STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION  
CITY OF MANITOWOC, WISCONSIN  

SECTION 400  

SEWER AND WATER CONSTRUCTION

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Valerie Tello, P.E.
# SECTION 400 - SEWER AND WATER CONSTRUCTION

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401 - GENERAL

401.1 Referenced Specifications
All materials and construction for storm sewers, sanitary sewers, and water mains in the City of Manitowoc shall be in accordance with the "Standard Specifications for Sewer and Water Construction in Wisconsin," Fifth Edition, with Addendum No. 1 and No. 2, (hereinafter referred to as the Wisconsin Sewer and Water Specifications or WSWS), and with the following modifications.

In the event a new edition or Addendum of the Wisconsin Water and Sewer Specifications is issued and the WSWS section numbers become changed, the text of the City's Standard Specifications and its references to various WSWS sections shall still apply to the appropriate renumbered WSWS section.

Various sections of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction – Latest Edition, are made part of the City's Standard Specifications by reference. The aforementioned standard specification is hereinafter referenced as the "Wisconsin DOT Specifications", the "DOT Specifications", or as "WDOT".

In addition, the sewer and water work shall conform to the requirements of the City's Standard Specifications of which this section is a part. When a conflict exists between any of the above specifications, the City of Manitowoc Specifications shall prevail.

401.2 Material Certificates
Prior to the start of construction, the Contractor shall furnish the Engineer with certificates of certification for all water and sewer pipe, valves, hydrants, and precast concrete manholes, catch basins, and inlets. The certificates shall conform to the requirements of Section 205.3 of the City's Standard Specification.
WSWS 1.1.0  DEFINITIONS AND TERMS

WSWS 1.1.25  Notice to Proceed
Add:
The Contractor shall not start any work prior to receiving the Notice to Proceed. The Engineer shall send the Notice to Proceed to the Contractor just prior to the anticipated starting date.

All work included in the Contract shall be completed before the Completion Date or within the required number of Calendar Days or Working Days stated in the Contract, whichever comes first.

The Contract Time will begin as of the date on the Notice to Proceed.

WSWS 1.2.0  NECESSARY NOTICES AND PERMITS

WSWS 1.2.1  Notice to Engineer
Add:
A pre-construction conference shall be held with the Contractor, Engineer, and Utility Companies before construction begins. The Contractor shall be prepared to discuss the construction schedule in detail, including access to abutting properties and traffic control.

WSWS 1.2.9  Notice for Local Sewerage District Connection
Delete this section in its entirety.

WSWS 1.3.0  CONTROL OF WORK AND MATERIALS

WSWS 1.3.2  Authority and Duties of Inspectors
Add:
The Engineer shall inspect all work performed and will endeavor to bring to the Contractor’s attention any work that is unacceptable in a timely fashion. However, the Contractor is fully responsible for all construction and is responsible for any alterations or rework necessary regardless of the inspection practices.

WSWS 1.3.14  Final Acceptance
Add:
"Final acceptance of sanitary and storm sewers will be withheld until the system has been video taped, the results have been reviewed by the City, and any defects have been repaired."
WSWS 1.5.0 SCOPe OF WORK AND SPECIFIC INSTRUCTIONS

WSWS 1.5.6 Guarantee
Delete the first sentence and replace with the following text:
All work shall be guaranteed for a period of one year from the date of final acceptance, which shall be in writing from the Engineer to the Contractor subsequent to all punch list items being completed. If no written completion notice is received, the warranty period shall begin upon the date of final payment.

WSWS 1.5.7 Items Not Listed in “Estimate of Quantities”
Add:
All work which is classified as "Incidental", shall mean that any costs incurred due to the specified work shall be included in the unit price bid in one or more of the other bid items. Hereinafter, this type of work will be referred to as "Incidental".

WSWS 1.7.0 PROTECTION OF WORK - PUBLIC AND PRIVATE

WSWS 1.7.3 Street Barricades, Signs and Warning Devices
Add:

Sign sizes smaller than the standard sizes described in the M.U.T.C.D. shall not be used.

The Contractor shall be responsible for maintaining traffic control site logs. The site logs shall list the date that the traffic control was set-up for each street or project, the configuration of the barricades and signage, any maintenance performed or adjustments to the traffic control and the date the traffic control was removed.

The Contractor shall submit to the Engineer a detailed traffic control plan at the pre-construction conference. No work shall begin until the Engineer accepts the traffic control plan.

All of the required traffic control devices shall be in place prior to starting any work. No work will be allowed to commence until the traffic control devices are installed to the satisfaction of the Engineer.

All costs for furnishing, installing, and maintaining traffic control devices shall be included in the lump sum unit price bid for “Traffic Control”.
WSWS 1.7.4 Flagman Required
Add:
"The Flagman shall have no duties other than directing traffic."

WSWS 1.7.6 Dust Palliative
Remove the last sentence and insert:
"The cost of the dust palliative treatment or watering shall be included as part of the unit cost for sewer and water installation."

WSWS 1.7.7 Access to Properties
Add:
"The Contractor shall minimize the length of time that access to private driveways are closed, and the property owner shall be notified by the Contractor at least 24 hours prior to closing the driveway to permit them to remove any vehicle from the driveway. No private driveway shall be closed to travel overnight without permission from the Engineer or unless stated otherwise in the contract documents."

WSWS 1.7.8 Protection of Private Property (Property Irons)
Add:
The Contractor is responsible to protect all existing property irons. All property irons that are damaged as a result of the work performed shall be re-established to their original location by a Registered Land Surveyor at the Contractor's expense, before final payment on the contract is made.

WSWS 1.7.10 Drainage
Add:
The Contractor shall provide the necessary ditching for drainage along any easement and/or right-of-way during and after construction. All costs for this work shall be classified as incidental.

WSWS 1.7.12 Traffic
Add:
"All existing streets, highways and roads will have a minimum of one lane open to through traffic during construction at all times. When obstructing the traffic on a roadway, the Contractor shall have sufficient flagmen to control the flow of traffic and the flagmen shall not be permitted to detain traffic unnecessarily. When work is underway on intersections, it shall be vigorously prosecuted to completion so as to inconvenience traffic for a minimum time. When the construction shall inadvertently obstruct, or in any other way affect through vehicle traffic on City, State, County or Town roads, the Contractor shall give sufficient notice to the respective highway departments and shall furnish a copy to the City Engineer."

WSWS 1.8.0 LEGAL RELATIONS

WSWS 1.8.2 Subcontracting
Add:
The City of Manitowoc encourages the Contractor to utilize Disadvantaged Business Enterprise (DBE) Employers for the work on any Contract.
WSWS 1.8.4 Liability and Insurance
Delete this section in its entirety, and replace with the following:
"The Contractor shall obtain and maintain insurance meeting the requirements of Article 5 of Section 100 of the City's Standard Specifications."

WSWS 1.8.5 Contract Bond
Delete this section in its entirety, and replace with the following:
"The Contractor shall furnish contract bonds meeting the requirements of Article 5 of Section 100 of the City's Standard Specifications."

WSWS 1.9.0 RETAINED PERCENTAGES

WSWS 1.9.1 Retained Percentages
Delete this section in its entirety, and replace with the following:
Retained percentages shall be in accordance with Article 14 of Section 100 of these Standard Specifications for Public Works Construction.

WSWS 1.10.0 PROSECUTION AND PROGRESS
WSWS 1.10.1 Prosecution of the Work
Add:
The Contractor shall submit to the Engineer a proposed detailed construction schedule of work at or before the pre-construction conference.
WSWS 2.1.2 Protection of Existing Structures and Utilities
Add the following text:
"In the event the plans show the location of certain utilities and/or structures both above and below ground, these locations shall not be taken as conclusive. Verification to the satisfaction of the Contractor of the exact location and condition of all utilities and/or structures, whether shown on the plans or not, shall be the responsibility of the Contractor. The Contractor shall note that other utilities and/or structures may exist within the project limits. No additional costs shall be incurred by the City for utilities, which are not shown on the project plans and need to be crossed, unless the utility substantially affects the line and/or grades of the sewer or water piping. Prior to the start of construction the Contractor shall contact Digger's Hotline to have all existing utilities marked.

If the Contractor's operations accidentally disrupt water or sewer service to a user, the Contractor shall restore that user's service immediately after such disruption occurs. All service disruption restoration work associated with such accidental disruption shall be performed by the Contractor at no cost to the City."

At all locations where water mains or storm sewers cross above mainline sanitary sewer pipe and/or sanitary building pipe, the Contractor shall place graded stone from the sanitary sewer pipe up to one foot above the top of the water main or storm sewer. All costs for furnishing, installing, and compaction of the stone in place shall be included in the unit price bid per lineal foot of pipe.

WSWS 2.1.5 Primary Line and Grade
Add:
The Engineer will stake the work for line and grade. It is the Contractor’s responsibility to transfer the line and grade from the stakes to all structures, forms, string lines, etc.

WSWS 2.1.7 Housing for Inspectors
Delete this section in its entirety, and replace with the following:
"If the Contractor maintains a temporary field office, it shall be located and maintained at a mutually agreed upon location. Upon completion of the work, it shall be removed from the work site."
**WSWS 2.2.0** **EXCAVATION**

**WSWS 2.2.13** Dewatering Sumps and Pump Wells

Add:

Water from dewatering operations shall not be directly discharged into any existing rivers, creeks, storm sewer systems, wetlands, etc.. Silt from dewatering operations shall not be allowed to enter any existing rivers, creeks, sewer systems, wetlands, etc.. Any silt that gets into existing rivers, creeks, sewer systems or wetlands, etc., shall be removed by the Contractor at no expense to the City. Any fines, forfeitures or costs associated with litigation ensuing as a result of actions taken or not taken by the Contractor shall be borne by the Contractor. Such costs will be either withheld from the contract payments or be charged to the Contractor at the owner’s discretion. The Contractor shall advise the Engineer at the time of the pre-construction meeting of how he intends to handle dewatering and control sediments from the dewatering operations.

If dewatering is required, the Contractor shall obtain the necessary permits from the Wisconsin Department of Natural Resources (WDNR).

If dewatering wells are required, the Contractor shall coordinate the requirements with: WDNR. All wells shall be drilled and closed in accordance with the requirements for installing and abandoning wells.

The Contractor shall comply with the provisions of Chapter NR 283, Wisconsin Statutes regulating the discharge of effluent from construction trench dewatering.

If treatment of water is required by the WDNR, then the Contractor shall comply with all stipulations and requirements.

Additional stormwater and erosion control requirements can be found in Section 800.

**WSWS 2.2.15** Tree Clearing and Grubbing

The sentence pertaining to pay items shall be changed to read:

"The cost of all clearing and grubbing shall be included in the unit price bid for other items of work, provided that a unit price specifically for clearing and grubbing is not included in the contract." Alter the minimum size for payment of tree and stump removal to include all trunks of size 3 inches in diameter and up.

**WSWS 2.6.0** **BACKFILLING**

**WSWS 2.6.1** Excavated Material for Backfill

Delete the entire paragraph and replace with the following:

"Native material excavated from an open trench may be used for backfilling in trenches, providing the native material meets or surpasses the requirements of WSWS 8.43.5. If used, native material shall be free of frozen materials or materials larger than six (6") inches in diameter. All detrimental materials shall become the property of the Contractor and shall be properly disposed of off site."
Where excavated material is used for backfilling and there is a deficiency, the material needed to make up the deficiency shall be furnished and installed by the Contractor at no additional cost to the City”.

