

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
METER PIT, REMOVAL

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21

REV:11/01/25

a. Description. This work shall consist of removing abandoned meter pits in which the meter has been removed or for removing active meter pits in which there is a meter in use in the meter pit. In active meter pits, the meter will need to be relocated into the building it serves before the meter pit can be removed. This work must be done according to section 203 of the Standard Specifications for Construction except as modified herein.

b. Materials. Backfill shall meet the requirements for Granular Materials Class II as specified in the standard specifications.

1. Meter Pit, Rem. Removing abandoned meter pits in which the meter has already been removed or for removing active meter pits in which there is a meter in use in the meter pit. In active meter pits, the meter will need to be relocated into the building it serves before the meter pit can be removed. All work necessary to relocate the meter into the building shall be performed, measured, and paid separately.

A. The work to remove a meter pit shall consist of removing the meter pit structure in its entirety, backfilling the hole with compacted sand, and restoring the surface as necessary.

B. Payment for the work of plugging or bulkheading abandoned pipes, conduits, or service connections encountered in excavation, up to 12 inches, is included in payment for Meter Pit, Rem. This work shall only be done when specifically shown on the Drawings or required by the Engineer.

c. Construction. Remove the meter pit structure in its entirety. Bulkhead abandoned pipes, conduits, or service connections encountered in the excavation up to 12 inches in diameter, and backfill the hole with compacted granular material Class II to the surrounding ground surface.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Meter Pit, Rem	Each

The unit price shall include all materials, equipment, and labor required to complete this work.

Plugging or bulkheading abandoned pipes, conduits, or service connections encountered in the excavation up to 12 inches in diameter is included in payment for **Meter Pit, Rem.**

All work necessary to relocate the meter into the building shall be paid separately.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
BULKHEAD REMOVAL

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21

REV:11/01/25

a. Description. This shall consist of removing bulkheads in existing pipes or manholes. This work must be done according to section 203 of the Standard Specifications for Construction except as modified herein.

b. Materials. None specified.

c. Construction. This work shall consist of removing all concrete, mortar, and reinforcing, including any forms utilized for the placement of the bulkhead, and disposing of the resulting material, where shown on the or as directed by the Engineer. The removal shall also include any repairs or concrete patching required for a smooth finish to the remaining pipe(s) or structure.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item**Pay Unit**

Bulkhead, Rem, 6 inch to 23 inch	Each
Bulkhead, Rem, 24 inch or Larger	Each

Bulkhead, Rem, 6 inch to 23 inch and **Bulkhead, Rem, 24 inch or Larger** will be measured as units and include the cost of removing and disposing of materials and repairing any damage to the pipe remaining.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR**MANHOLE, VALVE CHAMBER, OR CATCH BASIN, REMOVAL**

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:08/19/21

REV:11/01/25

a. Description. This work must be done according to section 203 of the Standard Specifications for Construction except as modified herein.

b. Materials. Backfill must meet the requirements for granular materials Class II as specified in the standard specifications.

c. Construction. The Contractor must break the existing structure down to a point at least 3 feet below the pavement or ground elevation, clean out all rubble and sediment and break up the concrete floor to allow it to drain, and backfill the area with compacted granular material Class II.

1. Manhole, Valve Chamber, or Catch Basin, Removal. The Contractor shall break the existing structure down to a point at least three feet below the pavement elevation, clean out all rubble and sediment, and complete the work by either of the following methods. The first method is to break up the concrete floor to allow it to drain and backfill the area with compacted granular material Class II. The second method is to backfill the structure area with pea stone and seal the structure with a concrete cap Detail P-23A or P-23B. The remaining area above the concrete cap shall be filled with compacted granular material Class II backfill. The Contractor shall use a vibrator to aid in the compaction of the pea stone.

A. The entire structure may be removed and backfilled with compacted sand in lieu of either of the above-mentioned methods at the Contractor's option.

B. Payment for the work of plugging or bulkheading abandoned pipes, conduits, or service connections encountered in excavation, up to and including 12 inches, is included in payment for **Mh, Valve Chamber, or Catch Basin, Rem.**

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item**Pay Unit**

Mh, Valve Chamber, or Catch Basin, RemEach

The Contractor may remove the entire structure and backfill with compacted sand in lieu of the above method. There will be no additional payment to remove the entire structure.

Payment for the work of maintaining and reconnecting live sewers, plugging or bulkheading abandoned pipes, conduits, or service connections encountered in excavation, up to and including 12 inches, is included in payment for **Mh, Valve Chamber, or Catch Basin, Rem.**

The removal of manholes, valve chambers, or catch basins necessary to construct new structures or utilities, whether shown on the plans or as directed by Engineer, will be included in the items for construction of the new structures or utilities.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
ABANDON AND FILL UNDERGROUND UTILITIES

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:08/19/21

REV:11/01/25

a. Description. This work shall consist of filling existing underground utilities, greater than 6 inches in diameter, which are to be abandoned with a flowable fill grout mix. This work must be done according to section 204 of the Standard Specifications for Construction except as modified herein.

b. Materials.

1. Flowable Fill. The flowable fill grout shall consist of a mix of Portland cement, fly ash, water, and fine aggregate 2NS. The fine aggregate shall have 100% passing the 1-inch sieve. The flowable fill grout mix shall have a minimum density of 130 pounds per cubic foot, a minimum compressive strength of 50 psi and a maximum compressive strength of 100 psi. Approximate proportions are 50 pounds cement, 500 pounds fly ash, 1,850 pounds 2NS, and 50 gallons of water.

2. Lightweight/Low Density Cellular Concrete (LDCC) Flowable Fill. Use Cement and Fly Ash in accordance with section b.1. Provide LDCC mixture with following properties.

- A. Cast Density Range, 35-45 pounds per cubic foot.
- B. Minimum Compressive Strength (28 Days), 200 pounds per square inch.
- C. Flow Consistency, greater than 7 inches per ASTM D6103

c. Construction. All utilities to be abandoned shall be cut at each end of the pipe and filled from one end until the fill material comes out the other end. All open ends of the pipe to be filled are to be plugged with a concrete cap. Such plugging is included in the cost of filling the pipe.

1. LDCC Flowable Fill. Maximum time a any given flowable fill operation with LDCC Flowable Fill is 4 hours.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item

Pay Unit

Abandon and Fill Underground Utilities, _ inch diaFoot

The Contractor may remove the utility in lieu of filling it at their option. However, the Contractor will only be paid the same unit price for the item **Abandon and Fill Underground Utilities, ___ inch dia** in the proposal. This item is only for abandoning and filling those utilities called out on the plans or required to be abandoned and filled by the Engineer. The Contractor will not be paid for removal of existing utilities necessitated by the construction of other utilities.

Removal of existing or abandoned utilities to permit construction of new utilities is included in the items for construction of the new utilities.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
BRICK PAVEMENT REMOVAL

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:08/19/21

REV:11/01/25

a. Description. This work shall consist of removing and salvaging brick pavement as well as protecting and storing the brick. This work shall be done according to section 204 of the Standard Specifications for Construction except as modified herein.

b. Materials. None Specified.

c. Construction.

1. Removal.

A. Brick Pavement, Removal. Remove brick pavers where shown on the Plans, removing the sand setting bed, the concrete base course, and any underlying layers of aggregate or soil regardless of the depth of the material being removed.

B. Brick Pavement, Remove and Salvage. Carefully remove and salvage the brick pavers where shown on the Plans, removing the sand setting bed, the concrete base course, and any underlying layers of aggregate or soil regardless of the depth of the material being removed.

(1) After the brick have been removed, examine and separate pavers with chips or cracks from the rest of the pavers. Cracked pavers, previously cut pavers, and pavers with chipped surfaces shall not be salvaged and shall become the property of the Contractor. The Engineer shall have the final determination of the pavers to be salvaged.

(2) Salvaged brick pavers shall be carefully cleaned, stacked on pallets, temporarily stored and protected from theft or vandalism onsite within the road right-of-way, and delivered to a location within the City of Grand Rapids as directed by the Engineer. Contractor shall coordinate delivery and shall provide a manifest proving the delivery of pavers prior to payment. No non-brick construction debris (concrete, HMA, etc.) will be accepted.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Brick Pavt, Rem, Full Depth.....	Square Yard
Brick Pavt, Rem, Salv, Full Depth.....	Square Yard

Brick Pavt, Rem, Full Depth shall be paid for at the contract unit price and shall include all labor, equipment, and materials to remove and dispose the existing bricks and base material.

Brick Pavt, Rem, Salv, Full Depth shall be paid for at the contract unit price and shall include all labor, equipment, and materials to remove the existing bricks and base material, protect and store the brick, and deliver with manifest to the City of Grand Rapids as directed by the Engineer.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
PAVEMENT REMOVAL, MODIFIED

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21

REV:11/01/25

a. Description. This work consists of removing pavement in accordance with section 204 of the Standard Specifications for Construction except as modified herein. All removals shall be to a sawcut edge as indicated on the plans or as directed by the Engineer and shall include removal of the entire full depth of the pavement structure be it hot mix asphalt (HMA), concrete, or HMA on concrete, brick on concrete, etc., regardless of thickness of the materials.

See cross section plans for approximate depths and location of pavement types.

b. Materials. None specified.

c. Construction. Work shall be in accordance with section 204 of the Standard Specifications for Construction.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item**Pay Unit**

Pavt, Rem, ModifiedSquare Yard

The unit price shall be payment in full for any necessary grading, excavation, and backfill when not paid for separately.

The removal of curb and gutter will be paid for separately.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR**EXCAVATION AND BACKFILL FOR UNDERGROUND UTILITIES**

ENG/CITY OF GRAND RAPIDS

1 OF 7

ORG:08/19/21

REV:11/01/25

a. Description. The work shall consist of excavating and backfilling for storm sewers, sanitary sewers, water mains, conduits, and all other underground utilities including manholes, catch basins, and similar structures, including the removal of unstable or unsuitable soil under proposed utility bedding. All work in this Special Provision shall be in accordance with section 205 of the Standard Specifications for Construction, except as modified herein.

b. Materials.

1. Backfill and Bedding.

A. Bedding shall meet the requirements for granular material class II per section 902 of the Standards Specifications for Construction except that 100 percent of the materials shall pass a 3/8 inch sieve.

B. Gravel shall only be used for bedding when shown on the Plans, included in the proposal, specified in the Special Provisions, or when approved by the Engineer. Gravel for bedding shall conform to the following grading requirements:

Table 1
Grading Requirements for Gravel

Standard Sieve	Sieve Analysis, Total % Passing (a)
1 ½ in	100
1 in	95 – 100
½ in	30 – 60
No. 4	15 – 30
No. 200	0 – 30

a. Crushed material, minimum 80 percent

2. Water. The water used to obtain the desired moisture content of backfill material shall be taken from the City's water mains, unless otherwise specified.

c. Construction.

1. Excavation.

A. Excavation of the trench shall normally begin at the outlet end for sewers unless otherwise permitted by the Engineer and as may be agreed upon for other utilities. The excavation shall be true to line and grade as is required and shall be of sufficient width to provide ample working space and to permit ramming and compacting of bedding backfill around the utility, including sufficient space for bracing and supporting sides of trenches and for pumping and draining of groundwater and/or sewage.

B. Width of Trench. In addition to the provisions of the preceding paragraph, the maximum bottom width of trench shall be 36 inches for pipe, 8 inches to 12 inches inclusive in diameter. For larger sizes of pipe, the maximum width of trench shall be not more than 2 feet greater than the inside diameter of the pipe, except as otherwise specified or directed. The above limiting restrictions on trench width apply from outside bottom of pipe to 12 inches above outside top of pipe.

C. Unstable Foundation. When the bottom uncovered at the proposed grade is soft and cannot support the pipe or utility as determined by the Engineer, a further depth shall be excavated and refilled to the proposed grade in accordance with Standard Detail S-15 and compacted in 12-inch layers, or other means to ensure a firm foundation for the utility as approved by the Engineer. The volume of unstable foundation removed and replaced with approved materials shall be determined in cubic yards and computed by assuming that the cross-section area of the unstable foundation takes the form of a trapezoid as shown on Standard Detail S-15.

2. Tunneling shall be done only where shown in Plans, or as approved by the Engineer.

3. Extent of Open Trench. The excavation shall at all times be finished to grade for a safe distance in advance of the completed structures, but unless otherwise specifically approved or permitted by the Engineer, not more than 50 feet of trench shall be open at one time. The excavated earth along the line of the trench shall be controlled by the use made of the street or right-of-way by the public and shall always be confined to approved limits. ADA compliant pedestrian crossings shall be erected and maintained by the Contractor where designated by the Engineer. Excavation or use of land outside the street right-of-way or easement shown on the drawing will not be permitted, unless approval is granted by the Engineer, or, as specified on the drawing or in the Special Provisions.

4. Fire Hydrants and Water Main Valves shall be kept accessible for immediate use at all times, unless otherwise approved by the Engineer. Upon approval, the Contractor shall notify the Grand Rapids Water Department and Fire Department of any hydrants or valves to be taken out of service.

5. Existing Underground Structures and Utilities. The Contractor shall provide and install adequate supports and protection for all sewer and water pipes or other underground structures and utilities extending into or crossing the trench. Where gas mains, telecommunication cable or conduits, electric cable or conduits, or any other public or

private infrastructure extend into or across the trench, the Contractor shall notify the owner of the utility at once and provide such supports and protection as may be required.

A. Should any such gas main, telecommunication cable or conduits, electric cable or conduits, or any other public or private infrastructure require raising or lowering or moving to another location due to direct conflict, such changes will be made by the owner without additional expense to the Contractor.

B. Where sewers, water mains, cables, conduits, or all other underground structures and utilities are within the influence of the Contractor's trench opening, the Contractor shall so carry on their work at all times as not to cause damage to the structure, structures, or utilities.

C. Where crossing underneath transmission water mains (24 inch and larger), a structural support plan is required at all times a transmission water main joint or more than 5 feet of transmission main is exposed below the spring line of the pipe, unless otherwise approved by the Engineer. Structural support plan shall be signed and sealed by a professional engineer and allow no more than 0.01' of deflection of the transmission watermain.

D. Where gas, electrical, telephone, water, or sewage service connections to occupied buildings must be temporarily disconnected, the Contractor shall give at least 24 hours' notice to the affected building occupants of the time and duration of the anticipated cut-off.

E. When pipes, conduits, or sewers are removed from the trench, leaving "dead" ends in the ground, such ends shall be fully plugged or bulkheaded with brick and mortar by the Contractor in accordance with section 402 of the Standard Specifications for Construction.

F. Removal and replacement of existing street lighting, storm, sanitary, or water main structures necessary for the proposed utility construction shall be included in the unit cost of installing the utility, and no extra compensation will be allowed unless an item is included in the proposal for said removal and replacement.

G. The Contractor shall not abandon any unidentified pipes, conduit, mains, etc., without the approval of the Engineer. If approval is not given, the Contractor shall restore such pipes, conduits, water mains, etc., to service. The cost of restoration shall be the responsibility of the Contractor.

H. The removal of abandoned underground utilities, both public and private (such as street lighting, telephone or electrical conduits; gas mains, water mains, sewer, etc.), necessary to install new utilities shall be considered to be part of installing the new utility and will not be paid for separately.

6. Disposal of Water. The Contractor shall remove, by pumping, bailing, or otherwise, any water that may accumulate or be intercepted or be found in the trenches and in any other excavations made under this contract. The Contractor shall provide all temporary construction necessary to keep the trenches entirely clear of water while the structures and their appurtenances are being constructed. The Contractor shall at all times have sufficient

pumping equipment on the job ready for immediate use. Disposal of water will be considered as included in other items of work. If groundwater is contaminated, cease all operations and notify the Engineer immediately. Contaminated water will be paid for separately as defined in the City of Grand Rapids Special Provision for Contaminated Soil and Groundwater Procedures, and the Contractor shall proceed as defined in that Special Provision.

A. Discharge to Storm Sewer. The Contractor shall discharge water from dewatering operations to separate storm sewer whenever possible. The Contractor shall provide the Engineer notification prior to proposed dewatering operations and discharge. The Engineer will be responsible to provide any necessary notification to EGLE and the City of Grand Rapids ESD Stormwater Engineer of proposed discharge to the storm sewer system.

B. Discharge to Sanitary Sewer. Prior to groundwater discharge to a sanitary or combined sewer, the Contractor shall obtain discharge authorization from the City of Grand Rapids Industrial Pretreatment Program (IPP) Supervisor. For authorization, the Contractor shall complete the following:

(1) Contact the IPP Supervisor and inform them of the Project and Project location.

(2) Submit the required IPP checklist, including characterization of the waste stream for all parameters listed in the checklist.

(3) Submit completed IPP discharge authorization permit application.

(a) The Contractor shall be responsible for any fees based on the current fee schedule in the current water sewer rate study.

(b) Application shall be submitted 30 days prior to planned dewatering.

(4) Obtain IPP discharge authorization permit authorization.

C. Dewatering Flow Rates. Flow rates shall not result in a total flow rate that exceeds 50 percent of the capacity of the receiving sewer, or that will cause backups of the receiving sewer, including separate storm sewers, combined sewers, and sanitary sewers. The City Hydraulic Engineer shall determine the allowable total flow rate for dewatering activities.

D. The Contractor shall pay special attention to the water quality of the discharge and incorporate necessary measures to reduce suspended solids (i.e., stone, straw, or geotextile filters). The Contractor shall temporarily suspend the discharge of dewatering water to storm sewers, sanitary sewers, or combined sewers if necessary, to prevent basement backups, local flooding, or combined sewer overflows.

E. Dewatering methods used by the Contractor shall provide adequate protection against damage to properties in the area. The potential for settlement of structures located in the area shall be assessed prior to initiating the dewatering operation and specific measures shall be incorporated to avoid settlement where necessary. The

Contractor shall be solely responsible for any claims, suits, and causes of actions for environmental damage or system damage caused to public or private property resulting from their dewatering activities.

(1) The Contractor shall not discharge to the sanitary or combined sewer without obtaining the necessary permit from the City of Grand Rapids. The Contractor shall provide all necessary pretreatment controls to maintain compliance with the Discharge Authorization requirements. The pumping rate shall be controlled to meet Discharge Authorization limits. There shall be no sanitary sewer or stormwater sewer backups caused by this discharge alone or in conjunction with other discharges. In the event of a suspected backup or pending backup, the discharge shall be halted immediately. The Contractor shall be responsible for damages and reparations for any and all claims resulting from backups related to this discharge.

(2) In the event that problems are experienced that are due to this discharge alone or in conjunction with other discharges or in the event any changes in local, state, or federal regulations occur, the City Manager or his designee may revoke this permission at any time.

7. Bracing, Sheeting, and Shelving. The Contractor shall brace or slope back the sides of all excavations in accordance with current MIOSHA and OSHA regulations. The Contractor shall be responsible for the design, installation, and maintenance of all excavation safety measures.

A. Unless otherwise specified in the proposal, the costs incurred in the installation of bracing, sheeting, and shelving shall be included in the unit price bid for the work being performed.

8. Bedding and Backfill.

A. General Requirements. Bedding and backfill shall not be placed until the material has been approved by the Engineer. Bedding material shall be placed under and around the utility to a minimum depth of at least 1 foot above the top of the utility. Bedding shall be placed in layers not more than 6 inches in thickness and each layer thoroughly compacted without damaging or displacing the utility. Unless otherwise specified on the Plans, on the proposal, or in the other Special Provisions, backfill shall be of material as specified in this Special Provision. The backfill shall be placed in layers not more than 12 inches thick, each layer being fully compacted using vibrators or other mechanical means as approved by the Engineer. Flooding of trenches as a method of compaction will be not permitted. However, additional water may be required to reach desired moisture content of the backfill material. The backfill shall test at 95 percent of maximum unit weight as measured by the current Modified Proctor Test, ASTM Specification D1557.

B. Clay or other Hard Bottom. When the soil encountered at the proposed utility grade is clay or other hard material, the Contractor shall excavate such hard material to a depth of 6 inches below the bottom of the pipe or conduit and replace such material with material as specified in this Special Provision. Cost of such work shall be included in the unit price for the utility unless payment is specifically provided for in a contract item prior to bidding.

C. Special Requirements. In certain instances, the Engineer may choose to use the existing material excavated from the trench as backfill for the area of the trench above 1 foot above the top of the utility. When the conditions allowing this choice are known prior to bidding, the Plans, proposal, or Special Provisions shall so note that the general requirements regarding the material used for backfill in Paragraph A above relative to the area above 1 foot above the top of the utility does not apply. Material shall be placed as specified in Paragraph A, above.

(1) When the conditions are unknown prior to bidding and the decision is made by the Engineer in the field, a suitable reduction in unit price for eliminating the required granular backfill as specified in Paragraph A above shall be negotiated. Material shall be placed as specified in Paragraph A, above.

D. Excavated rock, boulders of more than one cubic foot, broken concrete, masonry, frozen material, tree roots, or other vegetable or organic matter, debris, and refuse shall not be used for backfill.

9. PVC Solid Wall, PVC Corrugated Pipe, Truss Pipe Installation. The construction methods used for PVC solid wall and truss pipe shall be as specified in ASTM D2321, Underground Installation of Flexible Thermoplastic Sewer Pipe, the applicable sections of this Special Provision, and the Manufacturer's recommendations.

10. Disposal of Excess Excavated Material. All excavated material in excess of that needed for backfill shall be disposed of by the Contractor at the Contractor's cost. The Engineer reserves the right to direct the Contractor to haul any excess material for filling any low street, alley, or sidewalk space to an established grade, provided that such haul is within the Project limits.

11. Rock Excavation.

A. In accordance with section 205 of the Standard Specifications for Construction.

B. Pipe Clearance in Rock. When rock is encountered in the excavation, it shall be removed to the depth shown on the Plans or 6 inches below the bottom of the utility when no underdrain is required. If an underdrain is required, additional excavation shall be made to the depth and width required for the underdrain. The width of rock excavation shall be 2 feet greater than the inside diameter of the utility, unless otherwise specified.

12. Prolonged Trench Maintenance. When conditions are such that the final restoration must be prolonged, the Contractor shall maintain all roadways, driveways, and sidewalks in a condition suitable for their convenient and safe use until such time as they are permanently restored.

13. Removing Abandoned Utilities. The cost of removal of all abandoned underground utilities (such as street light conduits, gas mains, water mains, etc.) necessary to install new underground utility lines shall be included in the unit price for installation of the utility.

14. Holding Utility and Street Lighting Poles. The Contractor shall be responsible for holding any utility or street lighting pole that are located adjacent to the proposed

underground utility or utilities that the Contractor is constructing, and they shall provide all necessary materials, labor, and equipment necessary for holding the pole, for adequate compaction of backfill near the pole, and for any temporary or permanent guys and anchors. Any damage to underground and/or overhead utilities shall be the responsibility of the Contractor and shall be repaired or replaced by the Contractor at their expense. All work associated with holding these poles shall be included in the major items of work for placing the utility or utilities.

15. Cleaning Up. The Contractor shall remove surplus excavated materials and materials for construction as the work progresses, and shall render the street suitable, safe, and convenient for traffic. Before final acceptance of the work, the Contractor shall remove all temporary traffic control, clean the street surface, walks, gutters, fences, lawns, private property, right-of-way, and structures, leaving them in as good condition as originally found or better, and shall remove all machinery, tools, surplus materials, temporary buildings, and other temporary structures from the site of the work. Furthermore, the sewers, manholes, inlets, etc., shall be cleared of all scaffolding, centering, rubbish, dirt, dams, or other obstructions.

d. Measurement and Payment. Payment for the work covered in this Special Provision shall be included in the unit price of the utility work being accomplished, the removal of unstable or unsuitable soil under proposed utility bedding will be paid separately using the following pay item(s).

Pay Item

Pay Unit

Unsuitable Soil, Rem and Replacement, with ___ Cubic Yard

Unsuitable Soil, Rem and Replacement, with ___ will be measured in cubic yards as specified in this Special Provision.

Rock Excavation will be measured and paid in accordance with section 205 of Standard Specifications for Construction.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
SOIL EROSION AND SEDIMENTATION CONTROL

ENG/CITY OF GRAND RAPIDS

1 OF 3

ORG:08/19/21

REV:11/01/25

a. Description.

1. General. Soil Erosion and Sedimentation Control (SESC) shall be in accordance with section 208 of the Standard Specifications for Construction, except as modified herein.

2. The Contractor shall act as the agent for the City of Grand Rapids with regard to all the duties and responsibilities in providing soil erosion and sedimentation controls for this project, and shall comply with all federal, state, and local laws and regulations regarding soil erosion and sedimentation control at the construction site until the project construction is completed, the site has been permanently stabilized, and the project is accepted by the City Engineer. The Contractor shall indemnify the City of Grand Rapids, its officers, employees, and agents, and shall be solely responsible for any penalty, fine, or financial loss attributable to any violations of any federal, state, and local laws and regulations regarding soil erosion and sedimentation control that may occur during the construction until the project is accepted by the City Engineer.

b. Materials. None Specified.

c. Construction.

1. The Contractor shall complete the Land Use Development Services (LUDS) application form, which includes an Authorization to Proceed with Earth Change. The application can be found in the bid documents or on the City's website. The Contractor, as Agent for the City, shall complete the application form, and shall prepare a soil erosion and sedimentation control plan utilizing the "Keying System" found in the State of Michigan, Department of Technology, Management and Budget entitled **Soil Erosion and Sedimentation Control Guidebook** at the following link:

https://www.michigan.gov/-/media/Project/Websites/dtmb/Facilities/SESC_Guidebook_2019.pdf?rev=95c96450cb36481ea0e5476feb95917d

and shall be in accordance with the **2021 Michigan Department of Transportation Soil Erosion and Sedimentation Control Manual** at the following link:

<https://www.michigan.gov/-/media/Project/Websites/MDOT/Programs/Highway-Programs/Environmental-Efforts/Stormwater-Management/Stormwater-Design-Professionals/SESC-Manual.pdf?rev=a567f85e54b04095a5bb657428861395>

2. A base drawing of the project can be obtained from the City Engineer; the drawing may be used to prepare the soil erosion and sedimentation control plan in applying for a LUDS permit. It is the Contractor's responsibility to ensure that the plan has sufficient

information to be acceptable to the Environmental Services Department (ESD) of the City of Grand Rapids. The Contractor shall submit a comprehensive and completed application, SESC plan, including project phasing if applicable, and pay the associated application and authorization fees to the ESD, 1120 Monroe Avenue NW, to obtain the LUDS permit. The authorization shall be issued by the ESD, signed by the Contractor, and all authorization fees paid prior to beginning construction.

3. The Contractor shall properly maintain and operate the soil erosion and sedimentation controls in accordance with the plan submitted for the authorization, inspect the construction activity at least once per week and within 24 hours after every precipitation event that results in a discharge from the site, and take any needed corrective actions. All catch basins in the Contractor's work area and those on adjacent streets affected by Contractor's vehicular tracking of soil and other materials shall be protected from sedimentation. All roadways within the Contractor's work and influence area shall be swept clean by the Contractor. Any soil tracked within the project limits shall be swept at least once daily. Any soil tracked outside the project limits shall be swept immediately. Waiting until the end of the work day to sweep the public right-of-way outside the project limits is not an acceptable practice.

4. **Stormwater Operator's Inspection** shall be performed by a Construction Site Stormwater Operator who has been certified by the Michigan Department of Environment, Great Lakes, & Energy (EGLE) to inspect all soil erosion and sedimentation controls for proper installation and maintenance. The certification shall be done in accordance with requirements of R323.1251 et seq. of the Michigan Administrative Code. The Contractor's certified Construction Site Stormwater Operator shall inspect the construction site at least once per week and within 24 hours after every precipitation event that results in a discharge from the site, and shall prepare a report of each inspection and any necessary corrective actions. The report shall be submitted to the ESD, 456-4088 (facsimile) or stormwater@grcity.us (email) within 24 hours of conducting the inspection. The reports shall be maintained by the certified Construction Site Stormwater Operator as a log of the inspections and shall be available for inspection by the Engineer, EGLE, and the public. The Contractor is responsible for properly maintaining and operating the soil erosion and sedimentation control measures and shall promptly take all necessary corrective actions as reported by the Construction Site Stormwater Operator or as directed by the Engineer or ESD. The Contractor shall retain a copy of the log on file for a period of 3 years from the date of the latest inspection or corrective action. The Contractor shall also furnish a copy of this log to the Engineer upon completion of the project.

5. **Dust Control.** During the construction, maintain adequate dust control measures to prevent detriment to the safety, health, welfare, or comfort of any person, or cause damage to any property, residence, or business.

A. Sweep streets a minimum of once per day and as required by the Engineer with a street sweeping machine. Apply dust palliative to all dirt roads and drives to control dust. Apply water to paved roads, as required, to remove and control dust. If directed by the Engineer, the Contractor shall apply dust control within 2 hours of being notified to do so. Special efforts shall be used to control dust near local businesses. Trucks hauling soil shall be tarped/covered at all times while traveling in the project area.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Soil Erosion and Sedimentation Control, Install	Lump Sum
Soil Erosion and Sedimentation Control, Maintain	Lump Sum
Soil Erosion and Sedimentation Control, Rem	Lump Sum
Soil Erosion and Sedimentation Control Plan	Lump Sum
Stormwater Operator's Inspection	Each
Dust Control	Lump Sum

Soil Erosion and Sedimentation Control, Install, Soil Erosion and Sedimentation Control, Maintain, and Soil Erosion and Sedimentation Control, Rem shall be paid for properly installing, maintaining, operating, and removing the soil erosion and sedimentation control measures according to the soil erosion and sedimentation control plan; making all corrective actions needed during the course of the project; and sweeping all roadways as often as necessary within the Contractor's work and influence areas. **Soil Erosion and Sedimentation Control, Maintain** will be paid in accordance with payment schedule for Mobilization.

Soil Erosion and Sedimentation Control Plan shall be for developing the soil erosion and sedimentation control plan, submission of an authorization application including related authorization fees.

Stormwater Operator's Inspection shall be for the inspection of the entire construction activity made by a certified stormwater operator as required; preparing a report upon each inspection and submitting it to the ESD; and keeping the appropriate log as noted above.

The Contractor shall be solely responsible for any penalty, fine, or financial loss attributed to the City for any of the Contractor's means, methods, and techniques or those of the Contractor's agents, which directly or indirectly cause/result in the project being declared in noncompliance with the soil erosion and sedimentation control plan, any soil erosion control permit, and/or any National Pollution Discharge Elimination System (NPDES) permit issued in connection with this project. The Contractor shall pay all re-inspection fees associated with any Notice of Violation or Corrective Action Order, or any civil penalties from a Civil Infraction Ticket issued by ESD, in addition to any criminal penalties for noncompliance with the soil erosion and sedimentation control regulations of the City of Grand Rapids, the State of Michigan, or the Federal Environmental Protection Agency.

Dust Control shall be payment in full for furnishing all labor, equipment, and material and all other work required for a complete job. **Dust Control** will be paid in accordance with payment schedule for Mobilization.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
TEMPORARY GRAVEL PAVEMENT

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21

REV:11/01/25

a. Description. This work shall consist of temporary gravel pavement on a prepared subbase or subgrade. The materials, equipment, construction methods, and measurement and payment shall be as specified in sections 302 and 306 of the Standard Specifications for Construction, and this Special Provisions. Crushed, recycled concrete pavement meeting the gradation requirements of the specified aggregate may be used at the Contractor's option.

b. Materials. The aggregate used for temporary gravel pavement materials shall be any aggregate described in section 302 and 306 of the Standard Specifications for Construction, or as approved by the Engineer.

c. Construction. In accordance with sections 302 and 306 of the Standard Specification for Construction.

The Contractor shall maintain temporary gravel for the remainder of the project.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item**Pay Unit**

Temp Gravel PavtTon

Temp Gravel Pavt shall be payment in full for all labor, equipment, and material necessary to place and remove gravel pavement as directed by the Engineer. The Contractor shall only be paid for temporary gravel pavement when so required by the Engineer to place such materials. The Contractor shall only be paid one time for the placement of **Temp Gravel Pavt** in any one area.

The Contractor shall not be paid for **Temp Gravel Pavt** when used for the Contractor's convenience. Any temporary gravel necessary in the roadway over utility trenches to maintain local and emergency traffic is included in the utility being placed and shall not be paid for separately.

Any temporary gravel used in maintaining a lane for emergency and local traffic along and parallel to the street will be paid for separately, included in the item **Roadway Grading**.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
BORE AND JACK STEEL CASING PIPE

ENG/CITY OF GRAND RAPIDS

1 OF 3

ORG:08/19/21

REV:11/01/25

a. Description. The work shall consist of boring and jacking a casing pipe including carrier pipe and shall include the furnishing of all labor, materials, and equipment necessary to complete the work as specified herein. All work in this Special Provision shall be in accordance with section 401 of the Standard Specifications for Construction, except as modified herein.

b. Materials.

1. Steel Casing Pipe.

A. Steel Casing Pipe shall be 35,000 psi minimum yield strength and shall conform to ASTM Designation A-139, Grade B or as indicated on the Plans.

B. Steel casing pipe for carrier pipe less than 6 inches in diameter shall have an inside diameter of casing pipe at least 2 inches greater than the largest outside diameter of the carrier pipe joints.

C. Steel casing pipe for carrier pipe 6 inches or greater in diameter shall have an inside diameter of casing pipe at least 4 inches greater than the largest outside diameter of the carrier pipe joints.

D. All steel casing pipe under Railroads shall have a specified minimum yield strength, SMYS, of at least 35,000 psi. Casing pipe shall have a minimum wall thickness as shown in the Plans (Cooper E-80 railroad loading). All casing pipe joints will be welded in accordance with AISC specifications, section 1-7-2. All joints will be full penetration. The inside diameter of the casing pipe shall be such as to allow the carrier pipe to be removed subsequently without disturbing the casing or the roadbed.

2. Carrier Pipe shall be as called for in the Proposal and on the Plans.

3. Sand.

A. Sand fill shall meet the requirement for Granular Materials Class II as specified in the standard specifications.

4. Pea Stone.

A. Pea stone shall meet the requirement for Open-Graded Aggregate 34R as specified in the standard specifications.

5. Flowable Fill. Flowable fill shall consist of a mixture of Portland cement, fly ash, sand (2NS), and water. Use materials conforming to the standard specifications except as

modified below. All non-structural flowable fill is intended to be removable using conventional mechanical excavation methods.

A. Use Type I Portland cement conforming to section 901 of the Standard Specifications for Construction and Class F or C fly ash as specified by ASTM C618 except that there is no limit on loss on ignition.

B. Produce a mix of cement, fly ash, sand, and water in the following proportions.

(1) Portland Cement 50 lb/cyd.

(2) Fly Ash 500 lb/cyd.

(3) Sand 2850 lb/cyd.

(4) Water approx. 376 lb/cyd. (sufficient to produce desired flowability)

c. Construction. Excavation and backfill for bore pits and other open cut portions of the bore and jack operation shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities.

1. Joints between adjacent sections of steel casing pipe shall be field welded.

2. Casing pipe shall be placed on an elevation so that the carrier pipe will be at the proper elevation. Wood blocking, or other Engineer approved blocking, shall be used as necessary to install the carrier pipe at the proper elevation inside the casing pipe. Said blocking shall be securely fastened to the carrier pipe.

3. The carrier pipe shall be joined to form a continuous run through the casing.

4. The space between the carrier pipe and the casing pipe shall be completely filled with dry sand, pea stone, or flowable fill.

5. Both ends of the casing pipe shall be sealed with Grade 3500 concrete in accordance with the section 1004 of the Standard Specifications for Construction or as indicated on the Plans.

6. In constructing the jacking pit, the Contractor will be required to tight-sheet the front and all sides of the pit as necessary to protect his operation and the adjacent property.

7. Railroad. When bore and jack is in conjunction with placement of casings and utilities under a railroad, the Contractor shall comply with all requirements of the approved railroad permit.

8. Contamination. If an area of contaminated ground or groundwater is encountered, cease all operations and notify the Engineer immediately. Contaminated material will be paid separately. Bore and jack shall not resume until approved by the City, railroad (if applicable), and the Engineer.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Bore and Jack ___ inch dia Steel Casing Pipe, Wall Thickness ___ inch, including ___ inch (carrier pipe).....	Foot
Obstruction Rem, Bore and Jack, Less than 18 inch	Each
Obstruction Rem, Bore and Jack, 18 inch to 36 inch	Each
Obstruction Rem, Bore and Jack, 37 inch or Larger	Each

The unit price shall be payment in full for furnishing all labor, equipment, and material including excavation and backfill, necessary jacking pits, dewatering, complying with railroad requirements, including settlement monitoring, connections to pipes on both ends of the boring and jacking, and restoration.

Bore and Jack ___ inch dia Steel Casing Pipe, Wall Thickness ___ inch, including ___ inch (carrier pipe) shall be measured in linear feet of the actual length of pipe bored and jacked into place. This length shall not exceed that shown in the Proposal except if additional length is specifically authorized by the Engineer. No additional payment shall be made for the length beyond the Proposal amount except as authorized by the Engineer.

Obstruction Rem, Bore and Jack, (size) will be paid for each obstruction of the specified size that is encountered that halts the forward progress of the bore and jack operation, such as concrete rubble, cobbles, etc. The size of each obstruction piece will be measured as the average of the maximum and minimum dimension of the piece removed. Payment includes all labor, materials, and equipment necessary to remove the obstruction, including the removal and re-insertion of the auger. Only those obstructions which prohibit the advancement of the auger will be considered for payment. No separate payment will be made for obstructions that come through the cutting head regardless of the size.

Handling and disposal of contaminated material, if required, and restoration will be measured and paid for separately.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
STORM SEWERS

ENG/CITY OF GRAND RAPIDS

1 OF 7

ORG:08/19/21

REV:11/01/25

a. Description. The work shall consist of constructing storm sewer pipe of the specified sizes placed in a trench and shall include furnishing and installing the storm sewer pipe, excavation, and backfill. The work also shall include connections to the sewer, sewer laterals to the abutting property when specified, and basin connections which connect catch basins to manholes or the storm sewers. All work in this Special Provision shall be in accordance with section 402 of the Standard Specifications for Construction, except as modified herein.

b. Materials. Provide materials in accordance with the following specifications. Material shall be new and free of defect from manufacture or transport.

1. Storm Sewer Pipe. Storm sewer pipe and pipe used for basin connections, shall conform to one or all of the following current ASTM or other specifications as designated on the plans or in the proposal. Pipe furnished for a particular project shall be of the materials shown on the plans or specified in the proposal for that project. No changes in pipe material or size will be allowed between manholes.

A. Concrete Pipe conforming to the current ASTM Specification C76 Classes I through V, as shown in the plans or specified in the proposal (Basin connections 12 inches and larger).

B. Ductile Iron Pipe shall conform to the current ANSI Standard A21.50, thickness Class 53 or as approved by the Engineer. Ductile Iron Pipe shall be cement mortar lined in accordance with the current ANSI Standard A21.51 as shown on the plans or specified in the Proposal (Storm sewers or basin connections).

2. Storm Sewer Lateral Pipe shall be PVC Truss, PVC Solid-Wall, or Ductile Iron Pipe, unless otherwise specified.

A. PVC Truss Pipe (Composite Sewer Pipe) shall conform to the current ASTM Specification D2680.

B. Concrete Pipe shall conform to the requirements of the current ASTM Specification C76 Class III for depths up to 10 feet. For depths over 10 feet, the pipe shall be as shown on the plans or listed on the Proposal (Laterals 10 inches or larger).

C. PVC Solid-Wall Pipe shall conform to the current ASTM Specification D3034 with a standard dimension ratio of 35 (SDR35).

D. Ductile Iron Pipe shall conform to the current ANSI Standard A21.50, thickness Class 53. Ductile Iron Pipe shall be cement mortar lined in accordance with the current ANSI Standard A21.51.

3. Storm Lateral Connections.

A. Concrete Pipe. Lateral connections to concrete sewer pipe shall be per Detail S-20 for sewers 12 inches or less.

B. Flexible Connections for PVC Truss, Solid Wall greater than 15 inches Clay and Concrete Pipe greater than 12 inches in diameter. Rubber sleeve lateral connection shall conform to ASTM F477.

(1) Furnish flexible connections from the following.

- (a) Inserta Tee by ADS.
- (b) or Engineer approved equal

C. Flexible Connections into manhole or large diameter sewer conforming to ASTM C478. Flexible manhole connections shall conform to ASTM C923.

(1) Furnish flexible manhole connections from the following.

- (a) KorNSeal by National Pollution Control Systems Inc.
- (b) PSX by Press Seal Gasket Corporation.
- (c) ZLok by Alok Products Inc
- (d) or Engineer approved equal.

D. Rubber sleeve lateral connection shall conform to ASTM F477.

E. Ductile Iron Pipe. Lateral connections to ductile iron sewer pipe shall be made with manufactured ductile iron fittings.

4. Storm Sewer Joints. Joints for Sewer, Sewer Laterals, and Catch Basin Connections shall conform to the following specifications.

A. Concrete Pipe. Joints for concrete Storm Sewer Pipe of 12-inch diameter and larger shall be of the round rubber gasket type, or Glipp Type, using a modified bell and spigot design. The spigot shall have an external groove accurately sized to receive the gasket, so that when the pipe is laid and the joint completed, the gasket shall be enclosed on all surfaces. Joints and gaskets shall conform to the current ASTM Specifications C443 except the taper on the conic surfaces of the inside of the bell and the outer surface of the spigot shall not be more than 2 degrees with respect to the longitudinal axis of the pipe. The durometer hardness of rubber gaskets shall be 45, plus or minus 5, and the gaskets shall have a circular cross section or be the Glipp Type. The Contractor shall furnish to the Engineer a detailed drawing showing the pipe and joint proposed to be furnished under these specifications.

B. PVC Truss Pipe and PVC Solid-Wall Pipe. Joints shall be chemically welded or shall be of the elastomeric gasket seal type as specified in the current ASTM Specification D3212. Care shall be taken to ensure that all joints are pushed to the full "home" position and held tightly in the "home" position during any grade or line adjustments. If solvent is used, pipe shall be rotated during joint insertion to ensure a complete spread of joining cement. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, and

adhesives shall be used as recommended by the pipe manufacturer. Installations of solvent weld joint pipe shall be installed in accordance with current ASTM specification F402, and all required precautions shall be taken to assure adequate trench ventilation and protection for workers installing the pipe. Swab-type applicators shall be used to apply primer and cement. Opened containers in the trench shall be protected from dirt, water, and other contaminants.

C. Ductile Iron Pipe. Joints shall be push-on type coupled in accordance with ANSI/AWWA C111/A21.11.

D. Mortar Joints for Storm Sewers. Only when specifically shown on the plans, listed in the Proposal, or approved by the Engineer, pipe joints on storm sewers can be made with mortar in lieu of the resilient rubber gasketed joint specified.

(1) Mortar joints shall be made as follows: After each section of pipe is laid, the lower portion of the bell shall be filled with mortar and the succeeding section shall be laid in place so that the inner surfaces of the abutting sections are flush. The remainder of the joint shall then be filled with mortar and sufficient additional mortar used to form a bead around the joint, which shall be flush with the outside diameter of the bell. The inside of the joint shall be wiped clean and smooth. The joints of concrete pipe shall be thoroughly wet before the mortar is placed. The use of a bituminous or similar type mastic will not be permitted.

5. Pipe Test Certification. Contractor shall make arrangements to furnish the Engineer with a satisfactory test report by an approved independent Testing Consultant to be hired by the City covering all pipe delivered to the site. It shall, as a minimum, include the following information as may be applicable: ASTM specifications, breaking test data, absorption test data, test cylinder data, and other information as may be required by the Engineer.

A. The Testing Consultant shall stamp all pipe covered by their test report and delivered to the job site.

B. The cost of the above described testing shall be paid for by the City. Any testing charges resulting from unsatisfactory pipe having been furnished shall be the responsibility of the Contractor.

C. The Engineer may, in cases where in their opinion the work is of such small quantity as to make the above requirement unnecessary, waive or alter these test requirements if so requested prior to delivery of pipe to a job site.

D. The Engineer also may, in cases where the pipe manufacturer has an approved testing facility, accept certification test reports of tests performed by the manufacturer.

6. Mortar. Mortar shall be Type R-2 per section 1005 of the Standard Specifications for Construction.

c. Construction.

1. Excavation and Backfill. Excavation and backfill for sewers shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities.

2. Handling.

A. Ceramic lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc., shall be placed inside the pipe and fittings for lifting, positioning, or laying.

3. Laying Sewer Pipe.

A. General. Alignment and depth of the pipe shall be as shown on the Plans, unless otherwise approved by the Engineer. The construction shall begin at the outlet end and proceed toward the upper end. The pipe shall be carefully laid in the prepared trench to the line and grade as shown on the Plans or as approved by the Engineer, with the spigot end downstream. The bottom of the trench shall be so shaped to permit a firm and even bearing along the barrel of the pipe. A sufficient sand cushion shall be provided in clay soil as specified in the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities, where approved by the Engineer. The pipe shall be fitted close and tight and with smooth inverts. All connections to existing manholes shall be of the flexible type (rubber boot) that conform to ASTM C923.

(1) Flexible Connection. KorNSeal by National Pollution Control Systems Inc., PSX by Press Seal Gasket Corporation, Z Lok by A lok Products Inc, or Engineer approved equal.

(2) Concrete Joints. Wrap pipe joints, with a diameter greater than 24 inches, using geotextile fabric. Use geotextile at least 22 inches wide, centered on the joint.

B. Laser. The Contractor shall use the laser beam method of maintaining line and grade for sewer construction. If requested by the Engineer, the Contractor shall submit evidence to the Engineer that a qualified operator will handle the laser beam equipment during the course of construction.