WSWS 2.6.3 Granular Backfill Credits
Add:
"The credit that is due the owner shall be calculated using a mutually negotiated unit price."

WSWS 2.6.5 Support of Underground Structures
Add:
All costs associated with supporting, protecting, and backfilling around existing utilities located near and/or across the pipeline shall be included in the unit prices for the pipeline. Any damage caused to any existing utilities during work on the project shall be repaired and/or replaced by the Contractor at no expense to the City.”

For any street, where water mains or storm sewers cross above the mainline sanitary sewer pipe and/or sanitary building sewer pipe, the contractor shall place ¾ inch graded crushed stone from the sanitary sewer pipe up to one foot above the top of the water main or storm sewer. All costs for furnishing, installing, and compaction of the stone in place shall be included in the cost of pipe installation work.

WSWS 2.6.9 Minimum Backfill and/or Cover
The last two sentences shall be changed to read as follows:
"Excavated material meeting the requirements of WSWS 8.43.5 shall be used as a backfill only as allowed in WSWS 2.6.1 and shall be deposited in maximum 12-inch layers. Each layer shall be thoroughly compacted and meet required compaction parameters."

WSWS 2.6.14 Consolidation of Backfill
Delete this entire section and refer to Section 305 of the City's Standard Specifications for compaction requirements.

WSWS 2.7.0 SURFACE REPLACEMENT AND SITE RESTORATION
WSWS 2.7.1 Optional Replacement
This section shall be deleted in its entirety.

WSWS 2.7.3 Replacement of Pavements
Add the following text:
"If the Contract Documents require the Contractor to replace the pavement and crushed aggregate base course, the work shall conform to the following additional requirements.

1. Crushed Aggregate Base Course
   The crushed aggregate base course shall be constructed to the thickness of the materials specified in the Contract Documents."
Eight inches (8") of crushed aggregate base course compacted in place shall be used in lieu of the six inches (6") of crushed stone specified in WSWS 8.43.7.

2. **Pavement**
The pavement shall be constructed to the thicknesses and of the materials specified in the Contract Documents. Pavement construction shall conform to the requirements of the City's Standard Specifications, Section 500 for Portland Cement Concrete and Section 600 for Asphaltic Concrete. If the Contract Documents require temporary pavement, it shall conform to the requirements of Section 606.2.4 of the City's Standard Specifications.

3. **Compaction**
All replacement crushed aggregate base course and asphaltic concrete pavement shall be mechanically compacted in accordance with Sections 305 and 605.5, and to the degree of compaction specified in Sections 305.5.3 and 605.5, respectively, of the City's Standard Specifications.

4. **Saw Cutting**
Prior to removal of existing pavement and/or prior to placement of replacement gravel and pavement, the Contractor shall saw cut existing pavement around the excavated trench area to form straight edges. "(See Detail 416)

5. **Type "E" Pavement Replacement.** When Type "E" pavement replacement is called for, it shall mean eight inches (8") of crushed aggregate base course, in lieu of six inches (6") of 1-1/2" graded crushed stone and three inches (3") of crushed road gravel.

6. **Sidewalk Replacement.** Sidewalks shall be four inches (4") thick in lieu of five inches (5’); except where crossing driveways and alleys where they shall be six inches (6") thick in lieu of seven inches (7”).

7. **Driveway or Alley Approach Replacement.** Driveway and alley approaches shall be six inches (6") thick, in lieu of seven inches (7") thick.

WSWS 2.8.0 **EROSION CONTROL**

WSWS 2.8.1 Erosion Control – General Criteria
Add:
The Contractor shall comply with all of the provisions included in the latest edition of the Department of Natural Resource's "Construction Site Erosion and Sediment Control Standards" latest edition, Chapters 11 and 13 of the
Wisconsin Department of Transportation's "Facilities Development Manual", and/or the City of Manitowoc’s erosion control ordinance and permit requirements.

All work under this item shall be in accordance with Section 628 of the Standard D.O.T. Specifications.

In addition, the Contractor shall submit and be prepared to discuss an erosion control plan with the Engineer at the Pre-Construction Conference. The Contractor is responsible for a proper erosion control plan regardless of the plan included in the Contract Documents.

The Contractor shall install a Tracking Pad where required by City Ordinance, State law or the Engineer. Tracking Pads shall be installed in accordance with the Detail #801 found in Section 800 of this Standard Specification. The aggregate for the tracking pads shall be 1-1/2 inch to 3 inch diameter round stone. No other aggregate material will be accepted.

The aggregate shall be placed a minimum of 6 inches thick. All costs for furnishing and installation of the Tracking Pad shall be included in the unit price bid per each “Furnish and Install Tracking Pad”. The bid price for furnishing and installing the Tracking Pad shall include all maintenance of the Tracking Pad and shall include replacement if deemed necessary by the Engineer.

Silt Fences and Straw Bale Fences shall be installed according to Detail #803 and #804 found in Section 800 of this Standard Specification.

The Contractor shall keep the tracking of sediment material to an absolute minimum. Any sediment reaching a public or private road shall be removed before the end of each workday or more frequently if deemed necessary by the Engineer.

All costs for furnishing, installing, maintaining (including replacement), and removing erosion control devices shall be included in the unit price bid for each of the respective bid items.

WSWS 2.9.0 PAY MEASUREMENT

Payment and measurement for all sanitary sewer and storm sewer items shall follow the WSWS with exceptions as noted below and/or in the Special Provisions.

WSWS 2.9.12 Pay Measurement for Manholes
Delete this entire section and Add:
Pay measurement for standard manholes shall extend from the flow line of the outgoing sewer to the bottom of the cast iron manhole frame, in lieu of to the top of cast iron manhole frame. The manhole shall be paid for at the unit price bid per vertical foot, and the casting shall be paid for at the unit price bid per each casting.

In addition, outside drop manholes shall be paid for as a standard manhole, and the vertical drop on the outside of the manhole will be paid for by the vertical foot of outside drop of pipe as noted in File No. 19 through 22 in the “WSWS” as the “X” dimension.

In addition, non-standard manhole sections are for pipes 36 inches in diameter and larger. They shall be paid for per vertical feet of non-standard manhole as noted on Form #402.

WSWS 2.9.14 Pay Measurement for Catch Basins and Stormwater Inlets
Delete this entire section and Add:
Payment shall be unit price for each structure and a separate unit price for the casting and cover.

WSWS 2.9.15 Pay Measurement for Manhole and Catch Basin Adjustment
Delete this entire section and Add:
Manhole adjustments shall be included in the unit price for new castings but shall be paid for at a separate unit price for existing castings that require resetting.

WSWS 2.9.17 Pay Measurement for Clearing and Grubbing
Delete this entire section and Add:
"The cost of all clearing and grubbing encountered by the Contractor shall be included in the unit price bid for other items of work, provided that a unit price specifically for clearing and grubbing is not included in the contract."
404 - AMENDMENTS TO WSWS PART III - CONSTRUCTION - STORM AND SANITARY SEWER

WSWS 3.2.0  **LAYING OF PIPE SEWERS**

WSWS 3.2.6  **Pipe Sewer Bedding Sections**
All sewers shall be laid in conformance with Section 3.2.6 (b) (Class B) and Form #406, in lieu of the Standard Section.

4. In addition to WSWS Section 3.2.6(i & j), if there are any questions with regard to the condition of the line, including compaction, the City may have the Contractor repeat the deflection test after 30 days for verification. All costs for deflection tests shall be at the Contractor's expense.

WSWS 3.2.10(b)1a  **(Type of Joint to be Used on Concrete Pipe Storm Sewers)**
Delete "cement mortar".
Cement mortar joints in concrete storm sewer pipe will not be allowed. Concrete collars made of mortar and solid concrete bricks may be used at the last pipe joint when laying toward a manhole or other structure.

WSWS 3.2.25  **Bulkheads**
Add:
All costs incurred for installing bulkheads shall be classified as Incidental.

WSWS 3.2.27  **Connections to Existing Manholes or Existing Sewers**
Delete the last paragraph and add:
All costs for the connection of storm sewer, sanitary sewer, and storm inlet leads into existing manholes, at any location, above the floor shall be included in the unit price bid per lineal foot of pipe.

In addition, the Contractor shall reconnect all existing sewer pipes to new manholes as shown on the plans or as directed by the Engineer. The Contractor shall make the reconnection to a section of the existing sewer pipe that is in good condition as determined by the Engineer. The joint reconnecting the existing sewer to the new relaid sewer shall be made with a fernco adapter, unless another jointing method is approved by the Engineer.

All costs for reconnecting existing pipes into new manholes shall be included in the unit price bid per vertical foot of Manhole.

All costs for furnishing and installing the fernco adapters or for providing the designated joint shall be included in the unit price bid per vertical foot of Manhole.
WSWS 3.3.0 **MONOLITHIC CONCRETE SEWERS AND APPURTENNANCES**

Delete this entire chapter.

WSWS 3.4.0 **RECONNECTING BUILDING SEWERS, STORM WATER DRAINS AND UTILITY DRAINS**

WSWS 3.4.2 **Branch Fittings, Pipe, and Joints**

Add the following note to Table 19:
"Where the existing material of service or drain pipe encountered is clay, the pipe material to be used for reconnection shall be either PVC, as specified in WSWS 8.10.1, or Extra Strength Vitrified Clay."

WSWS 3.5.0 **MANHOLES**

WSWS 3.5.3 **Types of Manholes**

Delete this entire section and replace with the following: "Precast concrete manholes will be used at all times for sanitary and storm manholes, unless monolithic concrete construction or solid concrete block construction has been authorized by the Engineer. Manholes constructed with hollow block are not allowed and no exceptions will be allowed. The manholes shall be constructed to conform with the requirements of WSWS 8.39.0 and Detail #401 shown in the detail section of the City's Standard Specifications.

The Contractor shall submit manufacturer's certificates for the precast concrete manholes to the Engineer prior to using them on the project. The certificates shall state that the manholes conform to the requirements of ASTM C-478 and shall be signed by an authorized representative of the manufacturer.

All sanitary and storm manholes shall be four (4') feet inside diameter, unless otherwise specified by the Engineer."

All manholes that are constructed in field areas or as directed by the Engineer shall be marked with Hydrafinder Flags, or an approved equal.

WSWS 3.5.4 **General Requirements**

**Manhole Castings**

Add:
All sanitary and storm manhole castings shall be in conformance with Detail #407.

WSWS 3.5.8 **Special Types of Manholes**

Change the standard manhole diameter from 3 feet, 6 inches to 4 feet, 0 inches.

WSWS 3.5.10 **Grades for Setting Manhole Frames**
Sanitary and storm sewer manholes shall be built to the established grade with a minimum of four inches (4") and a maximum of ten inches (10") of pre-cast concrete adjusting rings in lieu of concrete bricks or blocks. Then, if necessary, additional pre-cast concrete adjusting rings shall be added to match the existing surface grade.

WSWS 3.6.0 **CATCH BASINS, STORM WATER INLETS AND STORM WATER DRAINS**

WSWS 3.6.1 Catch Basins
Delete this entire section and replace with the following:
"Precast concrete catch basins will be used at all times, unless monolithic concrete construction or solid block concrete construction has been authorized by the Engineer. Catch basins constructed with hollow block are not allowed and no exceptions will be allowed. The catch basins shall be constructed to conform with the requirements and details shown in the detail section of the City's Standard Specifications.

The Contractor shall submit manufacturer's certificates for the precast concrete catch basins to the Engineer prior to using them on the project. The certificates shall state that the catch basins conform to the requirements of ASTM C-478 and shall be signed by an authorized representative of the manufacturer."

WSWS 3.6.2 Trapped Sewer Catch Basin
Delete this entire section.

WSWS 3.6.3 Storm Water Inlet
Delete the text of this section and replace with the following:
"Storm water inlets are to be used at all locations unless catch basins are specifically approved by the City Engineer. Such inlets shall be of precast concrete, unless monolithic concrete construction or solid block concrete construction has been authorized by the Engineer. Storm water inlets constructed with hollow block are not allowed and no exceptions will be allowed. The inlets shall be constructed to conform with the requirements and details shown in the detail section of the City's Standard Specifications.

The Contractor shall submit manufacturer's certificates for the precast concrete inlets to the Engineer prior to using them on the project. The certificates shall state that the inlets conform to the requirements of ASTM C-478 and shall be signed by an authorized representative of the manufacturer."

Stormwater inlets shall be built in conformance with Form #405 and Form #411, in lieu of File No. 28 and File No. 29 in the WSWS.

All Type "H" inlet castings shall be Neenah casting R-3067 with a Type R grate (diagonal grate) or an approved equal, in lieu of WSWS 8.48.1, unless noted otherwise on the plans or in the Bid Proposal.
WSWS 3.7.0  LEAKAGE TEST OF SANITARY SEWERS
Add:
Any infiltration or ex-filtration tests that are required, the City shall require the Contractor to perform a Low Air Pressure Test.

In addition, the Contractor is expected to cooperate with the Engineer or his representative in testing the sewer line from manhole to manhole by furnishing equipment, labor, air compressor, etc.

All costs for the Low Air Pressure Test shall be included in the cost per lineal foot of pipe.

WSWS 3.7.1  General
Add:
Television Inspection of Sewers
The Contractor shall televise all sanitary and storm sewers (mainline only) after installation. Both new sewers and re-laid sewers shall be televised. Storm sewer inlet leads shall not be televised, unless noted otherwise. The Contractor shall furnish the City with a television inspection report and a VHS videotape of the sewers prior to final acceptance of the Contract.

All cleaning and television inspection of sewers shall be in accordance with the latest edition/revision of The National Association of Sewer Service Companies (NASSCO) "RECOMMENDED SPECIFICATIONS FOR SEWER COLLECTION SYSTEM REHABILITATION"; included by reference as a part of this Contract.

For sanitary sewers, the Low Pressure Air Test and the Deflection Testing shall be completed prior to the televising. If any repairs are required based on either of the two tests stated above, then the repairs shall be completed prior to the televising.

All costs for cleaning and televising shall be included in the unit price bid per lineal foot of “Televising Sanitary Sewers” or “Televising Storm Sewers”.
405.1 Television Inspection

All cleaning and television inspection of sewers shall be in accordance with the latest edition of the National Association of Sewer Service Companies (NASSCO) "RECOMMENDED SPECIFICATIONS FOR SEWER COLLECTION SYSTEM REHABILITATION"; included by reference as a part of the Standard Specifications.

On projects where the City is the Owner, the Contractor or Subcontractor shall perform a television inspection of the mainline sewer pipes upon completion of construction. Both new sewers and re-laid sewers shall be televised.

For new sanitary sewers, the Low Pressure Air Test and the Deflection Testing shall be completed prior to the televising. If any repairs are required based on either of the two tests stated above, the repairs should be completed prior to the televising.

Any re-televising of the sewer pipes that is required due to problems noted by the initial televising shall be at the Contractor’s expense. All costs for television inspection shall be included in the unit price bid under the contract.

When the City is not the Owner of the sewer line (i.e. Subdivision), the Contractor or the Owner shall have another party perform the television inspection at no cost to the City.

For all City and Private projects, a VHS videotape and a typed report of the television inspections shall be submitted to the City for review and shall become the property of the City. The City shall review and approve all televising prior to Final Acceptance of the project.

When there is a bid item in the Contract, all costs for cleaning and televising shall be included in the unit price bid per lineal foot of “Televising Sanitary Sewer” or “Televising Storm Sewer”.

For new sewer lines, any of the following defects evident from the television inspection shall be repaired by the Contractor and the defect re-televised for acceptance after the repair.

a) Dips in pipe exceeding one-eighth of the internal diameter of the pipe for a distance of more than eight (8) feet in both directions from the low point of the dip.

b) Cracked or broken pipe that have not been repaired.

c) Deflections of cross-sections for PVC pipe exceeding those allowed in
d) Infiltration leaks of water at joints or along the pipe.
e) Any other defect that the Sewer Utility or Engineer finds unacceptable.

405.02 Manhole Reconstruction

Manhole reconstruction is defined as work completed on the cone section or barrel section either of which shall require the removal or replacement of the existing cone or flat slab.

Manhole reconstruction shall include the final cover adjustment, if a new casting is not installed. There shall not be a separate pay item for adjusting inlet or manhole covers on those structures that are reconstructed.

Costs for the reconstruction work, including the final cover adjustment, shall be included in the unit price bid per each “Reconstruct Manhole”.

406 - ADDITIONAL CITY REQUIREMENTS FOR STORM SEWER CONSTRUCTION

406.1 Television Inspection
The requirements of Section 405.1 are applicable also to the construction of storm sewers.

406.2 Culverts
The following sections of the Wisconsin DOT Specifications are by reference made a part of the City's Standard Specifications.

- WDOT 520 Pipe Culverts
- WDOT 521 Corrugated Steel Pipe Culverts
- WDOT 522 Reinforced Concrete Pipe Culverts
- WDOT 523 Reinforced Concrete Horizontal Elliptical Pipe Culverts
- WDOT 524 Salvaged Pipe Culverts
- WDOT 525 Corrugated Aluminum Pipe Culverts

Measurement and payment for culverts shall be in accordance with the requirements of the referenced WDOT sections or as shown in the special provisions of the contract.

406.3 Riprap
The following section of the Wisconsin DOT Specifications are by reference made a part of the City's Standard Specifications.

- WDOT 606 Riprap
- WDOT 645 Geotextile Fabrics

Prior to using the riprap, the Contractor shall notify the Engineer of his source for the riprap and arrange for the Engineer to inspect the riprap at its source to verify that the weight of the stone pieces meets the requirements of the specifications.

406.4 Manhole, Inlet or Catch Basin Reconstruction

Manhole reconstruction is defined as work completed on the cone section or barrel section either of which shall require the removal or replacement of the existing cone or flat slab.

Inlet/Catch Basin reconstruction is defined as adjusting the height of the structure beneath the existing adjustment rings.

Manhole or inlet reconstruction shall include the final cover adjustment, if a new casting is not installed. There shall not be a separate pay item for adjusting inlet or manhole covers on those structures that are reconstructed.

Costs for the reconstruction work, including the final cover adjustment, shall be included in the unit price bid per each “Reconstruct Manhole”, “Reconstruct Inlet”, or “Reconstruct Catch Basin”.
408 - ADDITIONAL CITY REQUIREMENTS FOR WATER MAIN CONSTRUCTION

Refer to: Manitowoc Public Utilities
1303 S 8th Street
Manitowoc, WI 54220
(920) 683-4600
409.1 Tracer Wire

409.1.1 General
The Contractor shall furnish and install a coated, solid copper tracer wire on all non-conductive storm and sanitary sewer service lines in the trench along side the pipe.

409.1.2 Material
The tracer wire shall be twelve (12) gauge standard wire and solid green PVC coated for Sanitary Sewers.
The tracer wire shall be twelve (12) gauge standard wire and solid brown PVC coated for Storm Sewers.
The tracer wire shall be twelve (12) gauge standard wire and solid blue PVC coated for Water Services.

409.1.3 Placement of Wire
The tracer wire shall be installed in accordance with the detailed drawing Forms #423, #424, and/or #425.

409.1.4 Basis of Payment
The cost of furnishing and installing the tracer wire shall be included in the unit price bid per lineal foot of pipe requiring its need.

WSWS 5.2.0 EXCAVATION

The location of building sewers (sanitary and storm laterals) and water services shall be in accordance with File No. 50 of the Standard Sewer Specifications.

WSWS 5.2.1 Building Sanitary Sewers
Delete the last paragraph dealing with inspection tees.
Add:
All Building Sanitary Sewers installed for undeveloped (vacant) lots shall be marked with a steel post driven to grade and a 4" x 4" wooden post with at least four feet (4’) exposed above ground, with the top 2’ of which shall be painted green. The Contractor shall furnish and install all pipe, wyes,
bends, ferncos, connections, labor, etc. for the Building Sanitary Sewer work as shown on the plans and as directed by the Engineer. Building Sanitary Sewers shall be installed from the wye at the mainline sewer to two (2') feet behind the property line, using four (4") inch PVC pipe, SDR-35, unless noted otherwise. Building Sanitary Sewers shall be installed at a minimum slope of two percent (2%). The Engineer shall verify and document the flowline elevation at the end of all new Building Sanitary Sewers prior to backfilling. The Engineer reserves the right to add or delete Building Sanitary Sewers as necessary.

The Contractor shall mark the end of each sanitary lateral pipe with a 3-foot long wood 2"x4" and a 24-inch long #4 Rebar. The rebar shall be attached to the 2"x4".

For vacant lots, the Contractor shall mark the end location of the sanitary lateral at grade with a wood 2"x4". The 2"x4" shall extend a minimum of 3-feet below grade and a minimum of 2-feet above the existing ground grade. The 2"x4" shall be painted green.

The Contractor shall obtain a Plumbing Permit from the City of Manitowoc Plumbing Inspector for all new Building Sanitary Sewers and Water Service Piping.

All costs for furnishing and installing Building Sanitary Sewers including all wyes, bends, ferncos, connections, permit fee, etc. shall be included in the unit price bid per lineal foot of pipe.

WSWS 5.2.2 Building Combined Sewers
Delete this entire section.

WSWS 5.2.3 Building Storm Sewers (Laterals)
Add: The general design for the Building Storm Sewers, along with provisions for future locations and connections are shown on Detail #415.

The trench dimensions and bedding conditions shall be in accordance with Detail #406, in lieu of Section 3.2.6 (h) (i) and (j), depending on the type of pipe installed.

Also add: All Building Storm Sewers (Laterals) are shown on the plan view. The Contractor shall install Building Storm Sewers (Laterals) as shown on the plans and at locations as determined by the Engineer in the field.
All storm laterals shall be installed with six (6") inch PVC pipe, SDR-35, unless otherwise noted. All storm laterals shall be installed at a minimum depth of 3.5 feet and at a minimum slope of one percent (1%). All storm laterals for future use shall be capped off. All storm laterals shall be installed to two (2') feet behind the property line, unless otherwise noted.

The Contractor shall connect existing (private) storm lateral pipes to the new building storm sewer pipe as shown on the plans and as directed by the Engineer.

The end of the storm laterals shall be marked with a wood 2"x4" and a #4 Rebar as shown on Form #415. The 2"x4" shall be painted green.

In addition, the Contractor shall keep a full record of the positions of the building storm sewers, and said record shall be submitted in a neat legible form to the City Engineering Office on the completion of the project.

All costs for furnishing and installing Building Storm Sewers (Laterals), including all pipe, wyes, bends, plugs, ferncos, connections and all other fixtures to be attached to the building storm sewers shall be included in the cost per lineal foot of pipe.

WSWS 5.2.4 Water Service Piping

Add the following text:
"Water service piping may be laid in the same trench as the sanitary sewer lateral, as shown in WSWS File No. 50, Part VII. The sanitary sewer service trench shall be backfilled up to the elevation of the bottom of the water service line with bedding and cover material conforming to WSWS 6.43.2 and 6.43.3 respectively, and substantially compacted before installing the water service."