(1) The Engineer shall place the line and grade stakes at each manhole, or more often, as determined appropriate. The Contractor shall check the line and grade at every point at which a stake has been placed.

C. Laterals. The openings for laterals shall be tees or wyes (unless otherwise noted) placed at the locations shown on the Plans or as approved by the Engineer, and the pipe shall be laid from the tee to the property line. These laterals shall be laid at right angles to the street line unless otherwise directed and shall be laid on a uniform line and grade from the sewer opening to the property line. Lateral shall be constructed at a minimum 1 percent grade from the main to the right-of-way or easement line.

(1) Approved premanufactured pipe-to-pipe adapters shall be utilized on all laterals where more than one type of pipe is used.

(2) Sewer laterals shall be cored into concrete pipe and shall be fitted with a flexible connection.

D. Other Connections. All other connections shall be made in tee or wye openings at the locations shown on the Plans or as approved by the Engineer.

E. Cut-Ins. When cutting into a sewer or manhole, the opening in the larger sewer shall be no larger than is necessary to connect the new sewer or lateral. Openings shall be circular. All broken or surplus material shall be removed from both sewers.

(1) When the larger sewer is of reinforced concrete construction, the reinforcing steel shall be carefully cut off to the proper distance to avoid spalling the concrete. For connecting clay or concrete sewers greater than 24 inches, the sewer shall be neatly grouted into the receiving sewer as approved by the Engineer. For connecting clay or concrete sewers, 12 inches through 24 inches, the hole shall be cored in, and the connection between the new sewer and the sewer which was cut into shall be made with a flexible rubber boot, or manufactured lateral connection.

(2) For PVC pipe up to 15 inches, the connection shall be made using a saddle, solvent welded onto the cut pipe. The saddle shall be anchored with two stainless steel clamps in addition to the solvent weld. The saddle shall cover at least one half the outside diameter of the pipe. Connections greater than 15 inches shall be a flexible connection in accordance with subsection b.3 of this special provision.

F. Cutting PVC, Truss, PVC Solid-Wall Pipe, and PVC Corrugated Pipe. The cutting of PVC truss pipe and PVC solid-wall pipe lengths, where required, shall be performed by the use of tools or equipment that will provide a neat, perpendicular cut without damage to the plastic or filler material. Bowing or warping of PVC pipe can occur with temperature fluctuations. The Contractor shall store and protect from sunlight the pipe to minimize bowing. Nominal 12.5-foot pipe lengths having deviations from straight greater than 1 inch shall not be used.

4. Concrete Cradle. Where a concrete cradle is required, it shall be built of concrete Grade 3500, as specified in the Standard Specifications for Construction, and to conform to the details and at the locations shown on the Plans or as approved by the Engineer.

5. Video Inspection of Sewers.

A. After completion of a section of sewer and prior to placing the sewer into service, the Contractor shall perform a video inspection. The inspection shall be completed by trained and experienced personnel, with knowledge of the operation of the equipment, as well as the design and the construction of the sewer.

6. Sewer Reconstruction.

A. Removal of Existing Sewer. When so noted on the Plans, the work under this Special Provision shall include the removal of all existing sewers and laterals, which are to be replaced by the reconstructed sewer system. No extra compensation will be paid for said removal or for any necessary plugs.

B. Maintaining Existing Sewer and Sewer Services Flow.

(1) The Contractor shall maintain uninterrupted sewer service to all properties within and adjoining to the Project. The Contractor shall be responsible for the cost of any damages that occur because of a failure to maintain sewage flow.

(2) The Contractor shall make every reasonable effort to maintain uninterrupted water and sewer service to all property owners adjoining the project. In the event that such interruption of service is unavoidable it shall be done only with prior approval of the Engineer. Any necessary pumping of sewage for any reason whatever shall be the responsibility of the Contractor. This responsibility shall commence at the time the Contractor commences operations, unless otherwise required in the Project Special Provisions.

(3) Dry weather flows from existing upstream sewers may be bypass pumped during work hours. Bypass pumping of wet weather flows will not be allowed.

(4) The relaying of any sewer laterals shall be coordinated with the property owners and it shall be the responsibility of the Contractor to maintain sewage flow as necessary. Any interruption of service shall be done only with the prior approval of the Engineer.

(5) The Contractor shall be held responsible and shall plan his construction activities such that continuity of storm water conveyance system is maintained. All costs, damages, and fines resulting from any failure shall be borne by Contractor.

C. Reconnection of Laterals. The Contractor shall carefully uncover the existing storm sewer and locate all connections thereto. It shall be the Contractor's responsibility to reconnect all live laterals. The Contractor shall place tees or wyes in the reconstructed sewer as close to the existing laterals as is possible. No tee or wye shall be placed upstream from the lateral. Tees and wyes shall be shop fabricated. No field connections into the reconstructed sewer line will be allowed, unless approved by the Engineer. Any necessary additional lateral alignment may be accomplished by using premium jointed bends, provided that no bends shall be sharper than 45 degrees.

(1) During the process of construction, the Contractor shall video existing storm laterals for the purpose of making certain that all existing storm laterals have been reconnected. The Contractor shall make the arrangements necessary to gain access to buildings adjoining the project.

(2) The Contractor shall clean and inspect the lateral to the property line and advise the Engineer of the condition of the lateral prior to making the connection.

(3) The necessary field connection between the new lateral pipe and the existing lateral pipe shall be made by cutting the new lateral pipe to the proper length, inserting a prefabricated pipe to pipe adapter, and pouring a concrete collar not less than 6 inches thick by 12 inches wide around the joint. In the event the lateral is constructed of truss pipe, no concrete collar is to be placed. No misalignment or angle point will be allowed at the field connection.

(4) Existing laterals that are determined to be abandoned, shall not be connected or stubbed to the ROW line. All live services to be noted and placed on the record Plans.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Storm Sewer, C76 CI __, __ inch.....	Foot
Storm Sewer, DI CI __, __ inch	Foot
Tee on __ inch Storm Sewer, __ inch	Each
Basin Connection, C76 CI __, __ inch	Foot
Basin Connection, DI CI __, __ inch	Foot
Storm Sewer Lateral, C76 CI __, __ inch	Foot
Storm Sewer Lateral, DI CI __, __ inch	Foot
Storm Sewer Lateral, D2680, __ inch	Foot
Storm Sewer Lateral, SDR __, __ inch	Foot
Maintain Storm Sewer Serv	Lump Sum
Core and Boot __ inch Storm Sewer into Sewer or Mh	Each
Core and Seal __ inch Storm Sewer into Sewer or Mh	Each

The unit price shall be payment in full for furnishing all labor, equipment, and material and shall include all clearing, excavation, trenching, cofferdams, dewatering, cut-ins, furnishing and placing the storm sewer pipe, fittings and plugs, bedding, all backfilling, disposal of excess material, temporary sheeting and bracing, removal of abandoned utilities and services, temporary support, removal and replacement of existing utilities and services, and the repair and replacement thereof if damaged, connection of existing sewers, testing, and all other work required for a complete job.

Storm Sewers of the size(s) shown in the Proposal shall be measured in lineal feet along the centerline of the pipe, without reductions in length for manholes or other structures.

Storm Sewer Laterals of the size(s) shown in the Proposal shall be measured in lineal feet along the centerline of the pipe from the center of the main line sewer to the other end of the pipe.

Tees and Wyes shall be measured as units furnished. Payment for laying tees or wyes shall be included in the unit price for furnishing and laying the storm sewer.

Basin Connections of the size(s) shown in the Proposal shall be measured in lineal feet along the centerline of the pipe from the center of the manhole or receiving sewer to the center of the catch basin.

Maintain Storm Sewer Serv shall be payment in full for furnishing all labor, equipment, and material and all other work required for a complete job. **Maintain Storm Sewer Serv** will be paid in accordance with payment schedule for Mobilization. When **Maintain Storm Sewer Serv** is not included in the Proposal or call for on the plans, maintaining storm sewer service shall be considered included in the other contract Pay Items.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
STORM MANHOLES, CATCH BASINS, AND SIMILAR STRUCTURES

ENG/CITY OF GRAND RAPIDS

1 OF 6

ORG:10/27/21

REV:11/01/25

a. Description. The work shall consist of constructing manholes, catch basins, and similar structures including castings, according to the Standard Details or Plans. All work in this Special Provision shall be in accordance with section 403 of the Standard Specifications for Construction, except as modified herein.

b. Materials. Provide materials in accordance with the following.

1. Gray Iron Castings. In accordance with the current MDOT Standard Details and the Standard Specifications for Construction.

A. The manhole cover and frame, catch basin grate and frame, outlet hoods, and other similar combinations of castings shall be machined to fit and to the dimensions shown on the appropriate Standard Detail so that there will be an even bearing.

B. Furnish castings in accordance with the details on the plans, standard details, and the following.

- (1) Storm manhole casting, Detail S-13
 - (a) #1045Z Frame with Specialized Lettered Cover, Type C by EJ
 - (b) #R-1642G by Neenah
 - (c) or Engineer approved equal.
- (2) Storm manhole casting, bolt down, Detail S-14
 - (a) #1040ZPT, #1040APT Assembly with Specialized Lettered Cover, Type C by EJ
 - (b) #R-1916-F by Neenah
 - (c) or Engineer approved equal.
- (3) Storm manhole castings, oversized
 - (a) #1588 by EJ with Specialized Letter Cover by EJ
 - (b) #3166 by EJ with Specialized Letter Cover by EJ
 - (c) #R-1578 by Neenah
 - (d) or Engineer approved equal.
- (4) Catch basin casting, standard Detail S-3, Detail S-6, Detail S-6A, Detail P-8
 - (a) #7020, Type #1 back, Type M2 grate by EJ
 - (b) R-3031A by Neenah
 - (c) or Engineer approved equal.
- (5) Catch basin casting, double Detail S-4
 - (a) #7030, Type #1 back, Type M3 grate by EJ
 - (b) R-3067 by Neenah

- (c) or Engineer approved equal.
- (6) Catch basin casting, roll curb and gutter Detail P-5B
 - (a) #7490Z by EJ
 - (b) #R-3501-R by Neenah
 - (c) or Engineer approved equal.
- (7) Catch basin casting, valley gutter Detail P-5C
 - (a) #7568 by EJ
 - (b) #R-3350 by Neenah
 - (c) or Engineer approved equal.
- (8) Outlet hood Detail S-3, Detail S-4, Detail S-7
 - (a) #5954 by EJ
 - (b) R-3701 by Neenah
 - (c) or Engineer approved equal.
- (9) Infiltration basin Detail S-5
 - (a) #6508 by EJ
 - (b) R-4340-A by Neenah
 - (c) or Engineer approved equal
- (10) Alley basin Detail S-7
 - (a) #5105 by EJ
 - (b) R-3036-A by Neenah
 - (c) or Engineer approved equal.
- (11) Ditch basin Detail S-8
 - (a) #6508 by EJ
 - (b) R-4340-A by Neenah
 - (c) or Engineer approved equal.

2. Precast Reinforced Concrete Manholes and Catch Basins. All manholes including their cone sections shall conform to current ASTM C478 and catch basins to current ASTM C913, with rubber gasketed joints conforming to current ASTM Specification C443 or flexible butyl sealant joints conforming to the current ASTM Specification C990.

A. Furnish premium rubber or butyl rubber gaskets:

- (1) O-Ring by Press Seal Gasket Corporation.
- (2) Tylox SOCL profile gaskets by Hamilton Kent.
- (3) EZ Stick by Press-Seal,
- (4) Seal No. 2 by Hamilton Kent
- (5) ConSeal CS-102
- (6) or Engineer approved equal.

3. Adjusting Rings. Castings for structures specified in this Special Provision shall be adjusted to finished grades using precast concrete rings, or concrete bricks as shown on the Standard Details.

4. Mortar. Mortar shall be Type R-2 per section 1005 of the Standard Specification for Construction.

5. Concrete for adjustment of manhole castings shall be Grade 3500 as specified in the Standard Specifications for Construction.

6. Brick or Block Masonry units and precast concrete sections shall conform to the ASTM Specifications as follows:

A. Concrete Brick shall conform to the requirements for Grade A of the current Specifications for Concrete Building Brick, ASTM C55.

B. Concrete Blocks shall conform to the requirements of the current Specifications for Concrete Masonry Units for Construction of Catch Basins and Manholes, ASTM C139.

7. Plastic Coated Steel Steps.

A. Plastic shall conform to the requirements for Type II, Grade 49108 or Grade 16906 of the current Specifications for Propylene Plastic Molding and Extrusion Materials, ASTM D4101.

B. Steel shall conform to the requirements for Grade 60 of the current Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement, ASTM A615.

C. Furnish plastic coated steel steps.

- (1) ML-10-NCR by American Step Company
- (2) PS1-PF by M.A. Industries.
- (3) or Engineer approved equal.

8. Flexible Connections.

A. Furnish flexible manhole connection that conform to ASTM C923.

- (1) KorNSeal by National Pollution Control Systems Inc.
- (2) PSX by Press Seal Gasket Corporation.
- (3) Z Lok by A lok Products Inc
- (4) or Engineer approved equal.

9. Precast Reinforced Concrete Structures, Concrete Mortar, and Steel Reinforcement. Precast reinforced concrete structures, mortar, grout, and steel reinforcement shall be as specified in the standard specifications.

10. Nonwoven Geotextile Separator for Infiltration Basin stone shall be in accordance with section 910 of the Standard Specifications for Construction.

11. Infiltration Basin Stone shall be Coarse Aggregate 6A as specified in section 402 the standard specification or Engineer approved equal.

c. Construction.

1. Excavation. Excavation and backfill shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities. Excavation shall be of sufficient dimensions to provide ample space for sheeting and bracing where sheeting and bracing are required, and ample space to perform the work in a satisfactory manner and in accordance with current MIOSHA and OSHA regulations.

2. Infiltration. With the exception of Infiltration Basins and Catch Basins with bleeder pipes, all structures and manholes to be built under this Special Provision shall be made water-tight. Any infiltration which is detected shall be eliminated by the Contractor.

3. Brick or Block Units. Shall be laid in such a manner that the courses will be true to line and with the joints fully bonded.

A. In a structure of cylindrical design, radius blocks shall be used.

B. In a structure of rectangular design, the bricks shall be laid in alternate courses of headers and stretchers.

4. Manholes, Catch Basins, and Alley Basins. All manholes, catch basins, and alley basins shall be constructed of precast reinforced concrete sections, as shown on the Standard Details or Plans. Masonry and cast-in-place manholes, catch basins, and alley basins will not be allowed unless specified, or approved by the Engineer

A. Openings shall be provided in the manholes, catch basins, and alley basins for connections, including future connections, as shown on the Plans of such size and at such elevation as required and shall be included in the cost of the construction of the manholes, catch basins, and alley basins. All openings in manholes, catch basins, and alley basins for the purpose of receiving pipes up to and including 24-inch diameter (including openings for future pipes) shall be fitted with a connection of the flexible type connector. Flexible connectors on manholes shall be factory installed. Openings for future connections shall be sealed by an approved prefabricated cap.

B. The outside surface of brick or block manholes shall be parged 1/2-inch thick with mortar. The inside surface of all brick or block catch basins shall be parged with mortar one-half inch thick from the bottom to the corbel.

C. The manhole castings shall be set in a full bed of mortar with the top at the required elevation. Chimneys, including castings, shall be no more than 20 inches high, unless otherwise approved by the Engineer.

D. All catch basins shall be fitted with a standard cast iron hood as shown on the applicable Standard Details.

5. Drop Inlet or Manholes to Catch Basins shall be constructed to conform to the Standard Details and Plans. When an inlet of this design is to be used for a direct connection to a manhole, and is so specified on the Plans, the work shall be done in the same manner as when the connection discharges into a catch basin.

6. Adjusting and Finishing Castings and Oversized Castings. The Contractor shall be required to adjust manhole, oversized manhole, catch basin and flat grate castings to the proposed elevation or as required by the Engineer. Castings shall be adjusted according to standard detail P-22. The work of adjusting shall include removal of material and building up with grade rings to the proposed elevation. The following work shall be included:

A. The excavation or removal of existing unclassified materials, such as pavement, pavement base, earth, etc., so that the work of adjusting the casting can be done.

B. The building up with concrete grade rings, where necessary.

C. The setting and finishing of the new casting in accordance with 4.C of this Special Provision.

7. Bleeders when identified on the Plans are required for storm manholes and catch basins as shown on the applicable Standard Details.

A. Such bleeders shall be installed in accordance with the Standard Details unless otherwise shown on the Plans.

8. Backfill for Structures specified in this Special Provision shall be Granular Material Class II in accordance with the standard specifications, unless otherwise shown on the Plans or approved by the Engineer and placed in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Storm Mh, ___ foot dia, Det ___	Each
Storm Mh, ___ foot dia, Det ___, Add Depth over 15 foot	Foot
Catch Basin, ___ foot dia, Det ___	Each
Drop Inlet, Det S-6	Each
Drop Mh, Det S-6A	Each
Alley Basin, ___ foot dia, Det S-7	Each
Ditch Basin, ___ foot dia, Det S-8	Each
Infiltration Basin, ___ foot dia, ___ foot Sump, Det S-5	Each
Infiltration / Sediment Basin, ___ foot dia, ___ foot Sump, Det ___	Each

The unit price shall be payment in full for furnishing all labor, equipment, and material and shall include all clearing, excavation, trenching, cofferdams, dewatering, furnishing and placing the structures, all backfilling, disposal of excess material, temporary sheeting and bracing, removal of abandoned utilities and services, temporary support, removal and replacement of existing utilities and services, and the repair and replacement thereof if damaged, connection of existing sewers, testing, and all other work required for a complete job.

Manholes and catch basins includes furnishing and installing the structure, grade rings, casting, and all other accessories as specified and detailed.

Furnishing, adjusting, and finishing of castings on new manholes, catch basins, and similar structures is included in the cost of the manhole, catch basin, and similar structure and shall not be paid for separately.

Infiltration Basin, __ foot dia, __ foot Sump, Det S-5 and Infiltration / Sediment Basin, __ foot dia, __ foot Sump, Det __ includes the furnishing and installing of structure, cast iron hood, geotextile fabric, stone backfill, grade rings, casting, and backfill.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
**ADJUSTING CASTINGS ON MANHOLES, CATCH BASINS, AND SIMILAR
STRUCTURES**

ENG/CITY OF GRAND RAPIDS

1 OF 4

ORG:07/18/22

REV:11/01/25

a. Description. The work shall consist of adjusting castings on manholes, catch basins, and similar structures; and rebuilding the top portions of existing manholes, catch basins, and similar structures. Similar structures are structures that resemble a manhole or catch basin including but not limited to valve chambers, electrical manholes, and infiltration basins. All work in this Special Provision shall be in accordance with section 403 of the Standard Specifications for Construction, except as modified herein.

b. Materials. Furnish castings in accordance with the details on the plans, standard details, and from the following.

1. Castings.

- A. Storm, Sanitary and Water manhole casting, Detail S-13
 - (1) #1045Z Frame with Specialized Lettered Cover, Type C by EJ
 - (2) #R-1642G by Neenah
 - (3) or Engineer approved equal.
- B. Storm, Sanitary and Water manhole casting, bolt down, Detail S-14
 - (1) #1040ZPT, #1040APT Assembly with Specialized Lettered Cover, Type C by EJ
 - (2) #R-1916-F by Neenah
 - (3) or Engineer approved equal.
- C. Storm, Sanitary and Water manhole castings, oversized
 - (1) #1588 by EJ with Specialized Letter Cover by EJ
 - (2) #3166 by EJ with Specialized Letter Cover by EJ
 - (3) #R-1578 by Neenah
 - (4) or Engineer approved equal.
- D. Sewer Cleanout Casting Detail S-9
 - (1) R-4055 by Neenah
 - (2) # 6306A by EJ
 - (3) or Engineer approve equal
- E. Lamp Hole Detail S-11
 - (1) R-1973-1 by Neenah
 - (2) #157010 with 2965A Cover by EJ.
 - (3) or Engineer approved equal.

- F. Catch basin casting, standard Detail S-3, Detail S-6, Detail S-6A, Detail P-8
 - (1) #7020, Type #1 back, Type M2 grate by EJ
 - (2) R-3031A by Neenah
 - (3) or Engineer approved equal.
 - G. Catch basin casting, double Detail S-4
 - (1) #7030, Type #1 back, Type M3 grate by EJ
 - (2) R-3067 by Neenah
 - (3) or Engineer approved equal.
 - H. Catch basin casting, roll curb and gutter Detail P-5B
 - (1) #7490Z by EJ
 - (2) #R-3501-R by Neenah
 - (3) or Engineer approved equal.
 - I. Catch basin casting, valley gutter Detail P-5C
 - (1) #7568 by EJ
 - (2) #R-3350 by Neenah
 - (3) or Engineer approved equal.
 - J. Outlet hood Detail S-3, Detail S-4, Detail S-7
 - (1) #5954 by EJ
 - (2) R-3701 by Neenah
 - (3) or Engineer approved equal.
 - K. Infiltration basin Detail S-5
 - (1) #6508 by EJ
 - (2) R-4340-A by Neenah
 - (3) or Engineer approved equal.
 - L. Alley basin Detail S-7
 - (1) #5105 by EJ
 - (2) R-3036-A by Neenah
 - (3) or Engineer approved equal.
 - M. Ditch basin Detail S-8
 - (1) #6508 by EJ
 - (2) R-4340-A by Neenah
 - (3) or Engineer approved equal.
- 2. Adjusting Rings. Castings shall be adjusted to finished grades using precast concrete rings, or concrete bricks as shown on the Standard Details.
 - 3. Mortar. Mortar shall be Type R-2 per section 1005 of the Standard Specification for Construction.
 - 4. Concrete for adjustment of manhole castings and valve boxes shall be Grade 3500 as specified in current standard specifications.

5. Brick or Block Masonry units and precast concrete sections shall conform to the ASTM Specifications as follows:

A. Concrete Brick shall conform to the requirements for Grade A of the current Specifications for Concrete Building Brick, ASTM C55.

B. Concrete Blocks shall conform to the requirements of the current Specifications for Concrete Masonry Units for Construction of Catch Basins and Manholes, ASTM C139.

6. Plastic Coated Steel Steps.

A. Plastic shall conform to the requirements for Type II, Grade 49108 or Grade 16906 of the current Specifications for Propylene Plastic Molding and Extrusion Materials, ASTM D4101.

B. Steel shall conform to the requirements for Grade 60 of the current Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement, ASTM A615.

c. Construction.

1. Adjusting and Finishing Castings and Oversized Castings. In the prosecution of the work, the Contractor shall be required to adjust manhole, oversized manhole, catch basin, and flat grate castings to the proposed elevation or as required by the Engineer. Castings shall be adjusted according to standard detail P-22. At locations where the existing castings are not suitable as determined by the Engineer, the Contractor shall furnish new castings. Old castings not suitable for reuse shall be disposed of by the Contractor, unless the Plan or Proposal items specifically call for them to be salvaged. When salvaged the Contractor shall stockpile the castings onsite and notify the Engineer who will arrange for their pickup by the City. The work of adjusting shall include the removal of (temporary lowering) and building up of the top vertical foot of new masonry on the existing masonry, concrete grade rings, or a combination of each. The top vertical foot measurement does not include the height of the casting. The following work shall be included:

A. The excavation or removal of existing unclassified materials, such as pavement, pavement base, earth, etc., so that the work of adjusting the casting can be done.

B. The breaking out or removal of the existing casting from the manhole, catch basin, or other structures.

C. The tearing down or the building up of the top one foot of masonry and concrete grade rings, where necessary, or a combination of each.

D. The setting and finishing of the existing casting or new casting in a full bed of mortar with the top at the required elevation. Chimneys, including castings, shall be no more than 20 inches high, unless otherwise approved by the Engineer.

2. Rebuilding Manholes or Catch Basins. Whenever existing manholes, catch basins, or similar structures require more than 1 foot of removal and building up they shall be rebuilt according to the appropriate Standard Detail for such structure. When rebuilding of the

structure requires a new flat top, the work shall be done in accordance with Standard Detail S-10.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Mh Casting, Furn	Each
Mh Casting, Adj	Each
Mh Casting, Oversized, Furn	Each
Mh Casting, Oversized, Adj	Each
Mh or Catch Basin, Rebuild	Foot
Mh or Catch Basin, Rebuild with Flattop, Det S-10	Each
Catch Basin Casting, Furn	Each
Catch Basin Casting, Adj	Each

Furnishing, adjusting, and finishing of castings on new manholes, catch basins, and similar structures is considered included in the cost of the manhole, catch basin and similar structure and shall not be paid for separately.

When the top of the existing structure is raised or lowered less than one foot, the cost of such work shall be included in the contract unit price for **Mh Casting, Adj, Mh Casting, Oversized, Adj,** or **Catch Basin Casting, Adj,** unless otherwise specified.

Payment for **Mh or Catch Basin, Rebuild** includes raising or lowering the top of the Manhole or Catch Basin more than one foot. Payment will be made at the contract unit price per vertical foot of new masonry completed that is greater than one vertical foot.

When rebuilding of the structure requires a new flattop, the work shall be done in accordance with Standard Detail S-10, and the cost of such work shall be included in the contract unit price for **Mh or Catch basin, Rebuild with Flattop, Det S-10.** In this case, **Mh or Catch Basin, Rebuild,** shall not be paid separately and all repairs shall be considered included in **Mh or Catch basin, Rebuild with Flattop, Det S-10.**

Valve chamber and electrical manhole adjustment and rebuild items shall be paid for at the contract unit price for manhole related items. Infiltration basin adjustment and rebuild items shall be paid for at the contract unit price for catch basin related items.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
MANHOLE CASTING, ADJUSTING, HEAVY

ENG/CITY OF GRAND RAPIDS

1 OF 4

ORG:03/31/25

REV:11/01/25

a. Description. This work consists of surface preparation, furnishing, and installing concrete and rubber adjusting rings for proposed manholes shown on the Plans or as directed by the Engineer. The work also consists of furnishing and installing concrete and rubber adjusting rings for existing manhole adjustments and rebuilds. All work shall be in accordance with section 403 of the Standard Specifications for Construction, except as modified herein

b. Materials. Furnish castings in accordance with the details in this special provision, on the plans, standard details and from the following.

1. Castings.

- A. Storm, Sanitary and Water manhole casting, Detail S-13
 - (1) #1045Z Frame with Specialized Lettered Cover, Type C by EJ
 - (2) #R-1642G by Neenah
 - (3) or Engineer approved equal.
- B. Storm, Sanitary and Water manhole casting, bolt down, Detail S-14
 - (1) #1040ZPT, #1040APT Assembly with Specialized Lettered Cover, Type C by EJ
 - (2) #R-1916-F by Neenah
 - (3) or Engineer approved equal.
- C. Storm, Sanitary and Water manhole castings, oversized
 - (1) #1588 by EJ with Specialized Letter Cover by EJ
 - (2) #3166 by EJ with Specialized Letter Cover by EJ
 - (3) #R-1578 by Neenah
 - (4) or Engineer approved equal.

2. Adjusting Rings.

A. Concrete Adjusting Rings. In accordance with ASTM C478. Concrete adjusting rings shall be 2-inch to 12-inch in thickness.

B. Rubber or Polypropylene Adjusting Rings. Rubber or Polypropylene adjusting ring shall be 1/2-inch to 3-inch, or tapered thickness. A single rubber or polypropylene adjusting ring directly under the casting shall be used on each manhole adjustment.

- (1) Infra-Riser by East Jordan Iron Works.
- (2) Flex-O-Ring by American Highway Products.
- (3) Pro-Ring by Cretex Specialty Products.

3. Mortar. ASTM C270, Type M. Preblended from the manufacturer.

4. **Adhesive and Sealant.**

- A. Polyurethane Grout or Sealant.
 - (1) X-Seal by SealGuard, Inc.
 - (2) Avanti AV-202 by Press-Seal Corporation.
 - (3) Or Engineer Approved equal.

c. **Construction.**

1. **Mh Casting, Adj, Heavy.** Final adjustment shall include a maximum height of adjustment with adjusting rings of 15-inches (not including the casting), unless otherwise approved by the Engineer. Diameters and shapes shall conform to the specific structure and casting. Adjusting rings shall bear fully on the structure, or repaired structure surface, and casting shall be supported fully by the adjusting rings.

If required, a single concrete adjusting ring shall be used for any single casting adjustment. Multiple (stacked) concrete adjusting rings are not permitted, unless otherwise approved by the Engineer.

A single rubber or polypropylene adjusting ring shall be used between the structure and casting or concrete adjusting ring and casting for all adjustments.

A. **Preparation.**

(1) Clean the top of structure of any debris or foreign material. If placed on an existing structure, mortar from previous adjusting rings shall be removed.

(2) If the top of the structure is not level or is irregular, a bed of mortar shall be placed and leveled on the top surface. If no concrete adjusting ring is required, repair any minor surface defects that may be present with mortar prior to placing the rubber or polypropylene adjusting ring.

(3) **Mortar.** Only used for repair and leveling of existing structure.

(a) Mix mortar using a mechanical mixer to ensure optimal workability and performance.

(b) Use clean, potable water; add the amount of water consistent with optimum workability which provides adequate water to satisfy the initial rate of absorption of the masonry units.

(c) Mortar shall be used and placed in final position within 1 hour after initial mixing.

(d) Retemper of mortar will not be permitted, discard after 1 hour if not used.

B. **Concrete Adjusting Ring Installation (if required).**

(1) Wet both surfaces with fresh water. Surfaces should be wet but with no standing water.

(2) Apply two continuous strips, 5/16-inch - 3/8-inch thick of sealer/adhesive on the top surface of the clean structure, or repaired, level, clean structure surface. Place sealer/adhesive 1-inch from the outside and inside diameter of the adjustment ring.

(3) Position the ring in place, ensuring it is centered over the top surface of the structure.

C. Rubber or Polypropylene Ring and Casting Installation. In accordance with the Manufacture's recommendations and the following.

(1) Wet both surfaces with fresh water. Surfaces should be wet but with no standing water.

(2) Apply two continuous strip, 5/16-inch - 3/8-inch thick of sealer/adhesive on the top surface of the clean structure, concrete grade ring, or repaired, level, clean structure surface. Place sealer/adhesive 1-inch from the outside and inside diameter of the adjustment ring.

(3) Position the ring in place, ensuring it is centered over the top surface of the structure or concrete grade ring.

(4) Apply additional continuous strips, 5/16-inch - 3/8-inch thick of joint sealant/adhesive on the top surface of the ring, 1-inch from the outside and inside diameter of the frame.

(a) Total rubber adjusting ring height shall be a minimum 1/2-inch and a maximum of 3-inches.

(5) When required for matching proposed cross slope/slope of the surface, tapered adjusting rings shall be used.

(6) Center the casting over the structure opening. Place the bottom of the casting onto adjustment ring. Press down, applying firm pressure to the frame to create a tight seal with the sealant and adjustment ring.

D. No other materials shall be used in the construction of the grade adjustment area beyond those specified above. Prohibited materials include, but are not limited to wood or wood shims of any kind, concrete (except as-needed precast concrete adjustment ring(s)), brick, block, stones, etc.

E. After curing of sealant remove any excess sealant on the inside of the grade rings and casting.

F. Finalize casting adjustment in accordance with City of Grand Rapids standard detail P-22.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Mh Casting, Adj, Heavy	Each

Mh Casting, Adj, Heavy shall be payment in full for furnishing all labor, equipment, and material and shall include all clearing, excavation, trenching, furnishing and placing casting, grade rings, adhesive/sealant, disposal of excess materials, and all other work required for a complete job.

The completed work for the adjustment rings on proposed structures is included in the items to place the Manhole.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
HOT MIX ASPHALT ECHELON PAVING METHODS

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21

REV:11/01/25

a. Description. This work consists of the paving of all hot mix asphalt (HMA) surfaces and shall take place in a manner that eliminates all longitudinal joints and transverse joints between the edges of the pavement by use of echelon paving. The only exception will be for street paving projects where maintaining traffic on one side of the street during paving operations, typically for streets with four or more lanes of width. In this exception, one longitudinal joint will be permitted in the center of the roadway to facilitate maintaining traffic on the roadway and a transverse joint where approved project phasing does not allow placement of one continuous HMA paving surface. In addition to all project specification requirements for material and placement, multiple pavers and supporting rolling operations shall be used to place multiple-pass pavement courses. The individual pavers shall be located within a maximum distance of 100 feet of each other during paving. Rolling and compaction of the joint shall not take place until adjoining mats have been placed. Both mats shall be placed to the same loose thickness at the joint prior to compaction.

b. Materials. None specified.

c. Construction.

1. HMA Pre-production meeting. HMA placement procedures shall be reviewed at a HMA pre-production meeting. HMA construction practices including, but not limited to, materials, equipment, preparation of existing pavement, bond coat, transportation of mixtures, placing HMA, rolling, and weather and seasonal limitations shall be discussed, as well as traffic control, emergency access, communication with residents and businesses, and work hours. The date and time of the meeting will be established by the Contractor such that the meeting will be held at least 7 days prior to start of HMA paving operations.

A. An HMA pre-production agenda will be sent by the Engineer to all required attendees in advance of the meeting. Required attendees include the Contractor, HMA Paving Contractor, HMA Paving Contractor's foreman, HMA Producer if different from HMA Paving Contractor, Engineer's Testing consultant, Engineer's Inspector, and the Engineer.

d. Measurement and Payment. The completed work shall be included in the items to place HMA pavement.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
TEMPORARY HOT MIX ASPHALT PAVEMENT

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21

REV: 11/01/25

a. Description. This work shall consist of placing temporary hot mix asphalt (HMA) pavement on an aggregate base at locations as directed by the Engineer to provide and maintain access to side streets and driveways and to provide and maintain pedestrian traffic. This work shall be done in accordance with sections 204, 302, and 501 of the Standard Specifications for Construction.

b. Materials. Temporary HMA pavement materials shall be HMA mixture 5EL as approved by the Engineer in accordance with section 501 of the Standard Specifications for Construction. Aggregate base material used for temporary HMA pavement shall be any aggregate in accordance with section 302 of the Standard Specifications for Construction or as approved by the Engineer.

c. Construction. The Contractor shall construct temporary HMA pavements on an aggregate base in accordance with section 302 and 501 of the Standard Specifications for Construction. The Contractor shall maintain the temporary HMA pavements in a safe condition. When no longer needed, removal of temporary HMA pavements shall be in accordance with section 204 and 205 of the Standard Specifications for Construction.

1. Temporary HMA Pavement shall be placed on 4-inch aggregate base.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item**Pay Unit**

Temp HMA Pavt.....Ton

Temp HMA Pavt will be paid for by the ton according to weight tickets and includes payment for all material, equipment, and labor necessary to place and maintain the temporary HMA pavement and remove the temporary HMA pavement, including 4-inch aggregate base, when no longer necessary.

The Contractor shall only be paid for **Temp HMA Pavt** when directed by the Engineer to place these materials. The Contractor will not be paid for these items when used for the Contractor's convenience.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
LOW-TRACKING BOND COAT EMULSIFIED ASPHALT

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21
REV:11/01/25

- a. Description.** Furnish and apply hot mix asphalt (HMA) low-tracking bond coat emulsified asphalt between HMA pavement layers.
- b. Materials.** LTBC-1 or LTBC-2 in accordance with section 904 of the Standard Specifications for Construction.
- c. Construction.**
 - 1. Construct in accordance with subsection 501.03 of the Standard Specifications for Construction.
- d. Measurement and Payment.** The completed work shall be included in the items to place the HMA pavement.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
CONCRETE PAVEMENTS

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:11/03/21

REV:11/01/25

a. Description. This work shall consist of constructing a jointed Portland cement concrete pavement, base course, or shoulder, without reinforcement, as specified. The concrete shall be provided according to the requirements of sections 602 and 1004 of the Specifications for Construction except as modified by this Special Provision.

b. Materials. Provide materials in accordance with section 1004 of the Standard Specifications for Construction and as specified herein.

1. **Concrete.** Concrete for Concrete Pavements shall be Grade 3500HP. Concrete Grade 3500HP requires optimized aggregate gradation and 25 to 40 percent replacement of the Portland cement in the concrete mixture with a supplementary cementitious material (SCM) (slag cement, fly ash). Do not use other concrete Grades or Types in lieu of Grade 3500HP. Prepare the optimized aggregate gradation and perform process control in accordance with section 1004 of the Standard Specifications for Construction.

2. **Curing Materials, Epoxy Coated Lane Ties, Bond Breaker Material, and Joint Materials** in accordance with section 905 of the Standard Specifications for Construction.

c. Construction. In accordance with section 602 of the Standard Specifications for Construction.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Conc Pavt, Nonreinf, __ inch, Modified.....	Square Yard
Conc Base Cse, Nonreinf, __ inch, Modified.....	Square Yard

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
CONCRETE CURB AND GUTTER

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:08/19/21

REV:11/01/25

a. Description. The work shall consist of constructing concrete curb, gutter, combination curb and gutter, roll curb and gutter, valley curb and gutter, radius driveway returns, and radius alley returns, with or without steel reinforcement, as provided, on the prepared subgrade. All work shall be in accordance with section 802 of the Standard Specifications for Construction and standard detail, except as modified herein.

b. Materials.

1. Concrete. Concrete for all work in this Special Provision shall be Grade 3500 as specified in the standard specifications.

c. Construction. Construct in accordance with standard details and section 802 of the Standard Specifications for Construction and as specified herein.

1. The construction of concrete curb, gutter, combination curb and gutter, roll curb and gutter, driveway returns, or alley returns, shall precede the construction of non-rigid types of pavement or base course, but may either follow or precede, whichever is the more feasible, the construction of concrete pavement or concrete base course.

2. Positive Drainage. The Engineer will set line and grade. Minimum longitudinal slope for concrete curb shall be 0.4% for straight runs and 0.5% for radius runs, unless otherwise approved by the Engineer. The Contractor to ensure that positive drainage (no "Bird Baths") is achieved. In the event that there is not positive drainage ("Bird Baths" are evident) the Contractor shall, at their own expense, remove and replace sufficient length so as to ensure that positive drainage is achieved.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Curb and Gutter, (width) by (thickness) inch pan, Det P-5	Foot
Curb, (width) by (height) inch, Det P-5A	Foot
Roll Curb and Gutter, (width) by (thickness) inch pan, Det P-5B	Foot
Valley Gutter, (width) by (thickness) inch, Det P-5C	Foot
Median Island End Treatment, Det P-5D	Each

The unit price shall be payment in full for furnishing all labor, equipment, and material, for furnishing and placing sand and aggregate sub-base, and for any necessary grading, excavation, and backfill when not paid for separately, and for performing the work complete.

Curb and Gutter, Curb, Roll Curb and Gutter, and Valley Gutter will be measured in place by length in linear feet, along the joint of the curbing with the pavement, with no deductions in length for catch basins, inlet castings, dub-down drive approaches, or dub-down alley approaches as shown on the applicable Standard Details. Circular curb shall not be measured separately.

When called for in the plans, inverted curbs shall be measured and paid with the above pay items.

Concrete radius driveway returns as per Standard Detail P-2 shall include the drive return to a line 4 feet behind the face of the curb and will be measured and paid as **Curb and Gutter, (width) by (thickness) inch pan, Det P-5** in linear feet along the joint of the curbing with the pavement from tangent point to tangent point. Any concrete necessary beyond the back of the curb and gutter shall be placed under a separate item entitled **Driveway, Nonreinf Conc, __ inch.**

Concrete radius alley returns as per Standard Detail P-2A shall include the alley return to a line 7 feet behind the face of the curb and will be measured and paid as **Curb and Gutter, (width) by (thickness) inch pan, Det P-5** in linear feet along the joint of the curbing with the pavement from tangent point to tangent point. Any concrete necessary beyond the back of the curb and gutter shall be placed under a separate item entitled **Driveway, Nonreinf Conc, __ inch.**

Median Island End Treatment, Det P-5D will be measured as units and will be paid for at the contract unit price each. The unit price shall be payment in full for furnishing all labor, equipment, and material, and for any necessary grading, excavation and backfill when not paid for separately, and for performing the work complete.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
CONCRETE SIDEWALK AND CURB RAMP, THICKENED EDGE

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:11/01/25

a. Description. This item consists of constructing concrete sidewalk and curb ramps with a thickened edge. The work shall be done in accordance with section 803 of the Standard Specifications for Construction, except as detailed on the plans and as modified herein.

b. Materials. Use Grade 3500 concrete.

c. Construction. Construct sidewalk with thickened edge in accordance with the details on the plans.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Sidewalk, Conc, _ inch, Thickened Edge.....	Square Foot
Curb Ramp, Conc, _ inch, Thickened Edge.....	Square Foot

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
CONCRETE SIDEWALK AND CURB RAMP, MODIFIED

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:12/14/21

REV:11/01/25

a. Description. This item consists of constructing concrete sidewalk and curb ramps. The work shall be done in accordance with section 803 of the Standard Specifications for Construction, except as detailed on the Plans and as modified herein.

b. Materials. Use Grade 3500 concrete.

1. Submit manufacturer's product data to Engineer for approval prior to ordering detectable warning plates.

2. Product Delivery, Storage, and Handling. Deliver packaged new cast iron detectable warning plates clearly labeled with the manufacturer's name and brand designation. Protect plates against damage during construction to comply with manufacturer's specification. Protect tiles against damage from rolling loads following installation by covering with plywood. Clean tiles by method specified by detectable warning plate manufacturer.

3. Furnish detectable warning surface from the following.

- A. Duralast Detectable Warning Plate by East Jordan Iron Works.
- B. Detectable Warning Plate by Neenah Enterprises, Inc.
- C. or Engineer approved equal.

c. Construction. Sidewalk, Conc, _ inch, Modified and Curb Ramp, Conc, _ inch, Modified shall be constructed in accordance with section 803 of the Standard Specifications for Construction and Standard Plan R-28 Series except as modified herein.

1. Curb Ramps and Landings. Unless otherwise noted on the Plan, minimum ramp and landing slab thicknesses to be 6 inches for first 5 feet behind the curb and 4 inches for the remaining.

2. Coordinate construction of the concrete so that the required dimensions and slope match those required for placing the cast iron plates. Immediately after finishing the concrete, a level shall be used to check that the required slope is achieved. The cast iron plates shall be tamped or vibrated into the fresh concrete to ensure that the top surfaces (base of truncated domes) are flat and flush to each other and the adjacent concrete surfaces. The top surface (base of truncated domes) shall be flush to adjacent surfaces to permit proper water drainage and eliminate tripping hazards between adjacent finishes. The tolerance for elevation differences between plates or between plates and adjacent surfaces is 1/16 inch.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Sidewalk, Conc, _ inch, Modified	Square Foot
Curb Ramp, Conc, _ inch, Modified	Square Foot
Detectable Warning Surface, Modified.....	Foot

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
PERMANENT TRAFFIC CONTROL SIGNS

ENG/CITY OF GRAND RAPIDS

1 OF 3

ORG:07/02/21

REV:11/01/25

a. Description. This work consists of providing, fabricating, and erecting traffic signs and supports in accordance with the Michigan Manual on Uniform Traffic Control Devices (MMUTCD), the Michigan Standard Highway Signs Manual, and the Michigan Department of Transportation (MDOT) Sign Support Standards and as specified herein.

b. Materials. Provide materials in accordance with section 810 of the Standard Specifications for Construction, and as specified herein.

1. Sign Supports and Mounting Hardware. Post shall be galvanized except on temporary construction signs. Bolts and nylon insert lock nuts shall be stainless steel.

Mark posts at the 30-inch point with spray paint prior to driving to indicate minimum embedment.

A. Sign Post. 1.75-inch x 1.75-inch tubulars steel with a 12-gauge wall thickness and a weight of 2.06 lbs/ft minimum. Post to have 7/16-inch diameter holes at 1-inch center to center on all four sides.

B. Anchor Sleeve for placement of Sign Posts in earth. 2-inch x 2-inch tubulars steel with a 12-gauge wall thickness and a weight of 2.41 lbs/ft minimum. Anchor Sleeve shall be 3 foot minimum and to have 7/16-inch diameter holes at 1-inch center to center on all four sides.

Tolerances for posts and sleeve shall meet Standard Plan Sign-200-series.

C. Anchor for placement of Sign Post requiring concrete surface mount. 2-inch x 2-inch tubulars steel with a 12 gauge wall thickness and a weight of 2.41 lbs/ft minimum. Post to have 7/16 inch diameter holes at 1 inch center to center on all four sides with a 8-inch steel base.

1. Anchors. 3/8-inch x 4-inch galvanized high strength bolts.

D. PVC Sleeve. For placement of signs in concrete sidewalk and surfaces with snow melt systems, or as call for on the Plans. 3-inch diameter Schedule 40 PVC.

E. Concrete Base. 19 inch x 19 inch x 13 inch, 250 pound base.

2. Sign. Signs shall be in accordance with the Standard Specifications for Construction, section 810.

A. Sign Material. Shall be 0.080 inch aluminum sheet with a mill tolerance meeting the requirements of ASTM B209.

Sign Backgrounds and Legend and Border shall be Reflectorized (R) or Non-Reflectorized (NR) as shown on the Plan.

Degrease the aluminum sheet sign in accordance with the sheeting manufacturer's recommendations. After degreasing, surface treating, and rinsing, maintain sign panels free of grease, oil, and other contaminants.

c. Construction. In accordance with section 810 of the Standard Specification for Construction, and as specified herein.

1. Place the signs at the height called for in the MMUTCD. See Standard Plan Sign-740-series for sign connection and Sign-200-series for installation details. Regulatory signs shall have a minimum of 7 foot clearance and Object Marker signs shall have a minimum of 4 foot clearance.