The Contractor shall install new one (1") inch copper Water Service Piping (Water Laterals) as shown on the plans and as directed by the Engineer. The new Water Service Piping shall consist of the one (1") inch copper pipe, tapping sleeve, corporation, curb stop, and service box. The Manitowoc Public Utilities shall furnish all component parts for the Water Service Piping work, except that the Contractor shall furnish the one (1") inch copper pipe. The Engineer reserves the right to add or delete water services as necessary.

The Manitowoc Public Utilities shall make all taps to the existing water main.

The Contractor shall be responsible for all costs of the taps to
the existing water main.

The Contractor shall obtain a Tapping Permit from the Manitowoc Public Utilities for each new water service installed. The tapping permit fee will include the cost of all the component parts for the water service, except for the one (1”) inch copper pipe. The Contractor shall contact the Manitowoc Public Utilities at (920) 683-4604 for the cost of the tapping permit.

All water services shall be wrapped with polyethylene film pursuant to Section 5.5.17 of the Standard Sewer Specifications and as directed by the Manitowoc Public Utilities. The Contractor shall be responsible for the cost of the polyethylene film.

All new water services shall be installed from the existing main to the water service box, which shall be located two (2’) feet behind the property line, unless otherwise noted. The Contractor shall paint the top of the valve box blue in color.

WSWS 5.3.0  LAYING OF BUILDING SEWERS

WSWS 5.3.4  Connecting Building Sewers
All building sewers (sanitary and storm) that are being connected to new PVC mainline sewer pipe shall be connected with in-line wyes (PVC).

Saddle tees or wyes shall not be used for the connection of building sewers to new PVC sewer pipes.

All costs for furnishing and installing the in-line wyes shall be included in the unit price bid per lineal foot of Building Sewer Pipe.

Building Sewers shall not protrude more than one (1”) inch into the mainline pipe. Contractor shall be responsible for all costs related to correction.

WSWS 5.3.10  Type of Pipe to be Used
Delete the first paragraph and replace with the following text:
"PVC pipe shall be used for building service sewers, unless otherwise authorized by the Engineer. The minimum size building sewer shall be four (4) inches in diameter, unless otherwise specified. In a remove and replace project, the minimum pipe size shall be equal to the size of pipe that was removed, but not smaller than four (4) inches. The class of pipe required for PVC or other materials which may be allowed, shall be as listed in Table 11 of WSWS 5.3.10."
Standard pipe sizes and type shall be:

<table>
<thead>
<tr>
<th>USE</th>
<th>MIN. SIZE</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Sanitary Sewer</td>
<td>4&quot;</td>
<td>PVC</td>
</tr>
<tr>
<td>Building Storm Sewer</td>
<td>6&quot;</td>
<td>PVC</td>
</tr>
<tr>
<td>Risers (Sanitary &amp; Storm)</td>
<td>same as building service**</td>
<td>PVC</td>
</tr>
</tbody>
</table>

** Note: All risers shall be minimum 4-inch diameter. All risers shall be installed at a 45-degree slope when the vertical height dimension is greater than six (6’) feet.

WSWS 5.4.0 **ACCEPTANCE TESTING OF BUILDING SEWERS**

Delete all text in this chapter and replace with the following: "All building sanitary sewers shall be tested simultaneously with the main sewer, as specified in WSWS Part III."

WSWS 5.5.0 **LAYING OF WATER SERVICES**

WSWS 5.5.5 Lead Joints
Delete this entire section

WSWS 5.5.11 Laying Water Services
Add the following text:
"In lieu of bending the horizontal offsets at the corporation stops when using 1 1/4", 1 1/2", and 2" copper water service piping, the Contractor may install the pipe in a curved path in such a manner as to allow for movement of the in-place pipe."

WSWS 5.7.0 **LAWN SPRINKLER SERVICE SYSTEM**
Delete this entire chapter.
Add:
All lawn sprinkler service systems must be pre-approved in writing by the City Engineer. Such systems are strongly discouraged.
410 - AMENDMENTS TO WSWS PART VIII - MATERIAL SPECIFICATIONS

WSWS 8.6.0  **REINFORCED CONCRETE PIPE**

WSWS 8.6.1  **Reinforced Concrete Pipe – Requirements**
Add: All reinforced concrete pipe installed shall have sealed joints using rubber gaskets or an approved equal.

WSWS 8.10.0  **POLYVINYL CHLORIDE SEWER PIPE AND FITTINGS**

WSWS 8.10.1  **PVC Sewer pipe and Fittings – General Requirements**
Add: All PVC sewer pipe shall be green in color. The pipe fittings are permitted to be white in color.

WSWS 8.33.0  **AGGREGATES FOR PORTLAND CEMENT CONCRETE**

WSWS 8.33.3  **Coarse Aggregate**
Coarse Aggregate shall be in conformance with Section 501.2.5.4 of the Standard D.O.T. Specification, except that the maximum amount of Chert allowed under Section 501.2.5.4.2 shall be changed from five percent (5%) to less than one and one-half percent (1.5%) by weight.

WSWS 8.35.0  **CONCRETE**

WSWS 8.35.1  **Concrete – General Requirements**
Add: All concrete shall meet the requirements of Sections 415, 416 and 501 of the Standard D.O.T. Specifications.

Six (6) bags of air-entrained Portland Cement shall be used per cubic yard of concrete, except when high-early strength (H.E.S.) concrete pavement is specified it shall consist of eight (8) bags of cement per cubic yard of concrete in lieu of six (6) bags. No admixtures shall be allowed to substitute for cement nor to enhance strength with the exception of water reducers and are entrainment.

Air-entrainment under Section 501.3.2.4.2 shall produce six percent (6%) air plus or minus one percent (1%).

The Contractor replacing the concrete shall have experience in the placement and finishing of concrete.
Cold Weather Concreting

Delete all of Section 415.3.15.1 of the Standard D.O.T. Specifications and replace with the following:

Unless the Engineer issues written permission to continue work, the Contractor shall suspend concrete placement if the temperature as reported on “WOMT 1240 AM Radio” reaches 35°F in a descending pattern throughout the day. No placement shall commence until the temperature reached 33°F in an ascending pattern throughout the day. Under no circumstance shall concrete be placed upon any frozen ground.

The Contractor shall measure the concrete temperature as placed within 30 minutes of placement at regular geometric intervals when the temperature falls below 40°F. At all time concrete shall not fall below 50°F through the first three days of placement.

Heating of the water shall only be allowed in critical situations and only at the expressed direction of the Engineer.

Add the following to Section 415.3.15.2 of the Standard D.O.T. Specifications:

The official weather bureau shall be interpreted as the noon weather forecast of "WOMT 1240 AM Radio". The temperature for a single layer of polyethylene shall be 22°F to < 32°F.

All concrete placed after October 1st shall have a protective coating consisting of two applications of boiled linseed oil. The mixture and application rate shall be in accordance with the Portland Cement Association's "Technical Bulletin HB1-2" or as stated below. White water linseed oil may be specified as an alternative. It must meet all applicable ASTM standards and all other requirements of this section must be followed.

The linseed oil shall be applied in two applications according to the following directions and specifications:

1. The curb and gutter or pavement should be dry and swept clean with the temperature above 50 degrees Fahrenheit.

2. The first coat shall be composed of 50-50 mixture of commercial boiled linseed oil and mineral spirits and should dry in 2 to 3 hours at the above temperature.

3. The second application shall be 75-25 mixture of commercial boiled linseed oil and mineral spirits and may be applied after the first coat has
obtained a dry appearance.

4. The nozzle of the spraying equipment must be held close to the pavement to get complete coverage. Note: One gallon of the mixture will cover approximately 50 square yards.

The first application of boiled linseed oil shall be after seven (7) days of cure time. Whenever boiled linseed oil is required on one-half of a street, the same treatment shall be applied to the entire street.

All costs for furnishing and applying the linseed oil treatment shall be included in the unit price bid per square yard of Concrete Pavement.

WSWS 8.38.0  
CONCRETE BRICK AND BLOCK MASONRY UNITS

WSWS 8.38.3  Manhole Block Dimensions and Quality
Add the following text:
"Concrete block, when specified by the Engineer for manhole or inlet construction, shall be structured as a half course or solid block. No hollow core building block will be allowed, unless specifically ordered by the Engineer."

WSWS 8.42.0  
FRAME / CHIMNEY SEAL MATERIALS

WSWS 8.42.3  Manhole Chimney Seal
Add: When called for on the plans, the Contractor shall install an internal rubber chimney seal. (See Bid Proposal and/or Plans) The rubber sleeve shall be a nominal 8-3/8 inch to 10-inch wide sleeve, which conforms to the requirements of ASTM C-923, with a 3/16-inch thickness for durability, and resistance to puncturing or tearing. The sleeve shall be corrugated shape to allow for movement of up to two (2") inches vertically or horizontally before stretching the material.

The internal bands shall be fabricated from high quality, corrosion resistant, 16 gauge stainless steel conforming to ASTM A-240 Type 304. All studs and nuts used for this mechanism shall be stainless steel conforming to ASTM F-923 and F-594, Type 304. The surface of the manhole chimney or cone/corbel against which the sleeve is to be compressed, shall be circular, clean and reasonably smooth and free from any loose material or excessive voids. If the masonry surface is rough, sloped, or irregular and would not provide an effective seal, an approved non-shrink patching mortar shall be used to prepare a uniformly vertical surface for the bottom of the sleeve and extension to seal against. Any flaws in the manhole frame such as cracks, pits or protrusions, shall be repaired by either filling with mortar or grinding
smooth. The casting shall be cleaned to form a seal upon placement of the
sleeve and bands. Detailed installation instructions shall be in accordance
with the manufacturer's instructions. The standard manhole frame is a
R-1550-A casting, which sets on a 24-inch diameter, offset concrete cone.
The intent of the Engineer is to have three 2-inch precast concrete
adjustment rings.

**WSWS 8.43.0**  
**BEDDING, COVER, FOUNDATION AND BACKFILL MATERIALS**

**WSWS 8.43.5**  
Excavated Material Used as Backfill
Add: If the excavated material or any portion of it is deemed unsuitable by
the Engineer, approved granular material shall be used. The payment for
this material shall be according to the "Schedule of Fixed Prices". The
fixed price shall be full compensation for the granular backfill material and
disposing of the unsuitable material.

**WSWS 8.43.10**  
Breaker Run Quarry Stone
Wherever breaker run quarry stone is specified in the Contract, it shall mean
that the maximum size shall not exceed six inch (6") stone, and shall not
contain more than fifteen percent (15%) of one inch (1") diameter stone and
smaller. All costs for furnishing and installing Breaker Run material shall
be paid for according to the “Schedule of Fixed Prices”.

**WSWS 8.48.0**  
**MANHOLE AND CATCH BASIN CASTINGS**

Delete the text of this entire chapter and replace with the following:

8.48.1 Requirements
All manhole and inlet castings shall conform to the
requirements of A.S.T.M. A-48, Class No. 30-B. Castings
shall be free from cracks, holes, swells, and cold shuts.

8.48.2 Manhole Castings
Manhole casting frames and covers shall be in accordance with
Form 407:

For sanitary sewer manholes at sub aqueous buried
locations, remote locations or locations below the 100 year
floodplain: Neenah R-1916-C water tight frame and lid
assembly with bolted lid having two pick holes or approved
equal.

8.48.3 Inlet Castings
Storm sewer inlet frames and grates shall be:
1. For curb inlets: Neenah R-3067 frame with diagonal Type R grate. When specifically indicated on the drawings or in the Contract Documents, Type V (vane) grates shall be used. Such use shall only occur in high flow steep grade situations.

2. For driveway inlets: Neenah R-3290-A frame shall be used.

3. For field catch basins: Neenah R-2560-E frame and grate with circular beehive.

WSWS 8.49.0  **COAL-TAR EPOXY**

Delete this entire chapter.

WSWS 8.56.0  **SUBSTITUTION OF MATERIALS**

Add:
"Neither the Owner, (when the Owner is not the City of Manitowoc) nor the Contractor shall substitute for materials specified without prior written permission of the City Engineer. Prior to such permission being granted, the City may require the Contractor or Owner to supply a typical unit, at the location chosen by the City, to be checked for interchangeability with the City's standard unit."
The City of Manitowoc Standard Specifications for Public Works Detail Drawings take precedence over all other Details. When a Detail is not provided for by this manual, use the latest Form provided by in the WSWS.
412 - FOR FUTURE USE

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413 - REPAIR OF EXISTING SEWER AND WATER FACILITIES

413.1 Scope Of Work
The work under this section shall include the repair of existing sanitary and storm sewer facilities as shown on the plans, or as specified in the Contract Documents. All repair work shall conform to the requirements of Section 400 of the City's Standard Specifications except as modified within this subsection 413 or as specified otherwise in the Special Provisions.

The Contractor shall furnish all labor, supervision, equipment, materials, supplies, tools, and incidentals necessary to complete the work.

413.2 Remove And Replace Sewer Pipe

413.2.1 General
The repair work consists of removing and replacing sections of existing sewers at various locations.

The locations of proposed sewer pipe repairs are normally determined by the use of the City of Manitowoc televising equipment and are not to be taken as exact locations, but rather close approximations of the locations. The Engineer will field mark all sewer pipe repair locations prior to any sewer pipe repair work beginning. There shall be no adjustments to the unit prices for additional trench excavations to determine the exact location of the defective sections unless the defective section is ten (10) feet or more away from the location specified or marked by the Engineer.

413.2.2 Sewer Pipe Materials
Unless otherwise specified in the Contract Documents, all pipe used to repair sanitary sewer pipe shall be SDR35 PVC sewer pipe conforming to ASTM D3034 and meeting the requirements of WSWS 8.10.0.

When specified in the Contract Documents, pipe used to repair storm sewer pipe shall be reinforced concrete pipe, Class III, conforming to ASTM C-76 and meeting the requirements of WSWS 8.6.0. Typically, 18" and smaller diameter pipe shall be SDR35 PVC storm sewer pipe.

413.2.3 Installation
When removing a section or sections of existing sewer pipe, the Contractor shall take extreme care not to damage any adjacent sections of pipe. Any damage that may occur to adjacent sections shall be repaired by the Contractor at no expense to the City.

The Contractor shall prepare the new pipe to "fit" as tight as possible in the space left by removing the old pipe. "Fernco" couplers or equal shall then be used to joint the pipes together.

At no expense to the City, the Contractor shall repair any damage that may occur to existing catch basins, manholes, curb and gutter, street, sidewalk sections, or
other City facilities outside of the marked limits due to the Contractor's sewer pipe repair operations.

413.2.4 **Aggregate Slurry Backfill**
The Contractor shall use aggregate slurry backfill material for backfill around the sewer pipe repairs when pavement or curb and gutter exists above the repair location. The aggregate slurry backfill shall conform to the requirements specified in Section 413.7 of the City's Standard Specifications. The cost for aggregate slurry backfill shall be incorporated into the cost of the pipe repair unless specified otherwise.

413.2.5 **Granular Backfill**
Granular Backfill may be used when specified by the Engineer at repair locations that are not to be paved or for repair projects that are large and for which the Engineer approves the substitution of granular backfill in lieu of slurry backfill, provided the granular backfill meets the requirements of WSWS 8.43.4.

413.2.6 **Surface Restoration**
If pavement exists above a repair location, the Contractor shall restore and compact the subbase and the pavement at that location to meet the requirements of Section 606.2 of the City's Standard Specifications for asphalt pavement and Section 512.0 for concrete pavement. The requirements of Section 606.2.4 for temporary pavement are applicable to this work. If no pavement exists above the repair location, the Contractor shall restore the surface to its original condition in accordance with the requirements of Section 700 of the City's Standard Specifications.

413.2.7 **Measurement And Payment**
Measurement for removal and replacement of sewer pipe shall be made in lineal feet of pipe actually installed.

The contract unit prices for removal and replacement of sewer pipe of various specified types and sizes shall include all costs associated with removing and properly disposing of the existing damaged pipe sections and replacing them with the specified size and type of pipe; furnishing the pipe, couplers, and manufacturer's certificates for the pipe; hauling and properly disposing of excavated detrimental objects and materials; furnishing, installing, and compacting granular backfill (when allowed) and temporary pavement; and for all labor, supervision, equipment, materials, supplies, tools, and incidentals necessary to complete the work.

Unless otherwise specified in the Contract Documents, the costs associated with, pavement saw-cutting, and restoration of the roadway pavement and ground surface at the pipe repair locations are not to be included in the contract unit prices for removal and replacement of sewer pipe. These items are normally either separate bid items or are included in separate bid items.

The maximum quantity for payment of pavement restoration at sewer pipe repairs shall be based upon a maximum pavement patch width and a maximum pavement patch length as determined by the Engineer.
413.3 Inlet and Catch Basin Repair Work

413.3.1 General
The work under this section includes repairing existing catch basins or inlets and removing and replacing existing catch basin or inlet structures, frames, and/or grates. The location and a brief description of the work to be done at each catch basin or inlet shall be as specified in the Contract Documents.

Unless specifically indicated in the Contract Documents, all structures for collecting storm water from streets shall be inlets. Under certain situations, catch basin structures may be specified, subject to the approval of the Engineer. Within this Section 413.3 the term "inlet" shall be understood to include both catch basins and inlets.

413.3.2 Remove and Replace Catch Basin/Inlet Structures
Where inlet structures are to be removed and replaced, the Contractor shall furnish and install precast reinforced concrete inlets as specified on Detail# 405 of the City's Standard Specifications. Catch basin structures shall be as specified on Detail# 422. The removed structures shall be properly disposed of off site by the Contractor. The Contractor shall be responsible for determining the depth of the replacement structures and the number, size and location of the replacement pipes which will be needed. Any existing pipe connection into the structures shall also be removed and replaced as necessary. The replacement pipe shall be SDR35 PVC Pipe or Reinforced Concrete Pipe, which matches the inner diameter size of the existing pipe. All connections between the replacement pipe and existing pipe shall be made with "Fernco" couplers (or equal). Concrete collars made of mortar and solid concrete bricks may be used only when approved by the Engineer. Pipe lengths and reconnections shall be paid as incidental for any pipe length 10 feet or shorter as measured to the center of structure.

413.3.3 Inlet Frames and Grates
Where inlet frames and grates are to be removed and replaced, the Contractor shall furnish and install Neenah R-3067 frames with Type R (diagonal) grates or Type V (vane) if steep grades exist. The type of grate shall be as specified in the Contract Documents. The existing frames and grates on the removed catch basins shall remain the property of the City and will be picked up by City Public Works personnel. They shall be stockpiled at one location and the Contractor must notify the Engineer when they are ready to be picked up.

Frames and grates removed and intended for reinstallation, which are rendered unfit for use by the Contractor through the Contractor's operations and shall be replaced by the Contractor at no additional cost to the City.

413.3.4 Inlet Structural Repairs
Where inlets are to receive structural repairs, the Contractor shall make the repairs as specified in the Contract Documents. The various types of repair work to be performed by the Contractor are described in the following general terms:

1. Tuckpoint - Fill gaps and joints between existing blocks or below frame casting by tuckpointing mortar into the gaps. The gaps shall be cleaned of all soil and loose material before being filled with mortar.
2. **Brick and Mortar** - Fill gaps between existing blocks, at pipe connections, at lift holes, below the frame casting, and at broken inner faces of block with solid concrete brick and mortar. The gaps shall be cleaned of all soil and loose material before being filled with brick and mortar.

3. **Backplaster** - Backplaster the existing concrete block and brick on the inside of the inlet with mortar. Prior to backplastering, the surface to be backplastered shall be thoroughly cleaned. The surface must be free of dust, oil, rust, loose materials, and other contaminants.

4. **Remove and replace grade rings** - Remove the existing frame and grate. Remove the existing block or brick grade rings and replace with new reinforced concrete grade rings. Replace the existing frame and grate or reinstall the existing frame and grate (as specified in the description of the repair). If there is a difference in the depth of the existing frame and the replacement frame, the difference shall be made up with the reinforced concrete adjusting rings. The new adjusting rings shall be mortared together with mortar between each ring, and the frame shall be mortared to the top-adjusting ring.

413.3.5 **Aggregate Slurry Backfill**
The Contractor shall use aggregate slurry material for backfill around the replacement inlets. The aggregate slurry backfill shall conform to the requirements of Section 413.7 of the City's Standard Specifications.

413.3.6 **Curb and Gutter**
At each location where an inlet structure or frame is to be removed and replaced, curb and gutter will have to be removed and replaced. The curb and gutter removal and replacement work shall be in accordance with the requirements of Section 508 of the City's Standard Specifications.

At locations where inlets are to be removed and replaced, the cost for curb and gutter to be removed and replaced shall include four (4) feet to each side of the inlet and will be considered an incidental cost. Any curb and gutter removed and replaced outside of the removal and replacement limits without prior approval from the Engineer will be at no cost to the City. The Contractor shall not leave any existing curb shorter than two feet measured joint to joint.

413.3.7 **Pavement Restoration**
The Contractor shall remove and replace any existing pavement disturbed during inlet repair or removal and replacement work. Pavement restoration shall be in accordance with the requirements for full depth patching, as specified in Section 606.2 of the City's Standard Specifications for asphaltic concrete pavements or Section 512.2 for concrete pavements. The requirements of Section 606.2.4 for temporary pavement are applicable to this work. Pavement restoration shall include removing the existing pavement and replacing it with pavement of thickness and type equal to the surrounding pavement. The pavement shall be sawcut to form a minimum width of two and one half (2 1/2) feet for the pavement patch. The cost for pavement restoration shall be incidental to the cost for any inlet repair or replacement.
413.3.8 **Ground Restoration**
All areas behind the back of curb disturbed by the inlet repair or replacement work shall be backfilled, regraded, topsoiled, seeded, fertilized, mulched, and watered by the Contractor in accordance with the requirements of Section 700 of the City's Standard Specifications.

413.3.9 **Measurement and Payment**
The measurement and payment of catch basin replacements and repairs shall be by the unit. The quantity measured for payment shall be the number of catch basin or inlet units actually removed and replaced or repaired.

Unless specified otherwise in the Contract Documents, the following rules shall apply to the pricing and payment for the specified work of repairing or removing and replacing the catch basins or inlets:

1. All costs associated with curb and gutter removal and replacement at catch basins or inlets are to be included in the separate bid prices for such work and are not to be included in the bid prices for the catch basin or inlet work. Curb and gutter shall not be paid for that portion of the curb occupied by the casting curb back (head.)

2. All costs associated with ground restoration at the catch basin or inlet repair or replacement work and at the adjacent curb and gutter removal and replacement work shall be included in the unit bid prices for the removal and replacement of the curb and gutter and are not to be included in the bid prices for the catch basin or inlet work. The restoration adjacent to the curb head is considered incidental and is included in the cost of the inlet or catch basin repair.