2. Surface Mounted Anchor. Install Steel Posts with surface mounted anchor on concrete sidewalk. Verify sidewalk does not contain snowmelt system. Caution shall be exercised when drilling holes for concrete anchors. Drill holes, remove unsound concrete, dust, and fill drilled holes with adhesive. Concrete anchors shall be installed per manufacturers recommendations.

3. Snowmelt Sidewalk. Sign Posts that are to be placed in concrete sidewalk with snowmelt shall installed in PVC Sleeve placed in conjunction with sidewalk placement. PVC sleeves shall be 3 inch diameter and have a minimum 3 foot depth from the surface of the concrete. Insert the galvanized steel post into the hole and embed to a depth of 3 1/2 feet below the top of concrete grade. Fill the hole around the post with clean sand up to 3 inches below grade and silicone sealer in the top 3 inches.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Sign Post.....	Each
Sign.....	Square Foot
Conc Base, Sign Post	Each

Sign Post includes sign post, anchor sleeve, concrete surface mount, and PVC sleeve as required. **Sign Post** also includes the cost of drilling or saw cutting a hole in existing concrete, silicone sealer, cleaning the site, and replacing concrete damaged during the post installing if post location requires placement in a location with concrete sidewalk. Portion of posts installed deeper than the depth shown on the plans will not be paid for separately, unless authorized by the Engineer.

Sign will be measured by the square foot. The Engineer will not deduct corner radii or mounting holes when determining the area of sign faces. The Engineer will calculate the area using the smallest circumscribing rectangle. The Engineer will calculate the area of triangular signs using the area of the circumscribing triangle. The unit price for **Sign** shall include all variations of Reflectorized or Non-Reflectorized Legends and Borders as required.

The unit price for **Sign** includes the cost of attaching devices and hardware, including fabricating brackets, erecting signs on supports, pruning vegetation, and site cleanup.

Before final acceptance, replace or repair approved for use and in-use traffic sign installations that are damaged by conditions not caused by the Contractor, as directed by the Engineer.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
TEMPORARY BUSINESS SIGNS

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21

REV:11/01/25

a. Description. This work shall include the installation, maintenance, relocation, and removal of temporary access signage to businesses and parking areas. This work shall be done in accordance with section 812 of the Standard Specifications for Construction and as specified herein.

b. Materials. Materials shall be provided in accordance with section 812 of the Standard Specifications for Construction and as specified herein. The City of Grand Rapids will supply temporary access signage for directing the public to the various areas of the business district and/or neighborhood within the construction area.

c. Construction. The Contractor shall be responsible for the installation, maintenance, relocation, and removal of Temporary Business Signs as necessary to coincide with the various phases of the project. The installation of these signs will include furnishing posts for the signs, mounting the signs on the posts, and furnishing and placing sandbags to hold them up.

1. The Engineer will furnish a plan to the Contractor for location of the Temporary Business Signs prior to the start of construction. The Engineer will adjust the plan for the location of such signs as necessary during construction. The Contractor will locate these signs as required by the Engineer.

2. The Temporary Business Signs shall be in place prior to the Contractor beginning work.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Contract Item (Pay Item)**Pay Unit**

Sign, Temp Business, Oper.....Each

The cost to install, maintain, relocate, and remove these signs will be paid for as **Sign, Temp Business, Oper.**

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
TREE PROTECTION

ENG/CITY OF GRAND RAPIDS

1 OF 3

ORG:08/19/21

REV:11/01/25

a. Description. This work consists of removing, furnishing, and/or installing tree protection, root pruning, and sulfur application and includes; but is not limited to, all the necessary labor, materials, tools, and equipment necessary to result in a finished installation in accordance with section 815 of the Standard Specifications for Construction, except as modified herein.

1. Protection of Trees. Contractor shall protect existing trees and other vegetation identified in the Plans to remain in place. Prohibited practices include breaking of branches, scraping of bark, or unauthorized cutting; nailing or bolting into trees or plants; use of trees or plants as temporary support (i.e., for cables); unauthorized filling, excavating, trenching, or auguring within the parkway root zone; compaction/driving over the parkway root zone (see definitions that follow); storage of any materials or vehicles within the parkway root zone; dumping of construction waste or materials (including liquids); unauthorized removal or relocation of woody plants; removal of tree protection barricades or construction fencing prior to completion of project.

- A. Compaction within the parkway root zone is the increasing of the soil density caused by heavy equipment, storage of materials, or concentrated foot traffic which significantly alters the soil conditions from that which was present prior to construction.
- B. The parkway root zone of a tree is one and a half the distance of plant crown drip line outward from the stem, along undisturbed grade. Should placement of concrete be specified or authorized by the Owner within the root zone, a sulfur application will be applied by the Contractor. Trees to receive sulfur shall be identified by the City Forester or appointed representative.
- C. The parkway is defined as the area between the curb and sidewalk.

b. Materials. Provide materials in with the details on the plans and in accordance with the following specifications.

1. Sulfur. Furnish elemental sulfur, 90 percent sulfur derived from elemental sulfur, 10 percent bentonite from the following.

- A. Tiger 90cr Sulfur by Tiger-Sul.
- B. Mega-S 90% Elemental Sulfur by RSS.
- C. or Engineer approved equal.

c. Construction.

1. Root Pruning. Should it be necessary to cut and remove any tree roots affecting the sidewalk, this work will be performed by the Contractor.

A. Roots that are less than 4 inches in diameter may be removed by the Contractor using the following process:

(1) Roots are excavated to just outside the limits of sidewalk excavation.

(2) Roots must be cleanly cut cross-sectionally using a carbide tip saw, blade, or axe prior to removal.

(3) The Contractor shall not use machinery forks to rip roots up prior to cutting. The use of stump grinders to grind root material to the necessary grade is acceptable after a cross-sectional clean cut has been performed. MISS DIG shall be contacted prior to any stump grinder use in the right of way.

(4) All tools and methods used are to be approved by the Engineer.

B. Roots that interfere with the grade of the sidewalk shall be removed to a depth of 4 inches below the bottom of the sidewalk.

C. Roots greater than 4 inches in diameter will require approval from the City Forester or appointed representative prior to cutting and removal.

D. If it is determined by the Forester or designee that the necessary removal of the roots will jeopardize the stability or life expectancy of the tree, alternative methods may be considered including bridging the sidewalk over the root bed or tree removal.

2. Sulfur Application. Anywhere there is visible evidence of heaving in sidewalk and/or curb due to tree roots the Contractor shall saw cut roots (as described above) and, prior to placing concrete and after final grading, shall place granular sulfur pellets on the grade of any sidewalk square within area of a tree trunk or any sidewalk that has roots directly under the soil or as directed by the Engineer. The sulfur shall be distributed as a root deterrent at a rate of 0.2 pounds per square foot (3.2 oz).

3. Protect Tree. Place tree protection as shown on the Plans and as shown in the special detail.

A. The Contractor shall be responsible for any expense resulting from damage to trees or property caused by their negligence.

B. Damage to City trees as a result of Contractor actions shall be determined by the City Forester or appointed representative. The Forester or designee shall evaluate damage and establish proportional replacement value as shown in Table 1, regardless of the current disposition of the plant.

Table 1
Value Schedule for Trees

Caliper Diameter Size (in)	Value (\$)
1 - 6	Replace in kind
6 or greater	150.00 per diameter inch

Tree trunk diameter at breast height (DBH) or 4.5 feet above grade

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Sulfur Application	Square Foot
Protect Tree, Det M-2	Each
Root Pruning	Lump Sum

Protect Tree, Det M-2 includes the construction, maintenance, and removal of the tree protection structure, and all other measures used to protect the tree. Any trimming done to facilitate the Contractor's operations is included in this item. **Protect Tree, Det M-2** includes all materials, labor, and equipment necessary to conduct Contractor's operations in such a manner as to prevent damage to protected trees.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
LANDSCAPING

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:07/19/22

REV:11/01/25

a. Description. The work in this Special Provision consists of furnishing all labor, materials, and equipment required install landscaping related items. The work shall be done in accordance with section 815 of the Standard Specifications for Construction, the Drawings, project Special Provisions, and as directed by the Engineer.

b. Materials. Provide materials in accordance with sections 911 and 917 of the Standard Specifications for Construction and as specified herein.

1. Cobblestone. Washed native field stone, 8 inch to 12 inch diameter.
2. Steel Edging. Commercial-steel edging, fabricated in sections of 8 foot or 10 foot lengths, with loops stamped from or welded to face of sections to receive stakes.
 - A. Edging Size: 3/16-inch-thick by 4 inches
 - B. Color: Black
3. Prepared Soil. Mix topsoil with the following soil amendments and fertilizers in the following quantities:
 - A. Ratio of topsoil to loose peat and sand by volume: 4 parts by volume of topsoil to 1 part of granulated peat and 1 part sand.
 - B. Lime: As specified to meet the pH range of 5.5 to 7.
 - C. Weight of Slow-Release Fertilizer per 1000 square feet: 10 pounds.
 - D. Compost to achieve 6 percent organic matter.

c. Construction. Construction shall be done in accordance with section 815 of the Standard Specifications for Construction, the plans, and as specified herein.

1. Place and grade prepared soil according to section 815 of the Standard Specifications for Construction.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Prepared Soil.....	Cubic Yard
Cobblestone	Cubic Yard
Steel Edging.....	Foot

Prepared Soil will be measured and paid for at the unit price for the volume placed and as dimensioned on the plans.

Prepared Soil for backfilling a planting hole will be included in Site Preparation.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
WATERING AND CULTIVATING, MODIFIED

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:08/19/21

REV:11/01/25

a. Description. Watering and cultivating shall be performed in accordance with section 815 of the Standard Specifications for Construction except as modified herein.

b. Materials.

1. Tree Irrigation Bag.

- A. Treegator® Original by Spectrum Products Inc.
- B. EZ Soak Tree Watering Bag by SherillTree.
- C. Or approved equal.

c. Construction. During the first season, landscaping areas shall be watered at a frequency that ensures these areas receive at least 1/2 inch of water per week. In addition to the watering-in required at the time of initial planting, the Contractor shall water and cultivate once every week during the first growing season. The Contractor may suspend watering perennial plants and shrubs when rainfall is at least 1/2 inch during the calendar week.

In addition to the watering-in required at the time of initial planting and the required 5 water applications with probe, the tree irrigation bags shall be filled once every week during the first growing season regardless of the weekly rainfall.

During the first and second watering, use a nitrogen-enriched solution meeting Subsection 917.09.A.2. The Period of Establishment shall be defined as commencing at the completion of the initial planting and terminating at Final Completion.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item

Pay Unit

Tree Irrigation Bag	Each
Watering and Cultivating, Modified	Lump Sum

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
LAWN RESTORATION

ENG/CITY OF GRAND RAPIDS

1 OF 5

ORG:08/19/21

REV:11/01/25

a. Description. This work shall consist of furnishing, hauling, and spreading prepared soil, finish grading, and preparing the seed bed and seed, fertilizer, and mulch materials on all turf areas disturbed by construction activity. All work in this Special Provision shall be performed in accordance with section 816 of the Standard Specifications for Construction and Standard Plan R-100 Series, except as modified herein.

b. Materials. Provide materials in accordance with the following specifications.

1. Topsoil. Topsoil shall meet the following requirements:

A. Fertile, friable, screened, sandy loam soil, containing a minimum of 4 percent and maximum of 12 percent of organic matter as determined by the loss on Ignition Test, AOAC, with not more than 50 percent clay and not more than 55 percent sand as determined in accordance with ASTM D5268.

B. At least 90 percent of the material shall pass the No. 10 sieve and shall be free of refuse or all material toxic to plant growth free of subsoil and stumps roots, brush, or similar objects larger than 1-inch diameter and all stones larger than 1/2-inch diameter.

C. Ordinary sods and herbaceous growth like grass, need not be removed, but shall be thoroughly broken up and intermixed with soil during handling operations.

D. Topsoil Source. Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs, or marshes. Topsoil shall be of uniform quality, free from hard clods, stiff clay, hard pan, sod, partially disintegrated stone, and other materials considered as undesirable in good topsoil.

E. Topsoil Analysis. Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil. Report suitability of topsoil for lawn growth. Quantities of nitrogen, phosphorus, and potash nutrients and soil amendments in accordance with section 917 of the Standard Specifications for Construction to be added to produce satisfactory topsoil.

2. Fertilizer. Provide and apply Class B chemical nutrient fertilizer per section 917 of the Standard Specifications for Construction and as indicated by soil report.

3. Seed Mixture. THM in accordance with the standard specifications.

4. Furnish Mulch Blanket from the following.

A. Curlex NetFree 100% Biodegradable Erosion Control Blanket by American Excelsior Company.

B. or Engineer approved equal.

c. Construction. All work shall be performed in accordance with section 816 of the Standard Specifications for Construction and as specified herein.

1. Topsoiling and Chemical Fertilizer Nutrient. In accordance with the standard specifications.

2. Seeding. Application rate for seeding and mulching will be varied from the rate shown in the standard specifications as follows:

A. Seeding shall be done by the hydroseeding method unless otherwise approved by the Engineer. The application shall be as follows:

(1) Hydro Mulch shall be placed at a minimum of 2000 pounds per acre. The hydro mulch shall contain a minimum of 220 pounds of THM seed mixture and 84 pounds of each of the nutrients (12-12-12) per acre. The mulch shall consist of virgin wood fibers or an approved equal material. Wood fiber shall have a moisture content of not less than 7 percent or more than 13 percent, shall be no less than 98.4 percent organic matter, shall have a pH not less than 4.3 nor more than 5.3, shall be dyed green to aid in visual metering during application, and shall be mixed and applied in accordance with standard accepted procedures.

(2) When seeding is done by the seed, fertilizer, and mulch method, the application shall be as follows:

(a) THM seed at 150 pounds per acre, chemical fertilizer at 350 pounds per acre and mulch at 3000 pounds per acre.

(3) Once seed, fertilizer, and mulch method is complete, contractor shall place erosion control (mulch) blankets on areas as shown on the Plans. Where blankets are shown, also required will be the 6-inch wood pegs, or approved equal, with 24-inch spacing in order to hold the blankets in place.

(4) Initial Watering. The Contractor shall water all seeded areas a minimum of 3 times per day for a minimum 21 continuous days. Each watering event shall be a minimum of 3 continuous loops. Each loop being defined as watering both sides of the project at least one time. Deviation from this schedule shall only be allowed at the direction of the Engineer. Watering shall be slow and steady, as to allow for a significant soak of the soil. Amount of water shall total a minimum of 2 inches of water per week. Contractor shall ensure that watering is evenly distributed and gentle enough to ensure erosion does not occur.

B. Begin this work as soon as possible after final grading of the areas designated for turf establishment but no later than the maximum time frames stated in section 208 of the Standard Specifications for Construction.

C. Prior to placing prepared soil, shape, compact, and assure all areas to be seeded are weed free. Place prepared soil to a minimum depth of 4 inches, to meet proposed finished grade. Remove any stones greater than or equal to 1 inch in diameter. If the area being restored requires more than the minimum depth of prepared soil to meet finished grade, this additional depth must be filled using prepared soil or, at the Contractor's option, embankment. Furnishing and placing this additional material will not be paid separately but shall be included in the item Turf Establishment or the item **Roadway Grading**.

D. Asphalt Emulsion will not be permitted to hold the mulch in place. Seeding shall normally be placed prior to October 10. Extension of this time shall be at the discretion of the Engineer.

E. Before delivering any prepared soil to the site, the Contractor shall provide the topsoil analysis report, including the recommended soil amendments to be added to produce prepared soil, to the Engineer for review and acceptance.

F. The Engineer shall make visual inspection of the prepared soil delivered to the site and may elect to have the soil tested to verify compliance with requirements. One test will be at the Project's expense. If the prepared soil does not meet requirements additional tests will be at the Contractor's expense.

G. It shall be the responsibility of the Contractor to produce a healthy, uniform, close stand of grass, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 square feet and bare spots not exceeding 5 by 5 inches.

3. Reseeding. Seeded areas that do not show uniform germination as determined by the Engineer within 3 weeks of installation shall be reseeded. Parts of the seeded area that fail to show uniform development as determined by the Engineer shall be reseeded and such reseeded shall continue until the contractor produces a uniform close stand of grass, free of weeds. Reseeding shall be done on areas flatter than a 1:4 slope using the hydroseeding method. Sloped areas steeper than a 1:4 slope shall be reseeded with mulch blanket at the Contractor's expense.

4. Weed Control. If the Engineer deems it necessary, the Contractor must apply weed treatment within 3 days of being notified by the Engineer. The Contractor shall not apply weed treatment until after the third mowing of the lawn.

A. All costs associated with reseeded, weed killing, or other work required to establish acceptable turf shall be the responsibility of the contractor unless otherwise approved by the Engineer.

5. Turf Watering. After Initial Watering specified in c.2.A.4, watering shall occur at minimum of twice per week for 2 months and as directed by the Engineer. Amount of water shall total a minimum of 1.5 inches of water per week, combined natural rainwater and contractor watering. Distribute a letter to all residents at the time of seeding, stating, at minimum, the following: Topsoil, grass seed, and fertilizer were placed on (date), the

contractor's minimum watering requirements, the contractor's time frame, and that the home owner is to resume to water and maintain the grass after that time period.

6. Maintenance Period. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

A. Damage to seeded areas resulting from erosion or the Contractors operations shall be repaired by the Contractor until the lawn areas are acceptable.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

C. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

D. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowing to maintain the following grass height: 2 inches.

E. The Contractor's responsibility to maintain the turf shall end when the Engineer is satisfied the above requirements have been met and a good stand of weed-free grass has been established and mowed three times. However, any failure on the part of the property owner to properly care for the restored lawn area prior to the Contractor achieving an acceptable lawn of weed-free grass shall in no way relieve the Contractor of his responsibility as set forth above.

6. Final inspection and acceptance of the seeded areas will be made at the conclusion of the maintenance period.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Turf Establishment.....	Square Yard
Turf Establishment, As Needed Watering	Square Yard
Turf Watering.....	Each
Weed Control, Modified	Each
Mulch Blanket, Modified	Square Yard

Turf Establishment and **Turf Establishment, As Needed Watering** will be measured in square yards of prepared soil placed and shall be payment in full for all labor, equipment and materials to complete the specified work. **Turf Establishment** shall include Initial Watering.

Turf Establishment, As Needed Watering includes the same material, specified work and requirements as **Turf Establishment** but does not include the specified Initial Watering.

Turf Watering shall be payment in full for all labor, equipment, materials and all other work required.

Weed Control, Modified. Weed control, whether weed killer spray or weed trimming/cutting with motorized weed eater, shall be paid be each time the Contractor conducts said work and as directed by the Engineer. Payment shall be in full for all labor, equipment, materials, and all other work required.

Mulch Blanket, Modified shall be measured in square yards of blankets placed and shall be payment in full for placement and removal of blankets including all labor, equipment, and materials to complete the specified work. This item shall be placed as noted on the plans or as directed by the Engineer.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
ELECTRICAL DISTRIBUTION

ENG/CITY OF GRAND RAPIDS

1 OF 19

ORG:03/31/25

REV:11/01/25

a. Description. This work consists of furnishing and/or installing the items described below, and includes, but is not limited to, all of the necessary labor, materials, tools, and equipment necessary to result in a finished installation.

1. Applicable Codes and Guides. The following codes and guides apply to the work in this Special Provision. Depending on the materials and methods, other codes may also apply:

- A. Michigan State Construction Code Act of 1972, as amended
- B. Michigan Building Code rules, Parts 1-9; Department of Labor
- C. Michigan Occupational Health Standards for Construction; Michigan Department of Public Health
- D. Michigan Occupational Safety and Health Act "MIOSHA", Act 154, P.A. 1974 as amended; Michigan Department of Public Health
- E. Current Standard Specifications for Construction as amended; Michigan Department of Transportation
- F. OSHA Safety and Health Standards (29 CFR 1926/1910)
- G. City of Grand Rapids (City) Ordinances and State Rules and Regulations
- H. National Electrical Safety Code
- I. National Electrical Code

b. Materials. Materials used to construct the street lighting system shall be as specified herein.

1. Poles, Wood. Wood poles shall be of the height, class, and type specified in the Proposal, and shall meet the requirements of American National Standards Institute (ANSI) 05.1-2017 or latest revision thereof.

- A. Poles shall be Southern Pine or Red Pine.
- B. Treatment with CCA-C oxide preservatives.
- C. Pole shall be treated in accordance with the requirements of the American Wood Preservers Association (AWPA) standard C1 "all timber products – preservative

treatment by pressure process, and C4, preservative treatment with waterborne preservatives", except as noted in this specification.

D. Conditioning:

(1) Poles shall have a moisture content of 35% or less in the third inch from the surface of the pole.

(2) Only air-drying and kiln-drying are permitted.

(3) Poles shall be cool prior to treatment.

(4) Heating poles in the preservative is not permitted treatment.

(5) A maximum pressure of 150 PSIG for unlimited duration is permitted.

(6) A maximum fixation period of six hours by heating in steam or hot water at 220 degrees Fahrenheit is permitted in southern pine poles only.

E. Results of treatment:

(1) Retention: poles shall be treated to a retention level of 0.60 pcf as determined by an assay of the 0.50" to 2.0" zone of wood from the surface.

(2) Penetration: poles shall be penetrated in accordance with AWWA Standard C4, section 3.21.

(3) Retreatment: poles may be retreated, providing none of the limitations specified in AWWA standard C1, paragraph 6-retreatments are exceeded.

(4) Chemical constituents: CCA-type C waterborne preservatives used in the treatment of the utility poles shall be of the oxide form and not use constituents copper sulfate, sodium arsenate, or pyro-arsenate, potassium or sodium dichromate, or other constituents that will form water soluble electrolytes in utility poles.

F. Poles shall be marked as follows, reading from top down as per the sketch herein:

(1) Supplier's code.

(2) Plant location and year of manufacture.

(3) Species and preservative used.

(4) Reference mark (x) 6' plus or minus 2" from groundline.

(5) "GR ELC" or "GR SL" (owner code).

(6) Class and height.

G. Framing: poles shall be slab gained and drilled as per the sketch herein.

2. Cross Arms, Wood. Cross arms for use with wood poles shall be the type and size specified in the Proposal and shall meet the requirements of ANSI O5.3-2015 or latest revision thereof.

3. Overhead Line Hardware. Material used in the construction of overhead lines shall be the following:

A. Machine bolts. Double Arming Bolts, and Steel Cross Arm Pins shall meet IEEE C135.1 and be galvanized according to ASTM Specification A153.

Table 1
Overhead Line Machine Bolts

Size (in)	Minimum Tensile Strength (lbs)
3/8	8,500
1/2	16,000
5/8	25,000
3/4	36,000
7/8	50,000
1	66,000

B. Steel insulator pins shall be 5/8-inch with square washer, nut, and lock nut, with 1-inch lead thread to accept insulator.

C. Lag Screws shall be hot-dip galvanized, 1/2-inch x 4-inch with fether-drive and pilot point.

D. Washers - Hot-dip galvanized in the following sizes.

Table 2
Overhead Line Washers

Washer	Hole Diameter (in)	Bolt Size (in)
3" x 3" x 1/4" Curved Square	11/16	5/8
3" x 3" x 1/4" Square	13/16	3/4
1-3/4" O.D. x 10 Ga. Round	11/16	5/8
2" O.D. x 9 Ga. Round	13/16	3/4

E. One Wire Rack (Clevis). Hot-dip galvanized shall have curved sides, 3-1/4-inch opening for spool insulator, 4-inch clearance from back plate to center of spool insulator. Spool insulator shall be 3-inch high, 3-1/8-inch wide, single groove of 11/16-inch radius, with sky gray glaze, ANSI Class 53-2.

F. Cross Arm Braces shall be hot-dip galvanized 1-1/4-inch wide and 1/4-inch thick, with a 9/16-inch hole at one end and a 7/16-inch hole at the opposite end. Distance between the centers of the holes shall be 26 inches.

G. Extension strap shall be hot-dip galvanized, 1-1/4-inch wide and 5/16-inch thick, with 11/16-inch holes at each end. Distance between the holes shall be 20 inches.

H. Guying attachment shall be ductile iron grade 654512, ASTM 536, hot-dip galvanized per

ASTM 123, minimum ultimate strength of 21,000 pounds, for two 3/4-inch machine bolts, for a maximum of 1/2-inch cable installation, for use on flat or curved surfaces, for use with standard fiberglass insulators, and for use with insulated or uninsulated guy strand.

Continental Electric Co. #UGA-66-4.

I. Guy strand shall be utilities grade, zinc coating as listed in ASTM A363, of the following sizes:

(1) 5/16-inch, 3-wire at, 145-inch diameter 6500 lb., Grade 3.

(2) 3/8-inch, 7 wire at .120-inch diameter, 11,500 lb., Grade 4.

J. 20,000 lb. capacity guy consists of 3/8-inch strand (11,500 lb.) installed in a loop configuration and clamped together.

4. Overhead Line Insulators. Insulators shall be of the following type:

A. Pin type shall be the following:

(1) Polymer ANSI Class 55-4

(2) Threaded for 1-inch diameter pin.

(3) Radio-free interference type

(4) Two-skirt construction

(5) Leakage distance: 9-inch

(6) Dry leakage distance: 5-inch

(7) Cantilever Strength: 3,000 lb.

(8) Sky blue glaze: ANSI 70

B. Suspension - Dead end type shall be the following:

- (1) Use Hubbell 4010150215 epoxilator.
- (2) MacLean HDSO-57 clamp.
- (3) Ferrous cap and stud
- (4) ANSI Class: 52.1
- (5) Mechanical and Electrical Rating: 10,000 lb.
- (6) Proof Test: 5,000 lb.

C. Guy strain shall be porcelain ANSI Class 54-3 with sky blue glaze, ANSI 70. Length = 5-1/2-inch, Diameter = 3-3/8-inch, for up to 5/8-inch strand.

D. Fiberglass guy strain shall have 54 inches of fiberglass rod, hot-dip galvanized malleable iron fittings at each end, one of which shall have a roller. Minimum breaking strength shall be 30,000 pounds. Joslyn #703-54, or Engineer approved equal.

5. Overhead Sec /C. Conductors shall be as indicated on the Plans and shall be of the following:

A. #4 Triplex, code word "Whelk"

(1) Consisting of 2 - #4 solid aluminum phase conductors. Polyethylene insulated (one of which shall have an identification such as a ridge on the insulation) and 1- #4ACSR (6/1) bare neutral messenger (Stranding: 6 aluminum, 1 steel).

(2) Lay of the assembled conductors shall be 90 times the diameter of one insulated conductor.

(3) Common designation on Plans can be "#4Tx" or "4-4(6/1)-4".

B. #1/0 Triplex, code word "Neritina".

(1) Consisting of 2 - #1/0 aluminum conductors, 7 strands each, phase conductors, polyethylene insulated (one of which shall have an identification such as a ridge on the insulation), and 1 - #1/0 ACSR (6/1) bare neutral messenger (stranding: 6 aluminum, 1 steel) bare conductor.

(2) Lay of the assembled conductors shall be 90 times the diameter of one insulated conductor.

(3) Common designation on the Plans can be "#1/0Tx" or "#1/0(7) - #1/0(6/1) - #1/0(7)".

C. Lamp lead conductors shall be 2 conductor, #10 AWG copper, 7 strands, 600 volt, cross-linked polyethylene insulated-, or Engineer approved equal.

D. Insulated snap-on covers for insulating crimp splices and taps from or to the insulated conductor of Triplex:

(1) Burndy #CCD, for "D" die compression connectors, 2-3/4 inches long.

(2) Burndy #CCO, for "O" die compression connectors, 2-1/2 inches long, used for #4 tap and #1/0 lamp lead taps.

(3) Blackburn #C2 for 5/8-inch dies compression connectors, 2 inches long used for #4 butt and #4 lamp lead taps.

E. Secondary cable spreader.

(1) Hendrix #S-604

(2) Fargo G053

(3) or Engineer approved equal.

6. Underground Sec /C. Conductors shall be as indicated on the Plans and shall be of the following:

A. #6 U.S.E.

(1) Consisting of #6 AWG stranded annealed copper conductors. Cross-linked Polyethylene, 600 volt rated insulation.

(2) Insulation shall solidly be pigmented throughout.

B. #2 U.S.E.

(1) Consisting of #2 AWG stranded annealed copper conductors. Cross-linked Polyethylene, 600 volt rated insulation.

(2) Insulation shall solidly be pigmented throughout.

C. Lamp lead conductors shall be 3 conductor, #10 AWG copper, 7 strands, 600 volt, cross-linked polyethylene insulated, or Engineer approved equal.

D. Receptacle lead conductors shall be 3 conductor, #10 AWG copper, 7 strands, 600 volt, cross-linked polyethylene insulated, or Engineer approved equal.

E. Conductors shall be colored as following:

(1) Street lighting line conductors: Red or Black

(2) Street lighting neutral conductor: White

(3) 24-hour line conductors: Blue or Orange

(4) 24-hour neutral conductor: Grey

(5) Ground conductor: Green

7. Overhead Prim Line /C. Conductors shall be as indicated on the Plans and shall be of the following:

A. #4(7/1) ACSR code word "Swanate", ultimate strength 2245 lb. Steel core to have Class B zinc coating.

B. #2(7/1) ACSR code word "Sparate", ultimate strength 3385 lb. Steel core to have Class B zinc coating.

C. #1/0(6/1) ACSR code word "Raven", ultimate strength 4140 lb. Steel core to have Class B zinc coating.

D. #3/0(6/1) ACSR code word "Pigeon", ultimate strength 6135 lbs. Steel core to have Class B zinc coating.

E. Primary Cable.

(1) Kertie

(2) Okonite

(3) or Engineer approved equal.

8. Overhead Prim Neutral /C. Conductors shall be as indicated on the Plans and shall be of the following:

A. #2(7/1) ACSR code word "Beech", ultimate strength 3350 lb., consisting of 7 strands of aluminum, 1 strand of steel, and overall covering of polyethylene.

9. Underground Primary Conductors. Conductors shall be as indicated on the Plans and shall be of the following:

A. Underground Prim Line /C-#2/0 CU 15 kV.

(1) High Voltage Cables. High voltage cable shall be rated 15 kV (133% insulated). Cable shall be a single, stranded copper conductor with ethylene-propylene rubber (EPR) insulation and copper tape shielding. The cable shall be rated for an operating temperature of 105 degrees C. The cable shall meet UL requirements for MV-105, Sunlight Resistant and for Cable Tray use and shall be labeled accordingly. The cable shall be constructed with the following layers:

(2) Wire Gauge. The wire gauge of the conductor shall be 2/0. The conductor shall be Class B "compressed", with 19 strands of solid, uncoated copper wire. Diameter of the conductor shall be 0.400 inches (plus or minus 2%). The conductor shall not be "compacted".

(3) Shield/Stress Control. A semi-conducting or non-conducting stress control layer shall be provided between the conductor and insulation. The stress control layer shall be extruded material. The stress control layer shall meet the requirements of the Insulated Cable Engineers Association (ICEA) standard S-97-682. This layer shall be easily removable from the conductor without the use of heat or special tools.

(4) Insulation. The insulation shall be 220 mils of EPR compound. The EPR compound shall not contain any polyethylene and shall contain no more than 72% ethylene. The cable diameter over the insulation shall be 0.91 inches plus or minus 0.02 inches.

(5) Insulation Screen / Shield. An extruded, semi-conducting, stress control layer shall be provided between the insulation and copper tape shield. The stress control layer shall meet the requirements of the ICEA standard S-93-639. This layer shall be easily removable from the insulation layer without the use of heat or special tools.

(6) Copper Tape Shield. The metallic copper tape shield shall be constructed of tinned, 5 mil copper tape. It shall be applied helically with a minimum of 20% overlap.

(7) Jacket. An overall jacket shall be supplied.

(a) The jacket shall be a minimum of 70 mils thick and shall be constructed of chlorinated polyethylene (CPE) or chlorosulfonated polyethylene (CSPE). The overall cable nominal diameter shall be 1.20 inches (plus or minus 0.05 inches). The jacket shall meet or exceed the requirements of the ICEA standard S-93-639 for and shall meet the requirements of UL 1072 for cable tray installation.

(b) The jacket shall be labeled with the name of the manufacturer, year of manufacture, sequential footage numbers to the end of the reel, and all appropriate ratings. In addition, a phase indication shall be provided. Cable shall be provided with one of three phase indications: X, Y, or Z. All required labeling shall be provided continuously over the entire length of the cable. Labeling shall be embossed or indented in such a manner that it will remain readable after installation of the cable into conduit using conventional methods.

(8) Manufacturers. The cable shall be manufactured by Kerite or Okonite. No other manufacturers will be accepted.

B. Underground Prim Neutral /C-#2 CU, 600V. The neutral conductor shall be a #2 AWG copper, white cross-linked polyethylene jacket, Type USE-2.

10. Terminator, 15KV, Prim Cable. Use 3M cold shrink 7653-S-HSG-4 QT III, one piece silicone rubber termination kit per phase, with a 3M SC0020 stem. Tape shield grounding adapter shall be Cooper #5A2.

11. Elbow, 15KV, Prim Cable. Use a Eaton LE215CC07T load break elbow, or Engineer approved equal.

12. Splice, 15KV, Prim Cable. Use a 3M Cold Shrink QS-III kit 5513A with 3M CI-2/0 crimp barrel, or Engineer approve equal.

13. Arrestor, Distribution, 10KV.

(1) Hubbel 2137097324 PDV 100 HD Optima

(2) Cooper UHS10050A1A1B1A

(3) or Engineer approved equal.

14. Cut-out 200A with T Fuse. Use Chance C730-143PB or Engineer approved equal with fuse as specified on the plans.

15. Pole Mounted, Single Phase Transformers

A. Material of Construction.

(1) All materials shall be new. No rebuilt or reconditioned materials shall be used.

(2) Each transformer shall be provided with a mild steel tank and cover.

(3) Cover clamp and cover clamp bolt shall be constructed of stainless steel.

(4) Cover clamp nut shall be constructed of bronze.

(5) The name plate shall be anodized aluminum or stainless steel.

(6) Primary and secondary windings shall be constructed of copper or aluminum conductors.

(7) The cooling liquid shall be PCB free mineral oil.

(8) All surfaces shall be finished with a two-coat system comprised of an epoxy primer with light gray alkyd finish.

B. Construction Features.

(1) The transformer shall be a liquid cooled; single phase transformer housed in a standard tank designed for pole mounting.

(2) The transformer shall comply with all applicable ANSI standards, including but not limited to:

(a) C57.12.00 - IEEE Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.

(b) C57.12.20 - Overhead-Type Distribution Transformers, 500 KVA and

Smaller: High Voltage, 34500 Volts and Below: Low Voltage, 7970/13800Y Volts and Below.

(c) C57.12.31 - Pole Mounted Equipment - Enclosure Integrity

(d) C57.12.35 - Bar Coding for Distribution Transformers.

(e) C57.12.90 - IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and IEEE Guide for Short-Circuit Testing of Distribution and Power Transformers.

(f) C57.91 - Guide for Loading Mineral-Oil-Immersed Overhead and Pad-Mounted Transformers rated 500 KVA and less with 55°C or 65 ° C average winding rise.

(3) Tank.

(a) The tank shall be ANSI double hanger-bracket style and shall be provided with tank grounding provisions and lift lugs.

(b) The name plate shall be laser or mechanically engraved. Name plate format shall conform to ANSI C57.12.00 name plate "A".

(c) The tank shall be provided with a recessed bottom to prevent tank damage from irregular surfaces.

(d) The tank coating shall be light gray and shall meet ANSI requirements for:

(i) Salt Spray

(ii) Humidity

(iii) Impact

(iv) Oil Resistance

(v) Ultraviolet Accelerated Weathering

(vi) Cross-Hatch Adhesion

(vii) Abrasion Resistance (Taber Abraser)

(e) The tank shall be provided with a pressure relief device as a means to relieve pressure in excess of normal operating pressure. The venting and sealing characteristics shall be:

(i) Cracking Pressure: 10 psig +/- 2 psig

(ii) Resealing Pressure: 6 psig minimum

(iii) Zero Leakage: From Reseal Pressure to -8 psig

(iv) Flow at 15 psig: 35 SCFM minimum

(f) The tank shall be provided with an internal marking indicating proper oil level per section 6.2.3 of ANSI C57.12.20.

(4) Primary Connections.

(a) The primary shall be designed for a 60 Hertz, 12,470/7,200 Volt, grounded wye distribution system. Transformer primary windings shall be connected in grounded wye (single phase) configuration. All high voltage parts shall be protected and cleaned as necessary to assure that conditions which will not promote high voltage tracking are maintained.

(b) Two vertical cover mounted porcelain bushings shall be provided as the high voltage connections.

(c) The color of the high voltage bushings shall match Light Gray #70, Munsell Notation 5BG7.0/0.4

(d) High voltage bushing terminals shall be tinned to accommodate both aluminum and copper conductors.

(e) High voltage terminals shall be sized to accommodate AWG #8 Solid through AWG #2 Stranded conductors.

(f) The primary side basic insulation level (BIL) shall be 95 KV.

(5) Secondary Connections.

(a) The transformer secondary connections shall be designed for a grounded 120/240 Volt or a 240/480 Volt, single phase, three wire distribution system. Three low voltage bushings shall be provided.

(b) Low voltage bushing terminals shall be tinned to accommodate both aluminum and copper conductors.

(c) Low voltage terminals shall be sized to accommodate AWG #6 Solid through AWG #4/0 – 19 Stranded conductors.

(d) Internal secondary leads shall be permanently embossed with the letters A, B, C and D per ANSI C57.12.00 and C57.12.20 to provide a means to identify leads for reconnection.

(e) The secondary side basic insulation level (BIL) shall be 30 KV.

(6) Transformer.

(a) The transformer shall be a liquid filled transformer. The KVA rating shall be as shown on the Plans.

(b) The transformer shall be provided with full capacity high voltage taps at 2.5% above, 5.0% above, 2.5% below, and 5.0% below rated voltage. The tap changer shall be clearly labeled to reflect that the transformer must be de-energized when operating the changer, as required in section 6.2.1 of ANSI C57.12.20.

(c) The core and coil shall be vacuum processed to ensure maximum penetration of insulating fluid into the coil insulation system. While under vacuum, the windings shall be energized to heat the coils and drive out moisture and the transformer will be filled with preheated, filtered, degassed insulating fluid.

(d) The core shall be manufactured of burr-free, grain-oriented, silicon steel and shall be precisely stacked to eliminate gaps in the corner joints.

(e) The coil shall be insulated with B – stage, epoxy coated, diamond pattern insulating paper which shall be thermally cured under pressure to ensure bonding of conductor and paper.

(f) The PCB content of the liquid shall be tested prior to delivery. A written certification of the PCB test results shall be provided to the City. A label indicating the correct PCB content shall be affixed to the exterior of the tank.

(7) Performance.

(a) The transformer manufacturer shall supply a statement of transformer characteristics to the City. The statement shall include "no load" losses, conductor losses at 100% load, total losses and impedance.

(8) Manufacturers.

(a) The manufacturer shall be a company with a minimum of five years successful experience in the design and manufacture of distribution transformers.

16. Pad Mounted, Single Phase Transformer.

A. Material of Construction.

(1) All materials shall be new. No rebuilt or reconditioned materials shall be used.

(2) Each transformer shall be provided with a mild steel tank and cabinet.

(3) The cooling liquid shall be PCB free mineral oil.

(4) All surfaces shall be finished with a two-coat system comprised of an epoxy

primer with light green alkyd finish.

(5) All hardware shall be constructed of stainless steel.

B. Construction Features.

(1) General.

(a) The transformer shall be a liquid cooled, dead front, pad mounted, single phase transformer.

(2) Enclosure:

(a) The enclosure shall comply with applicable ANSI standards for enclosures.

(b) Provisions for attaching the unit to a concrete pad shall be included in the design, installed at the factory and coated with the unit.

(c) Hinged access cover shall be provided, including three point, lever operated door locks with padlock hasps and security bolts per ANSI standards.

(3) Primary Connections:

(a) The primary shall be designed for a 60 Hertz, 12,470/7,200 Volt, grounded wye distribution system. Transformer primary windings shall be connected in a grounded wye configuration. All high voltage parts shall be protected and cleaned as necessary to assure that conditions which will not promote high voltage tracking are maintained.

(b) Two (H1A, H1B) 15KV, 200 ampere, load break bushings and bushing wells meeting IEEE 386 shall be provided for the ungrounded primary connection. Two 15KV, 200 ampere, feed-thru inserts (Elastimold #1602A3R or Cooper #LFI 215 or equivalent) shall be installed in the two bushing wells. The bushing wells shall provide a conducting surface for the semi-conducting bushing insert to the tank ground. The bushing wells shall be externally replaceable and externally clamped. Bolts securing the bushing wells to the tank shall not extend more than 0.25 inch beyond the face of the bushing well. Bushing well studs shall be capable of withstanding 25 ft-lb of torque when accessories are installed.

(c) Hold-down tabs to secure accessories in the bushing well shall be provided. Tabs shall have rounded edges and not extend more than 0.25 inch beyond the face of the bushing well.

(d) Two replaceable, insulating parking stands (Elastimold #16SOP or Cooper #ISB 215S or equivalent) shall be installed in the transformer housing. Three 15 KV insulating caps (Elastimold #160DRG or Cooper #LPC 215 or equivalent) shall be installed, one on each parking stand and one on each unused bushing.

(e) One 15KV class, 10 MCOV, elbow type lightning arrester (Elastimold #167ESA-12 or Cooper # 3238018C012M or equivalent) shall be provided and installed on the transformer.

(f) The load breaking device must be a hot-stick operable assembly with a welded or bolted drip shield on the face of the tank to prevent oil from dripping on any electrical part. The shield shall be a minimum of 4 inches deep and 5 inches long. Bayonet fusing, Cooper Type 4000353C shall be provided for the transformer. Five extra fuses shall be provided to the City. An internal, current-limiting fuse which is designed to operate only on internal fault shall also be provided.

(4) Secondary Connections:

(a) The transformer secondary connections shall be designed for a 120/240 Volt or 240/480 Volt, single phase, three wire distribution system, as shown on the construction Plans. Secondary terminals shall consist of 0.625-11 UNC-2A threaded, low voltage bushings, each provided with a four hole "H" spade type connector constructed of tinned bronze or copper. Spades shall comply with ANSI 057.12.25-1981 Figure 4A. Bushings shall be externally clamped and externally replaceable.

(5) Transformer:

(a) The transformer shall be a liquid filled transformer with KVA rating as shown on the construction Plans. Hot spots shall not exceed 65 degree C.

(b) The ROB content of the liquid shall be tested prior to delivery. A written certification of the ROB test results shall be provided to the City. A label indicating the correct PCB content shall be affixed to the exterior of the tank.

(c) Windings shall be designed for 60 KV BIL (primary) and 30 KV BIL (secondary). The transformer shall be equipped with two 2.5% taps above and two 2.5% taps below standard operating voltage. The tap changer handle shall be designed for de-energized operation only.

(d) The transformer tank shall be designed to prevent direct contact between the tank and the pad. The tank shall be provided with plugged, threaded fittings which will accommodate gate valve installation at both the top and bottom of the tank.

(e) The tank shall be equipped with a pressure relief valve. Placement of the valve shall prevent oil from entering the valve with less than 11 % expansion of the oil above the volume at 25 degrees C. The relief device shall be one of the following:

(i) Tomco (Beta-Valve) 1712K-3, 1750K-3 or 1776X, with "Bug Out" disc

(ii) Qualitrol 202-030 or 201-020, with "Bug Cap"

(f) The tank grounding connector shall be capable of accepting wire in the range of #8 to #2/0 stranded copper.

(6) Performance:

(a) The transformer shall be designed to operate continuously with a 55 degree C temperature rise.

(b) The transformer manufacturer shall supply a statement of transformer characteristics to the City. The statement shall include "no load" losses, conductor losses at 100% load, and impedance.

(7) Manufacturers:

(a) The manufacturer shall be a company with a minimum of five years successful experience in the design and manufacture of distribution transformers.

17. Pad Mounted Three Phase Transformer.

A. The three phase pad mounted transformer shall be the same as the single phase pad mounted transformers except six (H1A, H2A, H3A, H1B, H2B, H3B) 15kV, 200 ampere, load break bushings and bushing well meeting IEEE 386 shall be provided with six 15kV, 200 ampere, feed-thru inserts; six replaceable insulating parking stands (Elastimold #16SOP or Cooper #ISB 215S or equivalent) shall be installed in the transformer housing; six 15 kV insulating caps (Elastimold #160DRG or Cooper #LPC 215 or equivalent) shall be installed; six 15kV class, 10 MCOV, elbow type lightning arresters (Elastimold #167ESA-12 or Cooper # 3238018C012M or equivalent) shall be provided and installed on the transformer. The secondary connections shall be designed for a three phase, three/four wire distribution system as specified on the plans.

c. Construction. Construction of items in this Special Provision shall conform to these specifications, applicable Standard Details, all applicable codes and regulations, and accepted industry standards and practices.

1. Light Poles. Light poles of all types shall be installed plumb with the bracket arms at right angles to the curb lines. The work shall include the excavation, furnishing, and placing sand backfill and disposal of surplus excavated material.

2. Bolt-Down Base. Bolt-down bases shall be constructed when and where shown on the Plans. Concrete shall be cast in place with the reinforcing steel, conduit elbows, and anchor bolts accurately located and securely tied.

3. Overhead Line. Overhead line shall be installed as shown on the Plans. Overhead line construction shall not impose undue stress on the poles. Pole line shall remain parallel with the right-of-way, and poles shall not be bent or lean due to cable or guy tension. Exposed metal materials shall be protected from corrosion by painting with a zinc-rich paint.

4. Wood Cross Arms.

A. All holes shall be drilled through the centerline of the faces and shall not vary by more than 1/32-inch from the diameters specified herein.