3. All costs associated with furnishing and placing aggregate slurry backfill at catch basins or inlets (when used) are to be included in the separate bid price for aggregate slurry backfill and are not to be included in the bid prices for the catch basin or inlet work.

4. All costs associated with temporary pavement and pavement restoration at catch basins and inlets shall be included in the appropriate unit bid prices for the catch basin and inlet work.

5. All costs associated with the repair, removal, and replacement of catch basins or inlets shall be included in the appropriate contract unit prices for such work. The costs included in the contract unit prices shall include the removal and proper disposal of specified structures, grade rings, frames, grates, backs, and detrimental and native materials; the furnishing and placement of structures, grade rings, frames, grates, and backs; removing and replacing existing inverted pipe, including couplings; reinstallation of existing frames, grates, and backs; the repair of existing catch basins or inlets by tuck pointing, bricking, back plastering, and/or mortaring; and all costs of labor, supervision, equipment, materials, supplies, tools, and incidentals necessary to complete the work in accordance with the specifications and Contract Documents.
413.4 Manhole Repair Work

413.4.1 General
The work under this section includes repairing existing sanitary, storm, or water manholes. The location and description of the work to be done at each manhole shall be as specified in the Contract Documents.

The various type of work (tuckpoint, brick, backplaster, and mortar) are the same as described in Section 413.3.4 for structural repairs of catch basins and inlets.

413.4.2 Measurement and Payment
The measurement of manhole repairs shall be by the unit and the quantity measured for payment shall be the number of manholes actually repaired.

The contract unit price for manhole repairs shall include all costs associated with the specified repairs to be made and all costs of labor, supervision, equipment, materials, supplies, tools, and incidentals necessary to complete the work in accordance with the specifications and Contract Documents.

413.5 Manhole and Catch Basin Adjustments

413.5.1 General
The work under this section includes making adjustments to the elevation of existing manholes, catch basins, and inlets so that they are one-eighth (1/8) inch to one-quarter (1/4) inch below the finished asphaltic concrete pavement or to one-eighth (1/8) inch to one-sixteenth (1/16) inch below the finished Portland cement concrete pavement. All adjustments shall be made by using reinforced concrete adjustment rings (grade rings) or, when permitted by the Engineer, by the use of approved adjusting castings or other method approved by the Engineer for such purpose.

The location and description of the adjustment work to be done by the Contractor at each unit shall be as specified in the Contract Documents.

413.5.2 Pavement and Subbase Restoration
All pavement required to be removed and replaced for the adjustments shall be a minimum width of two and one half (2 1/2) feet measured perpendicular to the perimeter of the unit for asphalt and a minimum of ½ panel for concrete (as determined by the Engineer), and the pavement patching work shall conform to the requirements for asphaltic concrete pavement patching of Section 606.2 of the City's Standard Specifications or to Section 512.2 for concrete pavement. The requirements of Section 606.2.4 for temporary pavement are applicable to this work. All subbase required to be removed for adjustments shall be replaced with crushed aggregate materials equivalent to or better than the surrounding roadway subbase materials.

413.5.3 Chimney Seals on Sanitary Sewer Manholes
If sanitary manholes are to be adjusted, they may contain internal chimney seals. Extreme care shall be taken not to hit existing manhole frames and damage existing chimney seals. Any chimney seal damaged during the work shall be
replaced by the Contractor at no expense to the City. The Contractor shall remove the existing chimney seal prior to adjusting the manhole. The Contractor shall be responsible for the safe storage and condition of the chimney seals and for reinstalling the chimney seals in the manholes immediately after work is completed.

413.5.4 Measurement and Payment
The measurement and payment of manhole, catch basin, and inlet adjustments will be in accordance with the provisions of WSWS 2.9.15 for the number of units actually adjusted, except that all adjustments exceeding a total of one foot of adjusting rings and all adjustments down exceeding the rings available shall be treated as a reconstruction. The contract unit price for the adjustments shall include all costs associated with removing and reinstalling the frame and cover; removal and reinstallation of chimney seals; removal and proper disposal of pavement and subbase materials; furnishing and installing adjusting grade rings or castings; subbase restoration and compaction; temporary pavement and pavement restoration; and all labor, supervision, materials, tools, equipment, supplies, and incidentals necessary to complete the adjustment work.

413.6 Manhole Removal and Replacement

413.6.1 General
The work under this section shall include the removal and replacement of existing sanitary, storm, or water manholes. The location and description of the work to be done at each manhole shall be as specified in the Contract Documents.

413.6.2 Manhole Structures and Pipes
Where manhole structures are to be removed and replaced, the Contractor shall furnish and install precast reinforced concrete manholes as specified on Detail# 401 or Detail# 402 of the City's Standard Specifications. The removed structures shall be properly disposed of off site by the Contractor. The Contractor shall be responsible for determining the depth of the replacement structures and the number, size and location of the replacement pipes, which will be needed.

Any existing pipe inverted into the remove and replace structures shall also be removed and replaced as necessary. The replacement pipe shall be SDR35 PVC Pipe conforming to ASTM D-3034 for sanitary sewer pipe and either SDR35 PVC Pipe or Class III Reinforced Concrete Pipe for storm sewer pipe (as determined by the Engineer). The pipe shall match the inner diameter size of the existing pipe. All connections between the replacement pipe and existing pipe shall be made with "Fernco" couplers (or equal). Concrete collars made of mortar and solid concrete brick may be used only when approved by the Engineer.

413.6.3 Aggregate Slurry Backfill
The Contractor shall use aggregate slurry backfill material for backfill around the replaced manholes where pavement exists around the manhole. The aggregate slurry backfill shall conform to the requirements specified in Section 413.7 of the City's Standard Specifications.

413.6.4 Granular Backfill
Granular backfill may be used when specified by the Engineer provided the
granular backfill meets the requirements of WSWS 8.43.4.

413.6.5 Frames and Covers
The Contract Documents specify whether the Contractor is to remove and reinstall the existing frame and cover or to furnish and install a new frame and grate. Unless otherwise specified in the Contract Documents, the frames and covers shall conform to the requirements of Detail# 407 for sanitary manholes and Detail# 407 for storm manholes shown in the City's Standard Specifications.

413.6.6 Chimney Seals at Sanitary Sewer Manholes
The requirements of Section 413.5.3 for chimney seals shall also apply to the manhole replacement work.

413.6.7 Surface Restoration
If pavement exists at the manhole replacement location, the Contractor shall restore and compact the subbase and the pavement of that location to meet the requirements of Section 606.2 of the City's Standard Specifications for asphalt pavement and Section 512.2 for concrete pavement. The requirements of Section 606.2.4 for temporary pavement are applicable to this work. If no pavement exists at the manhole location, the Contractor shall restore the surface to its original condition or to the condition specified in the plans and specifications for the described work, in accordance with the requirements of Section 700 of the City's Standard Specifications.

413.6.8 Measurement and Payment
The measurement and payment of manholes removed shall be by the unit, and the quantity measured for payment shall be the number of manhole units actually removed. The measurement and payment of manholes replaced shall be by vertical foot measured from flow line to the bottom of the casting.

Unless specified otherwise in the Contract Documents, the following rules shall apply to the pricing and payment for the specified work of removing and replacing manholes:

1. All costs associated with curb and gutter removal and replacement at manholes are to be included in the separate contract unit prices for such work and are not to be included in the contract unit prices for the manhole removal and replacement work.

2. All costs associated with ground restoration at the manhole replacement work shall be included in the contract unit prices for the manhole removal and replacement work.

3. All costs associated with furnishing and placing aggregate slurry backfill at manholes shall be included in the unit price for the manhole removal and replacement work.

4. All costs associated with temporary pavement at manholes shall be included in the contract unit prices for the manhole removal and replacement work. All cost associated with the permanent pavement replacement shall be paid under a separate unit price for pavement.
restoration.

5. All costs associated with the removal and replacement of manholes shall be included in the contract unit prices for such work. The costs included in the contract unit prices shall include the removal and proper disposal of specified structures, grade rings, frames, covers, and detrimental and native materials; the furnishing and placement of structures, grade rings, frames, and covers; removing and replacing existing pipe, including couplings; placing concrete channelization of the manhole benches; reinstallation of existing frames; and all costs of labor, supervision, equipment, materials, supplies, tools, and incidentals necessary to complete the manhole removal and replacement work in accordance with the specifications and Contract Documents.

413.7 Aggregate Slurry Backfill

413.7.1 General
The Contractor shall use aggregate slurry material for backfilling where any excavations are made through existing pavements for replacements of sewer pipe, manholes, and catch basins or inlets. The aggregate slurry backfill shall conform to the requirements specified in WSWS 8.43.8.

- END OF SECTION 400 -
## SECTION 400

SEWER AND WATER CONSTRUCTION

### DETAILS

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Utility Trench Restoration For Concrete & Resurfaced Pavements
Concrete Caps For Sewers
Rip Rap Detail At Storm Outfalls
Sewer Piling Detail
Manhole Pipe Repair Using Steel & Concrete
Type "3" Standard Precast Catch Basin (sump)
Tracer Wire Design for New or Relay Sewer Construction
Tracer Wire Detail for New Building Laterals in New Subdivisions or Vacant Lots
Tracer Wire Detail for Relay of Building Laterals
Anti-Vortex
Standard Lateral Location
Type 9 Box Manhole
Type 9 Catch Basin Box Manhole
TYPE 1
STANDARD PRECAST MANHOLE FOR SANITARY OR STORM SEwers
NOTES

1. MANHOLE BASE SECTIONS SHALL BE PLACED ON AT LEAST 8" OF BEDDING MATERIAL CONFORMING TO WSWS 8.43.2 FOR DRY SUBGRADE AND WSWS 8.43.6 FOR WET SUBGRADE.

2. CONCRETE AND STEEL REINFORCEMENT SHALL CONFORM TO ASTM C-478 REQUIREMENTS.

3. PRECAST REINFORCED CONCRETE ECCENTRIC CONE TOPS (OFFSET CORBELS) MUST BE USED FOR MANHOLES OF DEPTHS GREATER THAN FIVE (5) FEET.

   IF THE MANHOLE DEPTH, AS MEASURED FROM THE TOP OF THE CASTING FRAME TO THE TOP OF THE MANHOLE BASE SLAB, IS LESS THAN 5 FEET, A FLAT PRECAST REINFORCED CONCRETE MANHOLE TOP SHALL BE USED INSTEAD OF A CORBEL SECTION. THE FLAT MANHOLE TOP SHALL BE PROVIDED WITH AN ECCENTRIC 24" DIAMETER OPENING FOR THE MANHOLE CASTING.

4. PRECAST REINFORCED CONCRETE RISER SECTIONS (BARRELS) MAY BE PLACED WITH TONGUE OR "D" JOINT ENDS EITHER UP OR DOWN.

5. ALL FIELD JOINTS AT MANHOLE PIECES SHALL BE WATERTIGHT AND SHALL BE MADE IN ACCORDANCE WITH WSWS 3.5.4(i).

6. PRECAST REINFORCED CONCRETE ADJUSTING RINGS SHALL BE USED TO ADJUST THE FRAME TO THE REQUIRED GRADE. A MINIMUM OF 4" AND A MAXIMUM OF 10" OF ADJUSTING RINGS AND MORTAR SHALL BE USED FOR THE ADJUSTMENT. MORTAR OR FLEXIBLE SEAL SHALL BE 3/8" MINIMUM THICKNESS BETWEEN EACH RING, RING AND STRUCTURE, AND RING AND FRAME. THE THICKNESS OF EACH GRADE RING SHALL RANGE FROM 2" MINIMUM TO 6" MAXIMUM. GRADE RINGS SHALL BE REINFORCED WITH AT LEAST ONE RING OF STEEL REBAR CENTERED WITHIN THE RING.

7. STEPS SHALL BE PRECAST INTO THE MANHOLE SECTIONS BY THE MANUFACTURER. THE STEPS SHALL MEET THE REQUIREMENTS OF WSWS 6.40.0. THE TOP STEP SHALL BE SET NO LESS THAN THREE (3) INCHES AND NO MORE THAN SIX (6) INCHES BELOW THE TOP OF THE CORBEL. THE STEPS SHALL BE EQUALLY SPACED VERTICALLY AT SIXTEEN (16) INCHES ON CENTER.

8. THE ENTIRE SPACE BETWEEN THE PIPE LEADS AND THE PRECAST MANHOLE WALL SHALL BE MORTARED OR CONCRETED IN PLACE BY THE CONTRACTOR. SOLID CONCRETE BRICKS MORTARED IN PLACE MAY BE USED AS A FILLER FOR STORM MANHOLES.

9. FOR DETAILS OF OUTSIDE DROP TYPE CONNECTIONS OF SEWER PIPE TO SANITARY MANHOLES SEE DETAIL WSWS FILE NO.19

10. ALL SANITARY MANHOLES SHALL HAVE A MONOLITHIC BASE.
TOP VIEW SHOWN WITHOUT CASTING AND ADJUSTING RINGS

DOWN STREAM → MAINLINE SEWER

FINISHED GRADE

2'-3" MAX.

MANHOLE CASTING

PRECAST CONCRETE ADJUSTING RINGS
4" TO 10" OF ADJUSTMENT ONLY

PRECAST REINFORCED CONCRETE MANHOLE FLAT TOP WITH OFFSET OPENING

PRECAST STEP

REINFORCED CONCRETE RISER SECTION (BARREL)

SEE DETAIL 401 & 402 FOR ORIENTATION OF MANHOLE OPENING AND ADDITIONAL INFORMATION

NO SCALE

FLAT TOP DETAIL FOR TYPE 1 SANITARY & STORM MANHOLES

City of Manitowoc ENGINEERING DEPARTMENT

FORM NO. 403

Rev. 4/05
OPENING SHOWN IS FOR AN TYPE "H" CASTING.

TOP VIEW

INLET CASTING

PRECAST CONCRETE ADJUSTING RINGS.
4" TO 10" OF ADJUSTMENT ONLY
2" UP TO 6" THICK RINGS ALLOWED.

PRECAST CONCRETE ADJUSTING RINGS.

FINISHED GRADE

PRECAST CONCRETE ADJUSTING RINGS.

2-5/8 MAX

PRECAST STEP

PRECAST CONC BOTTOM

3" MIN.

18" SUMP

PRECAST CONCRETE ADJUSTING RINGS.

SECTION VIEW

PRECAST REINFORCED CONCRETE
MANHOLE FLAT TOP WITH 2' X 3' OPENING

PRECAST REINFORCED CONCRETE
RISER SECTION (BARREL)
TOTAL HEIGHT VARIABLE

TYPE 4
STORM MANHOLE

City of Manitowoc
ENGINEERING DEPARTMENT

NO SCALE

Rev. 3/10
FORM NO. 404
NOTES

1. CATCH BASIN AND INLET STRUCTURES SHALL BE PLACED ON AT LEAST 8" OF BEDDING MATERIAL CONFORMING TO WSWS.8.43.2 FOR DRY SUBGRADE AND WSWS.8.43.6 FOR WET SUBGRADE.

2. CONCRETE AND STEEL REINFORCEMENT SHALL CONFORM TO ASTM C-477 REQUIREMENTS.

3. PRECAST REINFORCED CONCRETE ADJUSTING RINGS SHALL BE USED TO ADJUST THE FRAME TO THE REQUIRED GRADE. A MINIMUM OF 4" A MAXIMUM OF 10" OF ADJUSTING RINGS AND MORTAR SHALL BE USED FOR THE ADJUSTMENT. MORTAR OR FLEXIBLE SEAL SHALL BE 5/8" MINIMUM THICKNESS BETWEEN EACH RING, RING AND STRUCTURE, AND RING AND FRAME. THE THICKNESS OF EACH GRADE RING SHALL RANGE FROM 2" MINIMUM TO 6" MAXIMUM. USE NO MORE THAN TWO (2) OF THE 2" SIZE OF GRADE RINGS PER STRUCTURE. GRADE RINGS SHALL BE REINFORCED WITH AT LEAST ONE RING OF STEEL REBAR CENTERED WITHIN THE RING. SPLIT RINGS ARE NOT ALLOWED.


5. THE ENTIRE SPACE BETWEEN THE PIPE LEADS AND THE PRECAST CATCH BASIN OR INLET SHALL BE MORTARIZED OR CONCRETED IN PLACE BY THE CONTRACTOR. SOLID CONCRETE BEAMS MAY BE USED AS A FILLER.

6. THE FRAME OF THE CATCH BASIN (OR INLET) SHALL NOT EXTEND MORE THAN 1 1/2" BEYOND THE INNER OR OUTER EDGES OF THE CATCH BASIN (OR INLET) STRUCTURE.

NO SCALE

City of Manitowoc
ENGINEERING DEPARTMENT

TYPE 3
STANDARD PRECAST INLET

Rev. 3/10
FORM NO. 405
TYPICAL SECTION SHOWING
BEDDING AND BACKFILL REQUIREMENTS
FOR SANITARY AND STORM SEWER

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<td>24&quot; &amp; OVER</td>
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<tr>
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<td>12&quot; &amp; UNDER</td>
<td>4&quot;</td>
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<tr>
<td>FRAME</td>
<td>COVER</td>
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<tr>
<td>R-1550-A</td>
<td>TYPE &quot;B&quot;</td>
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<tr>
<td>R-2050</td>
<td>OPEN GRATE</td>
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<tr>
<td>R-2560-E</td>
<td>BEE-HIVE GRATE</td>
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</table>

**STANDARD MANHOLE CASTINGS R-1550-A**

NEENAH FOUNDRY CATALOG "R" 12TH EDITION (1999) OR APPROVED EQUAL.

SANITARY SEWER-MACHINED TO RECEIVE A 1\(\frac{1}{4}\)" T-GASKET. DETAIL PER NEENAH FOUNDRY DRAWING 45512.

TYPE "B" COVER WITH TWO CONCEALED PICK HOLES.

STORM SEWER

NON ROCKING DESIGN TYPE "B" COVER WITH TWO OPEN PICK HOLES.

OPEN GRATE DESIGN R-2050 SHALL BE A TYPE "C" COVER.

BEE-HIVE CASTING & GRATE SHALL BE R-2560-E.

A STANDARD CASTING SHALL BE USED FOR MANHOLES LARGER THAN FOUR FEET IN DIAMETER.
NEENAH R-1916-C WATERTIGHT MANHOLE FRAME WITH BOLTED COVER

BOLT HOLE (4 REQUIRED)

CONCEALED PICK HOLE (2 REQUIRED)

23"

1-1/2"

20 1/2"

25 1/2"

36"

STANDARD FRAME & COVER FOR SANITARY MANHOLE IN SUBAQUEOUS OR BURIED CONDITIONS

City of Manitowoc

ENGINEERING DEPARTMENT

No Scale

FORM NO.
408

Rev. 4/05
RAENAHR FRAME & GRATE R-3067-R (DIAGONAL) DIMENSIONED ABOVE SHALL BE USED UNLESS INDICATED OTHERWISE IN THE CONTRACT DOCUMENTS.
NEENAH R-3290-A FRAME & GRATE SHALL BE USED AT CATCH BASINS LOCATED WITHIN DRIVEWAY OPENINGS

STANDARD FRAME & GRATE FOR DRIVEWAY CATCH BASINS & INLETS

Rev. 4/05
FORM NO. 410
NOTES:
1. THE MAXIMUM DEPTH OF THE STRUCTURE SHALL BE THREE (3') FEET.
NOTES:

1. HINGED GRATES REQUIRED FOR PIPES OF 24" DIAMETER OR GREATER.

2. GRATE TO BE HELD IN PIPE WITH 4 1/2" GRADE 5 BOLTS.

3. ENTIRE UNIT TO BE PRIMER COATED WITH "RUSTOLEUM GRADE" RED PRIMER.

A VERTICAL HINGED LOCKABLE BAR SHALL BE PROVIDED. THIS LOCKABLE BAR SHALL BE IN ADDITION TO THE VERTICAL REINFORCING BAR REQUIRED FOR GRATES 24" IN DIAMETER OR GREATER. THE END OF THE LOCKABLE BAR SHALL HAVE A 1-1/2" RADIUS, TO PERMIT ITS USE TO RETAIN THE HINGED SECTION OF THE GRATE IN AN OPEN POSITION OF AT LEAST 110 DEGREES. THE LENGTH OF THE BAR SHALL BE BASED ON THE SIZE OF THE GRATE BEING FURNISHED.

NO SCALE

HINGED GRATE FOR
STORM SEWER OUTFALLS
NOTES:

1. 6" PERFORATED PIPE TO BE CONNECTED TO A DOWNSTREAM CATCH BASIN OR INLET.

2. SLOPE ON 6" PIPE TO BE A MINIMUM OF 0.5%.

3. PIPE TO BE 6" PVC OR 6" CORRUGATED HDPE.

4. SUMP PUMP LINES SHALL NOT BE CONNECTED TO UNDERDRAIN PERFORATED PIPE.

5. PROVIDE CLEANOUT RISERS EVERY 300' MAXIMUM SPACING AND AT UPSTREAM END OF PIPE.

6. THE PERFORATED PIPE COULD BE FURNISHED WITH AN FILTER FABRIC SOCK IN LIEU OF THE FILTER FABRIC WRAPPED TRENCH.
NOTES:
1. 6" PIPE TO BE CONNECTED TO A DOWNSTREAM CATCH BASIN OR INLET.
2. SLOPE ON 6" PIPE TO BE A MINIMUM OF 0.5%.
3. PIPE TO BE 6" PVC (SDR-35)
4. 6" INLINE WYES OR TEES REQUIRED FOR NEW CONSTRUCTION.
5. PROVIDE CLEANOUT RISERS EVERY 300' MAXIMUM SPACING AND AT UPSTREAM END OF PIPE.
6. INLET CONNECTION TO BE 12" ABOVE DISCHARGE PIPE.
1. ALL STORM LATERALS TO BE 6" PVC (SDR-35)
2. ALL WYES OR TEES SHALL BE INLINE FOR NEW CONSTRUCTION. SADDLES CAN BE USED WHEN SEWER MAIN IS EXISTING.
3. ALL STORM LATERALS TO BE LAID AT 1.0% MINIMUM.
WHEN SAW CUTTING THE PAVEMENT FOR TRENCH RESTORATION, ALL SAW CUTS SHALL BE MADE PARALLEL OR PERPENDICULAR TO THE CENTERLINE OF THE TRENCH. PARALLEL CUTS SHALL BE A MINIMUM LENGTH OF 20 FEET AND PERPENDICULAR CUTS SHALL BE A MINIMUM OF 3 FEET IN LENGTH.
WHEN SAW CUTTING THE PAVEMENT FOR TRENCH RESTORATION, ALL SAW CUTS SHALL BE MADE PARALLEL OR PERPENDICULAR TO THE CENTERLINE OF THE TRENCH.