(1) Size 3-1/2-inch x 4-1/2-inch x 8 ft. (6 pin arm, double dead end to 1370#).

(a) Holes drilled in the 4-1/2-inch face shall be 11/16-inch diameter located at the center, and 42-inch each way from center, and 7/16-inch diameter located 19-inch each way from center (5 holes total).

(b) Holes drilled in the 3-1/2-inch face shall be 11/16-inch diameter, located 15-inch, 29-1/2-inch, and 44-inch each way from the center (6 holes total).

(2) Size 3-1/2-inch x 4-1/2-inch x 10 ft. (3 phase switch arm).

(a) Holes drilled in the 4-1/2-inch face shall be 11/16-inch diameter located at the center, and 54-inch each way from center, and 7/16-inch diameter located 19-inch each way from center (5 holes total).

(b) Holes drilled in the 3-1/2-inch face shall be 11/16-inch diameter, located 15-inch and 56-inch each way from the center (4 holes total).

(3) Size 5-1/2-inch x 7-1/2-inch x 8 ft. (Single - Dead end to 2550#, double dead end to 4800#).

(a) Holes drilled in the 5-1/2-inch face shall be 11/16-inch diameter located at the center, and 42-inch each way from center, and 7/16-inch diameter located 19-inch each way from center (5 holes total).

(b) Holes drilled in the 7-1/2-inch faces shall be 11/16-inch diameter, located 15-inch, 29-1/2-inch and 44-inch each way from the center (6 holes total).

5. Overhead Line Insulators.

A. Suspension – Dead end.

(1) Two suspension insulators are required for dead-ending on wood structures. Three suspension insulators are required for dead-ending on steel structures.

6. Primary Cables Installed in Conduit.

A. Preparing Conduits and Manholes. A short time before the cable is to be installed, the conduits shall be tested and cleaned of any obstructions or foreign matter unless the conduits were installed very recently, and it is definitely known that they were properly cleaned and inspected on completion of installation. Where no end bells are provided, the ends of the conduits shall be reamed to prevent damage to the cable during or after installation. Upon completion of inspection, a pulling wire shall be left in each conduit in which a cable is to be installed, for later drawing-in of the wire rope

which will be used to pull in the cable.

B. Installation of cable involves considerable work in manholes where space is limited and working conditions are imperfect at best. To provide suitable working conditions, especially for the making up of cable joints which requires the utmost in cleanliness on the part of the workman, any accumulated water shall be pumped out, mud and litter should be removed, and the manhole made as clean as reasonably possible.

C. Care shall be taken by the Contractor when pulling the cable through the conduit so as not to damage the cable in any way such as by excessive pulling tension or scoring of the sheath on irregularities in the conduit. The Contractor will be permitted to lubricate the cable with a suitable lubricant if he so desires.

D. If the cable is found to be defective while being installed or being energized, the defective section of cable shall be removed and replaced by the Contractor.

E. New primary cables shall be placed in one of the bottom new outside 4 inch conduits (paid for as part of this contract item). Provide 10 feet of additional primary conductor in each manhole for racking (paid for as part of this contract item). Provide 40 feet of additional primary conductor in each transformer vault for racking (paid for as part of this contract item). The Contractor shall label and tag each conductor in each manhole, transformer vault, pad mounted transformer, and switch gear with engraved plastic tags (paid for as part of this contract item).

7. Underground Conductor. Provide additional of each conductor in each of the following locations:

A. Manhole, enough to rack around the interior wall of the structure.

B. Handhole, 4 feet from the face of the structure.

C. Pole base, 4 feet from the pole handhole.

D. Conductors shall be labeled and tagged with engraved plastic tags in each manhole, handhole, and junction box with the following information: circuit voltage and circuit ID (paid for as part of the contract item).

E. Alternate connections of lamp lead between red and black and receptacle lead between blue and orange in pole handholes.

8. Transformers.

A. The transformer shall be installed as shown on the plans and in accordance with the requirements of the National Electric Safety Code.

B. A ground rod with a minimum length of 8 feet shall be installed at the base of the pole supporting the transformer. An additional ground rod will be installed if required to obtain 25 ohms or less between the transformer tank and ground and between the

neutral secondary lug and ground. Minimum ground conductor size shall be AWG #6 solid. All grounding conductors shall be solid copper. Wood molding shall be installed on all grounding conductors.

9. Underground Sec Conductor Splicing.

A. Splices below grade (ie. in manholes or handholes) shall be made using vice connectors and shall be covered with tape as follows:

(1) 2 layers of ½ lapped 33+ tape.

(2) 2 layers of ½ lapped 130C tape.

(3) 2 layers of ½ lapped 33+ tape.

B. Splices above grade (ie. in pole base or pedestal) can use polaris connectors instead of the below grade splicing method.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Wood pole, __ foot, CI _____, Det E-200	Each
Cross arm, Single, 3-1/2 inch by 4-1/2 inch by __ foot.....	Each
Cross arm, Double, 3-1/2 inch by 4-1/2 inch by __ foot	Each
One Wire Rack, Bolted	Each
Thimble Eye Nut, Bolted	Each
Steel Pin and Insulator	Each
Suspension, Dead End with Epoxilator and Clamp	Each
Suspension, Dead End, with 20-inch Extension Strap, Epoxilator, and Clamp	Each
Overhead Sec /C, #4 Triplex	Foot
Overhead Sec /C, #1/0 Triplex	Foot
Overhead Prim Line /C, __ ACSR	Foot
Overhead Prim Neutral /C, __ ACSR	Foot
Underground Prim Line /C, __ 1C-#2/0 CU 15 kV	Foot
Underground Prim Neutral, #2 CU, 600 V.....	Foot
Underground Sec /C, __ -#__ CU U.S.E.....	Foot
Arrestor, Distribution CI 10KV	Each
Cutout, 200A with __ A T Fuse.....	Each
Two Pole Fusible Weather Proof Disconnect Switch __ amperes.....	Each
Guy Installation for Wood Pole, Det E-250, __ K Rating, __ foot Lead including Fiberglass Guy Strain Insulation	Each
Sidewalk Guy Installation for Wood Pole, Det E-255, __ K Rating __ foot Lead including Fiberglass Guy Strain Insulation	Each
Guy Installation Pole to Pole, __ K Rating, including Fiberglass Guy Strain Insulation	Each
Ground Assembly for Wood Pole, Det E-205.....	Each

Terminator, 15 kV, Prim Cable	Each
Elbow, 15 kV, Prim Cable	Each
Splice, 15 kV, Prim Cable	Each
Transformer, Pole Mtd, Single Phase, __ kV, __/__ V Sec	Each
Transformer, Pad Mtd, Single Phase, __ kV, __/__ V Sec	Each
Transformer, Pad Mtd, Three Phase, __ kV, __/__ V Sec	Each

The unit price shall be payment in full for furnishing all labor, equipment, and material, and for any necessary grading, excavation and backfill when not paid for separately, and for performing the work complete.

1. Primary Cable Installed in Conduit of numbers and sizes specified will be paid for at the contract unit price per lineal foot. Measured from termination to termination.

2. Conductors of the numbers and sizes specified will be paid for at the contract unit price per foot.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
STREET LIGHTING

ENG/CITY OF GRAND RAPIDS

1 OF 20

ORG:03/31/25

REV:11/01/25

a. Description. This work consists of furnishing and/or installing the items described below, including all of the necessary labor, materials, tools, and equipment necessary to result in a finished installation.

1. Applicable Codes and Guides. The following codes and guides apply to the work in this Special Provision. Depending on the materials and methods, other codes may also apply:

- A. Michigan State Construction Code Act of 1972, as amended
- B. Michigan Building Code rules, Parts 1-9; Department of Labor
- C. Michigan Occupational Health Standards for Construction; Michigan Department of Public Health
- D. Michigan Occupational Safety and Health Act "MIOSHA", Act 154, P.A. 1974 as amended; Michigan Department of Public Health
- E. Current Standard Specifications for Construction as amended; Michigan Department of Transportation
- F. OSHA Safety and Health Standards (29 CFR 1926/1910)
- G. City of Grand Rapids (City) Ordinances and State Rules and Regulations
- H. National Electrical Safety Code
- I. National Electrical Code
- J. Illuminating Engineering Society of North America "IES"

b. Materials. Materials used to construct the street lighting system shall be as specified herein.

1. Round Tapered Fiberglass Light Poles. Fiberglass street lighting poles shall be round and hollow with a uniform taper of .15 inches per foot. A Bolt-Down Base meeting the requirement of the Standard Details shall be furnished as a part of the light pole. Wiring access and entrance holes shall be reinforced. The color of the pole shall be contained in the resin and shall be throughout the thickness of the pole.

- A. The inner core of the pole shall be formed by wrapping glass filaments treated in a bonding resin at a relatively wide angle (65° - 85°) to the longitudinal axis of the pole to

form a number of layers with alternate layers crossing one another in opposite directions. An outer core section of greater weight than the inner section shall be formed by wrapping a number of relatively narrow bands of filaments treated in a bonding resin at a relatively slight angle (3° - 15°) to the longitudinal axis, with alternating bands of filaments crossing each other in opposite directions. The pole shall be cured in an oven. The fiberglass and resin ratio of the pole shall contain at least 65% glass and the balance polyester resin.

B. A finish coating of pigmented urethane capable of withstanding exposure to ultraviolet, chemicals, and extreme weather conditions shall be applied to a minimum dry film thickness of one and one-half mils.

C. Poles shall be rated for 110 mph with a 30% gust factor AASHTO wind load areas.

D. Poles shall have no more than 5% deflection with a 200 lb. top horizontal load and shall withstand a 1200 lb. top vertical load without failure.

E. The manufacturer shall warranty the pole against structural failure from natural causes, within the criteria of these specifications, for a period of 20 years.

F. The fiberglass pole shall be equipped with the following:

- (1) A handhole with cover and wire entrance hole to be 2 inches by 5 inches.
- (2) The handhole location shall be 2 feet. above the foundation.
- (3) The finish shall be smooth.

G. Fiberglass Light Pole, 14-Foot. for Post Top Luminaire.

- (1) Total length - 14 feet.
- (2) 14 feet. above foundation.
- (3) Pole top tenon to be 3 inches diameter x 2-1/2 inches long.
- (4) Color shall be black.
- (5) Anchor Base: shall be sized to fit 1-inch anchor bolts on an 11-inch bolt circle.
- (6) Base cover shall be a two-piece assembly.

H. Fiberglass Light Pole, 35-foot Mounting Height and ___-foot Mast Arm.

(Reinforced for Walk-Wait Signal and Banners)

- (1) Reinforced Fiberglass pole with mast arm shall have the following attributes:

- (2) Luminaire mounting height of 35-foot with an 8-foot mast arm that has 33-inch rise.
 - (3) Pole shall be designed to support:
 - (a) Two 12-foot mast arm with luminaires weighing 60 lbs. with an effective projected area of 1.2 sq. feet.
 - (b) Two cloth banners (2.5-feet by 7.5-feet) mounted at the top and bottom with the bottom mounted at 15-feet above the base.
 - (c) One fixture weighing 50-pounds on two 1.5-foot arms at 10-foot and 13-foot above the base.
 - (d) One sign with 3-square foot surface with the bottom at 8-foot above the base.
 - (4) Mast arms shall be aluminum, with a tapered elliptical form, and 2-inch slip fitter.
 - (5) Color shall be gray.
 - (6) Anchor plate shall be a slotted design which will accept 1-inch diameter anchor bolts installed on any bolt circle diameter from 13.5-inches to 15-inches.
 - (7) A 4-inch by 12-inch handhole shall be provided 2-feet above the base on the left side of the pole, where left is the left-hand side when facing the street. The handhole shall be equipped with a painted cover and slotted fastener. Covers, fasteners and exposed handhole reinforcement shall be non-metallic.
 - (8) A cast aluminum pole cap shall be installed on the pole. Cap attaching hardware shall not rust or discolor the pole.
 - (9) An aluminum name plate showing the manufacturer's name, model #, date of manufacture, and "CITY OF GRAND RAPIDS" shall be permanently attached to each pole above the hand hole.
2. Bracket Arm and Options. Bracket arms and other options for fiberglass poles shall be as shown on the Standard Details unless otherwise called for in the Proposal, Plans, or in the Special Provisions.
- A. Bracket arms for wood pole installation shall be as indicated on the Plans, and shall be the following:
- (1) 30 inches long, Utility Metals #P200S026, or Engineer approved equal.
 - (2) 8 feet long
 - (a) General Electric #C623-G005

(b) Fabricated Metals Corp. #P200S080

(c) or Engineer approved equal.

(3) 12 feet long

(a) Fabricated Metals Corporation #D200S 120

(b) Utility Metals D200S120

(c) or Engineer approved equal.

(4) 20 feet long

(a) Fabricated Metals Corporation #D200S200

(b) Utility Metals A200S200

(d) or Engineer approved equal.

3. Tapered Fluted Fiberglass Post Top Light Pole. Poles shall be manufactured of filament-wound or spun-cast fiberglass. Pigmentation shall match the exterior color and be solid, uniform and continuous throughout the structure of the pole & base cover. The exterior shall be finished with an UV protective coating which shall be black in color. The protective coating shall have a minimum dry film thickness of 1.5 mils. The finish shall be uniform and consistent for the entire length of the pole and ornamental base cover.

A. Shaft Construction:

(1) The poles shall be round, hollow and evenly tapered along the length of the pole. A mounting height of 12, 16, or 20 feet shall be provided, measured from the bottom of the base plate to the bottom of the exposed portion of the tenon. Sixteen flutes shall be evenly spaced around the pole circumference. Exterior of the pole shall be 5 inches diameter at the base of the tenon.

(2) A 3.0 inch O.D., 6061-T6 aluminum alloy tenon shall be provided at the top of the pole for attachment of standard, slip-fit luminaires. The exposed portion of the tenon shall be 3 inches long and shall be painted to match the pole.

(3) The pole shall be designed to be anchor base mounted. Anchor base shall be sized to fit 1-inch anchor bolts on a 13.5-15-inch bolt circle.

(4) A two inch wide by five inch high handhole shall be provided in the pole at 14 inches above grade. A handhole cover shall be provided with each pole. The cover shall be finished to match the rest of the pole. All covers, fasteners and exposed handhole reinforcement shall be stainless steel or brass.

B. Ornamental Base Cover

(1) Each pole shall be provided with an ornamental, two-piece, base cover. The base cover shall be fabricated of fiberglass reinforced plastic and shall be finished to match the pole. The base cover shall be held in place by hex socket locking screws.

C. Performance

(1) The pole shall be designed with a minimum safety factor of 2. Before the safety factor is applied, the poles shall be designed to withstand a 100 mile per hour wind load with 10% gust factor applied to an effective projected area (E.P.A.) of 1.5 square feet. Deflection of the pole under the design conditions shall not exceed 2.5% of the length; i.e., 3.6 inches for 12 foot poles. Reinforcement shall be provided as necessary to maintain the required design strength and provide required openings.

4. Ornamental Alum Light Pole, 24-Foot. Poles, arms, filigree, and base covers shall be manufactured of cast and extruded aluminum. The pole finish shall be factory applied powder coat. The finish shall be uniform and continuous throughout the structure of the pole, arm, and covers. The final coat shall be gloss black in color. The couplings shall be finished to match the pole. Screws and other hardware not otherwise specified shall be bronze. Stainless steel hardware shall be supplied where bronze parts will not provide adequate strength.

A. Arm:

(1) The arm shall be smooth, round, and hollow with an outside diameter of 2.6 ± 0.4 inch. The arm shall terminate in a rectangular section at each end. The rectangular portion shall be 4.0 ± 0.25 inches square and 6.0 ± 2.0 inches high. Two finials shall be installed on each rectangular section. One finial shall be installed vertically on top of each rectangular section. The other two shall be placed on the same axis as the arm. A hand hole/wireway cover shall be provided at each end of the arm. These access points shall be designed so as to provide easy field installation of lamp wire into the pole. Access covers shall prevent water from entering the arm, pole, or luminaire. The inside corners of the arm shall be chamfered to prevent damage to lamp wire from sharp corners. Luminaire arms shall be oriented perpendicular with respect to the street and held captive in place.

B. Filigree:

(1) A filigree shall be provided below the arm. The filigree shall be decorative and shall provide structural support for the arm. Design of the filigree shall be identical to existing poles.

C. Shaft:

(1) The pole shafts shall be round and hollow.

(2) The shaft shall be 23.0 feet long. It shall be straight and fluted, with a 6-inch outside diameter to a point 20.0 feet above grade. The remainder shall be smooth and straight with a 3-inch outside diameter.

(3) One reinforced handhole opening shall be provided at 12 inches above the base plate and at an orientation of 180° clockwise from the street. The handhole shall be of adequate size to allow making electrical connections in the base of the pole.

(4) A ½ inch, 13 UNC grounding lug shall be provided on the inside of the pole at the handhole level.

(5) The pole shaft in accordance with the Plans may include a reinforced junction box for a receptacle. The junction box shall have a weather proof in use cover painted to match the pole.

(6) The pole shall be designed for anchor base mounting. The base mounting plate shall accept 1 inch diameter anchor bolts installed on any bolt circle from 13.5 inches to 15 inches. Holes shall be orientated at 45°, 135°, 225°, and 315° clockwise from the street.

D. Ornamental Base Cover:

(1) An ornamental two-piece base cover shall be included with each pole assembly.

(2) The base cover shall be 20 inches diameter at the base and 35 inches high. The tapered section shall be a concave design similar to existing poles. The base cover shall include appropriate decorative features.

(3) Removable base covers shall be held in place by hex socket locking screws.

E. Breakaway Banner Bracket and Banner Arms:

(1) The clamp-on break-away banner brackets for the poles shall consist of two clamp-on assemblies as described herein. The clamp-on assemblies shall be constructed of a suitable non-oxide material and include a connector designed to accept a 1 inch, left-hand, male NPT threaded adapter. The entire assembly shall be painted Black to match the pole after fabrication. All hardware used on the assembly shall be stainless steel.

(2) A break-away adapter shall be installed in each clamp-on assembly. The adapters shall be machined from aluminum and be provided with a 1 inch, left-hand, male NPT, threaded on one end, and a ¾ inch, right-hand, female NPT threaded on the other. The adapters shall be designed to break when a banner 66 inches by 30 inches is subjected to a wind speed of 50 mph. The adapter shall include a safety wire to prevent the banner arm from falling after the adapter breaks. After machining, the adapters shall be finished to match the pole.

F. Performance:

(1) The pole and arm shall be designed to support a 100 pound, pendant luminaire mounted at the end of the arm.

(2) The poles shall be designed to withstand a 100 mile per hour wind load with a 10% gust factor applied to an effective projected area (E.P.A.) of 1.5 square feet. Deflection of the pole under the design conditions shall not exceed 2.5% of the length; i.e., 6.9 inches for 23 foot poles.

(3) Reinforcement shall be provided as necessary to maintain the required design strength and provide required openings.

5. Light Pole, 24 Foot Ornamental Aluminum Double Arm. Poles, arms, filigree, and base covers shall be manufactured of cast and extruded aluminum. The pole finish shall be factory applied powder coat. The finish shall be uniform and continuous across the surface of the pole, arm, and covers. The final coat shall be gloss black in color. The couplings shall be finished to match the pole. Screws and other hardware not otherwise specified shall be bronze. Stainless steel hardware shall be supplied where bronze parts will not provide adequate strength.

A. Arm:

(1) The arm assembly shall consist of two arms at 180°.

(2) The arms shall be smooth, round, and hollow with an outside diameter of 2.3 ± 0.1 inch. The arm shall terminate in an ovoid section at the shaft end. Two finials shall be installed on the ovoid section. One finial shall be installed vertically on top of the ovoid section as a cover for a handhole/wire way access point. The other shall be placed on the same axis as the arm. The access point shall be designed so as to provide easy field installation of lamp wire into the pole. The access cover shall prevent water from entering the arm, pole, or luminaire. The inside corners of the arm shall be chamfered to prevent damage to lamp wire from sharp corners. The luminaire arm shall be oriented perpendicular with respect to the street and held captive in place.

(3) The arm length shall be 3 foot or 4 foot as specified in the Plans.

B. Filigree:

(1) A filigree shall be provided below the arms. The filigree shall be decorative and shall provide structural support for the arm. Design of the filigree shall be identical to existing poles.

C. Pole Shaft:

(1) The pole shafts shall be decorative square and hollow and shall have four tracks designed for supporting accessories.

(2) The shaft shall be 23.0 feet long. It shall be straight and fluted, with a minimum 5.75 inch decorative fluted outside to a point 20.0 feet above grade. The remainder shall be a 3 inch diameter by 36 inch tenon.

(3) The pole shall be designed for anchor base mounting. The base mounting

plate shall accept 1 inch diameter anchor bolts installed on a bolt circle of 12 inches. Holes shall be orientated at 0°, 90°, 180°, and 270° clockwise from the street.

(4) The shaft shall have an integrated structural base that matches the design of existing poles. The base cover shall be 20 inches in diameter at the base and 43 inches high. One reinforced handhole opening shall be provided at 12 inches above the base plate, and at an orientation of 270° clockwise from the street. The handhole shall be of adequate size to allow making electrical connections in the base of the pole. A removable handhole base cover shall be held in place by hex locking screws.

(5) A ½ inch, 13 UNC grounding lug shall be provided on the inside of the pole at the handhole level.

D. Banner Couplings and Breakaway Banner Arms:

(1) Two sets of banner arms shall be included with each pole.

(2) The banner coupling for the poles shall consist of two track mount assemblies as described herein. The track mount assemblies shall be constructed of a suitable non-oxide material. The entire assembly shall be painted black to match the pole after fabrication. All hardware used on the assembly shall be stainless steel.

(3) The banner arm shall be a 1¼ inch diameter pipe that is 33 inches long. The banner arm shall be welded to the break-away adapter. A removable ball shaped end cap shall be included with each banner arm.

(4) A break-away adapter shall be installed in each track mount assembly. The adapters shall be machined from aluminum. The adapters shall be designed to break when a banner 66 inches by 30 inches is subjected to a wind speed of 50 mph. The adapter shall include a safety wire to prevent the banner arm from falling after the adapter breaks. After machining, the adapters shall be finished to match the pole.

(5) The banner arm shall attach to the coupling using a 1/4" stainless steel latch pin.

E. Receptacle:

(1) The pole shall include a receptacle box with GFCI duplex receptacle and weather proof cast aluminum "in-use" cover.

F. Performance:

(1) The pole and arm shall be designed to support two 70 pound, pendant luminaires with a 2.5 square foot EPA, mounted at the end of the arm.

(2) The poles shall be designed to withstand a 90 mile per hour wind load with a 14% gust factor. Deflection of the pole under the design conditions shall not exceed

2.5% of the length; i.e., 6.9 inches for 23 foot poles.

(3) Reinforcement shall be provided as necessary to maintain the required design strength at the required openings.

6. General Specification for LED Luminaires

A. Definitions. Lighting terminology used herein is defined in IES LS-1. See referenced documents for additional definitions.

(1) Exception: The term “driver” is used herein to broadly cover both drivers and power supplies, where applicable.

(2) Clarification: The term “LED light source(s)” is used herein per IES LM-80 and TM-21 to broadly cover LED package(s), module(s), and array(s).

B. References. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by their basic designation only. Versions listed shall be superseded by updated versions as they become available.

C. American National Standards Institute (ANSI)

(1) C78.377-2011 (or latest), American National Standard for the Chromaticity of Solid State Lighting Products.

(2) C82.77-2002 (or latest), American National Standard for Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment.

(3) C136.2-2014 (or latest), American National Standard for Roadway and Area Lighting Equipment -- Dielectric Withstand and Electrical Immunity Requirements.

(4) C136.10-2010 (or latest), American National Standard for Roadway and Area Lighting Equipment -- Locking-Type Photocontrol Devices and Mating Receptacle Physical and Electrical Interchangeability and Testing.

(5) C136.15-2011 (or latest), American National Standard for Roadway and Area Lighting Equipment -- Luminaire Field Identification.

(6) C136.22-2004 (R2009 or latest), American National Standard for Roadway and Area Lighting Equipment -- Internal Labeling of Luminaires.

(7) C136.25-2009 (or latest), American National Standard for Roadway and Area Lighting Equipment -- Ingress Protection (Resistance to Dust, Solid Objects and Moisture) for Luminaire Enclosures.

(8) C136.31-2010 (or latest), American National Standard for Roadway Lighting Equipment - Luminaire Vibration.

(9) C136.37-2011 (or latest), American National Standard for Roadway and Area

Lighting Equipment - Solid State Light Sources Used in Roadway and Area Lighting.

(10) C136.41-2013 (or latest), American National Standard for Roadway and Area Lighting Equipment – Dimming Control Between an External Locking Type Photocontrol and Ballast or Driver.

D. American Society for Testing and Materials International (ASTM)

(1) B117-11 (or latest), Standard Practice for Operating Salt Spray (Fog) Apparatus.

(2) D1654-08 (or latest), Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.

(3) D523-08 (or latest), Standard Test Method for Specular Gloss.

(4) G154-06 (or latest), Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.

E. Energy Star.

(1) TM-21 Calculator, Rev. 020712 (or latest) <http://www.energystar.gov/TM-21Calculator>

F. European Union (EU).

(1) RoHS 11 Directive 2011/65/EU, on the restriction of the use of certain hazardous substances in electrical and electronic equipment recast.

G. Federal Communications Commission (FCC).

(1) 47 CFR Part 15, Telecommunication--Radio Frequency Devices.

H. Federal Trade Commission (FTC).

(1) Complying with the Made in USA Standard, December 1998 (<http://business.ftc.gov/advertising-and-marketing/made-usa>).

(2) Green Guides, 16 CFR part 260, Guides for the Use of Environmental Marketing Claims.

I. Illuminating Engineering Society of North America (IESNA or IES).

(1) DG-4-03 (or latest), Design Guide for Roadway Lighting Maintenance.

(2) HB-10-II (or latest), IES Lighting Handbook, 10th Edition.

(3) LM-50-13 (or latest), IES Approved Method for Photometric Measurement of Roadway and Street Lighting Installations.

(4) LM-61-06 (or latest), IESNA Approved Guide for Identifying Operating Factors Influencing Measured Vs. Predicted Performance for Installed Outdoor High Intensity Discharge (HID) Luminaires.

(5) LM-63-02 (R2008 or latest), ANSI/IESNA Standard File Format for the Electronic Transfer of Photometric Data and Related Information.

(6) LM-79-08 (or latest), IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.

(7) LM-80-08 (or latest), IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources.

(8) RP-8-00, ANSI/IESNA American National Standard Practice for Roadway Lighting

(9) RP-16-10 (or latest), ANSI/IES Nomenclature and Definitions for Illuminating Engineering.

(10) TM-I5-11 (or latest), Luminaire Classification System for Outdoor Luminaires.

(11) TM-21-11 (or latest), Projecting Long Term Lumen Maintenance of LED Light Sources.

J. Institute of Electrical and Electronics Engineers (IEEE).

(1) IEEE C62.41.2-2002 (or latest), IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and less) AC Power Circuits.

(2) ANSI/IEEE C62.45-2002 (or latest), IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits.

K. LED Lighting Facts.

(1) Submission Requirements.
<http://www.lightingfacts.com/About/Content/Manufacturers/SubmissionRequirements>

L. National Electrical Manufacturers Association (NEMA).

(1) ANSI/NEMA/ANSI C78.377-2008 (or latest), American National Standard for the Chromaticity of Solid State Lighting Products.

M. National Fire Protection Association (NFPA).

(1) 70 - National Electrical Code (NEC).

N. Underwriters Laboratories (UL).

- (1) 1449, Surge Protective Devices.
- (2) 1598, Luminaires.
- (3) 8750, Light Emitting Diode (LED) Equipment for Use in Lighting Products.

7. Luminaire Requirements.

A. General Requirements.

(1) Transmissive optical components shall be applied in accordance with OEM design guidelines to ensure suitability for the environment (e.g., electromagnetic, thermal, mechanical, chemical).

(2) Borosilicate or tempered glass optical enclosure is preferred

(3) Any plastic materials used in the optical assembly that affect the light output and distribution shall be appropriately heat and UV resistant. Plastic materials shall have been evaluated and exhibit a Yellowness Index (YI) over the useful life of the product of no more than 30%. YI reference ASTM E313 (ASTM D1925). A list of relevant plastic materials used and the plastic material manufacturer's "YI" data report shall be provided with the bid documents.

(4) The LED light source(s) and driver(s) shall be RoHS compliant.

(5) The luminaire shall accept the voltage or voltage range specified at 60 Hz, and shall operate normally for input voltage fluctuations of plus or minus 10 percent.

(6) All internal components shall be assembled and pre-wired using modular electrical connections.

(7) The following shall be in accordance with ANSI C136.37. Ingress protection: minimum rating of IP66 for Optical 4.2.7.1 assembly, and IP65 for Electrical components compartment.

B. Painted or finished luminaire surfaces exposed to the environment.

(1) The luminaire shall be powder coated grey.

(2) The finish shall exceed a rating of 8 (per ASTM D1654) after 5000 hours of testing per ASTM B117.

(3) The finish shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.

C. Vibration.

(1) All luminaires shall be 3G rated and meet requirements for Level 2 (bridge/overpass) per ANSI C136.31

D. Thermal management.

(1) The luminaire shall start and operate in an ambient temperature range from -30C to 40C.

(2) The maximum rated case temperature of driver and other internal components shall not be exceeded when luminaire is operated in ambient temperature range specified.

(3) The mechanical design of protruding external surfaces (heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation.

(4) Non-passive means of cooling are not allowed. This includes the use of liquids or other mechanical cooling systems.

E. Photocontrol receptacle.

(1) Receptacle. The luminaires shall be supplied with a 7-pin ANSI C136.41 compliant receptacle with the dimming leads from the driver connected to the receptacle pads and specified in ANSI C136.41.

(2) The 7 pin receptacles shall be fully prewired and ANSI C136.41 compliant. The dimmable LED driver shall be connected to the receptacle pads as specified by ANSI C136.41. Connection of the other two pads shall provide screw terminals to allow for future field wire access.

F. Electrical safety testing.

(1) The luminaire shall be listed for wet locations by a U.S. Occupational Safety Health Administration (OSHA) Nationally Recognized Testing Laboratory (NRTL).

G. Electrical Immunity.

(1) The luminaire shall meet the performance requirements specified in ANSI C136.2 for electrical immunity to an enhanced level (10kV/5kA).

(2) The surge protection device shall be connected in series with the luminaire load and shall disconnect power at the end of life. Device shall allow no more than 10% of pass-through to surge energy under either differential or common mode surge.

H. Interference and power quality.

(1) The luminaire shall comply with FCC 47 CFR part 15 interference criteria for Class A (nonresidential) digital devices.

(2) The luminaire shall comply with section 5.2.5 (luminaires rated for outdoor use) of ANSI C82.77 at full input power and across specified voltage range.

I. Electrical Features.

- (1) The expected life of the LED shall be a minimum of 100,000 hours at 25°C.
- (2) The luminaire's lumen depreciation shall not be less than L80 at 100,000 hours.
- (3) Expected life of the electronic driver of 100,000 hours at a 25°C ambient.

J. Color attributes.

- (1) The Color Rendering Index (CRI) shall be no less than 70.
- (2) The nominal Correlated Color Temperature (CCT) shall be 4000K +/- 8%

K. Identification.

- (1) The luminaire shall have an external label per ANSI C136.15.
- (2) The luminaire shall have an internal label per ANSI C136.22.

L. Mechanical Features.

- (1) The die cast aluminum door frame and housing with the wildlife shield cast into the housing. The luminaire housing and door shall be made of cast aluminum A838, A340, or A380.
- (2) Mast arm mount fixtures shall be adjustable for arms from 1-1/4-inch to 2-inch (1-5/8-inch to 2-3/8-inch O.D.) diameter with 2-bolt clamping mechanism. The mount shall provide adjustability of +/- 5° of tilt.
- (3) Post top mount fixtures shall be for mounting on a 3-inch nominal O.D. by 3-inch tenon.
- (4) Pendant mount fixtures shall mount using a stem that is held captively to the pole arm. Threaded mounting is not permissible.
- (5) Tool-less entry to electrical compartment with 3 station terminal block and quick disconnects.
- (6) Bubble level located inside the electrical compartment for levelling of luminaire during installation.
- (7) All bolts and fasteners shall be stainless steel.

M. End of Life.

- (1) At the end of life of the LED light source, the ability to replace the LED light source or other components allowing for the reuse of the housing is preferred.

N. Quality Assurance.

(1) Before approval and purchase, the City may request luminaire sample(s) identical to product configuration(s) submitted for inspection. The City may request IES LM-79 testing of luminaire sample(s) to verify performance is within manufacturer-reported tolerances.

(2) Each luminaire shall be fully assembled and electrically tested before shipment from the factory.

O. Warranty.

(1) The warranty shall be for a minimum period of 10 years, and shall cover maintained integrity and functionality of the following:

(a) The luminaire housing, wiring, connections, controls, and driver.

(b) The LED light source(s)

(c) Failure of a single chip on board (COB) or more than 15 percent of individual LEDs constitutes luminaire failure.

(d) A 15% reduction in foot candles on the ground constitutes luminaire failure. Field testing will be performed comparing the luminaire in question to other equivalent luminaires.

(e) LED driver(s)

(2) The warranty period shall begin with the date of the invoice to either the City or its LED Installation Contractor.

(3) The warranty shall cover: cost (labor and equipment) for replacing the luminaire, delivery freight of replacement fixture, and return freight of the failed fixture if required by the manufacturer.

P. Manufacturer Services.

(1) The manufacturer shall provide installation and troubleshooting support via telephone and/or email though the warranty period.

Q. Eligible Manufacturers.

(1) Any manufacturer having a minimum of 10 years' experience with the manufacture of LED luminaires and offering products that comply with the required product performance and operation criteria may be considered.

(2) US point of manufacture is required for luminaires and subassemblies (including LED Boards). Products and subassemblies manufactured in any territory that falls under NAFTA meet this requirement.

(3) All luminaires of a given type on a project must be from the same manufacturer.

R. Required Submittals.

(1) A Product Submittal Form with results of the application-based specification shall be submitted for each luminaire that is not on the Qualified Product List (QPL).

(2) Product cut sheets

(a) Luminaire cut sheets

(b) Cut sheets for LED light source(s)

(c) Cut sheets for LED driver(s)

(d) Provide diagrams illustrating light output and input power as a function of control signal.

(e) Cut sheets for surge protection device

(f) Identify if surge protection failure disables the luminaire.

(3) Instructions for installation and maintenance

(4) IES LM-79 luminaire photometric report(s) from an accredited test laboratory.

(a) Lumen maintenance calculations and supporting test data (LM-80).

(b) Shall be in accordance with LED Lighting Facts guidance.

(c) Exception: calculations shall be based on 100,000 hours of operation and average ambient temperature of 25C (TM-21).

(5) Computer-generated point-by-point photometric analysis of maintained light levels.

(a) See Appendices A-1 through A-4 for calculation setup criteria for each fixture.

(b) Calculation/measurement points shall be per IES RP-8. Separated vehicular lanes, bikeways, and walkways shall be evaluated separately.

(c) Calculations shall be for maintained values, i.e. Light Loss Factor (LLF) < 1.0, where $LLF = LLD \times LDD \times LATF \times MDF$

(d) Lamp Lumen Depreciation (LLD) shall be 0.90 or the value calculated in section 0, whichever is lower.

(e) Luminaire Dirt Depreciation (LDD) = 0.80

(f) Luminaire Ambient Temperature Factor (LATF) = 0.96 or value based upon the average ambient temperature specified in section 0, whichever is lower

(g) Material Depreciation Factor (MDF) (aka: Luminaire Component Depreciation Factor) = 1.0 for optics made of glass, 0.90 for optics made of acrylic, and .70 for optics made from polycarbonate.

(h) Light Loss Factor calculation shall be detailed in the photometric calculation.

(i) Mesopic multipliers (i.e., effective luminance factors) shall not be used. All values shall assume Photopic visual adaptation.

(6) Submit IES LM-63 format electronic file containing luminous intensity data associated with submitted LM-79 report(s) and used for point-by-point calculations. Summary of reliability testing performed 10.7 for LED driver(s).

8. Luminaire Types. Use a below pre-approved fixture, or Engineer approved equal.

Table 1
Pre-Approved Street Light Fixtures

Fixture Type	Style	Manufacture	Part Number
A	Cobra Head	American Electric Lighting	ATBS-P30-R2-RFD336035
B	Cobra Head	American Electric Lighting	ATBM-P50-R2-RFD302291
C	Cobra Head	American Electric Lighting	ATBL-C-R2-RFD-302292
D	Cobra Head	American Electric Lighting	ATBL-F-R2-RFD302293
E	Post Top	American Electric Lighting	245L-P55-RFD309214
F	Cobra Head	American Electric Lighting	ATBL-C-R2-RFD30048
G	Cobra Head	American Electric Lighting	ATBL-F-R2-RFD320049
H	Pendant	Holophane	ESL3-P20-TG4-RFD333782
J	Pendant	Holophane	ESL3-P30-TG4-RFD333783
K	Pendant	Holophane	ESL3-PP40-TG4-RFD333784
M	Ornamental Post Top	Holophane	GDV3-P20-GL3-RFD317500
N	Ornamental Post Top	Holophane	GDV3-P30-GL3-RFD317501
P	Ornamental Post Top	Holophane	GDV3-P50-GL3-RFD317906
Q	Ornamental Post Top	Holophane	WAE3-P50-GL5-RFD317417
R	Wall Mount	Holophane	TNLEDMED-PK6-WCR-RFD317416
S	Ceiling Mount	Holophane	TNLEDMED-PK4-CLN-RFD296487

c. Construction.

1. General. The location of underground utilities and other obstructions, if shown on the Plans, although plotted from the best information available, may not be completely accurate. Also, underground obstructions may be encountered which are not shown on the Plans or are unknown at this time. Locations of conduit and/or cable duct runs shown on the Plans may have to be adjusted for the above conditions. Abandoned structures which may be encountered, and which would interfere with the conduit or cable duct run shall be removed sufficiently to permit the installation or construction of the conduit or cable duct run. The cost of such removals shall be considered as included in the unit price for the conduit.

A. Fire Hydrants. Fire hydrants shall be kept accessible for immediate use at all times.

2. Execution.

A. Holding Utility and Street Lighting Poles. The Contractor shall support utility or street lighting pole(s) which may be located within the construction influence. The Contractor shall provide the necessary materials, labor, and equipment necessary for such support, for adequate compaction of backfill near the pole, and for temporary or permanent guys and anchors. Damage to underground and/or overhead utilities shall be the responsibility of the Contractor. Damaged utilities shall be replaced or repaired by the Contractor as directed by the utility owner.

B. Supporting Underground Utility Lines. The Contractor shall be responsible for the support of existing underground utility lines.

C. Removal of Existing Street Lighting System. The Contractor shall remove the street lighting system as noted on the plans or required by the Engineer. This work shall include, but is not limited to, the removal of the following items:

(1) Street lighting wiring. Street light poles, cross arms, insulators, dead ends, guys, and anchors.

(2) Items removed shall be removed from the site, and disposed by the Contractor, unless shown to be salvaged on the plans or directed to be salvaged by the Engineer.

(3) Arrangements for delivery of salvaged materials (as defined by the City ELC Department) shall be made by contacting the Energy Lighting and Communications Department at 616.456.3281.

D. Poles. Poles shall be installed plumb. Arms shall form a right angle with the adjacent curb, or as shown in the project plans and specifications. The anchor bolts shall be torqued to the manufacture's specifications. Wiring of poles shall be in accordance with the associated wiring detail. The wire used between the fuse holder in the base of the pole and the terminal block in the luminaire shall be individual XHHW insulated conductors or a multi-conductor assembly rated for: outdoor, sunlight, wet locations, and 600V, in-line splicing is not allowed.

E. Luminaires. Luminaires shall be installed on the light pole bracket arm combination furnished and installed under another item and shall include all the necessary wiring and connections to produce a balanced load with the existing or proposed single-phase three wire circuit with ground in accordance with the manufacturer's recommendations, to give a finished installation.

F. Controls. The controls, including enclosure and photocell, shall be securely mounted in location shown on the Plans.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Fiberglass Light Pole, 14 foot	Each
Fiberglass Light Pole, 28 foot Mounting Height and 8 foot Mast Arm	Each
Fiberglass Light Pole, 35 foot Mounting Height and 10 foot Mast Arm	Each
Bracket Arm on Wood Pole, __ foot, Det E-075	Each
Tapered Fluted Fiberglass Post Top Light Pole	Each
Ornamental Alum Light Pole, 24 foot	Each
Ornamental Alum Double Arm Light Pole, 24 foot	Each
St Light Type __	Each
Light Pole Fdn, __ inch dia	Each

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
DUCTS AND COMMUNICATIONS

ENG/CITY OF GRAND RAPIDS

1 OF 11

ORG:03/31/25

REV:11/01/25

a. Description. This work consists of furnishing and/or installing the duct and communications system including all of the necessary labor, materials, tools, and equipment necessary to result in a finished installation.

1. Applicable Codes and Guides. The most recent edition of the following codes and guides apply to the work in this Special Provision. Depending on the materials and methods, other codes may also apply:

- A. Michigan State Construction Code Act of 1972, as amended
- B. Michigan Building Code
- C. Michigan Occupational Health Standards
- D. Michigan Occupational Safety and Health Act MIOSHA
- E. Current Standard Specifications for Construction; Michigan Department of Transportation
- F. OSHA Safety and Health Standards
- G. City of Grand Rapids Ordinances
- H. National Electrical Safety Code
- I. National Electrical Code
- J. Illuminating Engineering Society of North America "IES"

b. Materials. Provide materials used to construct the Duct and Communications system shall be as specified herein.

- 1. Ducts and Communications (General Information).

A. Minimum Bending Radius for Conduits:

Table 1
Minimum Bending Radius

Conduit Size (in)	Minimum Bending Radius (in)
2	24
3	36
4	60

B. Pull tape (minimum 1250 pounds tensile strength) shall be placed in all new conduits prior to surface restoration. One string in each bank / lateral shall be replaced with a green, AWG #12 solid conductor, type THWN tracer wire. The tracer wire and strings shall be secured on both ends to prevent accidental removal. Enough tracer wire shall be left in each manhole/handhole to extend to 3 feet above final grade.

C. Conduit solvent shall be utilized to connect the sections of conduit placed.

D. General. Conduit for electric use may be either direct buried or concrete encased. Such conduit shall be, insofar as possible, continuous with joints only as necessary and staggered both horizontally and vertically in multiple conduit rows. The conduit shall be laid in a straight line if possible and if bends are necessary, they shall be "long sweep" type. All conduits shall be graded so as to drain into handholes or manholes with no low spots between structures.

2. Concrete Encased Conduit.

A. Concrete encased conduit shall be DB-60, DB-120, or schedule 40 PVC.

(1) All concrete for duct encasement shall be Grade 3500.

(2) Steel Reinforcement shall be in accordance with Division 7.

3. Direct Buried Conduit.

A. Direct buried conduits shall be DB-120 or schedule 40 PVC, unless otherwise noted in the Proposal and Plans.

4. Primary Riser Conduit. Shall be rigid, galvanized steel conduit as listed in the Proposal and shown on the Details. Height of the riser conduit shall be as specified in the bid documents.

5. Secondary Riser Conduit and Cable. The secondary riser conduit shall be rigid, galvanized steel conduit as listed in the Proposal and shown on the Details. Cable shall be an approved type as specified.

6. Manholes - Precast Concrete (General Information). Precast concrete manholes

shall be designed by the manufacturer to meet the following design standards:

A. ASTM C857-87 and ASTM C858-83 Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

(1) Live Load AASHTO HS20-44 Heavy Traffic

(2) Live Load Impact Use 24 inches cover → Increase live load by 20%

(3) Earth Cover Minimum 24 inches - Maximum 60 inches

B. Dimensions shall be the minimum inside dimensions.

C. The manhole shall be watertight to within 42 inches of grade.

D. One knockout for a 14-inch diameter sump pump cock shall be provided.

E. Mastic sealer shall be provided by the manufacturer for the joints/holes, including grade rings and pull-in irons.

F. Each manhole shall include the following: One 5/8-inch x 10-foot long - UL listed copperweld ground rod with an all bronze ground rod clamp with a stainless steel bolt. A #2CU U.S.E. XLP green grounding conductor attached to the wall (minimum of two attachments per wall).

G. A hook ladder of suitable length, when positioned at the proper climbing angle, and hooked to the bottom grade ring, shall be included as part of this pay item.

H. Manholes shall be delivered to the job site and unloaded in good condition. Cracked or otherwise damaged units shall not be accepted, nor shall any reimbursement be made for delivery or pick-up of damaged units.

I. Manholes shall be installed so that the floor is level. Compensation for additional depth of manholes will not be paid if the additional depth is required to assure the conduits entering the manhole maintain proper clearance from existing utilities and maintain proper slope towards the manhole.

J. Conduits entering the manhole shall be installed in the provided terminators, individually bored holes, or in windows constructed in accordance the project plans and specifications. Conduits installed in bored holes shall be properly spaced, cut flush with the interior face of the wall and shall be grouted from the inside and outside of the manhole. Conduits shall be sloped toward the manhole.

K. Castings shall be EJ #1220C or Engineer approved equal.

7. Mh, Precast Conc, 8 foot by 6 foot by 7 foot.

A. This manhole shall be a standard telecommunications type "J" design, and shall include the following:

B. Sixteen bell-end inserts for 4-inch PVC conduit provided in each wall of the manhole.

C. Eight auxiliary knockouts for 3-inch PVC in each wall.

D. Manhole shall have six (6) pull-in irons with backing plates (7/8-inch hot-dipped galvanized rolled steel U-bolt).

E. Metal bolt anchors for 1/2-inch bolts (five for each 36-inch cable rack stanchion) shall be cast into each wall. Spacing between inserts shall not exceed 24 inches horizontally. Inserts shall be protected during casting to prevent them from filling with concrete.

F. A top opening providing no less than a 39-inch diameter clear opening shall be provided. The top opening shall be centered longitudinally at one end of the manhole.

G. A minimum of one (1) 12-inch interlocking grade ring and two (2) 6-inch interlocking grade rings shall be provided. The grade ring with step shall be constructed of reinforced concrete and shall have a hot-dipped, galvanized step cast into the ring. Steps shall be no closer than 12 inches.

H. Only two 6-inch rings may be used per assembly, and when used, they shall be placed on top of the 12-inch ring(s).

I. Grade rings shall be suitable for use with East Jordan Iron Works model #1220 ring and cover. The minimum top, outside diameter of grade rings shall be 51-inches. The minimum inside diameter shall be 39 inches. The outsides of the rings shall be tapered, and the tops shall include an interlocking depression to prevent horizontal slippage of stacked rings.

J. Sufficient sealing mastic shall be provided with each grade ring to seal the ring to the structure below.

K. A cast iron ring and cover shall be provided with each manhole. The ring and cover shall be manufactured by East Jordan Iron Works and shall be Model 1220C (no alternatives) with the words "Signals & Lighting" cast into the cover (Detail E-526)

8. Mh, Hardware Package, for 8 foot by 6 foot by 7 foot. A complete hardware package shall be included with each manhole where indicated on the plans. The hardware shall be hot-dipped galvanized or stainless steel. Cable racking and stanchions shall be installed in accordance with the manufacturer's recommendations. The minimum acceptable hardware package shall include:

Table 2
Manhole Hardware - [Detail E-505](#)

Quantity (#)	Hardware
100	1/2 inch Hex bolts with washer x 1 3/8 inch, 316 Stainless
20	36 inch cable rack stanchion (Underground Devices #CR36) *
50	Cable Rack Saddle (Underground Devices #3HDS) *
1	Hook Ladder

* The fiberglass hardware package shall be manufactured by Underground Devices, Inc. or Engineer approved equal.

9. Mh, Precast Conc, 8 foot by 8 foot by 7 foot.

A. This manhole shall be a standard telecommunications type "A" design, and shall include the following:

B. Twenty-four bell-end inserts for 4-inch PVC conduit provided in each wall of the manhole.

C. Manhole shall have four (4) pull-in irons with backing plates (7/8-inch hot-dipped galvanized rolled steel U-bolt).

D. Metal bolt anchors for 1/2-inch bolts (five for each 36-inch cable rack stanchion) shall be cast into each wall. Spacing between inserts shall not exceed 24 inches horizontally. Inserts shall be protected during casting to prevent them from filling with concrete.

E. A top opening providing no less than a 39-inch diameter clear opening shall be provided. The top opening shall be centered longitudinally at one end of the manhole.

F. A minimum of one (1) 12-inch interlocking grade ring and two (2) 6-inch interlocking grade rings shall be provided. The grade ring with step shall be constructed of reinforced concrete and shall have a hot-dipped, galvanized step cast into the ring. Steps shall be no closer than 12 inches.

G. Only two 6-inch rings may be used per assembly, and when used, they shall be placed on top of the 12-inch ring(s).

H. Grade rings shall be suitable for use with East Jordan Iron Works model #1220 ring and cover. The minimum top, outside diameter of grade rings shall be 51-inches. The minimum inside diameter shall be 39 inches. The outsides of the rings shall be tapered, and the tops shall include an interlocking depression to prevent horizontal slippage of stacked rings.

I. Sufficient sealing mastic shall be provided with each grade ring to seal the ring to the structure below.

J. A cast iron ring and cover shall be provided with each manhole. The ring and

cover shall be manufactured by East Jordan Iron Works and shall be Model 1220C (no alternatives) with the words "Signals & Lighting" cast into the cover (Detail E-526)

10. Mh, Hardware Package, for 8 foot by 8 foot by 7 foot. A complete hardware package shall be included with each manhole where indicated on the plans. The hardware shall be hot-dipped galvanized or stainless steel. Cable racking and stanchions shall be installed in accordance with the manufacturer's recommendations. The minimum acceptable hardware package shall include:

Table 3
Manhole Hardware - Detail E-520 & E-525

Quantity (#)	Hardware
160	1/2 inch Hex bolts with washer x 1 3/8 inch, 316 Stainless
32	36 inch cable rack stanchion (Underground Devices #CR36) *
80	Cable Rack Saddle (Underground Devices #3HDS) *
1	Hook Ladder

* The fiberglass hardware package shall be manufactured by Underground Devices, Inc. or Engineer approved equal.

11. Mh, Precast Conc, 4 foot by 4 foot by 4 foot.

A. This manhole shall be a standard telecommunications type "S" design, and shall include the following:

B. Eight bell-end inserts for 4-inch PVC conduit provided in each wall of the manhole.

C. Manhole shall have four (4) pull-in irons with backing plates (1/8-inch hot-dipped galvanized rolled steel U-bolt).

D. Metal bolt anchors for 1/2-inch bolts (five for each 36-inch cable rack stanchion) shall be cast into each wall. Spacing between inserts shall not exceed 24 inches horizontally. Inserts shall be protected during casting to prevent them from filling with concrete.

E. A top opening providing no less than a 39-inch diameter clear opening shall be provided. The top opening shall be centered longitudinally at one end of the manhole.

F. A minimum of one (1) 12-inch interlocking grade ring and two (2) 6-inch interlocking grade rings shall be provided. The grade ring with step shall be constructed of reinforced concrete and shall have a hot-dipped, galvanized step cast into the ring. Steps shall be no closer than 12 inches.

G. Only two 6-inch rings may be used per assembly, and when used, they shall be placed on top of the 12-inch ring(s).

H. Grade rings shall be suitable for use with East Jordan Iron Works model #1220

ring and cover. The minimum top, outside diameter of grade rings shall be 51-inches. The minimum inside diameter shall be 39 inches. The outsides of the rings shall be tapered, and the tops shall include an interlocking depression to prevent horizontal slippage of stacked rings.

I. Sufficient sealing mastic shall be provided with each grade ring to seal the ring to the structure below.

J. A cast iron ring and cover shall be provided with each manhole. The ring and cover shall be manufactured by East Jordan Iron Works and shall be Model 1220C (no alternatives) with the words "Signals & Lighting" cast into the cover (Detail E-526)

12. Mh, Hardware Package, for 4 foot by 4 foot by 4 foot. A complete hardware package shall be included with each manhole where indicated on the plans. The hardware shall be hot-dipped galvanized or stainless steel. Cable racking and stanchions shall be installed in accordance with the manufacturer's recommendations. The minimum acceptable hardware package shall include:

Table 4
Manhole Hardware - [Detail E-515](#)

Quantity (#)	Hardware
40	1/2 inch Hex bolts with washer x 1 3/8 inch, 316 Stainless
8	36 inch cable rack stanchion (Underground Devices #CR36) *
16	Cable Rack Saddle (Underground Devices #3HDS) *
1	Hook Ladder

* The fiberglass hardware package shall be manufactured by Underground Devices, Inc. or Engineer approved equal.

13. Handholes - Precast Concrete (General Information). Precast concrete handholes shall be designed by the manufacturer to meet the following design standards:

A. ASTM C857-87 and ASTM C858-83 Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

(1) Live Load AASHTO HS20-44 Heavy Traffic

(2) Live Load Impact Use 24 inches cover → Increase live load by 20%

(3) Earth Cover Minimum 24 inches - Maximum 60 inches

B. Dimensions shall be the minimum inside dimensions.

C. The handhole shall consist of a 4 inch thick concrete round riser section reinforced with welded wire fabric centered in the concrete. An integral concrete base shall be provided as part of the riser section reinforced with welded wire fabric.

D. Four knockouts at 90 degrees shall be installed at 20 inches below the top of the

riser section and two 1/2 inch diameter lift pin holes shall be installed 16 inches below the top of the riser section.

E. Each handhole shall include the following: One 5/8-inch x 10-foot long - UL listed copperweld ground rod with an all bronze ground rod clamp with a stainless steel bolt. A #2CU U.S.E. XLP green grounding conductor.

F. Handholes shall be delivered to the job site and unloaded in good condition. Cracked or otherwise damaged units shall not be accepted, nor shall any reimbursement be made for delivery or pick-up of damaged units.

G. Handholes shall be installed so that the floor is level. Compensation for additional depth of manholes will not be paid if the additional depth is required to assure the conduits entering the manhole maintain proper clearance from existing utilities and maintain proper slope towards the manhole.

H. Conduits entering the handhole shall be installed in the provided knockouts, or individually bored holes. Conduits installed in bored holes shall be properly spaced, cut flush with the interior face of the wall and shall be grouted from the inside and outside of the handhole. Conduits shall be sloped toward the handhole.

14. Hh, Precast Conc, 36 inch round by 42 inch deep.

A. A cast iron ring and cover shall be provided with each manhole. The ring and cover shall be manufactured by East Jordan Iron Works and shall be Model 1220C (no alternatives) with the words "Signals & Lighting" cast into the cover (Detail E-526).

B. Design according to Detail E-530.

15. Hh, Precast Conc, 24 inch round by 36 inch deep.

A. A cast iron ring and cover shall be provided with each manhole. The ring and cover shall be manufactured by East Jordan Iron Works and shall be Model 1120C (no alternatives) with the words "Signals & Lighting" cast into the cover (Detail E-536).

B. Design according to Detail E-535.

16. Hh, Polymer, 17 inch by 30 inch. The handhole shall be designed by the manufacturer to meet the following design standards:

A. ANSI/SCTE 77 Standard Practice for Minimum Structural Design Loading for Underground Polymer Concrete Utility Structures.

(1) Live Load ANSI/SCTE 77 TIER 15

(2) Design/Test Load 15,000/22,500 LBS

B. Dimensions shall be the minimum cover dimensions.

17. Cable sec pedestal.

A. The pedestal shall be in accordance with Detail E-560 or Engineer approved equivalent.

c. Construction.

1. General Requirements for Duct and Conduit

A. Before the acceptance of conduit by the Engineer, the Contractor shall pull a cleaning device through the conduit to remove any foreign material from the conduit.

B. Should any conduit be installed with "dead ends," i.e., not connected to structures at either end, such "dead ends" shall be carefully plugged.

C. If available, standard bell sections shall be installed at all duct entrances to handholes, manholes, etc.

D. In instances where obstructions are found which will interfere with the duct construction, the Engineer may allow the formation of ducts to be modified to circumvent the obstruction by installing ducts above, below, or around the obstruction with a 1-inch separation between the concrete encasement and the obstruction.

E. Conduit shall be run straight between structures i.e., handhole, manhole, or building. (a total sum of 90 degrees of bend is allowed in a service lateral. Bends shall be factory made. (No field bending.)

F. Conduit shall be sloped toward structures at all points to prevent water from accumulating in the conduit, (no "low points".) When obstructions are encountered which require extra depth, the extra depth and slope shall be maintained until the next structure, i.e., handhole, manhole, or building. Payment for extra depth required to avoid conflicts and maintain slope shall be included in the unit cost for the duct bank. No extra payment shall be made.

G. Encasement must be kept at least 12 inches away from watermains when crossing over a water main.

H. Duct banks shall not be "splayed" to avoid conflicts without prior approval of the city.

I. Pull tape shall be placed in all new conduits prior to surface restoration, minimum 1250 tensile strength. One string in each bank/lateral shall be replaced with a green, AWG #12 solid conductor, type THWN tracer wire. The tracer wire and strings shall be secured on both ends to prevent accidental removal. Enough tracer wire shall be left in each manhole/handhole to extend to 3 feet above final grade.

J. Conduits shall enter structures through duct windows, cast-in terminators, or cored holes.

K. The Contractor shall maintain street lighting within the project limits throughout the project duration.

L. Backfilling around structures shall be in 1 foot lifts of class II sand or by flowable fill. Safety of the excavation may dictate the use of flowable fill.

M. The Contractor shall protect the footings and foundations of adjacent structures.

N. Connections and disconnections of lighting circuits to the Street Lighting System shall be coordinated with and performed by the City Energy, Lighting, & Communications (ELC) Department.

O. Conduit solvent shall be utilized to connect the sections of conduit placed.

P. Under certain conditions the Engineer may allow deflections or slight field bending. This work may only be done in the presence of this Engineer.

2. Direct Buried Conduit.

A. Conduits shall be installed with minimum cover of 36-inches in a roadway section and may be installed with 24-inch cover if outside the roadway and if they are to be used with circuits rated for less than 600V.

3. Concrete Encased Conduit.

A. Such conduits shall have a minimum 24-inch cover over the top of the encasement. The earth walls of the trench may be used to serve as forms for the concrete encasement except at open excavation around manholes or other structures where special concrete forms are necessary. All forms shall be securely braced to prevent spreading and shall be constructed of structurally sound lumber placed to provide a 3-inch concrete envelope on all sides.

B. The duct shall be placed on base-type spacers and shimmed to get 3 inch of concrete below the formation. Spacers are to be placed every 6 feet. Once the first layer or tier of ducts is laid, intermediate spacers shall be used for succeeding tiers of duct until formation is complete. All spacers are to be interlocked both horizontally and vertically with the spacer adjacent. Once duct formation is complete, the entire assembly shall be securely tied together with wire anchored by 5/8-inch reinforcing rods to avoid movement during concrete pour.

C. The concrete encasement shall be Grade 3500 with 17A aggregate. The concrete shall be fluid enough to allow it to flow between the ducts to eliminate all possible voids. Vibrate the concrete as it is poured. Neatly finish off and square the top of the concrete at the proper grade making sure there is 3-inch of concrete over the top of the ducts.

D. In instances where obstructions are found which will interfere with the duct construction, the Engineer may allow the formation of ducts to be modified to circumvent

the obstruction by installing ducts above, below, or around the obstruction with a 1-inch separation between the concrete encasement and the obstruction.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Mh, Precast Conc, __ foot by __ foot by __ foot	Each
Mh, Hardware Package, for __ foot by __ foot by __ foot	Each
Hh, Precast Conc, 36 inch round by 42 inch deep	Each
Hh, Precast Conc, 24 inch round by 36 inch deep	Each
Hh, Polymer, 17 inch by 30 inch	Each
Cable Sec Pedestal	Each
DB Conduit, (number of conduits), __ inch, schedule __ PVC	Foot
Conc Encased Conduit, (number of conduits), __ inch, schedule 40 PVC	Foot

The unit price shall be payment in full for furnishing all labor, equipment, and material, and for any necessary grading, excavation, and backfill when not paid for separately, and for performing the work complete.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR

VALVE CHAMBERS, METER PITS, AND SIMILAR STRUCTURES

ENG/CITY OF GRAND RAPIDS

1 OF 3

ORG:12/14/21

REV:11/01/25

a. Description. All work in this Special Provision shall be in accordance with section 823 of the Standard Specifications for Construction, except as modified herein. The work shall consist of constructing valve chambers, meter pits, and similar structures, according to the Standard Details or Plans.

b. Materials. Provide materials in accordance with the following.

1. Furnish castings in accordance with the details on the plans, standard details, and from the following.

- A. Water manhole casting, Detail S-13
 - (a) #1045Z Frame with Specialized Lettered Cover, Type C by EJ
 - (b) #R-1642G by Neenah
 - (c) or Engineer approved equal.
- B. Water manhole casting, bolt down, Detail S-14
 - (a) #1040ZPT, #1040APT Assembly with Specialized Lettered Cover, Type C by EJ
 - (b) #R-1916-F by Neenah
 - (c) or Engineer approved equal.
- C. Water manhole castings, oversized
 - (a) #1588 by EJ with Specialized Letter Cover by EJ
 - (b) #3166 by EJ with Specialized Letter Cover by EJ
 - (c) #R-1578 by Neenah
 - (d) or Engineer approved equal.

2. Furnish Access Doors in accordance with the details on the plans and from the following.

- A. Q-4 Type Q Single Leaf by Bilco
- B. APS 300 36 x 36 Alum by U.S.F. Fabrication Inc.
- C. or Engineer approved equal.

3. Adjustable Pipe Supports. Furnish Adjustable pipe supports that are stainless steel, conform to ASTM 304 and from the following.

- A. Adjustable Pipe Supports – Saddle Style by Trumbull
- B. Model S92 Adjustable Pipe Saddle Support by Standon Pipe Supports Inc.
- C. or Engineer approved equal.

c. Construction. Excavation and backfill for sewers shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities, and as specified herein.

1. **Excavation.** Excavation and backfill shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities. Excavation shall be of sufficient dimensions to provide ample space for sheeting and bracing where sheeting and bracing are required, and ample space to perform the work in a satisfactory manner and in accordance with current MIOSHA and OSHA regulations.

2. **Infiltration.** All structures and manholes to be built under this Special Provision shall be made watertight. Any infiltration which is detected shall be eliminated by the Contractor.

3. **Valve Chambers and Meter Pits** shall be constructed to conform to the Standard Details or Plans. They shall be precast reinforced concrete structures as shown on the Standard Details, unless otherwise shown on the Plans or approved by the Engineer.

A. Openings shall be provided in the chamber and pits for connections, including future connections, as shown on the Plans of such size and at such elevation as required and shall be included in the cost of the construction. All openings for the purpose of receiving pipes up to and including 24 inch diameter (including openings for future pipes) shall be fitted with a connection of the flexible type connector. Flexible connectors on manholes shall be factory installed. Openings for future connections shall be sealed by an approved prefabricated cap.

B. The manhole castings shall be set in a full bed of mortar with the top at the required elevation. Chimneys, including castings, shall be no more than 20 inches high, unless otherwise approved by the Engineer.

C. Pipe Supports shall be securely anchored to the floor.

4. **Adjusting and Finishing Castings and Oversized Castings.** The Contractor shall be required to adjust chamber and pit castings to the proposed elevation or as required by the Engineer. Castings shall be adjusted according to standard detail P-22. The work of adjusting shall include removal of material and building up with grade rings to the proposed elevation. The following work shall be included:

A. The excavation or removal of existing unclassified materials, such as pavement, pavement base, earth, etc., so that the work of adjusting the casting can be done.

B. The building up with concrete grade rings, where necessary.

C. The setting and finishing of the new casting in accordance with 4.C of this Special Provision.

5. **Backfill for Structures** specified in this Special Provision shall be Granular Material Class II in accordance with the Standard Specifications for Construction, unless otherwise shown on the Plans or approved by the Engineer and placed in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Valve Chamber, with Gate Valve, ___ inch, Det W-1	Each
Valve Chamber, with Butterfly Valve, ___ inch, Det W-2	Each
Valve Chamber, with Butterfly Valve, ___ inch, Det W-2A	Each
Meter Pit, Det W-11	Each
Mh, Air Vent, Det W-17	Each
Chamber, Blowoff Assembly, Det W-18	Each

The unit price shall be payment in full for furnishing all labor, equipment, and material and shall include all clearing, excavation, trenching, cofferdams, dewatering, furnishing and placing the structures, all backfilling, disposal of excess material, temporary sheeting and bracing, removal of abandoned utilities and services, temporary support, removal and replacement of existing utilities and services, and the repair and replacement thereof if damaged, connection of existing sewers, testing, and all other work required for a complete job.

Chambers, meter pits, and similar structures shall be measured in units as shown in the Proposal and includes furnishing and installing the structure, grade rings, casting, equipment, valves, couplings, and all other accessories as specified and detailed.

Furnishing, adjusting, and finishing of castings on new chambers and similar structures is considered included in the cost of the chamber, valve boxes, and similar structure and shall not be paid for separately.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
WATER MAINS

ENG/CITY OF GRAND RAPIDS

1 OF 30

ORG:08/19/21

REV:11/01/25

a. Description. All work in this Special Provision shall be in accordance with section 823 of the Standard Specifications for Construction, except as modified herein.

1. The work shall consist of constructing ductile iron water mains and prestressed concrete water main of specified sized and appurtenances up to and including 24 inches in diameter as specified in the Proposal and as shown on the Plans, including the furnishing of all labor, equipment, and materials. The placement of water mains, water service connections, and appurtenances shall also include the excavation and backfilling of the trench as necessary.

2. All reference to American Water Works Association (ANSI/AWWA) standards and National Sanitation Foundation (NSF) shall be to the latest revision thereof.

3. All internal plumbing required to reconnect water services shall be in accordance with the current Michigan Plumbing Code.

b. Materials. Provide materials in accordance with the following specifications.

1. General.

A. The Contractor will furnish certification by the Manufacturer stating that the pipe, specials, valves, hydrants, or other materials as required by the Engineer conform to the required specifications.

B. In addition, all valves and hydrants are to be tagged or stamped by the Manufacturer stating that they conform to the Standard Specifications. The tag or stamp shall be permanently attached to valves and the barrel of hydrants.

C. All water system components shall be new, ANSI/NSF 61 and ANSI/NSF 372 certified.

D. All stainless-steel materials used in this Special Provision shall conform to ASTM F593 or F594.

E. All Ductile Iron pipe and fittings shall be made in the U.S.A.

2. Ductile Iron Pipe. Ductile iron pipe shall meet or surpass ANSI/AWWA C151/A21.51 and be in accordance with the specifications noted herein. All pipe shall be centrifugally

cast. Also, all pipe shall be lined with cement mortar on the inside in accordance with ANSI/AWWA C104/A21.4.

A. The raw material for ductile iron shall have an average minimum recycled content consisting of 90% scrap iron and steel.

B. Unless otherwise specified, the pipe joints will be push-on type coupled in accordance with ANSI/AWWA C111/A21.11.

C. Unless otherwise specified, all pipe shall be Class 53.

(1) Within the Downtown area (DGRI limit) all pipe shall be Class 56.

D. The exterior of ductile iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200 g/m² of pipe surface area. A finishing layer topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils. The coating system shall conform in every respect to ISO 8179-1 Ductile iron pipes – External zinc-based coating – Part 1: Metallic zinc with finishing layer. Second edition 2001-06-01.

E. When indicated on the Plans or required by the Engineer the Contractor shall use specialty rubber gaskets. Specialty gaskets include, but are not limited to Nitrile (NBR) gaskets, Viton Fluorel (FKM) gaskets, etc. These gaskets shall be supplied by the pipe manufacturer.

F. Furnish ductile iron pipe (unrestrained and restrained joint).

(1) McWane (Restrained Joint - TR Flex).

(2) American Ductile Iron Pipe (Restrained Joint - Lok Ring Joint, Flex Ring Joint, or Flex-Lok Ball Joint).

(3) US Pipe (Restrained Joint - TR Flex or Bolt-Lok)

3. Concrete Water Pipe. Concrete water pipe shall be in accordance with ANSI/AWWA C301 with a working pressure of 175 PSI.

4. Ductile Iron Restrained Joint Pipe. All components of the restrained joint shall be as manufactured, supplied, or recommended by the manufacturer of the restrained joint pipe system installed.

5. Water Main Fittings. All fittings shall be ductile iron in accordance with ANSI/AWWA C153/A21.53 and with a minimum pressure rating of 350 P.S.I.

A. Nominal thickness of ductile fittings shall be equal to Class 53 Ductile Iron Pipe Thickness. Fittings shall be cement lined in accordance with ANSI/AWWA C104/A21.4 and shall have mechanical joints in accordance with ANSI/AWWA C110.

6. Mechanical Joint Anchoring Fittings for Hydrants. Mechanical joint anchoring fittings may be furnished as an alternate to restrained joint pipe as noted in this Special Provision.

- A. Foster Adaptor by Infact Corp.
 - B. or Engineer approved equal.
7. Joint Restraining Glands. Joint restraining glands for mechanical joint pipe, fittings, and valves. Restraining glands shall not be used for joint restraint on plain end fittings.
- A. Furnish joint restraining glands for sizes up to 16 inches.
 - (1) Megalug Series 1100 by EBAA Iron, Inc.
 - (2) Uni-Flange Wedge Action MC Retainer Gland by Ford.
 - (3) or Engineer approved equal.
 - B. Furnish joint restraining glands for sized 18 to 24 inches.
 - (1) Megalug Series 1100TDM by EBAA Iron, Inc.
 - (2) or Engineer approved equal.
8. Joint Restraining Gaskets. Joint restraining gaskets shall be supplied by the pipe manufacturer and are acceptable for push-on joint pipe up to 16-inches. Restraining gaskets shall not be used for joint restraint on fittings.
- A. Furnish joint restraining gaskets.
 - (1) Fast-Grip by American Pipe for Fastite Joint Pipe.
 - (2) Field Lok 350 by US Pipe for Tyton Joint Pipe.
 - (3) or Engineer approved equal.
9. Tie Rods, Clamps, Nuts, Eye-Bolts, and Appurtenances. All tie rods and nuts furnished as an alternative to restrained joint pipe as noted in this Special Provision shall be stainless steel, ASTM F593 and F594. 3/4-inch Diameter eye-bolts and nuts required and as shown in the Standard Details will be corten steel or stainless steel. Clamps and other appurtenances which are not ductile iron, cast iron or stainless steel, shall be coated as specified herein.
- A. Use tie rod restraint only as approved by the Engineer.
10. Gate Valves and Tapping Valves. This specification covers cast or ductile iron body, bronze mounted gate valves for use in the water distribution system in sizes from 4 inches through 12 inches nominal diameter designed for direct bury and operated through a standard valve box.
- A. Valves are to be furnished in accordance with ANSI/AWWA C515 and in accordance with the following supplementary specifications:
 - (1) These valves are for ordinary water distribution system service in approximately level setting on buried pipelines. Unless otherwise noted on the Plans, these valves shall be the same nominal size as the water main. They will be double disc gate valves with non-rising stems.

(2) An electronic copy (PDF or approved equal) of certified shop plans shall be furnished as requested by the Engineer for each valve size and type including all repair parts ordering data.

(3) The valve shall have mechanical or restrained joint ends in accordance with ANSI/AWWA C515. Valves with mechanical joint ends will be furnished with accessories, including glands, gaskets, and corten steel or stainless-steel tee-head bolts and nuts.

(4) The valves will be installed vertically in a horizontal line.

(5) The stems shall be made of Grade D or E bronze as listed in ANSI/AWWA C515.

(6) The stuffing box shall be the O-ring type as listed in ANSI/AWWA C515.

(7) Gland bolts shall be of Class B, C, D, or E bronze, corten steel, or stainless steel as listed in ANSI/AWWA C515.

(8) All valves shall rotate clockwise to open, wrench nut to be painted red, and be 1-15/16 inches square at the top, 2 inches square at the base and 1-3/4 inches high. The nut or cap screw for the wrench nut shall be bronze or stainless steel per ASTM F593 and F594.

(9) Bonnet bolts shall be rust-proofed by cadmium or zinc coating.

(10) The minimum number of turns to operate the valve from fully open to fully closed shall be in accordance with ANSI/AWWA C515 using stems with single lead threads:

Table 1
Gate Valve Turns

Size (in)	Minimum Number of Full Turns
4	12
6	18
8	24
12	36

B. Furnish gate valves 4 inches through 12 inches from the following, unless otherwise approved by the City Engineer.

- (1) FlowMaster Resilient Wedge Gate Valve by EJ.
- (2) American Flow Control by American.
- (3) Resilient Wedge Valve by Clow Valve Company.
- (4) USP Series Resilient Wedge Gate Valve by US Pipe.
- (5) Series 65 Ductile Iron Gate Valve by American AVK.
- (6) or Engineer approved equal.

11. Butterfly Valves. This specification covers tight shut off butterfly valves for water system distribution valves, 16 inches through 24 inches, and shall be designed for placement in valve chamber unless otherwise call for and approved by the Engineer.

A. Valves shall be Class 150B and have mechanical or restrained joint ends in accordance with ANSI/AWWA C110. Valves furnished under this specification shall conform to ANSI/AWWA C504, except as herein modified. Unless otherwise noted on the Plans, these valves shall be the same nominal size as the water main.

(1) An electronic copy (PDF or approved equal) of certified shop plans shall be furnished as requested by the Engineer for each valve size and type including all repair parts ordering data.

(2) Valves will be furnished with corten steel or stainless-steel nuts and bolts.

(3) Manual operators shall be of the traveling nut slotted lever or link-lever type, sealed and gasketed, and lubricated to withstand submersion in water.

(4) The minimum number of turns to operate the manual valve from fully open to fully closed shall be the same as for gate valves using a single-lead stem in accordance with ANSI/AWWA C515.

(5) The operator or wrench nut shall be painted red and 1-15/16 inches square at the top, 2 inches square at the base and 1-3/4 inches high.

(6) The operator shall rotate clockwise to open and shall have the input shaft vertical.

(7) The body of the valve will be of the short pattern design unless specified otherwise.

(8) The maximum non-shock shutoff pressure rating shall be 150 P.S.I.

(9) Shaft seals shall be of the O-ring type and replaceable without removing the valve from service.

B. Furnish butterfly valves 16 inches through 24 inches from the following, unless otherwise approved by the City Engineer.

- (1) Groundhog by Pratt.
- (2) Dezurik AWWA Butterfly Valves.
- (3) or Engineer approved equal.

12. Compression Type Fire Hydrants.

A. Compression type fire hydrants shall be in strict conformity with the ANSI/AWWA C502 and the following specifications:

(1) An electronic copy (PDF or approved equal) Certified shop plans shall be furnished as requested by the Engineer for each hydrant including all repair parts ordering data.

(2) The main valve stem operating and supporting mechanism shall not restrict the flow of water through the nozzles. Loss of head due to friction, within the hydrant, corrected for inlet and outlet velocity head, shall not exceed the maximum permissible head loss as given in the following table:

Table 2
Compression Type Fire Hydrants

Number of Outlet (nozzles)	Nominal Diam. of Outlet Nozzles (in)	Total Flow from Outlet Nozzles (gpm)	Max. Permissible Head Loss (psi)
1	2-1/2	250	1.0
2	2-1/2	500*	2.0
1	4	1000	5.0

* 250 gpm approximately, from each outlet nozzle.

(3) If the operating mechanism is under the main valve, it shall be bronze to bronze mounted. The hydrant top shall be of the dry type bonnet design (free-draining) and contain no oil.

(4) The hydrant valve shall be compression type and 5-1/4 inches in diameter.

(5) The inlet at the hydrant butt shall be mechanical joint ANSI A21.11 standard 6-inch.

(6) The delivery or head of the hydrant shall have two 2-1/2 inch and one 4 inch National Standard hose coupling male screw thread outlets with caps.

(7) The hydrant shall have a bury length of 6 feet from the invert of the connecting pipe to the ground line. The distance from the center line of the connecting pipe to the center line of the outlet nozzles shall not be less than 7 feet 6 inches.

(8) Each nozzle cap shall have a suitable rubber or synthetic rubber gasket and chains with **S hooks** attached to the barrel.

(9) The hydrant shall be opened by turning the operating nut clockwise. A clearly visible arrow and the word **OPEN** shall be cast in relief on the top of the hydrant to designate the direction of opening.

(10) The hydrant shall be painted with a zinc chromate primer and finish coat of paint above grade and with two coats of asphalt varnish below grade. Painting shall be in strict accordance with ANSI/AWWA C502.

(a) Shop painted in accordance with NSF/ANSI Standard 61.

(11) The hydrant operating nut and nozzle caps shall have a 1-3/4-inch square portion 1 inch high.

(12) O-ring seals shall be installed in the hydrant top. Stuffing box seals may not be used.

(13) The hydrant shall be capable of withstanding a minimum of 200 foot-pounds of torque in both the opening and closing directions without causing permanent deformation of metal parts.

(14) Barrel and stem extensions shall be made at or above the ground line and without digging.

(15) The hydrant mechanism shall be so designed that the valve may be easily removed and the valve seat, if required to be removed, shall have bronze to bronze mounting for easy removal.

(16) Outlet nozzles shall be threaded into the barrel and pinned.

(17) The hydrant shall be supplied with a tapped drain. The drain shall be plugged.

(18) The Contractor will be required to present an affidavit from the Fire Underwriter Laboratory that the maximum permissible loss of head is not exceeded if requested by the Engineer.

B. Furnish compression type fire hydrants.

- (1) 5BR250 WaterMaster Fire Hydrant by EJ.
- (2) F-2641 Eddy Fire Hydrant by Clow Valve Co. (Transmission Mains only)
- (3) or Engineer approved equal.

C. Furnish hydrant paint.

- (1) #944 by Rust-Oleum.
- (2) #448 by DEFI-Rust Enamel.
- (3) or Engineer approved equal.

13. Copper Water Service Pipe.

A. Copper water service pipe 2 inches and smaller in diameter shall be Type K, annealed seamless soft copper tubing in accordance with the current ASTM Specifications.

14. Furnish Copper to Copper Connections. Connections shall be as per ANSI/AWWA C800 and certified to NSF 61.

- A. H 15400n, H 15403n, H 15480n by Mueller Company
- B. 74756, 74758, 74758-22 by A.Y. McDonald Mfg. Co.
- C. C 22-xx-nl, CS 22-xx-nl, C 44-xx-nl by The Ford Meter Box Company, Inc.
- D. or Engineer approved equal

15. Furnish Tapping Saddles. Threads shall be as per ANSI/AWWA C800 (Standard Mueller Thread). 1-1/2 inch and 2 inch taps require saddles on 4 inch through 16 inch water mains. Direct Taps shall be allowed in non-buried applications such as valve chambers.

- A. 317 series by Smith-Blair.
- B. FC202 series by The Ford Meter Box Company, Inc.
- C. 202N series by Romac Industries, Inc.
- D. 3417 series by PowerSeal Pipeline Products Corporation.
- E. or Engineer approved equal.

16. Furnish Smith-Type Tapping Sleeves. Smith-type tapping sleeves are to be all stainless-steel sleeves with stainless steel flange.

- A. 663 series by Smith-Blair.
- B. FAST series by The Ford Meter Box Company, Inc.
- C. SST series by Romac Industries, Inc.
- D. H304 series by Mueller Company.
- E. 3480 series by PowerSeal Pipeline Products Corporation.
- F. or Engineer approved equal.

17. Furnish Corporation Stops. Threads shall be as per ANSI/AWWA C800 (Standard Mueller Thread).

- A. (1) H 15000n, P 15008n, P 15013n by Mueller Company.
- B. 74701, 74701B, 74701-22, 74701B-22 by A.Y. McDonald Mfg. Co.
- C. F 600-x-nl, FB 600-x-nl, F 1000-x-nl, FB 1000-x-nl by The Ford Meter Box Company, Inc.
- D. or Engineer approved equal.

18. Furnish Curb Stops. Connections shall be as per ANSI/AWWA C800 and certified to NSF 61.

- A. H 1502 2n, H 1504 2n, H 15200n or H 15204n, P-15209n by Mueller Company.
- B. 74713, 74713-22, 76100, 76100-22 by A.Y. McDonald Mfg. Co.
- C. B 22nl or B 44-xxx-nl by The Ford Meter Box Company, Inc.
- D. or Engineer approved equal.

19. Furnish Curb Boxes. Connections shall be as per ANSI/AWWA C800 and certified to NSF 61.

- A. H 10350 (with H 10349 base for 2-inch) by Mueller Company.
- B. No. 6500 D screw type by Tyler Union.
- C. or Engineer approved equal.

20. Furnish Curb Box Lock. Vadle Curb Box Locks by JRC Supplies Inc.

21. Furnish Valve Boxes. Produced with Class 35 cast iron in accordance with and meeting all applicable terms and provisions of ASTM A48.

- A. 6860 series by Tyler Union.
- B. 8560 series by EJ.
- C. or Engineer approved equal.

22. Furnish basement penetration void seal for water services.

- A. Thoroc Plug by ChemRex
- B. Octoplug Plus by IPA Systems, Inc.
- C. or Engineer approved equal.

23. Rust Preventive Coating. Fittings, clamps, bolts, nuts, appurtenances, etc., which are not ductile iron, cast iron, stainless steel or corten steel, and are buried in the ground shall be coated with a modified polyamine epoxy in accordance with ANSI/AWWA C210. The application of the material shall be according to the specifications or instructions of the Manufacturer. The cost of furnishing and applying such material shall be included in the unit price for water main of the sizes shown. Existing steel water main encountered during construction shall be coated with a coal tar protective coating in accordance with ANSI/AWWA C203.

- A. Epoxyline Series 22 by Tnemec.
- B. Pota-Pox Plus Series N140 by Tnemec.
- C. or Engineer approved equal.

24. Furnish Polyethylene Encasement. Polyethylene encasement for use with ductile iron pipe shall meet all the requirements for ANSI/AWWA C105/A21.5.

A. In addition, polyethylene encasement for use with ductile iron pipe systems shall consist of three layers of co-extruded linear low-density polyethylene (LLDPE), fused into a single thickness of not less than 8 mils.

B. The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of anti-microbial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

c. Construction.

1. Excavation. Excavation shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities, and the following conditions:

A. Alignment. Alignment of the trench shall be as shown on the Plans unless otherwise required by the Engineer.

B. Depth. Depth of the water main shall be 5 feet 9 inches from grade to center line of pipe or have a minimum 5 feet of cover to the top of the pipe, unless otherwise specified on the Plans or required by the Engineer.

(1) All water main placed with cover between 4 feet (but not less) and 5 feet shall be covered with 2-inch extruded polystyrene foam insulation board per Detail W-16.

2. Horizontal and Vertical Changes. The data shown on the Plans is indicative of adjacent and/or interfering structures and features but is not guaranteed to be complete or exact in location and detail. Small adjustments can be made by deflecting joints as per manufacturers recommendation and not exceeding Table 3 and Table 4 as follows.

Table 3
Maximum Deflection Full Length Pipe - Mechanical Joint Pipe

Diameter of Pipe (in)	Deflection Angle (min) (degrees)	Maximum Deflection (in)		Approx. Radius of Curve Produced by Succession of Joints (ft)	
		18 ft Length	20 ft Length	18 ft Length	20 ft Length
4	8-18	31	35	125	140
6	8-07	27	30	145	160
8	5-21	20	22	195	220
10	5-21	20	22	195	220
12	5-21	20	22	195	220
14	3-35	13-1/2	15	285	320
16	3-35	13-1/2	15	285	320
18	3-00	11	12	340	380
20	3-00	11	12	340	380
24	2-23	9	10	450	500

Table 4
Maximum Deflection Full Length Pipe – Push-On Joint Pipe

Diameter of Pipe (in)	Deflection Angle (min) (degrees)	Maximum Deflection (in)		Approx. Radius of Curve Produced by Succession of Joints (ft)	
		18 ft Length	20 ft Length	18 ft Length	20 ft Length
4	5	19	21	205	230
6	5	19	21	205	230
8	5	19	21	205	230
10	5	19	21	205	230
12	5	19	21	205	230
14	3	11	12	340	380
16	3	11	12	340	380
18	3	11	12	340	380
20	3	11	12	340	380
24	3	11	12	340	380

A. The Contractor shall do the work in the locations shown on the Plans, with minor adjustments allowable if approved by the Engineer. Deflections in pipes and fittings shall be made with sufficient number of joints being deflected to allow for clearance of underground structures. The maximum deflection permissible shall be limited to that allowed in the deflection tables. For approved vertical changes only, the depth from centerline of main to grade shall not exceed 8 feet and the minimum distance from top of pipe to ground line is 5 feet provided said vertical change can be accomplished within 40 linear feet each side of the conflicting utility. Shallow crossings shall be in accordance with Detail W-16. For approved horizontal changes the separation of the edge of main to edge of structure or vertical foundation shall not be less than 5 feet. When using concrete pipe or restrained joint pipe, laying schedules will be required and followed unless adjustments are approved by the Engineer.

3. Interruption of Water Service. All water main shutdowns and tie-ins shall be coordinated and scheduled in a manner that carefully and considerably assures the minimum inconvenience of business and property owners. Interruption of service during business hours, except in emergency situations, will not be allowed. It is anticipated that the Contractor may be required to complete tie-ins at night and/or weekends, including Sundays.

A. Prior to any water main construction, the Contractor shall arrange a meeting with representatives from City Engineering and Grand Rapids Water System to discuss the coordination and scheduling of proposed water main construction. At this time, the Contractor shall request that the Grand Rapids Water System exercise (operate) all existing valves that will be required to complete any proposed shutdown.

B. Prior to a water main shutdown and/or tie-in, the Contractor shall schedule a meeting with City Engineering and Grand Rapids Water System to review shutdown

procedures and sequencing. Such meetings shall occur at least seven days in advance of proposed shutdown or tie-in. In addition, the Contractor and a representative of the City shall notify impacted business and property owners at least seven days prior to a proposed shutdown. Interruption of service shall not exceed 4 hours in duration. It is expected that tie-ins will have to be made at night and on weekends to facilitate business operations of property owners.

C. In advance of a shutdown, the Contractor shall expose the existing water main to be impacted by the tie-in and determine if any unusual or unexpected conditions exist. The Grand Rapids Water System will shut down the main once the tie-in location has been exposed and, all necessary materials, labor, and parts are on hand to successfully complete the tie-in in a timely manner.

D. The shutdown of all water mains shall be coordinated with the Grand Rapids Water System. The Contractor is to coordinate the timing of the shutdowns with the Water Department. When directed by the City the Contractor shall also coordinate shutdowns with affected properties. The Contractor shall not operate any valve on any water main in service, except in case of emergency. In such emergency, the Contractor shall, with the approval of the Engineer, operate such valves consistent with normal valve operating procedures in order to relieve the emergency. The Contractor shall immediately notify the Fire Department, Grand Rapids Water System, and consumers affected regarding the time and probable duration of each shut-off.

E. For cases in which the Grand Rapids Water System personnel operate the valves, the Contractor shall notify the Fire Department, Grand Rapids Water System, and consumers affected at least one day in advance of the shut-off. The Grand Rapids Water System will then open and close valves on mains in service where necessary, in conjunction with the Contractor's work, subject to such limitation as to time and place as requirements of the Grand Rapids Water System shall impose.

F. Temporary Water Services placed in cases of a lead service line break or other emergency shall only be utilized for a maximum of 48 hours, unless otherwise approved by the Engineer. Place new permanent service within that time.

4. Continuity of Service for Reconstructing an Existing Water Main. Where the Contractor is replacing an existing water main, it shall be the Contractor's responsibility to schedule their work in such a manner so as to ensure that the time period during which water service is shut down is kept to a minimum. To this end, the Contractor shall construct the new water main while the existing water main remains in service. The following general procedure shall be employed to ensure minimum service interruptions:

- A. The Contractor shall lay the entire new water main.
- B. The new water main shall be tested and chlorinated.
- C. After the testing and chlorination has been approved, the Contractor shall connect one end of the new water main to the water system and plug the open end of the existing water main that is to be abandoned.

D. While the Contractor is proceeding with the reconnection of existing water services, both the old and the new water mains shall be in service. Each water main being connected to the water system at one end only.

E. Upon completion of the water service reconnections, the Contractor shall then remove the temporary plug from the dead end of the new water main and connect that end of the main to the water system to complete the loop and thereby disconnect permanently the old water main from the water system.

F. All work necessary to maintain service as described above shall be coordinated with the Engineer and the Grand Rapids Water System and shall be considered as included in other items of the contract.

5. Pipe Installation.

A. Handling. Proper implements, tools, and facilities shall be provided and used by the Contractor for the safe and expedient completion of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench by means of derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to pipe or pipe coating. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

B. Grade. The Contractor shall always check the lines and grades of the pipe as constructed from the stakes furnished by the Engineer. Any variation therefrom shall be corrected as approved by the Engineer before continuing with the work.

C. Pipe Kept Clean. All dirt or other foreign material shall be removed from the inside of the pipe before it is lowered into its position in the trench, and it shall be kept clean by approved means during and after laying.

(1) Whenever work is stopped for the day, a standard plug shall be securely placed in the end of the pipe. No tools or other articles shall be stored in the pipe at any time.

D. Cutting Pipe. The Contractor shall cut the pipe in a neat, straight, and uniform manner wherever necessary for placing valves, hydrants, special castings, or closure pieces without damage to the pipe and without extra cost to the City. The area adjacent to cuts made on pipe shall be beveled before assembly of the joint.

(1) The method of cutting pipe shall be subject to the approval of the Engineer.

E. Bell Ends to Face Direction of Laying. Unless otherwise approved, pipe shall be laid with bell ends facing the direction of laying; and for lines on an appreciable slope, bells shall, at the direction of the Engineer, face up-grade.

F. Railroad Crossing. Whenever the line of the pipe shall cross any railroad or lie within the railroad right-of-way, all of the precautionary construction measures required by the railroad officials shall be followed by the Contractor.

G. Spacers in Ductile/Cast Iron Sleeves. In connecting ductile/cast iron pipe together with a ductile/cast iron sleeve, the space between the adjoining ductile/cast iron pipes shall not exceed 1 inch. Where the space between adjoining ductile/cast iron pipe exceeds 1 inch, a spacer shall be placed to fill the space. The spacer shall be a piece of ductile iron pipe of the same diameter and class as the adjoining pipes and shall be cut straight and uniform and be free of defects and damage.

H. Zinc Coating. Repair scratches in the zinc greater than 1/8 inch in width, by field application of zinc paint, in accordance with ISO 8179, except when the pipe is to be encased in polyethylene encasement.

I. In Casing Pipe. Water main placed in casing pipe shall be restrained for the full length of the casing.

6. Assembling Mechanical Joint Pipe.

A. Preparation of Pipe Ends. The last exterior 8 inch of the plain end and inside of the bell of mechanical joint pipe shall be thoroughly cleaned to remove oil, grit, tar (other than standard coating), or any other foreign matter and then painted with a non-toxic, tasteless, odorless vegetable soap product recommended and/or supplied by the Manufacturer. The retaining gland shall then be slipped on the plain end of the pipe with the lip extension of the gland toward the bell end of the pipe to be joined. The rubber gasket shall be cleaned and painted with the vegetable soap product and placed on the plain end with the thick edge toward the gland.

B. Alignment of Pipe in Bell. The plain end shall be centered in the bell, the pipe forced home, and brought into alignment; it shall be secured there with sand carefully tamped under and around it, excepting at the bell holes. Care shall be taken to prevent dirt from entering into the joint space.

C. Bolting of Joint. The entire section of the pipe shall be pushed forward to seat the plain end in the bell. The gasket shall then be pressed into place within the bell, being careful to have the gasket evenly located around the entire joint. The retaining gland shall be moved along the pipe into position for bolting, all of the bolts inserted, and the nuts screwed up tightly with the fingers. All nuts shall be tightened with a torque limit wrench. The torque limits for various sizes of bolts shall be as follows:

Table 5
Torque Limits

Size (in)	Range of Torque (ft-lbs)
5/8	45 - 60
3/4	75 - 90
1	100 - 120
1-1/4	120 - 150

D. Nuts spaced 180 degrees apart shall be tightened alternately in order to produce an equal pressure on all parts of the gland. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. This may be done by partially tightening the bottom bolt first, then the top bolt, next the bolts at either side, and last, the remaining bolts. Repeat this cycle until all bolts are within the above range of torques. If effective sealing is not attained at the maximum torque indicated above, the joint should be disassembled and reassembled after thorough cleaning. Overstressing of bolts to compensate for poor installation practice is not allowed.

7. Assembling Push-On Joint Pipe.

A. Preparation of Pipe Ends. After the pipe is lowered in the trench and positioned for jointing, the inside of the bell and the outside of the plain end of the jointing pipe must be wiped clean to the guideline stripe. The gasket is then inserted in the groove in the bell by flexing so that it is in the proper position. A liberal coating of the vegetable soap product, as specified in this Special Provision, shall be applied to the outside of the plain end from the plain end to the guideline.

(1) The condition of the trench bottom must be such that correct position and location of the pipe results in a joint of maximum tightness and a permanent seal is assured.

B. Restrained Joint Pipe. Restrained joint pipe will be assembled in the same manner as push-on joint pipe and as outlined in the Manufacturer's recommendations.

C. Permissible Deflection of Joints. Permissible deflection of joints in push-on joint pipe shall be in accordance with Table 4. Permissible deflection for restrained joint pipe shall be in accordance with the Manufacturer's recommendation.

8. Jointing Concrete Water Pipe.

A. Preparation of Pipe Ends. The joint rings and rubber gasket shall be cleaned and liberally lubricated with an approved type of vegetable oil soap.

B. Alignment of Pipe in Bell. The plain end, with the gasket placed in the groove, shall be centered into the bell of the pipe already laid, making sure that both pipes are properly aligned. The pipe is then forced home. After the plain end ring is well centered into the joint ring, so that the gasket shall be fully compressed and brought to its final shape, and just before the pipe is brought fully home, each gasket shall be carefully checked with a suitable feeler gauge supplied by the pipe manufacturer for being in proper position around the full circumference of the joint. If the gasket is found not to be in proper position, the pipes shall be separated, and the damaged gasket replaced.

C. Pouring Cement Grout in Diaper. When the pipe has been joined, a band of 5.5 inches wide minimum shall be placed around the outside of the pipe at the joint as recommended and available from the pipe manufacturer. The band shall serve as a

form for placing a 1:2 cement mortar grout in the external recess formed by the face of the bell and the shoulder of the plain end.

(1) The cement mortar grout materials and preparation shall meet the requirements of ANSI/AWWA C301.

(2) If a reinforced paper joint band is used, it shall be drawn up tight around the pipe and the backfill tamped against it up to the spring line before pouring the grout. If a cloth band is used, it shall be wired around the outside of the pipe and the grout poured before backfilling. On pipes of 24-inch diameter or larger, the joint space remaining on the inside of the pipe shall be filled with a stiff mix of 1:2 cement mortar which shall be troweled in place so as to produce a continuous smooth flush surface across the joint.

D. Permissible Deflection in Joints of Concrete Water Pipe. Wherever necessary to deflect pipe from a straight line, either in a vertical or horizontal plane, to avoid obstructions, to plumb stems, or for any other reason, the degree of deflection shall be such so that the joint opening in the inside of the pipe shall not exceed 3/8 inch or the allowance as recommended by the pipe Manufacturer, whichever is the least.

9. Polyethylene Encasement. Where indicated on the Plans or required by the Engineer, all buried ductile iron pipe, including all straight pipe, bends, tees, adapters, closure pieces, and other fittings or specials, and all valves, shall be provided with at least one wrap of polyethylene encasement. The use of plastic wrap does not preclude the need for the rust preventive coating as referenced in this Special Provision.

A. Locations where ductile iron pipe shall be double wrapped with polyethylene encasement are indicated on the Plans.

B. Polyethylene tube protection shall be installed in accordance with AWWA C600 and ANSI/AWWA C105/A21.5. Method A. Preparation of the pipe shall include, but shall not be limited to, removal of lumps of clay, mud, cinders, etc., prior to installation. Also in accordance with all recommendations and practices of the AWWA M41, Manual of Water Supply Practices – Ductile Iron Pipe and Fittings. Specifically, the wrap shall be overlapped one foot in each direction at joints and secured in place around the pipe and any wrap at tap locations shall be taped tightly prior to tapping and inspected for any needed repairs following the tap.

C. Where ductile iron pipe is also embedded or encased in concrete, the polyethylene tube shall be installed over the pipe for 5 feet either side of each end of the concrete encasement.

D. All installations shall be carried out by personnel trained and equipped to meet these various requirements.

E. The terms polyethylene tube protection and polyethylene encasement are interchangeable and shall have the same meaning.

10. Setting Valves, Valve Boxes, and Special fittings.

A. General. Valves and special fittings shall be set and jointed to new pipe in the manner specified for cleaning, laying, and jointing pipe. All valves and special fittings shall be anchored in accordance with this Special Provision.

B. Valve Boxes. Valve boxes shall be firmly supported and maintained plumb over the operating nut of the valve, with box cover flush with the grade line or at such level as may be directed. All other valves, as may be designated on the Plans, shall be set in valve chambers with the operating nuts readily accessible for operation through the valve chamber opening or through a valve box top section let into the chamber top centered over the operating nut.

C. Valve Chambers. Valve chambers when shown on the Plans will be paid for separately.

11. Setting Hydrants.

A. Location. Hydrants shall be set at the locations shown on the Plans or as approved by the Engineer. All hydrants set within the street right-of-way shall have their grade line mark located 6 inches above the proposed centerline grade. All hydrants not located within a street right-of-way shall have their grade line mark set at the grade line shown on the Plans, in the specifications or as in the applicable Standard Detail.

(1) All necessary hydrant extensions shall be furnished and placed by the Contractor. When hydrant extensions are required because the water main is deeper than the standard as shown on the Plans, or as required by the Engineer, or if the grade at the hydrant location is substantially different from the grade above the water main, then hydrant extensions shall be paid for separately. If a hydrant extension is required for any other reasons, it shall be provided by the Contractor at no additional cost as part of the work of installing the hydrant. All extensions shall be painted as noted in this Special Provision.

B. Position of Nozzles. All hydrants shall stand plumb and shall have their hose or 2.5-inch nozzles parallel with the curb, with the pumper nozzle pointing normal to the curb. The 4-inch nozzle shall be a minimum of 18 inches above the ground and a maximum of 24 inches above the finish grade.

C. Anchorage for Hydrants, Hydrant Valves, and Hydrant Laterals. Each hydrant will be restrained to the hydrant lateral valve and the valve shall be restrained to the water main or tee with restrained joint pipe, mechanical joint anchoring fittings or stainless-steel tie rods as specified in this Special Provision. Thrust blocks will not be used for restraint on hydrants or hydrant laterals. The entire hydrant lateral shall be restrained as provided for herein.

D. Pumping Hydrant. All fire hydrants shall be pumped completely dry when the water main is placed in service.

12. Laying Water Services. Unless otherwise approved by the Engineer, place water services perpendicular to the water main, and place the curb stop a minimum 3 feet from the

back of curb, generally in the middle of parkway. No water service should be within 7 feet of a tree in the right of way.

A. Curb Box Locks.

(1) For 1-inch and 3/4-inch curb stops and curb boxes installation place curb box lock on prepared subbase under the curb stop. If the anti-twist ring fits over the key of the curb stop then push the ring onto the curb box lock until it locks into place. If the curb stop has a cone shape design, place the larger end of the valve body in the larger side of the curb box lock.

(2) When installing the curb box lock on soft or unstable ground the lock shall be secured to a larger base such as a block or brick. Screw curb box lock down onto a larger base with anchoring screws.

B. For curb stops larger than 1 inch, the curb stop shall be installed on an approved block or brick support so that the valve can be operated normally after backfilling.

C. The service shall be sealed shut by using a copper to copper connection or cast iron or ductile iron plug.

D. Curb Boxes shall be a minimum 5 feet from the water main and 5 feet from the right-of-way line, unless approved otherwise by the Engineer.

E. Under no circumstances is the water service laid by the Contractor to extend closer than 3 feet to the structure to be served unless said last 3 feet is laid under the supervision of a licensed plumber in possession of a valid connection permit.

13. Tapping for Water Services. Taps 2 inches in diameter and less shall be made either by the City or the Contractor, but no taps shall be made until a permit has been issued, the water main has passed hydrostatic and bacteriological testing and approval has been granted by the Engineer. The corporation stop shall be installed using a tapping machine approved by the Engineer and shall be installed along the horizontal axis of the pipe. Acceptable tapping machines are those manufactured by Hayes, Mueller, Ford, A.P. Smith, or an approved equal. The flow arrow shall point away from the main.

A. Prior to construction of the proposed water service, the Contractor and licensed plumber shall coordinate with the Engineer and the property owner to determine the location of the proposed service, new meter (if required), and construction schedule.

B. All taps over 2 inches in diameter shall be made by the City and charged to the Contractor with material (including the corporation stop, any necessary saddle or tapping sleeves, etc.) to be furnished by the Contractor. Taps 2 inches in diameter and less which are made by the City shall be similarly charged to the Contractor as noted above. All service tees installed as part of the water main construction shall have a permit issued before construction commences.

C. Place Corporation Stops along the horizontal axis of the water main. Do not place Corporation Stop within 3 feet of a water main joint or fitting, or within 3 feet of another corporation stop unless otherwise approved by the Engineer.

14. Reconnect Existing ___ inch Copper Water Service. This work consists of all that is necessary to reconnect existing copper water services to the new water main including all copper water pipe, connections, fittings, sand backfill, and all else necessary to reconnect the water service, complete, in accordance with the Plans and applicable Standard Details. The tap will be paid for under a separate item.

A. The Contractor shall be required to obtain tapping permits prior to commencement of such work; however, said permit will be issued at no charge to the Contractor. The taps including the corporation stop and collar shall be paid for separately. The curb stop shall also be replaced but will be paid for separately.

15. Construction of Water Services outside the Right-of-Way.

A. General Requirements. The City will obtain agreements from individual property owners for the water service construction outside the right-of-way when in association with public project. For Development projects, the City will assist with agreements, but the agreements will be the responsibility of the Developer's Engineer.

(1) Prior to starting any work outside the right-of-way, the Contractor shall verify with the Engineer that the appropriate grading permits and agreements have been obtained from the property owner.

(2) Plumbing permits will be required for work performed inside and outside existing buildings. The Contractor shall secure all required permits and pay all associated fees. All plumbing work inside and within three feet of a building shall be performed by a licensed plumber in possession of a valid permit. The Contractor will coordinate with the City plumbing inspector and water department. A list of names, addresses, and telephone numbers will be made available to Contractor.

B. Exploratory Investigation. The Contractor shall establish necessary lane, shoulder, and/or sidewalk closures required to perform work. Advance the exploratory excavation using vacuum boring excavation, hand digging, conventional machine excavation, or a combination thereof subject to approval of the Engineer. Allow the Engineer access to document the necessary information. If the technique used to advance the excavation is causing damage to the existing facilities, cease all work until an alternate method approved by the Engineer.

C. Water Service Outside of the Right-of-Way. Where shown on the Plans, the Contractor shall construct water services outside the public right-of-way and reconnect them to the new or existing copper water service at the curb stop. Schedule the work for the services such that at no time will connections from any new copper service piping be made to existing lead services.

(1) Place water services perpendicular to the water main unless otherwise approved by the Engineer, and a minimum of 5 feet deep from finish grade using trenchless technology.

(a) Trenchless Technology Submittals. When required by the Engineer, the Contractor shall furnish document(s) supporting the directional drilling Contractor's qualifications and experience.

(b) Equipment and Expertise. The Contractor shall have equipment and expertise, appropriate for horizontal directional drilling, horizontal boring, or other Engineered approved trenchless installations. This includes the preparation and maintenance of the bore path using drilling fluids as appropriate for the geology of the soils. The Contractor shall also have experience in safety and dependability installing, in similar geology, similar size and length of piping involved.

(c) Work Plan. Prior to beginning work, the Contractor shall submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The Contractor shall also submit all proof of all required permits. The work plan shall include a description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable), list of subcontractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), an environmental protection plan, and contingency plans for possible problems. Work plan shall be comprehensive, realistic, and based on actual working conditions for this particular project. Plan shall document the thoughtful planning required to successfully complete the project.

D. Basement Penetration. Core drill 3-inch maximum hole for 1-inch or 1.5-inch copper service. Coordinate hole sized for copper services over 1.5 inch with Engineer. Hole to be minimum of 5 feet below exterior finished grade. If basement wall is nonexistent or cannot be drilled, the copper may be fed into the house through the basement floor with tunneling equipment. Seal void between hole and copper with a rapid-setting, cement-based water-stop mortar in accordance with subsection b.22 of this special provision. Existing service lines may not be used for new connections, unless approved by Engineer.

E. Connection of New Service Line.

(1) Connect new shut off valve, copper horn, and meter within 3 feet of basement wall, or as approved by the Engineer.

(2) Continue copper to existing house plumbing, match existing size, 1 inch minimum. Connect to maximum pipe size of system. Provide all copper and fittings necessary to make connection.

(3) Flush water system until water clears, check all new plumbing for leaks.

(4) Restore temporary removals or damages to the lawn, driveway, or building.

(5) Have homeowner sign a letter of acceptance of the Work, in a form approved by Engineer.

(6) The Contractor shall not connect proposed copper water service back to an existing lead service for any reason, temporary or otherwise, unless approved in writing by the Engineer.

F. Remote Meters. If building does not have a basement, or an area where meter can be installed inside of the first floor, utilize a meter pit. Install City of Grand Rapids standard meter pit per Standard Detail W-11 on private property in a location approved by the homeowner. Run new copper into the home and install a new shut off valve. Install new copper to the existing house plumbing. Install remote meter reader per City standard detail, or as approve by the Engineer. Flush water system until water clears, check all new plumbing for leaks. Restore temporary removals or damages to the lawn, driveway, or building.

(1) Saw cut existing supply line just inside basement wall and plug pipe with threaded or soldered cap.

(2) For trench excavation approved by the Engineer, the Contractor shall saw cut existing bituminous and concrete surfaces and shall carefully remove all paved areas inside and around all buildings affected by the project. The Contractor shall directional drill the proposed water services in all instances where removal and replacement of walls, trees, concrete stairs, porch structures, and other appurtenances not in the Proposal would be required.

(3) Following the placement of the water service, the Contractor shall restore the area disturbed outside the ROW to match the conditions prior to construction of the service.

16. Anchorage of Bends, Valves, Tees, and Plugs.

A. General Requirements. On water main work, all bends, tees, plugs, reducers, and other fittings shall be securely anchored. Anchorage can be accomplished through the use of the following methods: Joint Restraint, Thrust Blocks, and Encasements. However, thrust blocks will only be permitted at such locations where the Plans specifically indicate that they will be allowed, or as approved by the Engineer. When using concrete pipe or restrained joint pipe, laying schedules will be required and followed unless adjustments are approved by the Engineer.

(1) Providing anchorage shall be included in the unit bid for the water main and no extra payment will be made.

(2) For concrete pipe, the restraining element shall be of the type recommended by the Manufacturer and approved by the Engineer. Welded type restrained joint water pipe shall be assembled according to the Manufacturer's recommendations.

B. Joint Restraint. Refers to mechanical devices such as restrained joint pipe, joint restraining glands, joint restraining gaskets, mechanical joint anchoring fittings, or stainless steel tie rods.

(1) Restrained joint pipe and restrained joints for any necessary closure pieces at specials shall be as specified in this Special Provision unless an alternate method is given prior approval by the Engineer.

(2) Joint restraining glands shall be as specified in this Special Provision and may be used as an alternative to restrained joint pipe on 24-inch diameter pipe and

less. Approved joint restraining glands will be permitted on mechanical joint pipe, fittings, valves, hydrants, hydrant laterals, and hydrant valves. Restraining glands shall not be used on plain end fittings.

(3) Joint restraining gaskets shall be as specified in this Special Provision and may be used as an alternative to restrained joint pipe on 12-inch diameter pipe and less. Restraining gaskets shall not be used as restraint on fittings and valves.

(4) Mechanical joint anchoring fittings shall be as specified in this Special Provision and are approved for use for anchorage of hydrants, hydrant valves, and hydrant laterals only.

(5) Stainless steel tie rods shall be as specified in this Special Provision. The number of rods to be provided is listed below in Table 6. Tie rod restrained joints shall only be used when approved by the Engineer.

Table 6
Number of Rods Per Joints

Pipe Diameter (in)	No. of Rods
6	2
8	2
10	4
12	6
16	8

(6) When joints are to be restrained with mechanical devices as noted above, all joints shall be restrained for a minimum distance from the fitting as required in Table 7.

Table 7
Pipe Restraint Length Required

Pipe Diameter (in)	Tees, 90° Bends (ft)	45° Bends (ft)	22-1/2° Bends (ft)	11-1/4° Bends (ft)	Dead Ends (ft)	Reducers (one size) (ft)	** (ft)
4	19	8	4	2	21		
6	27	12	6	3	30	14	63
8	35	15	7	4	38	15	55
12	51	21	10	5	55	27	120
16	65	27	13	7	70	28	110
20	79	33	16	8	86	28	104
24	93	39	19	10	101	40	99

** If straight run of pipe on small side of reducer exceeds this value, then no restrained joints are necessary.

The length of restrained pipe required as shown in table 7 is based on trench backfill being compacted to 95% of the maximum unit weight as measured by the modified Proctor, AASHTO T-180. If the pipe is to be wrapped in polyethylene, the length of restrained pipe required will be as shown on the Plans or in the special provisions. Table does not consider polyethylene wrapped pipe.

(7) Special fittings and anchoring requirements. All joints lying within the above minimum distances from the fitting must be restrained as noted herein and as referenced in the applicable Standard Details.

(a) Tees. Tees shall be restrained in the branch direction as required in Table 7. Also, to augment the above, in the straight through direction, the minimum length of the first pipe on either side of the tee shall be 10 feet. In those cases where a valve is placed at the tee, the valve shall be restrained to the tee as noted below and the next pipe shall be a minimum length of 10 feet.

(b) Plugs. All dead ends on water mains shall be capped or plugged with standard plugs or caps. The water main, including the plug or cap, shall be restrained back from the plug or cap as required in Table 7.

(c) Bends. Bends shall be restrained in both directions as required in Table 7.

(d) Valves. Valves used in conjunction with restrained joint pipe shall be restrained in accordance with the recommendations of the manufacturer of the restrained joint pipe. All valves at crosses or tees will be restrained to the tee by use of restrained joint pipe or stainless-steel tie rods. Anchorage of hydrant valves is shown in the Standard Details.

C. Thrust Blocks. Thrust blocks shall be allowed only at the specific locations shown on the Plans, or as specifically approved by the Engineer. At such locations, all fittings which have not been restrained through the use of restrained joint pipe or stainless-steel tie rods shall be securely blocked against the trench bottom and walls through the use of concrete thrust blocks. Thrust blocks shall be formed as shown on Standard Detail W-7 or as approved by the Engineer according to the laying conditions encountered.

(1) Forms for thrust blocks shall be of industry standard materials (i.e., steel, plywood, wood, etc.) as necessary to ensure they are constructed to the dimensions shown. The concrete shall be separated from the water main by a layer of polyethylene plastic sheeting or other approved wrap to ensure that there is no bonding between pipe and concrete.

D. Concrete Encasements. For water main greater than 16 inches in diameter, joint restraint may include encasements and shall be as required on the Plans, in the Special Specifications, or on the applicable Standard Details.

17. Hydrostatic Testing, Chlorination, and Bacteriological Testing.

A. General Requirements. All newly constructed water mains and water services 4 inches and greater in diameter must be hydrostatically tested, chlorinated, and bacteriologically tested. Hydrostatic testing and chlorination may be performed by the contractor or performed by the Grand Rapids Water System, at the Contractor's option. Bacteriological Testing will be performed by the Grand Rapids Water System personnel. The Contractor shall provide a minimum of 72 hours' advance notice to the Grand Rapids Water System to either schedule the testing crews or to schedule the observation of the testing in the event the Contractor elects to perform the same.

B. Construction Coordination. Follow all requirements of c.3 Interruption of Water Service of this Special Provision, and as specified below.

(1) Contractors are encouraged to give as much advance notice as possible, particularly during the busy portion of the construction season.

(2) The Contractor shall make every effort to schedule well in advance of the anticipated time for testing and chlorinating. The Contractor shall ensure that all trenches are open, that riser pipes are easily accessible without use of ladders and that provisions have been made for the removal of ground water so that testing and chlorinating can begin immediately upon arrival of Grand Rapids Water System personnel.

(3) The Contractor will supply all of the necessary plugs, caps, and galvanized riser pipes with gate valves. The main plugs or caps placed at the end of the water main and/or the end of the stub services for future main extensions for testing, flushing, and chlorinating, shall have an opening extension or connection of not less than 2 inches in diameter, so that filling, flushing, and chlorinating can take place at a sufficient velocity to clean the main and reduce the time required for these operations (2 to 3 times the volume of the pipe at 3.0 fps). The Contractor shall also provide a clean city water supply to within 50 linear feet of the test site as shown on the

applicable Standard Detail. For larger water mains riser pipes and gate valves sizes shall be adjusted to meet the flushing requirements of AWWA C651.

(4) The water main must be flushed in accordance with AWWA C651 (3.0 fps min) to ensure the removal of all foreign material prior to testing. The Contractor shall provide restraints adequate for the testing pressures. Provisions for flushing the mains without damage to surrounding property shall be made in advance by the Contractor. Such flushing may include the use of a polyethylene swab or the injection of compressed air into the water main as approved by the Engineer. The Contractor shall be responsible for providing a suitable and approved means for discharge of flushing, testing, and chlorinating water. This includes disposing of heavily chlorinated water.

(5) The Contractor shall maintain the equipment and set up for testing (riser pipes, gate valves, etc.) in good and workable condition and shall make all necessary repairs prior to testing and chlorination.

(6) The Contractor will protect all exposed piping from freezing during the winter construction season. In the event it becomes necessary to thaw frozen piping and/or valves, the Contractor shall be responsible for damages caused by either the Contractor or the Grand Rapids Water System while attempting to thaw said frozen piping and valves. The Grand Rapids Water System will attempt to notify the Contractor of any such damages of which it is aware.

C. Hydrostatic Tests. The allowable leaking for new water mains shall be as outlined in Table 5A of AWWA Standard C600. If the Contractor elects to perform the hydrostatic testing, said testing will be observed by Grand Rapids Water System personnel using a water meter supplied by the Grand Rapids Water System. Existing valves as necessary to flush and fill the main may be operated by the Contractor as approved by the Engineer and the Grand Rapids Water System.

(1) The length of water main to be tested shall be as approved by the Engineer. Large test sections will not proportionally increase the leakage allowance but will be rounded off to the next higher 100 joint increment. Only when permission from the Engineer has been received, shall a test be made against an existing valve. The new facility shall be tested separate from existing water mains unless a connection is approved by the Engineer and the Grand Rapids Water System.

(a) Test Pressure. The test pressure shall be 160 PSI. The pipe shall be filled with water slowly, and all air pockets removed by bleeding off at hydrants or standpipes. All valves and hydrants and the pipe will be pressurized to the specified pressure by a pressure pump.

(b) Acceptance. Acceptance shall be determined on the basis of allowable leakage. If any test discloses a leakage greater than that specified in the table, the Contractor will be required to locate and repair the defects until the leakage is within the specified allowance. In addition to the allowable leakage, the test pressure shall not vary by more than +/-5 psi for the duration of the test.

(c) Allowable leakage per 100 joint of pipeline in gallons per 2 hours will be as follows and based on a test pressure of 160 PSI:

Table 8
Allowable Hydrostatic Test Losses

Pipe Diameter (in)	Allowable Loss (gallons per 2 hours per 100 joints)
4	0.6
6	0.9
8	1.2
10	1.5
12	1.8
16	2.4
24	3.5
30	4.6
36	5.5

(d) The test shall be repeated as necessary to maintain the test pressure for two hours. In all cases, the pressure shall be restored to 160 pounds at the end of the two-hour period. The loss shall not exceed the allowance in the table for the size of pipe and number of joints.

(2) Defects, Cracks, or Leakage. Any defects, cracks, or leakage that develop or may be discovered, either in the pipe or in the castings or due to the negligence of the Contractor, shall be promptly corrected by the Contractor at his/her expense to the satisfaction of the Engineer.

D. Leakage. Leakage is defined as the quantity of water to be supplied into the newly laid pipe necessary to maintain the specified leakage test pressure after the pipe has been filled with water and air expelled.

E. Chlorination. After the hydrostatic test has been satisfactorily completed the water main shall be chlorinated. This may be done by either the Contractor or the Grand Rapids Water System personnel at the Contractors option. If the Contractor elects to perform the work necessary to chlorinate the water main, the same shall be accomplished by use of an approved liquid chlorinator in accordance with the requirements of the Grand Rapids Water System and under the observation of Grand Rapids Water System personnel. Chlorination shall be as outlined in AWWA C651. Unless otherwise approved by the City and EGLE, the continuous feed method of chlorination shall be used. This method consists of completely filling the main to removed particulates, and refilling the main with potable water that has been chlorinated to 25 mg/L. Following the injection of the required chlorine solution, the water main shall

be left for a period of at least 24 hours after which the water main shall be flushed again with City water to remove the chlorine solution. Following the 24-hour holding period in the main there shall be a free chlorine residual of not less than 10 mg/L.

(1) The Contractor shall not place or inject any chlorine tablets or powder into the pipe during construction or prior to the testing and chlorination of the main.

(2) In certain situations, small sections of the new water main may, with the approval of the Engineer and the Grand Rapids Water System, be excluded from the overall chlorination. When this is the case, all pipe, fittings, or offsets must be cleaned of all dust, dirt, or other deposits and then carefully swabbed with a chlorine solution containing 50,000 parts per million (5 percent bleach - Clorox, etc.) of chlorine immediately before installation.

E. Bacteriological Testing. Once the hydrostatic testing and chlorination have been completed and the water main filled with City water, Grand Rapids Water System personnel will initiate sampling for bacteriological testing with the assistance of the Contractor.

(1) Bacteriological testing shall be as outlined in AWWA C651. In no case shall the length of section for testing exceed 1200 feet unless specifically approved by the City and the EGLE.

F. Responsibility for Testing Costs. All work performed by the Grand Rapids Water System in connection with initial testing and chlorinating the water main will be done at the expense of the City. However, if it is necessary to test or chlorinate more than once, all additional costs beyond the first test shall be borne by the Contractor. The cost for all work performed by the Contractor and materials supplied by the Contractor in connection with testing and chlorinating the water main shall be included in the unit price for furnishing and laying the water main and no extra payment will be made.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Water Main, __ inch.....	Foot
Water Serv, __ inch.....	Foot
Water Serv, __ inch, Curb Box to Main.....	Foot
Water Serv, __ inch, Curb Box to Meter	Each
Water Serv, __ inch, Curb Box to Meter, over __ feet.....	Each
Water Serv, Exploratory Investigation.....	Each
Water Main Construction, Plumbing Allowance	Dollar
Reconnect Existing __ inch Copper Water Serv	Each
Curb Stop and Box on Water Serv, __ inch	Each
Curb Box on Water Serv, __ inch	Each
Tap for Water Serv, including Corporation Stop, __ inch	Each
Tap for Water Serv, including Corporation Stop and Collar, __ inch	Each
Valve and Box, __ inch.....	Each
Butterfly Valve and Box, __ inch.....	Each

Tapping Sleeve, Valve and Box, __ inch by __ inch by __ inch	Each
Hydrant, 5 inch	Each
Four-Way Cross, __ inch by __ inch	Each
Tee, __ inch by __ inch by __ inch	Each
Reducer, __ inch by __ inch	Each
Sleeve, __ inch	Each
Bend, __ Degree, __ inch	Each
Fitting, Oversized	Dollars
Plug, __ inch	Each
Cap, __ inch	Each
Adj Existing __ inch Water Serv	Each
Hydrant Extension, __ inch	Each
Thrust Block, Det __	Each
Fire Hydrant, Rem	Each
Fire Hydrant, Rem and Salv	Each

The unit price shall be payment in full for furnishing all labor, equipment, and material and shall include all clearing, excavation, trenching, cofferdams, dewatering, furnishing and placing the pipe, fittings and plugs, anchorage, bedding, all backfilling, disposal of excess materials, temporary sheeting and bracing, temporary support, removal of abandoned utilities and services, removal and replacement of existing utilities and services, and the replacement and repair thereof if damaged, connections to existing water mains, testing, disinfection, and all other work required for a complete job.

Water main of the size(s) shown in the Proposal shall be measured in linear feet along the centerline of the water pipe in place from end to end of the line of pipe including the lengths of special fittings and valves.

Water Services of the size(s) shown in the Proposal shall be measured along the centerline of the pipe from the center of the water main to the end of the pipe.

Curb Stops and Boxes, Valves and Boxes, Valves, Hydrants, Taps, and Special fittings shall be measured in units as shown in the Proposal and includes furnishing and installing curb stops and boxes, valves and valve boxes, taps including corporation stops and appurtenances, 5-inch hydrants, and special fittings.

Gate and Butterfly Valves in chambers will be paid for separately. Butterfly Valves shall be placed in chambers unless otherwise approved by the City Engineer.

Water Serv, __ inch, Curb Box to Main shall be payment in full for placement of new copper water serv from the curb box to the water main utilizing directional drilling or other approved trenchless technology, and includes furnishing and placing all copper piping, fittings, and work required for the proper placement of the water serv.

Water Serv, __ inch, Curb Box to Meter shall be payment in full for placement of new copper water serv from the curb box to the building penetration at the meter or proposed meter location utilizing directional drilling or other approved trenchless technology, and includes furnishing and placing all copper piping, fittings, sand backfill, permit fees and work required for the proper placement of the water serv.

Water Serv, __ inch, Curb Box to Meter, over __ feet shall be payment in full for placement of new copper water serv in locations where the distance from the curb stop box to the building penetration location exceeds __ feet. **Water Serv, __ inch, Curb Box to Meter, over __ feet** will be measured and paid when the service exceeds a __ foot distance from the curb box to the building penetration and will be paid in lieu of **Water Serv, __ inch, Curb Box to Meter** and includes furnishing and placing all copper piping, fittings, sand backfill and work required for the proper placement of the water services.

Water Serv, Exploratory Investigation will be paid for at the Contract unit price for the exploratory investigation of existing water services. **Water Serv, Exploratory Investigation** will be paid only if the exploratory investigation yields a location where abatement is not required. At locations where abatement is required and the excavation of the existing water service is part of the connection of a new copper service from the main to the curb box, the excavation will not be paid separately but will be considered included in the unit price of the new water service. **Water Serv, Exploratory Investigation** includes all labor, equipment, and materials required to complete the work, including all costs associated with repair or replacement resulting from the contractor's activities.

Water Main Construction, Plumbing Allowance is an allowance established to pay for all materials, labor, and equipment, including the services of a licensed plumber, required to:

1. Replace the water service inside and within 3 feet of a building and connect the service to the existing or proposed service meter.
2. Assist property owners and building maintenance staff during water service interruptions. This may be caused during the installation of a new water main and may result in the accumulation of sediment in screens of faucets and private plumbing lines. This work may include shutting off service within a building to prevent draining of the internal water distribution system, cleaning of internal plumbing systems and screens, meeting attendance, and other work as approved by the Engineer.

This work shall only be conducted at the request and approval of scope by the Engineer. Where the work is performed by a subcontractor or supplier, the Contractor will be paid for the amount invoiced plus an additional 6 percent of the invoiced cost as reimbursement for the Contractor's administrative costs. Where the Contractor will be performing the work with his own forces, the work will be paid for using predetermined, negotiated unit price. If the Contractor and Engineer cannot agree upon unit price, the work will be paid for by force account in accordance with section 109 of the Standard Specifications for Construction.

When approved by the Engineer, water services from curb box to meter may be placed in open trenches and will be measured and paid for per linear foot for **Water Serv, __ inch**, from the water main to the building penetration, and includes furnishing and placing all piping, fittings, sand backfill, and work required for the proper reconnection of the water services.

When water services outside the right-of-way are placed by open cut, the restoration of surface over the new water service will be paid for separately under the related items.

Fitting, Oversized shall be an allowance to cover costs for oversized fittings and joint restraint glands required to connect to existing water main. **Fitting, Oversized** shall not be paid when it

is known oversized fittings will be required at the time of bidding. The allowance will cover the invoiced cost difference between the standard fittings on the project and the oversized fittings.

Adj Existing __ inch Water Serv shall be paid for at the contract unit price for each service adjusted and approved by the Engineer.

Water Main offsets of the size(s) shown shall be paid for at the Contract unit price for water main and water main fittings required for the offset. All offsets shall be coordinated with each proposed utility, both shown on the Plans and revised in the field, and no extra payment will be made to remove, or relocate an offset that is found to be in conflict with another utility.

Hydrant Extension, __ inch shall be paid for at the unit price per vertical half-foot (each every 6 inch) of extension in those locations where extensions are indicated on the Plans or as approved by the Engineer.

When the placement of new water main does not call for new water services on the Plans or in the Proposal. **Reconnect Existing __ inch Copper Water Serv** shall be paid for at the contract unit price for each service reconnected.

Special fittings as listed in the Proposal shall be measured as a unit including furnishing and placing the Special. The cost of related work shall be included in the unit price for the water main.

Anchorage. The cost of providing anchorage shall be included in the unit price for the laying of the pipe and no extra payment will be made.

Specialty Gaskets. When shown on the Plans or called for in Special Provisions the cost of providing and placing Nitrile Buna-N (NBR) gaskets and Viton Fluorel (FKM) gaskets shall be included in the unit price for the water main.

Polyethylene Encasement. When indicated on the Plans or called for in Special Provisions the cost of providing and placing polyethylene encasement shall be included in the unit price for the water main.

The furnishing and installation of the curb stop locks for 1 or 3/4-inch water services shall be included in **Curb Stop and Box on Water Serv, __ inch.**

Connection of proposed copper water services to existing water services at the right-of-way line shall be included in the unit price of the water service, and shall include furnishing and placing the pipe-to-pipe adapter needed to connect the service

Measurement and payment for all other water main items shall be as specified in the other project Special Provisions.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
ADJUSTING VALVE BOXES AND CURB BOXES

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:07/19/22

REV:11/01/25

a. Description. All work in this Special Provision shall be in accordance with section 823 of the Standard Specifications for Construction, except as modified herein. The work shall consist of adjusting valve boxes and curb boxes to fit grade changes.

b. Materials. Provide materials in accordance with the following specifications.

1. Valve Boxes.

- A. 6860 series by Tyler Union.
- B. 8560 series by EJ.
- C. or Engineer approved equal.

2. Curb Boxes.

- A. H 10350 (with H 10349 base for 2-inch) by Mueller Company.
- B. No. 6500 D screw type by Tyler Union.
- C. or Engineer approved equal.

c. Construction.

1. Adjusting and Finishing Valve Boxes and Curb Boxes. In the prosecution of the work, the Contractor shall be required to adjust boxes to the proposed elevation or as required by the Engineer. Valve boxes shall be adjusted according to standard detail P-23 and P-23C.

2. At locations where the existing boxes are not suitable as determined by the Engineer, the Contractor shall furnish new boxes. Old boxes not suitable for reuse shall be disposed of by the Contractor, unless the Plan or Proposal items specifically call for them to be salvaged. When salvaged the Contractor shall stockpile the boxes onsite and notify the Engineer who will arrange for their pickup by the City.

3. The work of adjusting shall include the removal of (temporary lowering) of each. The following work shall be included:

- A. The excavation or removal of existing unclassified materials, such as pavement, pavement base, earth, etc., so that the work of adjusting the boxes can be done.
- B. The breaking out or removal of the existing boxes.
- C. The setting and finishing of the existing boxes or new boxes with the top at the required elevation.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Curb Box in Pavt, Det P-23C	Each
Valve Box, Furn	Each
Valve Box, Adj	Each
Curb Box, Furn	Each
Curb Box, Adj	Each

The unit price shall be payment in full for furnishing all labor, equipment and material and shall include all removals, excavation, furnishing, and placing the valve boxes and cub boxes, all backfilling, disposal of excess material, removal of abandoned utilities and services, temporary support, removal and replacement of existing utilities and services, and the repair and replacement thereof if damaged, and all other work required for a complete job.

Furnishing, adjusting, and finishing of valve boxes and curb boxes on new valves and curb stops similar structures is considered included in the cost of the Valve and Box and Curb Stop and Box and shall not be paid for separately.

Curb Box in Pavt, Det P-23C shall be measured in units as shown in the Proposal and includes furnishing and installing a valve box and cover, concrete rings, and reinforcing steel as detailed in the Plans. The unit price shall be payment in full for furnishing all labor, equipment, materials, and all other work required for a complete job.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
FORCEMAINS AND FORCEMAIN STRUCTURES

ENG/CITY OF GRAND RAPIDS

1 OF 10

ORG:08/19/21

REV:11/01/25

a. Description. This work shall consist of constructing a forcemain of the type and size and at the depths as shown on the Plans, including excavation, backfill, and the furnishing of all labor, equipment, and materials. All work in this Special Provision shall be in accordance with section 825 of the Standard Specifications for Construction, except as modified herein.

b. Materials. Provide materials in accordance with the following specifications.

1. Ductile Iron Pipe. Centrifugally cast ductile iron pipe meeting or surpassing ANSI/AWWA C150/A21.50 and C151/A21.51. Unless otherwise specified, furnish pipe conforming to special thickness class 53. Furnish gaskets comprised of Styrene Butadiene Rubber (SBR) unless otherwise specified on the Plans or required by the Engineer.

A. Furnish ductile iron pipe with an interior cement mortar lining in accordance with ANSI/AWWA C104/A21.04.

B. Furnish ductile iron pipe with an exterior coating of arc-sprayed zinc per ISO 8179-1. The mass of the zinc applied shall be 200 g/m² of pipe surface area. A finishing layer topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils.

C. Furnish pipe with interior and exterior bituminous seal coat in accordance with ANSI/AWWA C110/A21.10. When called for in the Plans, furnish ductile iron pipe with interior Ceramic Epoxy Lining in accordance with section 4.1.b in lieu of interior bituminous seal coat.

D. When indicated on the Plans or required by the Engineer the Contractor shall use specialty rubber gaskets. Specialty gaskets include, but are not limited to Ethylene Propylene Diene Monomer (EPDM), Polychloroprene (CR/Neoprene), Acrylonitrile (BUNA-N/NBR/Nitrile), Fluoroelastomer (FKM/Flourel/Viton), etc. These gaskets shall be supplied by the pipe manufacturer.

E. Ceramic Epoxy Lining. When shown in the plans, or specified in the Proposal the ductile iron pipe shall include Ceramic Epoxy Lining. Lining shall be applied by a firm certified in ceramic lining of ductile iron pipe. Furnish ceramic lining from the following.

- (1) Protecto 401 by Induron Protective Coatings.
- (2) Ceramapure by Induron Protective Coatings.
- (3) or Engineer approved equal.

F. Unrestrained Pipe. Push-on joints in accordance with AWWA/ANSI C111/A21.11.

G. Joint Restraint.

Restrained Joint Pipe. All components of the restrained joint shall be as manufactured, supplied, or recommended by the manufacturer of the restrained joint pipe system installed.

Joint Restraining Glands. Joint restraining glands for mechanical joint pipe, fittings and valves. Restraining glands shall not be used for joint restraint on plain end fittings.

Joint Restraining Gaskets. Joint restraining gaskets shall be supplied by the pipe manufacturer and are acceptable for push-on joint pipe up to 16 inches. Restraining gaskets shall not be used for joint restraint on fittings.

H. Polyethylene Encasement. Polyethylene encasement for use with ductile iron pipe shall meet all the requirements for ANSI/AWWA C105/A21.5.

Polyethylene encasement for use with ductile iron pipe systems shall consist of three layers of co-extruded linear low-density polyethylene (LLDPE), fused into a single thickness of not less than 8 mils.

The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of anti-microbial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

2. Fittings.

A. All fittings shall be ductile iron and shall be mechanical joint and conform:

(1) 6-inch through 24-inch ANSI/WWA C153/A21.53.

(2) 30-inch through 48-inch ANSI/AWWA C110/A21.10.

3. Gate and Plug Valves.

A. Valves on force mains shall be plug valves for sizes up to and including 12 inches, and gate valves for sizes larger than 12 inches.

B. Plug valves shall be nonlubricated, eccentric type with resilient faced plugs as called for in the Valve Schedule. End connections shall be mechanical joint unless otherwise shown on the Plans or applicable Standard Details. Port areas shall be equal to at least 80 percent of the nominal size pipe area. Valve bodies shall be suitably marked to indicate whether the valve is open or closed.

C. The seating surface of the rotating element shall be nitrile butadiene (hycar), or other material recommended by the manufacturer for sewage service. Bearings at the top and bottom supporting the rotating element shall be self-lubricating, corrosion-resistant type, suitable for sewage plant service. The valve shall be of the bolted bonnet design. Packing shall be visible for inspection without dismantling valve or

removing operator. The packing shall be adjustable and replaceable without disassembling of the valve.

D. All plug valves shall be of adequate design to operate with a pressure of 50 psi on both sides or on either side of the valve without leakage.

E. Gate Valves. This specification covers cast or ductile iron body, bronze mounted gate valves in sizes from 4 inches through 12 inches nominal diameter designed for direct bury and operated through a standard valve box. Valves are to be furnished in accordance with ANSI/AWWA C515 and in accordance with the following supplementary specifications:

(1) These valves are for system service in approximately level setting on buried pipelines. Unless otherwise noted on the Plans, these valves shall be the same nominal size as the forcemain. They will be double disc gate valves with non rising stems.

(2) An electronic copy (PDF or approved equal) of certified shop plans shall be furnished as requested by the Engineer for each valve size and type including all repair parts ordering data.

(3) The valve shall have mechanical or restrained joint ends in accordance with ANSI/AWWA C515. Valves with mechanical joint ends will be furnished with accessories, including glands, gaskets, and corten steel or stainless-steel tee head bolts and nuts.

(4) The valves will be installed vertically in a horizontal line.

(5) The stems shall be made of Grade D or E bronze as listed in ANSI/AWWA C515.

(6) The stuffing box shall be the O ring type as listed in ANSI/AWWA C515.

(7) Gland bolts shall be of Class B, C, D, or E bronze, corten steel, or stainless steel as listed in ANSI/AWWA C515.

(8) All valves shall rotate clockwise to open, wrench nut to be painted red, and be 1 15/16 inches square at the top, 2 inches square at the base and 1 3/4 inches high. The nut or cap screw for the wrench nut shall be bronze or stainless steel per ASTM F593 and F594.

(9) Bonnet bolts shall be rust proofed by cadmium or zinc coating.

(10) The minimum number of turns to operate the valve from fully open to fully closed shall be in accordance with ANSI/AWWA C515 using stems with single lead threads:

Table 1
Gate Valve Turns

Size (in)	Minimum Number of Full Turns
4	12
6	18
8	24
12	36

(11) Furnish gate valves 4 inches through 12 inches from the following, unless otherwise approved by the City Engineer.

- (a) FlowMaster Resilient Wedge Gate Valve by EJ.
- (b) American Flow Control by American.
- (c) Resilient Wedge Valve by Clow Valve Company.
- (d) USP Series Resilient Wedge Gate Valve by US Pipe.
- (e) Series 65 Ductile Iron Gate Valve by American AVK.
- (f) or Engineer approved equal.

F. Furnish plug valves.

- (1) Eccentric Plug Valves by Clow Valve Co.
- (2) Eccentric Plug Valves by DeZURIK, Inc.
- (3) Series 120 AWWA Eccentric Plug Valves by Homestead.
- (4) Ballcentric Plug Valve by Pratt.
- (5) or Engineer approved equal.

4. Furnish Air Relief Valves.

A. Air relief valves for force mains shall be AWWA C512, designed for 100 psig working pressure, wastewater service, and provided with all the accessories shown on Standard Detail S 18. Accessories shall be provided by the valve manufacturer. Valve bodies shall be ductile or cast iron. Float and internal hardware shall be stainless steel. Unless otherwise noted, furnish combination air valves. Furnish air-release, air/vacuum as shown on the Plans or as directed by the Engineer.

- (1) APCO Bulletin 400 by DeZURIK, Inc.
- (2) Air Release Valves by Val-matic Valve & Mfg. Corporation
- (3) or Engineer approved equal.

c. Construction.

1. Excavation and Backfill. Excavation and backfill shall be performed according to the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities, and the following.

2. Horizontal and Vertical Changes. The data shown on the Plans is indicative of adjacent and/or interfering structures and features but is not guaranteed to be complete or exact in location and detail. Small adjustments can be made by deflecting joints as per manufacturers recommendation and not exceeding Table 2 and Table 3 as follows.

Table 2
Maximum Deflection Full Length Pipe - Mechanical Joint Pipe

Diameter of Pipe (in)	Deflection Angle (min) (degrees)	Maximum Deflection (in)		Approx. Radius of Curve Produced by Succession of Joints (ft)	
		18 ft Length	20 ft Length	18 ft Length	20 ft Length
4	8-18	31	35	125	140
6	8-07	27	30	145	160
8	5-21	20	22	195	220
10	5-21	20	22	195	220
12	5-21	20	22	195	220
14	3-35	13-1/2	15	285	320
16	3-35	13-1/2	15	285	320
18	3-00	11	12	340	380
20	3-00	11	12	340	380
24	2-23	9	10	450	500

Table 3
Maximum Deflection Full Length Pipe – Push-On Joint Pipe

Diameter of Pipe (in)	Deflection Angle (min) (degrees)	Maximum Deflection (in)		Approx. Radius of Curve Produced by Succession of Joints (ft)	
		18 ft Length	20 ft Length	18 ft Length	20 ft Length
4	5	19	21	205	230
6	5	19	21	205	230
8	5	19	21	205	230
10	5	19	21	205	230
12	5	19	21	205	230
14	3	11	12	340	380
16	3	11	12	340	380
18	3	11	12	340	380
20	3	11	12	340	380
24	3	11	12	340	380

A. General. Proper implements, tools, and facilities shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings, and valves shall be carefully lowered into the trench piece by piece by means of derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to pipe or pipe coating. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

B. Alignment. Alignment of the trench shall be as shown on the Plans unless otherwise approved by the Engineer.

C. Depth. The depth shall be 5 feet 9 inches from finished grade to the centerline of pipe unless shown otherwise on the Plans or approved by the Engineer.

D. Pipe Kept Clean. All dirt or other foreign matter shall be removed from the inside of the pipe before it is lowered into its position in the trench and shall be kept clean by approved means during and after laying.

(1) Whenever work is stopped for the day, a standard plug shall be securely placed in the end of the pipe. No tools or other articles shall be stored in the pipe at any time.

E. Cutting Pipe. The Contractor shall cut the pipe in a neat and workmanlike manner in accordance with the manufacture's recommendations wherever necessary for placing valves, special fittings, or closure pieces without damage to the pipe and without extra cost to the City. The area adjacent to cuts made on slip joint pipe shall be beveled before assembly of the joint.

(1) Pipe shall not be cut with a hardy, chisels, or any tool or machine that will cause damage to the pipe or the cement lining. The method of cutting pipe shall be in accordance with the manufacturer's recommendations, subject to the approval of the Engineer.

3. Anchorage of Bends, Tees, and Plugs.

A. General Requirements. On force main work, all bends, tees, plugs, reducers, and other fittings shall be securely anchored. Anchorage can be accomplished through the use of the following methods: Joint Restraint, Thrust Blocks, and Encasements. However, thrust blocks will only be permitted at such locations where the Plans specifically indicate that they will be allowed, or as approved by the Engineer. When using concrete pipe or restrained joint pipe, laying schedules will be required and followed unless adjustments are approved by the Engineer.

(1) Providing anchorage shall be included in the unit bid for the force main and no extra payment will be made.

B. Joint Restraint. Refers to mechanical devices such as restrained joint pipe, joint restraining glands, joint restraining gaskets, mechanical joint anchoring fittings, or stainless steel tie rods.

(1) Restrained joint pipe and restrained joints for any necessary closure pieces at specials shall be as specified in this Special Provision unless an alternate method is given prior approval by the Engineer.

(2) Joint restraining glands shall be as specified in this Special Provision and may be used as an alternative to restrained joint pipe on 24-inch diameter pipe and less. Approved joint restraining glands will be permitted on mechanical joint pipe, fittings, valves, hydrants, hydrant laterals, and hydrant valves. Restraining glands shall not be used on plain end fittings.

(3) Joint restraining gaskets shall be as specified in this Special Provision and may be used as an alternative to restrained joint pipe on 12-inch diameter pipe and less. Restraining gaskets shall not be used as restraint on fittings and valves.

(4) Mechanical joint anchoring fittings shall be as specified in this Special Provision and are approved for use for anchorage of hydrants, hydrant valves, and hydrant laterals only.

(5) Stainless steel tie rods shall be as specified in this Special Provision. The number of rods to be provided is listed below in Table 4. Tie rod restrained joints shall only be used when approved by the Engineer.

Table 4
Number of Rods Per Joints

Pipe Diameter (in)	No. of Rods
6	2
8	2
10	4
12	6
16	8

(6) When joints are to be restrained with mechanical devices as noted above, all joints shall be restrained for a minimum distance from the fitting as required in Table 5.

Table 5
Pipe Restraint Length Required

Pipe Diameter (in)	Tees, 90° Bends (ft)	45° Bends (ft)	22-1/2° Bends (ft)	11-1/4° Bends (ft)	Dead Ends (ft)	Reducers (one size) (ft)	** (ft)
4	19	8	4	2	21		
6	27	12	6	3	30	14	63
8	35	15	7	4	38	15	55
12	51	21	10	5	55	27	120
16	65	27	13	7	70	28	110
20	79	33	16	8	86	28	104
24	93	39	19	10	101	40	99

** If straight run of pipe on small side of reducer exceeds this value, then no restrained joints are necessary.

The length of restrained pipe required as shown in table 7 is based on trench backfill being compacted to 95% of the maximum unit weight as measured by the modified Proctor, AASHTO T-180. If the pipe is to be wrapped in polyethylene, the length of restrained pipe required will be as shown on the Plans or in the special provisions. Table does not consider polyethylene wrapped pipe.

(7) Special fittings and anchoring requirements. All joints lying within the above minimum distances from the fitting must be restrained as noted herein and as referenced in the applicable Standard Details.

(a) Bends. Bends shall be restrained in both directions as required in Table 7.

(b) Valves. Valves used in conjunction with restrained joint pipe shall be restrained in accordance with the recommendations of the manufacturer of the restrained joint pipe. All valves at crosses or tees will be restrained to the tee by use of restrained joint pipe or stainless-steel tie rods. Anchorage of hydrant valves is shown in the Standard Details.

C. Thrust Blocks. Thrust blocks shall be allowed only at the specific locations shown on the Plans, or as specifically approved by the Engineer. At such locations, all fittings which have not been restrained through the use of restrained joint pipe or stainless-steel tie rods shall be securely blocked against the trench bottom and walls through the use of concrete thrust blocks. Thrust blocks shall be formed as shown on Standard Detail W-7 or as approved by the Engineer according to the laying conditions encountered.

(1) Forms for thrust blocks shall be of industry standard materials (i.e., steel, plywood, wood, etc.) as necessary to ensure they are constructed to the dimensions shown. The concrete shall be separated from the force main by a layer of polyethylene plastic sheeting or other approved wrap to ensure that there is no

bonding between pipe and concrete.

4. Pressure Test. The allowable leaking for new force mains shall be as outlined in Table 5A of AWWA Standard C600. If the Contractor elects to perform the hydrostatic testing, said testing will be observed by Grand Rapids personnel using a meter supplied by the Grand Rapids. Existing valves as necessary to flush and fill the main may be operated by the Contractor as approved by the Engineer and the Grand Rapids.

A. The length of force main to be tested shall be as approved by the Engineer. Large test sections will not proportionally increase the leakage allowance but will be rounded off to the next higher 100 joint increment. Only when permission from the Engineer has been received, shall a test be made against an existing valve. The new facility shall be tested separate from existing force mains unless a connection is approved by the Engineer and the Grand Rapids.

(1) Test Pressure. The test pressure shall be 160 PSI. The pipe shall be filled with water slowly, and all air pockets removed by bleeding off at hydrants or standpipes. All valves and hydrants and the pipe will be pressurized to the specified pressure by a pressure pump.

(2) Acceptance. Acceptance shall be determined on the basis of allowable leakage. If any test discloses a leakage greater than that specified in the table, the Contractor will be required to locate and repair the defects until the leakage is within the specified allowance. In addition to the allowable leakage, the test pressure shall not vary by more than +/-5 psi for the duration of the test.

(3) Allowable leakage per 100 joint of pipeline in gallons per 2 hours will be as follows and based on a test pressure of 160 PSI:

Table 6
Allowable Hydrostatic Test Losses

Pipe Diameter (in)	Allowable Loss (gallons per 2 hours per 100 joints)
4	0.6
6	0.9
8	1.2
10	1.5
12	1.8
16	2.4
24	3.5
30	4.6
36	5.5

(4) The test shall be repeated as necessary to maintain the test pressure for two hours. In all cases, the pressure shall be restored to 160 pounds at the end of the

two-hour period. The loss shall not exceed the allowance in the table for the size of pipe and number of joints.

B. Defects, Cracks, or Leakage. Any defects, cracks, or leakage that develop or may be discovered, either in the pipe or in the castings or due to the negligence of the Contractor, shall be promptly corrected by the Contractor at his/her expense to the satisfaction of the Engineer.

C. Leakage. Leakage is defined as the quantity of water to be supplied into the newly laid pipe necessary to maintain the specified leakage test pressure after the pipe has been filled with water and air expelled.

d. **Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Forcemain, ___ inch	Foot
Blowoff Tee with Plug, ___ inch, on ___ inch Forcemain	Each
Air Relief Valve and Chamber on ___ inch Forcemain, Det S-18.....	Each
Forcemain, Discharge Mh, Det S-22	Each
Valve and Box, ___ inch	Each
Tee, ___ inch by ___ inch by ___ inch	Each
Reducer, ___ inch by ___ inch	Each
Bend, ___ Degree, ___ inch	Each
Sleeve, ___ inch.....	Each
Plug, ___ inch.....	Each

The unit price shall be payment in full for furnishing all labor, equipment, and material, and shall include all clearing, excavation, trenching, cofferdams, dewatering, furnishing and placing the pipe, fittings and plugs, anchorage, bedding, all backfilling, disposal of excess materials, temporary sheeting and bracing, temporary support, removal of abandoned utilities and services, removal and replacement of existing utilities and services, and the replacement and repair thereof if damaged, testing, and all other work required for a complete job.

Forcemain of the size and class as shown shall be measured in linear feet along the centerline of the pipe in place, including the lengths of valves and specials.

Air Relief Valve and Chamber on ___ inch Forcemain, Det S-18 shall be measured as a unit and shall include the costs of all of the equipment and materials including chamber, valves and couplings shown Det S-18.

Special fittings as listed in the Proposal shall be measured as a unit including furnishing and placing the special. The cost of related work shall be included in the unit price for the forcemain.

Anchorage. The cost of providing anchorage shall be included in the unit price for the laying of the pipe and no extra payment will be made.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
SANITARY MANHOLES AND SIMILAR STRUCTURES

ENG/CITY OF GRAND RAPIDS

1 OF 5

ORG:10/27/21

REV:11/01/25

a. Description. The work shall consist of constructing manholes and similar structures, according to the Standard Details or Plans. All work in this Special Provision shall be in accordance with section 825 of the Standard Specifications for Construction, except as modified herein.

b. Materials. Provide materials in accordance with the following.

1. Gray Iron Castings. In accordance with the current MDOT Standard Details and the Standard Specifications for Construction.

A. The manhole cover and frame, catch basin grate and frame, outlet hoods, and other similar combinations of castings shall be machined to fit and to the dimensions shown on the appropriate Standard Detail so that there will be an even bearing.

B. Furnish castings in accordance with the details on the plans, standard details, and the following.

- (1) Sanitary manhole casting, Detail S-13
 - (a) #1045Z Frame with Specialized Lettered Cover, Type C by EJ
 - (b) #R-1642G by Neenah
 - (c) or Engineer approved equal.
- (2) Sanitary manhole casting, bolt down, Detail S-14
 - (a) #1040ZPT, #1040APT Assembly with Specialized Lettered Cover, Type C by EJ
 - (b) #R-1916-F by Neenah
 - (c) or Engineer approved equal.
- (3) Sanitary manhole castings, oversized
 - (a) #1588 by EJ with Specialized Letter Cover by EJ
 - (b) #3166 by EJ with Specialized Letter Cover by EJ
 - (c) #R-1578 by Neenah
 - (d) or Engineer approved equal.
- (4) Sewer Cleanout Casting Detail S-9
 - (a) R-4055 by Neenah
 - (b) # 6306A by EJ
 - (c) or Engineer approve equal
- (5) Lamp Hole Detail S-11
 - (a) R-1973-1 by Neenah
 - (b) #157010 with 2965A Cover by EJ.

(c) or Engineer approved equal.

C. Watertight Manhole Insert.

(1) Furnish watertight manhole insert for Detail S-21:

(a) Mec-4 by Preco Industries

(b) or Engineer approved equal.

2. Precast Reinforced Concrete Manholes. All manholes including their cone sections shall conform to current ASTM C478, with rubber gasketed joints conforming to current ASTM Specification C443 or flexible butyl sealant joints conforming to the current ASTM Specification C990.

A. Furnish premium rubber or butyl rubber gaskets from the following.

(1) O-Ring by Press Seal Gasket Corporation.

(2) Tylox SOCL profile gaskets by Hamilton Kent.

(3) EZ Stick by Press-Seal,

(4) Seal No. 2 by Hamilton Kent

(5) ConSeal CS-102

(6) or Engineer approved equal.

3. Adjusting Rings. Castings for structures specified in this Special Provision shall be adjusted to finished grades using precast concrete rings, or concrete bricks as shown on the Standard Details.

4. Mortar. Mortar shall be Type R-2 per section 1005 of the Standard Specification for Construction.

5. Concrete for adjustment of manhole castings shall be Grade 3500 as specified in Standard Specifications for Construction.

6. Brick or Block Masonry units and precast concrete sections shall conform to the ASTM Specifications as follows:

A. Concrete Brick shall conform to the requirements for Grade A of the current Specifications for Concrete Building Brick, ASTM C55.

B. Concrete Blocks shall conform to the requirements of the current Specifications for Concrete Masonry Units for Construction of Manholes, ASTM C139.

7. Plastic Coated Steel Steps.

A. Plastic shall conform to the requirements for Type II, Grade 49108 or Grade 16906 of the current Specifications for Propylene Plastic Molding and Extrusion Materials, ASTM D4101.

B. Steel shall conform to the requirements for Grade 60 of the current Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement, ASTM A615.

- C. Furnish plastic coated steel steps from the following.
 - (1) ML-10-NCR by American Step Company
 - (2) PS1-PF by M.A. Industries.
 - (3) or Engineer approved equal.

8. Flexible Connections. Flexible manhole connections shall conform to ASTM C923.

- A. Furnish Flexible manhole connections from the following.
 - (1) KorNSeal by National Pollution Control Systems Inc.
 - (2) PSX by Press Seal Gasket Corporation.
 - (3) Z Lok by A lok Products Inc
 - (4) or Engineer approved equal.

c. Construction.

1. Excavation. Excavation and backfill shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities. Excavation shall be of sufficient dimensions to provide ample space for sheeting and bracing where sheeting and bracing are required, and ample space to perform the work in a satisfactory manner and in accordance with current MIOSHA and OSHA regulations.

2. Infiltration. All structures and manholes to be built under this Special Provision shall be made water- tight. Any infiltration which is detected shall be eliminated by the Contractor.

3. Brick or Block Units. Shall be laid in such a manner that the courses will be true to line and with the joints fully bonded.

- A. In a structure of cylindrical design, radius blocks shall be used.

- B. In a structure of rectangular design, the bricks shall be laid in alternate courses of headers and stretchers.

4. Manholes. All manholes shall be constructed of precast reinforced concrete sections, as shown on the Standard Details or Plans. Masonry and cast-in-place manholes will not be allowed unless specified or approved by the Engineer.

- A. Openings shall be provided in the manholes for connections, including future connections, as shown on the Plans of such size and at such elevation as required and shall be included in the cost of the construction of the manholes. All openings in manholes for the purpose of receiving pipes up to and including 24-inch diameter (including openings for future pipes) shall be fitted with a connection of the flexible type connector. Flexible connectors on manholes shall be factory installed. Openings for future connections shall be sealed by an approved prefabricated cap.

- B. The outside surface of brick or block manholes shall be parged one-half inch thick with mortar. The inside surface of all brick or block manholes shall be parged with mortar 1/2-inch thick from the bottom to the corbel.

C. The manhole castings shall be set in a full bed of mortar with the top at the required elevation. Chimneys, including castings, shall be no more than 20 inches high, unless otherwise approved by the Engineer.

5. Drop Connections to Sanitary Manhole shall be constructed to conform to the Standard Details and Plans.

A. The drop connection pipe and fittings below the incoming sewer shall be fully encased in concrete.

B. The high-speed drop connection pipe and fittings below the lower fitting shall be fully encased in concrete.

6. Adjusting and Finishing Castings and Oversized Castings. The Contractor shall be required to adjust manhole and oversized manhole castings to the proposed elevation or as required by the Engineer. Castings shall be adjusted according to detail P-22. The work of adjusting shall include removal of material and building up with grade rings to the proposed elevation. The following work shall be included:

A. The excavation or removal of existing unclassified materials, such as pavement, pavement base, earth, etc., so that the work of adjusting the casting can be done.

B. The building up with concrete grade rings, where necessary.

C. The setting and finishing of the new casting in accordance with 4.C of this Special Provision.

7. Backfill for Structures specified in this Special Provision shall be Granular Material Class II in accordance with the Standard Specifications for Construction, unless otherwise shown on the Plans or approved by the Engineer and placed in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Sanitary Mh __ foot dia, Det __	Each
Sanitary Mh, __ foot dia, Det __, Add Depth over 15 foot	Foot
Drop Connection, Det S-1A, on __ inch Sanitary Sewer	Each
Drop Connection, Det S-1A, on __ inch Sanitary Sewer, Add Depth over 15 foot.....	Foot
Drop Connection, Det S-1B, on __ inch Sanitary Sewer	Each

The prices shall be payment in full for furnishing all labor, equipment, and material and shall include all clearing, excavation, trenching, cofferdams, dewatering, furnishing and placing the structures, all backfilling, disposal of excess material, temporary sheeting and bracing, removal of abandoned utilities and services, temporary support, removal and replacement of existing

utilities and services, and the repair and replacement thereof if damaged, connection of existing sewers, testing, and all other work required for a complete job.

Manholes includes furnishing and installing the structure, grade rings, casting, and all other accessories as specified and detailed.

Furnishing, adjusting, and finishing of castings on new manholes and similar structures is considered included in the cost of the manhole and similar structure and shall not be paid for separately.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
SANITARY SEWERS

ENG/CITY OF GRAND RAPIDS

1 OF 15

ORG:08/19/21

REV:11/01/25

a. Description. The work shall consist of constructing sanitary sewer pipe of the specified sizes placed in a trench, and shall include furnishing and installing the pipe, excavation, and backfill. The work also shall include connections to the sanitary sewer and sanitary sewer laterals to the abutting property. All work in this Special Provision shall be in accordance with section 825 of the Standard Specifications for Construction, except as modified herein.

b. Materials. Provide materials in accordance with the following specifications. Material shall be new and free of defect from manufacture or transport.

1. Sanitary Sewer Pipe. Sewer pipe shall conform to one or all of the following current ASTM or other specifications as designated on the Plans or in the Proposal. Pipe furnished shall be of the materials shown on the Plans or specified in the Proposal. No changes in pipe material or size will be allowed between manholes.

A. PVC Truss Pipe (Composite Sewer Pipe) shall conform to current ASTM Specification D2680 as shown on the Plans or specified in the Proposal.

B. PVC Solid-Wall Pipe where approved, shall conform to current ASTM specification D3034, including appendixes, with a standard dimension ratio of 26 PS115 (DR26).

(1) The use of PVC Solid Wall Pipe shall only be permitted by the City Engineer's office on a project by project basis and said approval shall be prior to bids being received and the Plans or Special Provisions shall so state.

C. PVC Corrugated Pipe with a smooth interior shall conform to current ASTM specification F949.

(1) The use of PVC Corrugated Pipe shall only be permitted by the City Engineer's office.

D. Ductile Iron Pipe shall conform to the current ANSI A21.50, thickness Class 53 or as approved by the Engineer. Ductile Iron Pipe shall be cement mortar lined in accordance with the current ANSI A21.51 as shown on the Plans or specified in the Proposal.

(1) Ceramic Epoxy Lining. When shown in the plans or specified in the Proposal the ductile iron pipe shall include Ceramic Epoxy Lining. Lining shall be applied by a firm certified in ceramic lining of ductile iron pipe. Furnish ceramic lining from the following.

(a) Protecto 401 by Induron Protective Coatings.

- (b) Ceramapure by Induron Protective Coatings.
- (c) or Engineer approved equal.

E. Vitrified Clay Pipe conforming to the current ASTM Specification C700 or for either standard or extra-strength pipe or to the current National Clay Pipe Institute's Specification ER 4-67, as shown in the Plans or specified in the Proposal.

- (1) The use of Vitrified Clay Pipe shall only be permitted by the City Engineer's Office.

F. Concrete Pipe conforming to the current ASTM Specification C76 Classes I through V, as shown in the Plans or specified in the Proposal.

- (1) The use of Concrete Pipe shall only be permitted by the City Engineer's Office.

2. Sanitary Sewer Lateral Pipe shall be PVC Truss, PVC Solid-Wall, Ductile Iron Pipe, or Vitrified Clay Pipe, unless otherwise specified.

A. PVC Truss Pipe (Composite Sewer Pipe) shall conform to the current ASTM specification D2680.

B. PVC Solid-Wall Pipe shall conform to the current ASTM Specification D3034 with a standard dimension ratio of 35 (SDR35). Extra Strength laterals in accordance with Standard Detail S-17 shall be SDR23.5 for all depths.

C. Ductile Iron Pipe shall conform to the current ANSI A21.50, thickness Class 53. Ductile Iron Pipe shall be cement mortar lined in accordance with the current ANSI Standard A 21.51.

D. Vitrified Clay Pipe for depths up to 10 feet shall be standard strength pipe conforming to current ASTM specification C700. Depths over 10 feet shall be as shown on the Plans or listed in the Proposal.

- (1) The use of Vitrified Clay Pipe shall only be permitted by the City Engineer's Office.

E. Concrete Pipe conforming to the current ASTM Specification C76 Classes I through V, as shown in the Plans or specified in the Proposal (Laterals 12 inches or larger in diameter).

- (1) The use of Concrete Pipe shall only be permitted by the City Engineer's Office.

3. Sanitary Sewer Lateral Connections.

A. PVC Truss and PVC Solid Wall Pipe. Lateral connections to truss and solid wall pipe shall be manufactured tees and wyes for sewer mains 15 inches or less in diameter.

B. Clay. Lateral connections to clay sewer pipe shall be per Detail S-20 for sewers 12 inches or less in diameter.

C. Concrete Pipe. Lateral connections to concrete sewer pipe shall be per Detail S-20 for sewers 12 inches or less in diameter.

D. Flexible Connections for PVC Truss, Solid Wall greater than 15 inches Clay and Concrete Pipe greater than 12 inches in diameter. Rubber sleeve lateral connection shall conform to ASTM F477.

- (1) Furnish flexible connections from the following.
 - (a) Inserta Tee by ADS.
 - (b) or Engineer approved equal

E. Flexible Connections into manhole or large diameter sewer conforming to ASTM C478. Flexible manhole connections shall conform to ASTM C923.

- (1) Furnish flexible manhole connections from the following.
 - (a) KorNSeal by National Pollution Control Systems Inc.
 - (b) PSX by Press Seal Gasket Corporation.
 - (c) ZLok by Alok Products Inc
 - (d) or Engineer approved equal.

4. Sewer Joints. Joints for Sewer and Sewer Laterals shall conform to the following specifications.

A. PVC Truss Pipe and PVC Solid-Wall Pipe. Joints shall be chemically welded or shall be of the elastomeric gasket seal type as specified in the current ASTM Specification D3212. Care shall be taken to ensure that all joints are pushed to the full "home" position and held tightly in the "home" position during any grade or line adjustments. If solvent is used, pipe shall be rotated during joint insertion to ensure a complete spread of joining cement. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers and adhesives shall be used as recommended by the pipe manufacturer. Installations of solvent weld joint pipe shall be installed in accordance with current ASTM specification F402, and all required precautions shall be taken to assure adequate trench ventilation and protection for workers installing the pipe. Swab-type applicators shall be used to apply primer and cement. Opened containers in the trench shall be protected from dirt, water and other contaminants.

B. PVC Corrugated Pipe. Joints shall be made with integrally formed bell and spigot gasketed connections. Contractor shall provide documentation showing no leakage when gasketed pipe joints are tested in accordance with ASTM D3212. Gaskets shall meet the requirements of ASTM F477.

C. Vitrified Clay Pipe. Joints shall conform to the current ASTM specification C425 Types I, II or III.

D. Ductile Iron Pipe. Joints shall be push-on type coupled in accordance with ANSI/AWWA C111/A 21.11.

E. Concrete Pipe. Joints for concrete sanitary sewer pipe of 10-inch diameter and larger shall be of the round rubber gasket type, or Glipp Type, using a modified bell and spigot design. The spigot shall have an external groove accurately sized to receive the gasket, so that when the pipe is laid and the joint completed, the gasket shall be enclosed on all surfaces. Joints and gaskets shall conform to the current ASTM Specifications C443 except the taper on the conic surfaces of the inside of the bell and the outer surface of the spigot shall not be more than 2 degrees with respect to the longitudinal axis of the pipe. The durometer hardness of rubber gaskets shall be 45, plus or minus 5, and the gaskets shall have a circular cross section or be the Glipp Type. The Contractor shall furnish to the Engineer a detailed drawing showing the pipe and joint proposed to be furnished under these specifications.

5. Pipe Test Certification. Contractor shall make arrangements to furnish the Engineer with a satisfactory test report by an approved independent Testing Consultant to be hired by the City covering all pipe delivered to the site. It shall, as a minimum, include the following information as may be applicable: ASTM specifications, breaking test data, absorption test data, test cylinder data, and other information as may be required by the Engineer.

A. The Testing Consultant shall stamp all pipe covered by their test report and delivered to the job site.

B. The cost of the above-described testing shall be paid for by the City. Any testing charges resulting from unsatisfactory pipe having been furnished shall be the responsibility of the Contractor. (The Testing Consultant and testing costs for a Private Development project shall be arranged and paid for by the Developer.)

C. The Engineer may, in cases where in their opinion the work is of such small quantity as to make the above requirement unnecessary, waive or alter these test requirements if so requested prior to delivery of pipe to a job site.

D. The Engineer also may, in cases where the pipe manufacturer has an approved testing facility, accept certification test reports of tests performed by the manufacturer.

c. Construction.

1. Excavation and Backfill. Excavation and backfill for sewers shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities.

2. Handling.

A. Ceramic lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc., shall be placed inside the pipe and fittings for lifting, positioning, or laying.

3. Laying Sewer Pipe.

A. General. Alignment and depth of the pipe shall be as shown on the Plans, unless otherwise approved by the Engineer. The construction shall begin at the outlet end and proceed toward the upper end. The pipe shall be carefully laid in the prepared trench to the line and grade as shown on the Plans or as approved by the Engineer, with the spigot end downstream. The bottom of the trench shall be so shaped to permit a firm and even bearing along the barrel of the pipe. A sufficient sand cushion shall be provided in clay soil as specified in the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities, where approved by the Engineer. The pipe shall be fitted close and tight and with smooth inverts. All connections to existing manholes shall be of the flexible type (rubber boot) that conform to ASTM C923.

(1) Flexible Connection. KorNSeal by National Pollution Control Systems Inc., PSX by Press Seal Gasket Corporation, Z Lok by A lok Products Inc, or Engineer approved equal.

(2) Concrete Joints. Wrap pipe joints, with a diameter greater than 24 inches, using geotextile fabric. Use geotextile at least 22 inches wide, centered on the joint.

B. Laser. The Contractor shall use the laser beam method of maintaining line and grade for sewer construction. If requested by the Engineer, the Contractor shall submit evidence to the Engineer that a qualified operator will handle the laser beam equipment during the course of construction.

(1) The Engineer shall place the line and grade stakes at each manhole, or more often, as determined appropriate. The Contractor shall check the line and grade at every point at which a stake has been placed.

C. Laterals. The openings for house connections shall be tees or wyes (unless otherwise noted) placed at the locations shown on the Plans or as approved by the Engineer, and the pipe shall be laid from the tee to the property line. These laterals shall be laid at right angles to the street line unless otherwise directed and shall be laid on a uniform line and grade from the sewer opening to the property line. Lateral shall be constructed at a minimum 1 percent grade from the main to the right-of-way or easement line. The depth of the lateral, below grade, at the right-of-way or easement line shall be set at 9.5 feet to the invert, unless otherwise shown on the Plans and approved by the Engineer. The upper end of the lateral shall be closed with a stopper sealed in place by the same joint and material as used for the lateral. The location of the end of each lateral and of each stoppered opening in the sewer shall be marked by a 2 inch x 2 inch wooden stake which shall extend vertically from the sewer pipe to just below the ground, and which shall have at its lower end, a piece of lumber 1 inch x 2 inch x 6 inch securely nailed horizontally, and shall have at its upper end a securely fastened, heavy ferro-magnetic washer.

(1) If the lateral being constructed is to be constructed all the way to the structure which it will serve, the final connection is to be made by a licensed plumber in possession of a valid connection permit. No lateral is to be constructed any closer than 3 feet to the structure it is to serve without the above requirements being met.

(2) No sewer lateral may be connected into any newly constructed sanitary sewer until such time as said sewer has been approved and an "In-Service" letter has been written by the Engineer.

(3) Approved premanufactured pipe-to-pipe adapters shall be utilized on all laterals where more than one type of pipe is used.

(4) Sewer laterals shall be cored into concrete pipe and shall be fitted with a flexible connection.

(5) Sewer laterals connecting to lined sanitary sewer shall be connected per details on the plan in accordance with subsection b. of this special provision.

(6) All lateral connections to sewer mains and manholes shall be by gravity. No force main connections will be allowed.

D. Extra Strength Laterals. Where the buried depth of the sanitary sewer main is greater than 13 feet below the established street grade, an extra strength lateral as per Standard Detail S-17 shall be constructed at the location shown on the Plans or profile, of the diameter and height specified, or as approved by the Engineer, for the purpose of providing a connection at the top of such riser for a house lateral.

E. Other Connections. All other connections shall be made in tee or wye openings at the locations shown on the Plans or as approved by the Engineer.

F. Cut-Ins. When cutting into a sewer or manhole, the opening in the larger sewer shall be no larger than is necessary to connect the new sewer or lateral. Openings shall be circular. All broken or surplus material shall be removed from both sewers.

(1) When the larger sewer is of reinforced concrete construction, the reinforcing steel shall be carefully cut off to the proper distance to avoid spalling the concrete. For connecting clay or concrete sewers greater than 24 inches, the sewer shall be neatly grouted into the receiving sewer as approved by the Engineer. For connecting clay or concrete sewers, 12 inches through 24 inches, the hole shall be cored in, and the connection between the new sewer and the sewer which was cut into shall be made with a flexible rubber boot, or manufactured lateral connection. Cut-ins for clay or concrete pipe 12 inches in diameter and less shall be made with a sewer saddle as shown in Standard Detail S-20, unless otherwise approved by the Engineer.

(2) For PVC pipe up to 15 inches, the connection shall be made using a saddle, solvent welded onto the cut pipe. The saddle shall be anchored with two stainless steel clamps in addition to the solvent weld. The saddle shall cover at least one half the outside diameter of the pipe. Connections greater than 15 inches shall be a flexible connection in accordance with subsection b.3 of this special provision.

G. Cutting PVC, Truss, PVC Solid-Wall Pipe, and PVC Corrugated Pipe. The cutting of PVC truss pipe and PVC solid-wall pipe lengths, where required, shall be performed by the use of tools or equipment that will provide a neat, perpendicular cut without damage to the plastic or filler material. Bowing or warping of PVC pipe can

occur with temperature fluctuations. The Contractor shall store and protect from sunlight the pipe to minimize bowing. Nominal 12.5-foot pipe lengths having deviations from straight greater than 1 inch shall not be used.

4. Concrete Cradle. Where a concrete cradle is required, it shall be built of concrete Grade 3500, as specified in the standard specifications, and to conform to the details and at the locations shown on the Plans or as approved by the Engineer.

5. Testing and Inspection of Sewers. All sanitary sewer pipes and their service laterals shall be tested and inspected for infiltration and exfiltration by the Contractor. Any construction which fails the requirements of this Special Provision will be sealed and retested at the expense of the Contractor. Any construction which cannot be sealed to bring the sewer within the requirement of this Special Provision will be reconstructed and retested at the Contractor's expense. The cost of the initial test and inspection will be included in the unit cost of the construction of the sewer.

A. When requested by the Engineer, PVC solid wall and PVC truss pipe shall be inspected to ensure that the pipe has not deformed. The complete installation shall at no point have out-of-round deflections greater than 5 percent. The deflection test shall be conducted after final backfill has been in place for at least 30 days. All flexible pipe <200 psi and flexible pipe >200 psi with more than 12 feet of cover shall be tested. The Engineer shall have the option of requiring deflectometer or go/no go gauging tests run prior to acceptance of pipe on pipelines where high deflections are suspected. Pipe with deflections greater than 5 percent will be considered unacceptable and shall be relaid by the Contractor at the Contractor's expense. The cost of such testing will be considered to have been included in the unit price for the sewer.

B. Exfiltration Test shall be conducted by a water test or a low-pressure air.

(1) Water Test. When the sewers are to be tested with water, the Contractor shall isolate a section or sections of the sewers between manholes by means of approved temporary type of watertight bulkheads. The isolated section of sewer shall then be filled with water to a level which is 2.5 feet above the existing water table, but not less than 2.5 feet above the end of the highest lateral or crown of the sewer pipe at the high end of the isolated section under test. The length of the section shall be such that, where possible, the water level at its lower end will not more than 5 feet above the crown of the pipe except as may be required by a high-water table. The length of time of the exfiltration test period shall be at the discretion of the Engineer. Determination of the amount of exfiltration shall be made by measurement of the loss of volume of water in the manholes. The amount of exfiltration over a 24-hour period will then be calculated from the measured loss of volume and time period.

(a) Infiltration shall be measured by the temporary placement of weirs in manholes capable of accurately measuring the infiltration which occurs.

(2) Low-pressure Air Tests shall be conducted according to ASTM F1417 for plastic pipe, C828 for vitrified clay pipe, and C924 for reinforced concrete pipe.

(3) Rates of infiltration or exfiltration for sewers will not exceed 100 gallons per day, per inch of diameter, per mile of sewer.

(4) Tabulation of this requirement for various diameters per lineal foot is as follows:

Table 1
Rates of Infiltration or Exfiltration

Diameter of Sewer (in)	Infiltration or Exfiltration (gallons per day per foot)	Diameter of Sewer (in)	Infiltration or Exfiltration (gallons per day per foot)
6	.113	30	.568
8	.151	36	.681
10	.198	42	.795
12	.227	48	.909
15	.284	54	1.022
18	.341	60	1.136
21	.397	66	1.250
24	.454	72	1.363
27	.511		

(a) Exceeding these amounts will be considered as failure for the tested lengths of sewer.

(b) Any infiltration which is observed shall be sealed by the Contractor.

(c) On any section of sewer that the Engineer shall deem it impractical to test by means of the water exfiltration test specified in this Special Provision, the following air test shall be used. Air shall be slowly supplied to the plugged pipeline until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe. The average back pressure is determined by inserting a pipe probe by boring or jetting, into the backfill material adjacent to the center of the pipe and determine the pressure in the probe when air passes slowly through it. All gauge pressures in the test should be increased by this amount. At least two minutes shall be allowed for temperature stabilization before proceeding further.

(d) The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch.

(e) The sewer shall be considered acceptable if the time interval for the pressure drop from 3.5 pounds per square inch to 2.5 pounds per square inch is not less than the holding time listed in the table which follows.

Low Pressure Air Test Tables
Time Required For 1.0 PSIG Pressure Drop
When Testing One Pipe Diameter Only for Size and Length of Pipe Indicated.

Table 2
PVC and DI Sewer

Pipe Dia (in)	Min. Time (min:sec)	Length for Min Time (ft)	Time for Longer Length (sec)	Test Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

Table 3
VCP and Concrete Sewer

Pipe Dia (in)	Min Time (min:sec)	Length for Min Time (ft)	Time for Longer Length (sec)	Test Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	.190L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:48	11:24	12:50
15	7:05	159	2.671L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
36	17:00	66	15.384L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	19:50	57	20.939L	34:54	52:21	69:48	87:15	104:42	122:09	139:36	157:03

Note: When testing two sizes of sewer pipe simultaneously, time shall be computed by ratio of lengths involved.

Example: 400 feet of 8-inch PVC pipe and 150 feet of 6-inch VCP pipe.

$$\begin{aligned}
 \text{Time} &= \frac{\text{Time}_1 \times \text{Length}_1 + \text{Time}_2 \times \text{Length}_2}{\text{Length}_1 + \text{Length}_2} \\
 &= \frac{400 \times 10:08 + 150 \times 2:50}{400 + 150} = \frac{400 \times 608 + 150 \times 170}{400 + 150} \\
 &= 489 \text{ seconds} = 8:09 \text{ (min:sec)}.
 \end{aligned}$$

C. Video Inspection of Sewers.

(1) After completion of a section of sewer and prior to placing the sewer into service, the Contractor shall perform a video inspection. The inspection shall be completed by trained and experienced personnel, with knowledge of the operation of the equipment, as well as the design and the construction of the sewer. The Camera shall move through the pipe line at a uniform rate with a maximum rate of speed of 30 feet per minute. The Camera shall stop as necessary at all potential defects and damage to ensure proper documentation of the pipe's condition.

(2) The Camera shall have a minimum 300-line resolution, digital, video picture.

(3) Video inspection shall be for all sewers less than 60 inches in diameter.

(4) The Contractor shall submit an inspection log and digital video of the inspected sewer documenting: date and time of recording, all unusual conditions, collapsed sections, wide joints and cracked pipe. The inspection log and digital video shall list the location, in relation to the starting point, of all conditions.

(5) The Contractor shall submit the sewer inspection video prior to placement of top course of pavement.

6. Sewer Joint Repairs and Joint Repair Testing.

A. Pressure Testing and Grouting. Except as herein specified or as indicated on the Plans, the work of this Special Provision shall comply with the following: ASTM Standards, F2304 – Standard Practice for Rehabilitation of Sewers using Chemical Grouting.

(1) Chemical Grout information.

(a) Description of chemical grout materials to be used.

(b) Description of proposed additives to be used.

(c) Manufacturer's recommended procedures for storing, mixing, testing, and handling of chemical grouts.

(d) SDS sheets for all materials to be used.

(2) Upon completion of the repair of each pipe segment, submit to Engineer a report showing the following data for each joint and lateral connection tested, grouted or attempted to be grouted as required by the PACP:

(a) Identification of the sewer pipe section tested by assigned sewer ID (if available) and length.

(b) Type of pipe material, diameter, and depth of pipe to the surface at manholes.

(c) Length of pipe sections between joints.

(d) Test pressure used and duration of test.

(e) Pass/fail results for each joint/connection tested.

(f) Location stationing of each joint/connection tested and location of any joints/connections not tested with an explanation for not testing.

- (g) Volume of grout material used on each joint or connection.
- (h) Gel set time used (cup test results from tanks).
- (i) Grout mix record of the batches mixed including amount of grout and catalyst, additives, temperature of the grout solution in tanks.
- (j) Indicate operator conducting testing and sealing on the reports.
- (k) Video Inspection:
 - (i) Video shall include testing and sealing operations for each joint/lateral (including inflation and deflation over the joint/lateral) displaying the final air test of joints or laterals.
 - (ii) Final recording shall include inspection of the pipe after all grouting work is complete.

7. Sewer Reconstruction.

A. Removal of Existing Sewer. When so noted on the Plans, the work under this Special Provision shall include the removal of all existing sewers and laterals, which are to be replaced by the reconstructed sewer system. No extra compensation will be paid for said removal or for any necessary plugs.

B. Maintaining Existing Sewer and Sewer Services Flow.

(1) The Contractor shall maintain uninterrupted sewer service to all properties within and adjoining to the Project. The Contractor shall be responsible for the cost of any damages that occur because of a failure to maintain sewage flow.

(2) The Contractor shall make every reasonable effort to maintain uninterrupted water and sewer service to all property owners adjoining the project. In the event that such interruption of service is unavoidable it shall be done only with prior approval of the Engineer. Any necessary pumping of sewage for any reason whatever shall be the responsibility of the Contractor. This responsibility shall commence at the time the Contractor commences reconstruction operations, or 48 hours after the award of the contract, whichever occurs first, unless otherwise required in the Project Special Provisions.

(3) Dry weather flows from existing upstream sewers may be bypass pumped during work hours. Bypass pumping of wet weather flows will not be allowed.

(4) The relaying of any sewer laterals shall be coordinated with the property owners and it shall be the responsibility of the Contractor to maintain sewage flow as necessary. Any interruption of service shall be done only with the prior approval of the Engineer.

(5) The Contractor shall be held responsible and shall plan his construction activities such that continuity of sewage conveyance system is maintained. All costs, damages, and fines resulting from any failure shall be borne by Contractor.

(6) When the Pay Item is included in the Proposal, all costs for maintaining sanitary sewer flow shall be considered included in the Maintain Sanitary Sewer Service. When the Maintain Sanitary Sewer Service Pay Item is not included in the Proposal, maintaining existing sanitary sewer and services flow will not be paid separately, and is included in other items.

C. Reconnection of Laterals. The Contractor shall carefully uncover the existing sanitary sewer and locate all connections thereto. It shall be the Contractor's responsibility to reconnect all live laterals. Where the property is either unoccupied/vacant or undeveloped, one lateral per lot shall be reconnected. The Contractor shall place tees or wyes in the reconstructed sewer as close to the existing laterals as is possible. Place new tees or wyes no closer than 3 feet apart on the main. Laterals shall be laid at right angles to the street line and sanitary main, no tee or wye shall be placed upstream from the lateral, unless otherwise approved by the Engineer. Tees and wyes shall be shop fabricated. No field connections into the reconstructed sewer line will be allowed, unless approved by the Engineer. Any necessary additional lateral alignment may be accomplished by using premium jointed bends, provided that no bends shall be sharper than 45 degrees.

(1) During the process of construction, the Contractor shall video existing sanitary laterals for the purpose of making certain that all existing sanitary laterals have been reconnected. The Contractor shall make the arrangements necessary to gain access to buildings adjoining the project.

(2) The Contractor shall clean and inspect the lateral to the property line and advise the Engineer of the condition of the lateral prior to making the connection.

(3) The necessary field connection between the new lateral pipe and the existing lateral pipe shall be made by cutting the new lateral pipe to the proper length, inserting a prefabricated pipe to pipe adapter, and pouring a concrete collar not less than 6 inches thick by 12 inches wide around the joint. In the event the lateral is constructed of truss pipe, no concrete collar is to be placed. No misalignment or angle point will be allowed at the field connection.

(4) Existing laterals that are determined to be abandoned, shall not be connected or stubbed to the ROW line, so long as each property has at least one-line sewer lateral. All live services to be noted and placed on the record Plans.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Sanitary Sewer, D2680, __ inch	Foot
Sanitary Sewer, F949, __ inch	Foot
Sanitary Sewer, C700X, __ inch	Foot
Sanitary Sewer, C76 CI __, __ inch	Foot
Sanitary Sewer, DI CI __, __ inch	Foot
Sanitary Sewer, DI CI __, Epoxy Lined, __ inch	Foot
Tee/wye on __ inch Sanitary Sewer, __ inch	Each
Sanitary Sewer Lateral, SDR __, __ inch	Foot
Sanitary Sewer Lateral, D2680, __ inch	Foot
Sanitary Sewer Lateral, DI CI __, __ inch	Foot
Sanitary Sewer Lateral, C700X, __ inch	Foot
Sanitary Sewer Lateral, Extra Strength, __ inch	Foot
Reconnect Existing Sanitary Sewer Lateral	Each
Maintain Sanitary Sewer Serv	Lump Sum
Core and Boot __ inch Sanitary Sewer into Sewer or Mh	Each
Core and Seal __ inch Sanitary Sewer into Sewer or Mh	Each
Video Sewer	Foot
Video Private Property Sewer Lateral	Dollar

The unit price shall be payment in full for furnishing all labor, equipment, and material and shall include all clearing, excavation, trenching, cofferdams, dewatering, cut-ins, furnishing and placing the sanitary sewer pipe, fittings and plugs, bedding, all backfilling, disposal of excess material, temporary sheeting and bracing, removal of abandoned utilities and services, temporary support, removal and replacement of existing utilities and services, and the repair and replacement thereof if damaged, connection of existing sewers, testing, and all other work required for a complete job.

Sanitary Sewers of the size(s) shown in the Proposal shall be measured in lineal feet along the centerline of the pipe, without reductions in length for manholes or other structures.

Sanitary Sewer Laterals of the size(s) shown in the proposal shall be measured in lineal feet along the centerline of the pipe from the center of the main line sewer to the other end of the pipe.

1. Connection of proposed laterals to existing laterals at the right-of-way line shall be included in the unit price of the lateral, and shall include furnishing and placing all necessary bends, the pipe-to-pipe adapter, and or concrete collar, needed to connect the laterals.

Tees and Wyes shall be measured as units furnished. Payment for laying tees or wyes shall be included in the unit price for furnishing and laying the sanitary sewer.

When connecting laterals into concrete pipe or manhole, **Core and Boot __ inch Sanitary Sewer into Sewer or Mh** payment in full for lateral connections.

When the placement of new sanitary sewer does not call for new sanitary sewer laterals on the Plans or in the Proposal, **Reconnect Existing Sanitary Sewer Lateral** shall be measured and paid for each connection, including furnishing and placing all necessary bends, sewer lateral pipe, the pipe-to-pipe adapter, the concrete collar, surface restoration unless separate pay items are provided, and work required for the proper reconnection. The tee or wye will be paid for separately.

Maintain Sanitary Sewer Serv shall be payment in full for furnishing all labor, equipment, and material and all other work required for a complete job. **Maintain Sanitary Sewer Serv** will be paid in accordance with payment schedule for Mobilization. When **Maintain Sanitary Sewer Serv** is not included in the Proposal or call for on the Plans, maintaining sanitary sewer service shall be included in the contract unit prices for other relevant pay items.

Video Sewer shall be payment in full for furnishing all labor, equipment all other work required for a complete job. Video Sewer shall also be payment in full for all traffic control, bypass pumping, cleaning, recording media, and inspection log.

Video Private Property Sewer Lateral shall be payment in full for furnishing all labor, equipment, and all other work required for a complete job of videoing laterals on private property, if needed during construction or when deemed necessary by the engineer. **Video Private Property Sewer Lateral** shall also be payment in full for all traffic control, bypass pumping, cleaning, recording media, and inspection log for such videoing.

Core and Boot and **Core and Seal ___ inch Sanitary Sewer into Sewer or Mh** shall include reforming manhole flow channels when connecting to existing manholes.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
REINFORCED CONCRETE STRUCTURES

ENG/CITY OF GRAND RAPIDS

1 OF 8

ORG:08/19/21

REV:11/01/25

a. Description. This work shall consist of construction of all reinforced concrete structures, both above and below ground and all items directly related to the proper functioning of the completed concrete work, including foundation excavation, forming steel reinforcement, waterproofing, backfill, and related items. All work in this Special Provision shall be in accordance with sections 403, 825 and 706 of the Standard Specifications for Construction, except as modified herein.

b. Materials.

1. Concrete. Concrete for all work in this division shall be Grade 3500 as specified in section 706 of the Standard Specifications for Construction, unless otherwise specified.

2. Form Material. All face form lumber for exposed surfaces shall be either dressed tongue and groove, dressed shiplap, or square edged lumber sized uniformly. Face form lumber shall be of uniform width and thickness and shall be sound and free from loose or rotten knots, knot holes, check splits, or wane showing on the surface in contact with concrete.

A. For exposed surfaces, to be left unfinished, dressed tongue and groove or shiplap lumber not less than 3/4 inch actual thickness and not more than eight inches in width shall be used.

B. Instead of face form lumber, the Contractor may use plywood for structural boarding. It shall be at least 5 ply, not less than 3/4 inch in thickness, and in computing stud spacing it will be considered as 1-inch lumber.

C. The Contractor shall not use defective face form lumber which may produce work inferior to that resulting from new material.

D. Metal forms shall be of such thickness and so constructed that the forms will remain true to shape. All bolt and rivet heads occurring in the inside face of the forms shall be countersunk. Use of the metal form shall result in a plane smooth surface of the desired contour.

c. Construction. Excavation and backfill for sewers shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities, and as specified herein.

1. Foundation Excavation. Foundation Excavation shall be made of sufficient size to permit construction of the foundation units and to provide for adequate drainage. Excavated material suitable for the purpose of backfilling shall be stored and used later.

A. Special care shall be taken not to disturb the bottom of the excavation. The elevations for the bottom of footings shall be subject to such changes as are necessary to insure a satisfactory foundation. The final removal of the foundation material to grade shall not be made until just before the foundation is placed. All unsound material underlying proposed structures shall be removed and replaced with bank run gravel or coarse aggregate, in layers not exceeding 6 inches in depth, and each layer shall be thoroughly compacted by tamping or by vibrating. The thickness of each layer of backfill may be increased to more than 6 inches, provided the full depth of each layer of backfill is compacted to not less than 95 percent of maximum.

B. Concrete shall not be placed until the depth of excavation has been checked, and the suitability of foundation material has been approved by the Engineer.

C. Where soil conditions allow and when approved by the Engineer, the footing forms may be omitted. Footing excavation may be trimmed to the exact size of the footing. In this case, guide forms to establish the grade for the top of the footing will be required.

2. Forms. All forms shall be of wood or metal and shall be built mortar-tight of sound material sufficiently strong and rigid to prevent distortion during the placing and curing of concrete.

A. Form Design. Design, erect, support, brace and maintain form work to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure.

(1) Design form work to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

(2) Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only.

(3) Provide for openings, offsets, linkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work.

B. Form Construction. Forms shall be constructed and maintained to prevent warping and the opening of joints due to shrinkage of the lumber. Forms shall be secured to studs or uprights with true horizontal joints.

(1) Forms shall be built true to the lines designated and shall be so maintained until the concrete has sufficiently hardened to allow their removal.

(2) Form work shall be built to be readily removable, without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Forms shall be fabricated for ready removal without hammering or prying against concrete surfaces.

(3) Crush plates or wrecking plates shall be provided where stripping may damage cast concrete surfaces.

(4) Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

(5) Forms shall be securely braced to prevent movement while placing concrete.

(6) Clamps, pins, or other connecting devices shall be designed to hold the forms rigidly together and to allow removal without injury to the concrete.

(7) Form work shall be constructed so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Forms shall be constructed to size, shape, line, and dimensions shown, to obtain accurate alignment, location, grades, level, and plumb work in finished structures. The maximum deflection of form facing material between supports, and the maximum deflection of form supports such as studs and wales, shall not exceed 1/4 inch per 10 feet of span.

All face form lumber on upright studs shall be secured to the studs or uprights with true horizontal joints.

(a) Temporary openings shall be provided at the base of wall and column forms and other interior area of form work where it is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Temporary openings shall be located on forms at inconspicuous locations.

(b) Forms and bracing shall be retightened after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

(c) Selected materials shall be used to obtain required finishes. Joints shall be solidly butted and provided with back-ups at joints to prevent leakage of cement paste.

(d) Unless otherwise provided on the Plans or by authorization, all buried corners shall be finished square without moldings. All exposed corners and edges shall be chamfered 3/4-inch minimums, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

(e) Coordinate the installation of joint materials, perimeter insulation, and vapor retarders with placement of forms and reinforcing steel.

C. Use of Forms.

(1) Special care shall be exercised to keep metal forms free from ruts, grease, or other foreign materials such as will tend to discolor the concrete.

(2) Cleaning and Tightening. Forms and adjacent surfaces to receive concrete shall be thoroughly cleaned. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed.

(3) Metal forms which do not present a smooth surface or line up properly shall not be used.

(4) Oiling. The inside of all forms for exposed concrete surfaces shall be oiled with a light, clear, paraffin-base oil which will not discolor or otherwise injuriously affect the concrete surface. Oiling shall be done after all necessary planning is completed.

D. Coordination Issues. Openings in the concrete form work shall be provided when necessary to accommodate work of other trades. Size and location of openings, recesses and chases shall be determined from trades providing such items. Items built into forms shall be accurately placed and securely supported.

3. Placing of Steel Reinforcement. Materials for steel reinforcement shall be as specified in section 706 of the Standard Specifications for Construction. Steel reinforcement shall be accurately placed in the position shown on the details or Plans. If not shown, steel reinforcement shall be placed in accordance with the current Standards of the American Concrete Institute.

A. Bars shall be placed with a variation between adjacent bars of not more than one-sixth of the spacing shown on the Plans, and the clear distance from the surface of the concrete to the reinforcement shall not vary by more than one-fourth of the dimensions.

B. Bars shall be tied at all intersections except where spacing is less than one foot in each direction when alternate intersections shall be tied. Supports for reinforcement which are to remain in the work shall be precast concrete blocks of approved shape and dimensions.

C. Steel reinforcement shall be accurately secured against displacement by standard chairs, bolsters, spacers, and the like, supplemented by such additional supporting and spacing devices as may be required. Metal chairs for use in flat slabs when permitted by the Engineer shall be of sufficient strength to satisfactorily support the reinforcing.

D. When placed in final position, reinforcement shall be free from dirt, rust, mill scale, paint, oil or other foreign material. When there is a delay in depositing concrete,

reinforcement shall be re-inspected and corrected as to position and cleaning where necessary. Projecting reinforcement from prior concrete pours shall be cleaned of adhering mortar and loose rust before being incorporated in the new concrete pour.

4. Building in Work. All necessary ties, anchors, bolts, inserts, manholes, steps, and other work shall be accurately set and securely held in concrete work according to details shown on the Plans or standard practice.

A. Suitable sleeves shall be set in concrete for all small piping of every kind and for all large piping where shown on the Plans where such piping passes through concrete work. Such sleeves shall be set with due regard to their position in the final surface finish. Proper allowance shall be made in concrete work, where necessary, for other installed work.

5. Placing Concrete. Concrete shall be placed in any unit of the structure only after the forms, bracing and preparations for casting have been approved. At the time concrete is placed, the forms shall be clean and all sawdust, chips, and other debris shall have been removed from the interior of the forms. Struts, stays, and braces, serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their location, shall be removed when the concrete placing has reached an elevation rendering their service unnecessary.

A. The concrete shall be promptly placed with a minimum of handling to avoid segregation of the materials. Each pour shall be completed in a continuous operation with no interruption in excess of 45 minutes between the placing of contiguous adjacent portions of concrete. Each layer shall be placed and compacted before the preceding layer has taken an initial set.

B. Concrete during and immediately after depositing shall be compacted thoroughly by means of suitable tools. For thin walls or inaccessible portions of the forms where rodding or forking is impracticable, the concrete shall be assisted into place by tapping or hammering the forms opposite the freshly deposited concrete, and the concrete shall be worked thoroughly around the reinforcement, around embedded fixtures, and into the corners of the forms. Internal vibrators may be used.

C. To obtain clean and firm bearing surfaces, all water and softened material shall be removed from excavations immediately before concrete is deposited. Concrete shall not be deposited in water, nor shall water be allowed to rise over the concrete until the concrete has hardened sufficiently to prevent injury. Any flow of water into the excavation shall be diverted through proper side-drains to a sump or shall be removed by other approved methods which will avoid washing the freshly deposited concrete. Water vent pipes and drains shall be filled by grouting or other means approved by the Engineer after the concrete has thoroughly hardened.

D. The concrete shall be deposited in the forms in horizontal layers not more than 12 inches thick unless otherwise specified by the Engineer and to as near final position as possible. When placing operations would involve dropping the concrete more than 5 feet, it shall be deposited through sheet metal or other approved pipes made in sections not to exceed 4 feet in length. The use of long troughs, chutes, or pipes for

conveying concrete from the mixing plant to the forms will not be permitted. Short troughs, chutes, or pipes used as aids in placing concrete shall be arranged and used in such a manner that the concrete ingredients do not become separated. Where steep slopes are required, troughs and chutes shall be equipped with baffle boards or shall be arranged in short lengths that reverse the direction of movement. Troughs and chutes shall be of metal or shall be lined with metal and shall extend as nearly as possible to the point of deposit. When the discharge must be intermittent, provide a hopper or other device for regulating the discharge shall be provided.

E. Before depositing concrete on or against concrete which has set, the forms shall be retightened, and the surface of the hardened concrete shall be roughened as required by the Engineer and thoroughly cleaned of foreign matter and laitance. The new concrete placed in contact with hardened or partly hardened concrete shall contain an excess of mortar to insure bond. To ensure this excess mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surfaces of the hardened concrete, including horizontal, vertical, and inclined surfaces, shall first be slushed with a coating of neat cement grout or of mortar against which the new concrete shall be placed at once before the grout or mortar has attained its initial set.

F. The placing of concrete shall be so regulated that the pressures caused by wet concrete shall not exceed those used in the design of the forms. The slump shall not be less than 3 inches and not more than 4 inches unless otherwise approved by the Engineer.

G. Such spading as is necessary to ensure smooth surfaces and dense concrete shall be done along form surfaces and in corners. After the initial set of the concrete, the forms shall not be jarred. All forms above concrete being placed, and all placing equipment, shall be kept clean and free from coatings of hardened concrete. Water used for flushing the placing equipment shall be discharged clear of the concrete and forms.

6. Construction Joints. In general, necessary construction joints are shown on the Plans, and modifications of locations shall be subject to the approval of the Engineer.

A. Construction joints when called for on the Plans between footings and walls and/or in walls below grade shall be provided with a polyvinyl chloride thermoplastic type water stop as approved by the Engineer. All water stops shall be continuous with ends lapped or spliced to make the joint watertight, and plates shall be adequately supported in accurate position and in a manner that does not interfere with the reinforcing steel. Water stops shall be placed at junctions of walls with floor slab and/or as shown on the Plans.

B. The contact surface of concrete already in place, and the faces of all joints shall be thoroughly wetted before placing new concrete. The face edges of all joints shall be carefully finished true to line and elevation.

7. Patching and Finishing Concrete. Immediately following the removal of forms, all fins and other irregular projections shall be removed from exposed surfaces. On all surfaces, the cavities produced by form ties and other holes, broken corners and edges and similar

defects shall be thoroughly cleaned. After being saturated with water for not less than one hour, surfaces shall be carefully pointed and trued with a mortar of cement and fine aggregate of the same proportions as the concrete being finished. Mortar used in pointing shall be not more than one hour old.

A. If, in the judgment of the Engineer, any defects present in the concrete are of such a nature as to warrant condemnation, such portion of the pour may be ordered replaced in its entirety and the Contractor shall promptly replace the same.

B. Where not specifically designated, the top surface of the concrete slabs shall be struck off at the elevations shown on the Plans and given a smooth wood float finish. Where floors contain active drains, they shall slope uniformly to the floor drain.

8. Waterproofing. The materials and methods for waterproofing will be done according to the Standard Specifications for Construction Division 7, Waterproofing, and Protective Covers, where called for on the Plans, Special Provisions or otherwise authorized.

9. Backfill. Backfill against structures shall be Granular Material Class II, in accordance with the Standard Specifications for Construction, unless otherwise approved by the Engineer. Backfill shall not be placed against any portion of the structure until the structure has been approved by the Engineer for backfilling. The backfill shall be carried up to the surface of the adjacent ground or to the elevation for the proposed earth grade, and its surface shall be neatly graded.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Bulkhead, Reinf, Det ____	Each
Wall, Reinf, Det ____	Foot
Junction Chamber, Reinf, Det ____	Each

The unit price shall be payment in full for furnishing all labor, equipment, materials, including excavation, dewatering, bypass pumping, backfill, steel reinforcement forming, concrete, waterproofing, restoration, and performing the work complete unless otherwise provided in the Provisions or in the Proposal.

Bulkhead, Reinf, Det ____ will be measured in units under pay unit above. Only bulkheads for sewers specifically referred to in the Plans or specifications shall be measured for payment.

Wall, Reinf, Det ____ will be paid for by length as measured along the top of the finished wall and shall include all materials, labor, and equipment required to construct the complete wall and footing. Separate payment will not be made for the work required to provide an acceptable concrete mix design.

Junction Chamber, Reinf, Det ____ shall include all concrete, reinforcement, waterstop and water proofing, butyl rope mastic, precast manhole riser sections, adjusting rings, manhole

casting, manhole steps, grout, mortar and all other materials, equipment, and labor required to construct the cast in place junction chamber as detailed on the Plans.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
BRICK PAVEMENT

ENG/CITY OF GRAND RAPIDS

1 OF 7

ORG:08/19/21

REV:11/01/25

a. Description. This work shall consist of a wearing surface of new or salvaged brick, laid on a sand cushion and constructed on the prepared concrete base or other foundation. All work in this Special Provision shall be in accordance with the Standard Specifications for Construction, except as modified herein.

b. Materials.

1. Paving Brick. Paving brick shall conform to the requirements of this Special Provision issued for projects where such materials are to be used. Salvaged paving brick may be obtained from the City's supply, when available, upon written authorization from the Engineer, or provided by the City at no cost to the Contractor if specifically stated in the Proposal or Special Provisions.

A. New Brick Paver.

(1) The brick shall be manufactured from clay, shale, or similar naturally occurring earthy substance which is subjected to heat treatment (firing). The heat treatment shall develop sufficient bonding of the particle constituents to provide the strength and durability requirements as specified.

(2) The bricks are to have a wire cut face with no lugs and no chamfered edges. The corners shall be square. The bricks shall be laid in a running bond pattern as shown in the plans. The brick shall be 2-3/4 inches deep by 4 inches wide by 8 inches long.

(3) Physical requirements.

(a) The cumulative length of chips or edge breakage on any single brick unit shall not exceed 10 percent of the total edge perimeter. A chip is defined as breakage exceeding 5/16 inch in depth along an edge, or 1/2 inch at the corner.

(b) The concave or convex warpage along the face of any brick unit shall not exceed 1/16 inch for the entire length.

(c) Tolerance on dimensions (maximum permissible variation from specified dimension, plus or minus):

(i) Depth – 1/16 inch.

(ii) Width – 3/32 inch.

(iii) Length – 1/8 inch.

(d) The paver brick shall meet or exceed the current ASTM C1272, Application PX, Type F for Heavy Vehicular Paving Brick. The bricks shall be manufactured in accordance with the following requirements per the current ASTM C67:

(i) Compressive Strength. A minimum of 10,000 psi (average of 5 bricks) or 8800 psi for any single brick.

(ii) Modulus of Rupture. A minimum of 1500 psi (average of 5 bricks) or 1275 psi for any single brick.

(iii) Cold Water Absorption. A maximum of 6 percent (average of 5 bricks) or 7 percent for each individual brick.

(iv) Efflorescence. Visual inspection shall result in an evaluation of "No Efflorescence" (10 units).

(4) Furnish Paving Brick (2-3/4 inch) from the following.

- (a) Belden.
- (b) Watsontown.
- (c) Bowerstone.
- (d) Pine Hall.
- (e) McAvoy.

B. Salvaged Brick Paver.

(1) Salvaged historic brick shall be Metropolitan (Canton) block, salvaged Bessemer (Youngstown) block, or approved equal.

(2) Salvaged brick shall match the specifications for new brick pavers.

2. Sand Filler. The sand filler shall be Masonry Sand, No. 8 Sand, per the current ASTM C144, and shall meet the following grading requirements, including angularity index (A.I.):

Table 1
Grading Requirements for Sand Filler

Standard Sieve	Sieve Analysis, Total % Passing (a)
3/8 in	100
No. 4	100
No. 8	100
No. 16	70 – 100
No. 30	40 - 75
No. 50	10 – 35
No. 100	2 – 15
No. 200	0 – 5

Angularity Index (AI) 5.0 (minimum)

3. Sand Cushion.

A. Fine Aggregate. The fine aggregate shall consist of clean, hard, durable, uncoated particles free from clay lumps, organic materials, soft or flaky materials and other foreign matter.

B. The fine aggregate shall meet the following grading requirements including angularity index (A.I.):

Table 2
Grading Requirements for Sand Cushion

Standard Sieve	Sieve Analysis, Total % Passing (a)
3/8 in	100
No. 4	95 - 100
No. 8	80 - 95
No. 30	50 - 75
No. 50	10 - 35
No. 100	2 - 10
No. 200	0 - 3

Angularity Index (AI) 5.0 (minimum)

C. The fine aggregate shall be tested stock. The testing frequency shall be a minimum of three complete tests (physical and sieve analysis and Angularity Index (A.I.)). The tested stockpile shall be uniform and not subject to extreme variations within the requirements.

4. Fiber Joint Filler. In accordance with section 914 of the Standard Specifications for Construction.

c. Construction.

1. Preliminary Work.

A. Removing and Salvaging Brick. If applicable, Remove brick or remove and salvage brick, paid for separately.

B. Repairing Existing Foundation. After the brick wearing course has been removed, all of the existing sand cushion or mastic cushion shall be removed together with all other foreign matter, so that the condition of the existing base course may be examined by the Engineer. If the concrete base course is defective, it shall be removed to the extent required by the Engineer. In the event that the defective base course was caused by unstable subgrade, the subgrade shall be removed to the extent required by the Engineer and replaced with sand-gravel or other suitable material and compacted as

required to the original elevation of the subgrade. The concrete base course shall then be replaced as specified in section 1004 of the Standard Specifications for Construction.

C. Changing Crown or Grade. When the crown or grade elevation is to be raised, the sand cushion or mastic cushion shall be removed, the existing concrete foundation shall be swept clean, and the crown or grade shall be built up by placing concrete or mortar on the existing concrete foundation to conform to the Plans or required by the Engineer. On those areas where the elevation is to be raised two (2) inches or more, concrete Grade 3500HP shall be used, and on those areas where the elevation is raised less than two (2) inches, mortar shall be used. The concrete and mortar shall be as specified in section 1004 of the Standard Specifications for Construction.

D. New Concrete Base Course. When called for in the Plans or in the Proposal place new concrete base course in accordance with the details in the Plans and as specified in section 1004 of the Standard Specifications for Construction.

2. Concrete Header.

A. Construct concrete header in accordance with the details on the Plans. Concrete shall be Grade 3500 as specified in section 1004 of the Standard Specifications for Construction.

3. Brick Pavement.

A. Placing Sand Cushion. When the concrete base course has been placed, repaired, or the crown or grade has been changed, as above specified, the sand cushion shall be spread over the prepared concrete base to a uniform thickness which will not exceed one inch when the brick surface is rolled. (It is estimated that 1-1/2 inch loose will compact to the required 1 inch after rolling.)

(1) The sand cushion shall be carefully shaped to a true cross section parallel with the surface of the finished pavement by means of an approved template so designed as to be easily drawn on the edge of the adjacent brick pavement or on other approved guides.

B. Handling Brick. Brick must be delivered from the piles to the brick-layers by hand, or mechanically on conveyors. No throwing, dumping, or other rough handling of the brick will be permitted.

(1) Deliver packaged new masonry materials in their original unopened containers clearly labeled with the manufacturer's name, brand designation, type, and class as applicable.

(2) Handle and store new brick masonry materials in such a manner to prevent damage or inclusion of any foreign and/or deleterious material. Store under waterproof covers and on planking clear of the ground. Label each palette of brick with the manufacturer's name, palette identification number, quantity of brick, and shipping date.

(3) Transport and stockpile aggregates separately according to their sources and gradations. Handle at all times in such a manner as to prevent segregation or contamination with earth or foreign material.

C. Laying Brick. When the area to be paved is one or more City blocks in length and extends from curb to curb, the brick shall be laid upon the prepared sand cushion in straight courses at right angles to the curb between street intersections. The brick courses in intersections shall be laid in the directions shown on the Plans. For salvaged brick with lugs, the brick shall be laid carefully with lugs in the same direction and with the better face up and so that the lugs of the brick in one course will touch the brick in the adjoining course. The ends of the brick shall be as close together as possible without wedging or bridging. The spaces between the brick shall be kept clean and open to the bottom until the grout filler is applied. Joints shall be broken by starting each alternate course with a half brick. Bats or broken brick shall not be used except at headers, and they shall not be less than 3 inches in length. The course shall not deviate from a true line more than 1 inch in 50 feet.

(1) When the area to be paved is less than one city block in length and is less in width than the full width of the street, the brick used shall be of the same size and color as in the adjacent pavement. The end bricks in the existing pavement adjacent to the area to be paved shall be whole bricks only, so that the new work may be neatly "toothed" into the old and produce a firm and neat surface.

(2) Immediately after laying, the brick surface shall be swept and inspected. All brick which is soft, cracked, spalled, off-color, underburned, over-burned, or otherwise undesirable will be marked by the Inspector. The Contractor shall at once remove such brick from the pavement with flat-nosed tongs, without disturbing the sand cushion and replace them with approved brick. Slightly chipped brick, if not otherwise defective, may be turned over and if the reverse side is satisfactory, may be replaced in the pavement.

D. Rolling Brick. After the bricks have been laid, and after all objectionable bricks have been removed, they shall be brought to a true surface by means of rolling with a power-driven tandem roller weighing not less than 5, or more than 8 tons. The pavement shall be rolled in longitudinal and diagonal directions. The longitudinal rolling shall begin at the curb and progress toward the center of the pavement. The pavement shall then be thoroughly rolled at an angle of 45 degrees with the curb. When this rolling has been completed, the brick shall again be inspected and all that are broken or damaged shall be removed from the pavement and replaced with approved brick. If necessary, to secure a uniform surface, the brick shall again be rolled diagonally across the pavement at right angles to the first diagonal rolling. To prevent the brick from being left careened, the roller shall in all cases cover exactly the same area in making its backward trip as was covered in its forward trip and shall proceed at a very slow rate of speed until the entire pavement has been rolled. Portions of the pavement inaccessible to the roller shall be tamped to grade by the use of hand tampers applied upon a 2-inch board.

(1) After final rolling, the pavement shall be tested with a 10-foot straight edge laid parallel with the centerline of the pavement, and any depression exceeding

1/8 inch shall be corrected, and if necessary, the entire surrounding area shall be again rolled.

E. Opening to Traffic. After the completion of the rolling, the pavement shall be swept clean, and all construction equipment removed.

4. Final Clean-Up. Before final acceptance of the work, the Contractor shall clean the street surface, walks, gutter, fences, lawns, private property, and structures, leaving them in as good a condition as originally found, and shall remove all machinery, tools, surplus and waste materials, temporary buildings, and other temporary structures from the site.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Brick Pavt	Square Yard
Brick Pavt, Salv Pavers	Square Yard
Brick Pavt, Conc Header	Foot
Brick Pavt, Repr	Square Yard
Brick Pavt, Conc or Mortar Shim	Cubic Yard

The unit price shall be payment in full for furnishing all labor, equipment, and material, and for any necessary grading, excavation and backfill when not paid for separately, and for performing the work complete.

Brick Pavt will be paid for at the contract unit price per square yard, which shall be payment in full for furnishing all labor, equipment, and materials for performing the work complete, ready for use. Sand cushion will not be measured separately but shall be considered as included in the unit price for the item **Brick Pavt**. Concrete pavement base, where called for on the Plans or in the Proposal, will be paid for separately.

Brick Pavt, Salv Pavers will be paid for at the contract unit price per square yard, which shall be payment in full for furnishing all labor, equipment and materials for performing the work complete, ready for use. Salvaged Pavers shall be supplied by the City or previously removed and salvaged from the road. Sand cushion will not be measured separately but shall be considered as included in the unit price for the item **Brick Pavt, Salv Pavers**. Concrete pavement base, where called for on the Plans or in the Proposal, will be paid for separately.

Brick Pavt, Conc Header will be paid for at the contract unit price per foot, which shall be payment in full for furnishing all labor, equipment, and materials for performing the work complete. The unit price includes all required reinforcement and tie bars as detailed in the Plans.

Removing and replacing concrete foundation will be paid for separately.

Brick Pavt, Repr will be paid for at the contract unit price per square yard, and shall include all preliminary work, brick pavement, and final clean-up as specified in this Special Provision and includes the removal and replacement of the aggregate and concrete base, sand cushion and

brick pavement (new or salvaged). Any saw cutting necessary for the removal of the pavement shall also be included in this item.

Brick Pavt, Conc or Mortar Shim will be paid for at the contract unit price per cubic yard, which shall be payment in full for furnishing all labor, equipment, and materials, and performing the work complete, ready for application of cushion.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
CONTAMINATED SOIL AND GROUNDWATER PROCEDURES

ENG/CITY OF GRAND RAPIDS

1 OF 6

ORG:08/19/21

REV:11/01/25

a. Description. All work in this Special Provision shall be in accordance with Standard Specifications for Construction, except as modified herein.

This work consists of all labor, equipment, and materials necessary to handle, transport, and dispose of potentially contaminated or contaminated soil and groundwater.

1. Governing Standards. Except as modified or supplemented herein, the handling of potentially contaminated or contaminated soil and groundwater shall be governed by state and federal waste management regulations, by the provisions of Federal Regulation 29 CFR Part 1910.120, and regulations of the Occupational Safety and Health Administration (OSHA).

2. Definitions of Terms.

A. Clean Area. A designated area where the possibility of contact with hazardous materials has been removed. Personnel working in this area are not required to meet health and safety training requirements in accordance with Federal Regulation 29 CFR Part 1910.120.

B. Exclusion Zone. A designated area where contact with hazardous material is expected. Personnel working in area must meet health and safety training requirements in accordance with Federal Regulation 29 CFR Part 1910.120.

C. Contaminated Material. Soils or other materials which contain chemical contaminants in excess of federal and state standards for unlimited (residential) land use. These soils may not be used as fill unless approved by the Engineer.

D. Hazardous Material. Soils or other materials which contain chemical contaminants in excess of federal and state standards for disposal in a non-hazardous solid waste landfill.

E. Level C Protection. Protection of personnel from hazardous conditions in accordance with Federal Regulation 29 CFR Part 1910.120.

F. Fractionation Tanks. Tanks used for temporary onsite storage of water removed from the trench during the excavation operation.

b. Materials. None Specified.

c. Construction. Excavation and backfill for utilities shall be done in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities, and as specified herein.

1. **Performance Requirements.** The Contractor is responsible for complying with the requirements of Federal Regulation 29 CFR Part 1910.120, the Health and Safety training for his employees and providing his employees with adequate protective equipment.

A. The Contractor is responsible for the monitoring of City designated clean areas to ensure that the areas remain free from exposure to contaminated materials.

B. The Contractor is responsible for the monitoring of City designated exclusion zones to ensure proper compliance with Federal Regulations.

2. **Health and Safety Plan.** The Contractor shall prepare a Health and Safety Plan for this project and shall provide a copy to the Engineer if requested.

3. **Handling of Potentially Contaminated Soils.** The Engineer will determine which soils are uncontaminated and contaminated. The Engineer will monitor excavated soils and direct the Contractor to remove uncontaminated soils from the project site or to place the potentially contaminated soils in a designated Soil Stockpile Area, for review by the Engineer.

A. The existence of potentially contaminated soils will be determined by the Engineer during the trenching operations. The Engineer will identify potentially contaminated soils as they are excavated and will designate a soil stockpile area. The Contractor will load, transport, and unload the potentially contaminated soils at the designated soil stockpile area. The Contractor shall stockpile the materials in piles as required by the Engineer. Segregation of materials may be necessary to prevent cross contamination.

B. All potentially contaminated soils stockpiled shall be placed on and covered by a 6-mil black PVC liner. Contractor shall avoid transporting contaminated soils or allowing runoff of storm water which may come in contact with potentially contaminated soil to clean areas. The Contractor shall monitor the integrity of the PVC liner and correct deficiencies.

C. Engineer will obtain samples of the soil from the stockpile area and have necessary analytical tests performed to determine the required method of disposal. Sample collection, laboratory testing, and landfill approval typically require 4 to 5 days to complete. The Engineer will identify the type of disposal required and notify the Contractor. The following three disposal types for materials removed from the potentially contaminated area will apply:

(1) **Uncontaminated Soils.** If the soil is uncontaminated, the Contractor will load, transport, and dispose of the soils at an appropriate disposal area. This removal operation will begin within 48 hours of notification by the Engineer and be completed as expeditiously as possible to facilitate the ongoing use of the soil stockpile area.

(2) Non-hazardous Contaminated Soils. If the soil is contaminated and non-hazardous, the Contractor will load, transport, and dispose of contaminated soils at a non-hazardous solid waste landfill. This removal operation will begin within 48 hours of notification by the Engineer and be completed as expeditiously as possible to facilitate the ongoing use of the soil stockpile area.

(3) Hazardous Contaminated Soils. If the soil is contaminated and hazardous, as determined by the analytical test results, the soil will be loaded, transported, and disposed of at a hazardous waste disposal site by the hazardous waste contractor designated by the City.

4. Excess Water Control/Handling Potentially Contaminated Groundwater. Excavations shall be kept dry during construction. Water shall be removed by use of wells, well points, portable pumps, bailing, drains, underdrains, or other acceptable methods. Surface water shall be diverted from entering excavations by the construction and maintenance of channels, berms, etc. Sediment traps and other soil erosion control measures shall prevent soil particles from entering any sewer, watercourse, or similar conveyance.

A. Contractor shall provide, maintain, and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the work. Dewatering shall be accomplished by means which will ensure dry excavations, preserve final lines and grades, not disturb or displace adjacent soil, and avoid contamination of any surface water or storm water. All pumping and drainage shall be done with no damage to property, pedestrians, vehicular traffic, or the work of other contractors and in accordance with all pertinent laws, ordinances, and regulations. Existing drainage facilities shall not be overloaded or obstructed.

B. If the groundwater is determined by the Engineer to be potentially contaminated (e.g., hydrocarbon sheen or chemical odor), the Contractor shall immediately cease dewatering operations and shall not resume dewatering until equipment appropriate to store the potentially contaminated groundwater is onsite and operational. Additionally, the Contractor shall manage the groundwater as contaminated until directed otherwise by the Engineer.

C. Potentially contaminated groundwater removed from the trench during the pipe laying operation shall be stored in fractionation tanks located on the project site. Each fractionation tank shall have a minimum capacity of 20,000 gallons.

D. Samples of the stored groundwater will be collected by the Engineer within 48 hours of initial storage in the fractionation tanks. Analytical tests will be performed on the samples to determine if the stored groundwater is contaminated. Laboratory testing of collected samples typically requires 24 to 72 hours to complete. Based on the results of these tests, the Engineer will identify the type of disposal required and notify the Contractor. The following types of disposal may be used:

(1) Uncontaminated Groundwater. If chemical concentrations in the stored groundwater are below federal and applicable state clean up criteria, the Contractor

shall dispose of it by pumping in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities.

(2) Non-hazardous Contaminated Groundwater. If the stored groundwater is contaminated and non-hazardous, as determined by the Engineer, the stored water shall be disposed of as directed by the Engineer in one of three ways. Disposal will be based on the sampling results:

(a) By discharge into the nearest available sanitary sewer in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities.

(b) By pumping the stored water through a carbon treatment system and discharging to the nearest available sanitary sewer in accordance with the City of Grand Rapids Special Provision for Excavation and Backfill for Underground Utilities. The carbon treatment system shall be operated at a minimum empty bed contact time of 15 minutes. The Contractor shall submit information regarding use, performance, and capacity of the carbon treatment system for review and approval.

(c) By loading, transporting, and disposing at a licensed treatment facility, contingent upon City and Engineer approval.

(3) Hazardous Contaminated Groundwater. If the stored groundwater is contaminated, hazardous, and not treatable by carbon filtration, it shall be loaded, transported, and disposed of at a hazardous waste disposal site by the hazardous waste contractor designated by the City.

E. Fractionation tanks shall be emptied and made available for reuse within 72 hours of notification by the Engineer of the appropriate disposal method of the tank's contents. After each tank is emptied, it may require decontamination before reuse. The Engineer will notify the Contractor of this requirement.

5. Available Disposal Facilities for Contaminated Wastes.

A. Non-hazardous Solid Waste Landfills.

(1) Autumn Hills Recycling & Disposal Facility

- (a) Address: 700 56th Avenue Zeeland, MI 49464
- (b) Phone Number: 616.688.5777
- (c) Owner: Waste Management, Inc.

(2) Ottawa County Farms Landfill.

- (a) Address: 15550 68th Avenue Coopersville, MI 49404
- (b) Phone Number: 616.837.8195
- (c) Owner: Allied Waste Industries, Inc.

(3) South Kent Landfill

- (a) Address: 10300 South Kent Drive, SW Byron Center, MI 49315
- (b) Phone Number: 616.877.4192
- (c) Owner: Kent County Department of Public Works

B. Non-hazardous Liquid Waste.

- (1) Plummer's Environmental Services
 - (a) Address: 10075 Sedroc Industrial Drive SW Byron Center, MI 49315
 - (b) Phone Number: 616.877.3930
 - (c) Owner: Plummer's Environmental Services, Inc.
- (2) Ottawa County
 - (a) Address: 15550 68th Avenue Coopersville, MI 49404
 - (b) Phone Number: 616.837.8195
 - (c) Owner: Ottawa County Farms Landfill
- (3) SET Environmental, Inc.
 - (a) Address: 1040 Market Avenue, SW Grand Rapids, MI 49503
 - (b) Phone Number: 616.235.1500
 - (c) Owner: SET Environmental, Inc.

C. Hazardous Wastes – Solid or Liquid. Hazardous wastes, solid and liquid, shall be handled by a contractor designated by the City.

D. Fractionation Tank Vendors.

- (1) Fishburn Services
 - (a) P.O. Box: 5012 OH-299 Marengo, OH 43334
 - (b) Phone Number: 419.253.6031
 - (c) Owner: Fishburn Services, Inc.
- (2) Central Michigan Tank
 - (a) Address: 5963 Venture Way Mount Pleasant, MI 48858
 - (b) Phone Number: 517.772.2471
 - (c) Owner: Central Michigan Tank, Inc.
- (3) or other City Approved Vendor.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item

Pay Unit

Contaminated Material, Storage, Handling, and Disposal Dollar

Contaminated Material, Storage, Handling, and Disposal is an allowance established to pay for the handling, transporting, storage, and disposal of non-hazardous and hazardous contaminated soil and groundwater. All work to be paid under this item shall be pre-approved in writing by the Engineer.

1. Where the work is performed by a subcontractor or supplier, the Contractor will be paid for the amount invoiced plus an additional 6 percent of the invoiced cost as reimbursement for the Contractor's administrative costs. Where the Contractor will be performing the work with his own forces, the work will be paid for using predetermined, negotiated unit price. If the Contractor and Engineer cannot agree upon unit price, the work will be paid for by force account in accordance with subsection 109.05 of the Standard Specifications for Construction.

2. The cost of the following work items will be paid for from the allowance:

A. Loading, transporting, and unloading potentially contaminated soils at the soil stockpile area.

B. Labor, equipment, and materials related to the use of a PVC liner.

C. Loading, transporting, and disposing of contaminated, non-hazardous soils at a non-hazardous solid waste landfill.

D. Loading, transporting, and disposing of contaminated, hazardous waste at a hazardous waste disposal site by the hazardous waste disposal contractor designated by the City.

E. All work associated with the supply, use, decontamination, reuse, and removal from site of fractionation tanks.

F. All costs associated with disposing of non-hazardous contaminated groundwater using a carbon treatment system.

G. Loading, transporting, and disposing of non-hazardous contaminated groundwater at a licensed treatment facility.

H. Loading, transporting, and disposing of hazardous contaminated groundwater at a hazardous waste disposal site by the hazardous waste disposal contractor designated by the City.

I. Permit fees associated with disposing of non-hazardous contaminated groundwater by disposal to the nearest available sanitary sewer.

3. The following work items will not be paid for separately, but are considered included in payment for the utility and/or grading work requiring the excavation or dewatering:

A. Loading, transporting, and disposing uncontaminated soils to a disposal area.

B. Crushed stone or gravel used to aid dewatering operations.

C. All costs associated with disposing of uncontaminated groundwater.

D. All costs associated with disposing of non-hazardous contaminated groundwater by disposal to the nearest available sanitary sewer, excluding permit fees.

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
PRECONSTRUCTION DOCUMENTATION

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:08/19/21

REV:11/01/25

a. Description. This work shall include completing preconstruction documentation to record the condition of existing facilities adjacent to the right-of-way prior to demolition and construction, monitoring existing facilities to determine if construction activities are having adverse effects, and all work necessary to return facilities to their preconstruction condition at the conclusion of the project. All work in this Special Provision shall be in accordance with section 107 of the Standard Specifications for Construction, except as modified herein.

b. Materials. Provide materials in accordance with the following specifications.

1. Furnish Crack Monitors from the following.
 - (1) Tell-Tale Crack Monitor by Avongard.
 - (2) 4020A Heavy-Duty Building Foundation Crack Monitor by CrackMon.
 - (3) Tell-Tale Crack Monitor by Mastrad
 - (4) or Engineer approved equal.

c. Construction.

1. Preconstruction Documentation. The preconstruction documentation shall be conducted by the Contractor and witnessed by the Engineer immediately following the award of the Contract and prior to beginning any work. The Contractor shall employ a professional firm acceptable to the City and actively engaged in preconstruction color audio-video recording.

A. The preconstruction documentation shall include all surface features within the zone of construction influence including existing driveways, sidewalks, parkways, curbs, ditches, streets, landscaping, trees, culverts, retaining walls, fences, visible utilities, bridge piers, abutments, slope paving, and all buildings. Documentation shall also include all existing cracks, steps, porches, and all possible areas of concern from various angles on existing buildings that could be affected by the construction. At a minimum, the preconstruction documentation shall include portions of all buildings and structures that are within 30 feet of the street right-of-way and within 50 feet of any buildings shown to be removed on the plans. The preconstruction documentation may include, but not necessarily be limited to, areaways, basements of buildings, building interiors, and building exteriors. Preconstruction documentation shall include an assessment of existing structural conditions and documentation of all existing cracks and structural defects.

B. The preconstruction documentation shall be recorded in the form of preconstruction video in DVD format, pictures, and field notes. At a minimum, three copies of the preconstruction documentation shall be furnished to the Engineer prior to starting construction. The Contractor shall effectively coordinate with private property owners for work performed on private property.

2. Equipment. Video recording and camera equipment used to record the condition of existing facilities shall be in proper working condition at the time of preconstruction documentation. Flash Drives, CDs, DVDs, or other media used to record the preconstruction documentation images shall be good quality, new materials.

A. Cameras. Cameras shall be high quality 3-chip color video camera, optical stabilization, 20X minimum optical magnification, and shall be capable of producing NTSC 525 lines resolution/60 fields/30 frames per second and minimum illumination capabilities of at least 3-lux. Video recordings shall be time and date stamped on screen, include 2 simultaneous audio tracks (track 1 for SMPTE time code corresponding with number visible on screen and included on computer printout, track 2 with narrative commentary).

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Preconstruction Documentation.....	Lump Sum

Preconstruction Documentation includes recording the condition of existing facilities adjacent to the project.

CITY OF GRAND RAPIDS

SPECIAL PROVISION
FOR
BICYCLE RACK

ENG/CITY OF GRAND RAPIDS

1 OF 1

ORG:07/19/22

REV:11/01/25

a. Description. The work shall include providing and installing bicycle racks as shown on the Plans, described in this Special Provision, and directed by the Engineer.

b. Materials.

1. Bicycle racks shall be inverted "U" Bicycle racks with crossbar and Black Plastisol coating as manufactured by:

- A. Cycle-Safe, Inc., Grand Rapids, Michigan 49546, 888-954-9977;
- B. CSF Inc., Grand Rapids, Michigan, 49509, 616-940-9830;
- C. or approved equal.

2. Hardware for anchoring the bicycle racks into concrete shall be Grade 304 stainless steel and shall include the following:

- A. 3/8 inch – 16 drop-in expansion anchors that are 1 9/16 inch in length.
- B. 3/8 inch – 16 x 1-1/4 inch T-45 tamper-proof bolts.
- C. 3/8 inch flat washers.

c. Construction. Contractor shall install bicycle racks per the Plans, details, field markings, and manufacturer's recommendations. Bicycle racks shall be anchored to concrete sidewalk with bolts and anchors. The hole for the anchor shall be 1-5/8-inch deep so the anchor is set 1/16 inch below the sidewalk surface. Bicycle racks shall be mounted plumb.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item**Pay Unit**

Bicycle Rack.....Each

The unit price shall be payment in full for furnishing all labor, equipment, and materials to place bicycle racks

CITY OF GRAND RAPIDS
SPECIAL PROVISION
FOR
UNDERGROUND SPRINKLING SYSTEMS, RESTORE

ENG/CITY OF GRAND RAPIDS

1 OF 2

ORG:08/19/21

REV:11/01/25

a. Description. Restore existing privately owned underground sprinkling systems within the project site as described herein. This work shall be paid with an allowance for the actual work required to restore and modify existing privately owned underground sprinkling systems. The Contractor shall take care to avoid disturbance of existing underground sprinkling systems within the project site.

b. Materials. Materials used to restore or modify existing underground sprinkling systems shall be of the same brand, model, and specifications as the removed or damaged portion(s) of the sprinkling system and shall be compatible with the rest of the system.

c. Construction. The Contractor shall take precautions to prevent or minimize damage and disruption to private lawn sprinkling systems, including, but not limited to, completing visual inspections of the project site to determine areas in which lawn sprinkling equipment exists. This work of inspection shall be considered included in the work disturbing the areas with potential sprinkling systems.

The Contractor shall repair or replace all lawn sprinkling systems disturbed by his/her operations and shall contact and coordinate any necessary work with the appropriate owners of such sprinkling systems. The Contractor shall obtain written permission from property owners prior to completing any work outside the R.O.W. on private property and shall provide copies of these documents to the Engineer for the project file.

The Contractor shall employ an underground sprinkling specialist to make necessary repairs or modifications to the affected underground sprinkling systems. During construction activities, the disturbed portions of the system shall be isolated and/or removed in such a way that the undisturbed portions of the system remain operational until the entire system is completely restored. The existing underground sprinkling systems shall be restored or modified so that spray from the sprinkler heads does not spray over sidewalks or into driving lanes of the road.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

Pay Item	Pay Unit
Underground Sprinkling Systems, Restore	Dollar

Payment for **Underground Sprinkling Systems, Restore** will be paid for as an allowance after all disturbed sprinkling systems have been repaired and/or replaced, whichever occurs later. The Contractor shall supply the Engineer with actual invoices from the underground sprinkling specialist for this work effort and may add up to 5% markup.

The Contractor waives all claim for damages or delay which he/she may suffer by reason of the presence of lawn sprinkling equipment within the project site and understands that no extra compensation will be paid to him/her due to any lawn sprinkling equipment encountered.