PARALLEL CUTS SHALL BE A MINIMUM LENGTH OF 20 FEET AND PERPENDICULAR CUTS SHALL BE A MINIMUM OF 3 FEET IN LENGTH. (SEE FORM 416)
PROPOSED BUILDING FOOTING

COMPACTED GRANULAR FILL
COMPACTION 95%
MODIFIED PROTOR

TO BE DETERMINED BY ENGINEER

FORMED WALL (TYP.)

SEWER SPRING LINE

*5 REBAR AT 18" ON CENTER

6 BAG CONCRETE

SOLID GROUND OR STONE MATERIAL, EXISTING BEDDING TO REMAIN.

EXTEND THE CAP A MINIMUM OF 10 FEET PAST THE OUTSIDE OF BUILDING WALLS.

TYPICAL CONCRETE CAP
OVER SEWER PIPE
SECTION A-A'

SEWER PIPE

PIPE BEDDING STONE

ENDWALL LENGTH VARIES

PLACE RIP RAP LEVEL WITH FLOWLINE OF APRON

GEOTEXTILE FILTER FABRIC

6''

L

MEDIUM/HEAVY RANDOM RIPRAP WITH FILTER FABRIC AT STORM OUTFALLS
(CONCRETE OR C.M.P. ENDWALL)

NO SCALE

RIP RAP DETAIL
AT STORM OUTFALLS

Pipe Dia.

<table>
<thead>
<tr>
<th>Pipe Dia.</th>
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<tbody>
<tr>
<td>8''-27''</td>
<td>10'</td>
</tr>
<tr>
<td>30''-48''</td>
<td>15'</td>
</tr>
<tr>
<td>&gt; 48''</td>
<td>25'</td>
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</tbody>
</table>
SEWER PILING DETAIL

3/4" DIA. BOLTS
STAINLESS STEEL
w/WASHERS
& NUTS (TYP.)

2"X6" TREATED
LUMBER
(TYPICAL)

TREATED TIMBER
PILING

5 TON PER PILE
BEARING CAPACITY
PROBABLE MAXIMUM
LENGTH = 16'-20'

6'

4'

NO SCALE

City of Manitowoc
ENGINEERING DEPARTMENT
FORM NO. 420
Rev. 4/05
MANHOLE PIPE REPAIR

**4** REPAIR TIES DRILLED INTO EXISTING CONCRETE PIPE

6"  24½"  6"  6"

1/8" STEEL PLATE ANCHORED AT 4 CORNERS

6 BAG MIX CONCRETE WITH 2 LAYERS OF PAVING MESH

EXISTING RCP
NOTES

1. CATCH BASIN AND INLET STRUCTURES SHALL BE PLACED ON AT LEAST 8" OF BEDDING MATERIAL CONFORMING TO WSDS.8.43.2 FOR DRY SUBGRADE AND WSDS.8.43.6 FOR WET SUBGRADE.

2. CONCRETE AND STEEL REINFORCEMENT SHALL CONFORM TO ASTM C-476 REQUIREMENTS.

3. PRECAST REINFORCED CONCRETE ADJUSTING RINGS SHALL BE USED TO ADJUST THE FRAME TO THE REQUIRED GRADE. A MINIMUM OF 12" OF ADJUSTING RINGS AND MORTAR SHALL BE USED FOR THE ADJUSTMENT. MORTAR OR FLEXIBLE SEAL SHALL BE 3/8" MINIMUM THICKNESS BETWEEN EACH RING RING AND STRUCTURE AND RING AND FRAME. THE THICKNESS OF EACH GRADE RING SHALL BE FROM 1" MINIMUM TO 6" MAXIMUM. USE NO MORE THAN TWO (2) OF THE 2" SIDE OF GRADE RINGS PER FRAME. GRADE RINGS SHALL BE REINFORCED WITH AT LEAST ONE RING OF STEEL REBAR CENTERED WITHIN THE RING. SPLIT RINGS ARE NOT ALLOWED.


5. THE ENTIRE SPACE BETWEEN THE PIPE LEADS AND THE PRECAST CATCH BASIN OR INLET SHALL BE MORTARIZED OR CONCRETE IN PLACE BY THE CONTRACTOR. SOLID CONCRETE BRICKS MAY BE USED AS A FILLER.

6. THE FRAME OF THE CATCH BASIN (OR INLET) SHALL NOT EXTEND MORE THAN 1-1/2" BEYOND THE INNER OR OUTER EDGES OF THE CATCH BASIN (OR INLET) STRUCTURE.

NO SCALE

TYPE 3
STANDARD PRECAST CATCH BASIN
(SUMP)
1. Tracer wire shall be 12 gauge (type THWN or THHN) solid copper wire with a plastic corrosion protective coating.

2. Wire coloring shall be blue for water, green for sanitary, and brown for storm.

3. Tracer wire shall be strapped to the top of the pipe wall by means of a minimum of two complete wraps of electrical tape at intervals of a maximum of 14 feet and at all bends. The wires shall have some slack to allow for bends in laying of the piping.

4. If splicing is required the use of a direct bury, waterproof splice kit (3M Scotchlok 562 with Scotch Lok tape 33 and Scotch coat, or equivalent) is required. A waterproof wire nut, sized according to wire size and the number of conductors (ideal Twister DB plus or equivalent) is also acceptable. The contractor shall submit product to engineer for approval.

5. When storm and sanitary laterals are installed in the same trench, individual corresponding tracing wires are required.

6. To preserve continuity, if a tracer wire is damaged or severed, it shall be repaired or replaced immediately. See note 4.

7. Proof of continuity shall be required upon installation, repair or replacement of tracer wire.

8. For protection against damage, the tracer wire(s) shall extend to daylight through a 1" PVC schedule 40 conduit with access through a removable threaded galvanized metal cap. See form 424 or 425.

City of Manitowoc
Engineering Department

No Scale

Tracer Wire Design for New or Relay Sewer Construction

Rev. 2/07
FORM NO. 423
STANDARD TRACER WIRE DETAIL FOR STORM AND SANITARY LATERALS WITHIN THE STREET R/W OR UTILITY EASEMENT, INSTALLED IN NEW SUBDIVISIONS OR VACANT LOTS.

1. TRACER WIRE SHALL BE 12 GAUGE (TYPE THWN OR THHN) SOLID COPPER WIRE WITH A PLASTIC CORROSION PROTECTIVE COATING.

2. WIRE COLORING SHALL BE BLUE FOR WATER, GREEN FOR SANITARY AND BROWN FOR STORM.

3. TRACER WIRE SHALL BE STRAPPED TO THE TOP OF THE PIPE WALL BY MEANS OF A MINIMUM OF TWO COMPLETE WRAPS OF ELECTRICAL TAPE AT INTERVALS OF A MAXIMUM OF 14 FEET AND AT ALL BENDS. THE WIRES SHALL HAVE SOME SLACK TO ALLOW FOR BENDS IN LAYING OF THE PIPING.

4. IF SPLICING IS REQUIRED THE USE OF A DIRECT BURY, WATERPROOF SPLICE KIT (3M SCOTCHLOC 562 WITH SCOTCHLOC TAPE 33 AND SCOTCH COAT, OR EQUIVALENT) IS REQUIRED. A WATERPROOF WIRE NUT, SIZED ACCORDING TO WIRE SIZE AND THE NUMBER OF CONDUCTORS (IDEAL TWISTER DB PLUS OR EQUIVALENT) IS ALSO ACCEPTABLE. THE CONTRACTOR SHALL SUBMIT PRODUCT TO ENGINEER FOR APPROVAL.

5. WHEN STORM AND SANITARY LATERALS ARE INSTALLED IN THE SAME TRENCH, INDIVIDUAL CORRESPONDING TRACING WIRES ARE REQUIRED.

6. TO PRESERVE CONTINUITY, IF A TRACER WIRE IS DAMAGED OR SEVERED, IT SHALL BE REPAIRED OR REPLACED IMMEDIATELY. SEE NOTE 4.

7. PROOF OF CONTINUITY SHALL BE REQUIRED UPON INSTALLATION, REPAIR OR REPLACEMENT OF TRACER WIRE.

8. FOR PROTECTION AGAINST DAMAGE, THE TRACER WIRE(S), SHALL EXTEND TO DAYLIGHT THROUGH A 1" PVC SCHEDULE 40 CONDUIT WITH ACCESS THROUGH A REMOVABLE THREADED GALVANIZED METAL CAP.

9. IF THE SEWER MAIN DOES HAVE A TRACER WIRE INSTALLED, SPLICE LATERAL WIRE TO THE MAIN WIRE USING A WATERPROOF SPLICE KIT OR WATERPROOF WIRE NUT. IF THE SEWER MAIN DOES NOT HAVE A TRACER WIRE, TERMINATE LATERAL WIRE AT THE SEWER MAIN AND INSTALL A WATERPROOF END CAP/WIRE NUT.
STANDARD TRACER WIRE DETAIL FOR RELAYING OF STORM AND SANITARY LATERALS WITHIN THE STREET R/W OR UTILITY EASEMENT.

1. TRACER WIRE SHALL BE 12 GAUGE (TYPE THWN OR THHN) SOLID COPPER WIRE WITH A PLASTIC CORROSION PROTECTIVE COATING.

2. WIRE COLORING SHALL BE BLUE FOR WATER, GREEN FOR SANITARY AND BROWN FOR STORM.

3. TRACER WIRE SHALL BE STRAPPED TO THE TOP OF THE PIPE WALL BY MEANS OF A MINIMUM OF TWO COMPLETE WRAPS OF ELECTRICAL TAPE AT INTERVALS OF A MAXIMUM OF 14 FEET AND AT ALL BENDS. THE WIRES SHALL HAVE SOME SLACK TO ALLOW FOR BENDS IN LAYING OF THE PIPING.

4. IF SPLICING IS REQUIRED THE USE OF A DIRECT BURY, WATERPROOF SPLICE KIT (3M SCOTCHLOK 562 WITH SCOTCHLOK TAPE 33 AND SCOTCH COAT, OR EQUIVALENT) IS REQUIRED. A WATERPROOF WIRE NUT, SIZED ACCORDING TO WIRE SIZE AND THE NUMBER OF CONDUCTORS (IDEAL TWISTER DB PLUS OR EQUIVALENT) IS ALSO ACCEPTABLE. THE CONTRACTOR SHALL SUBMIT PRODUCT TO ENGINEER FOR APPROVAL.

5. WHEN STORM AND SANITARY LATERALS ARE INSTALLED IN THE SAME TRENCH, INDIVIDUAL CORRESPONDING TRACING WIRES ARE REQUIRED.

6. TO PRESERVE CONTINUITY, IF A TRACER WIRE IS DAMAGED OR SEVERED, IT SHALL BE REPAIRED OR REPLACED IMMEDIATELY. SEE NOTE 4.

7. PROOF OF CONTINUITY SHALL BE REQUIRED UPON INSTALLATION, REPAIR OR REPLACEMENT OF TRACER WIRE.

8. FOR PROTECTION AGAINST DAMAGE, THE TRACER WIRE(S), SHALL EXTEND TO DAYLIGHT THROUGH A 1" PVC SCHEDULE 40 CONDUIT WITH ACCESS THROUGH A REMOVABLE THREADED GALVANIZED METAL CAP.

9. IF THE SEWER MAIN DOES HAVE A TRACER WIRE INSTALLED, SPLICE LATERAL WIRE TO THE MAIN WIRE USING A WATERPROOF SPLICE KIT OR WATERPROOF WIRE NUT. IF THE SEWER MAIN DOES NOT HAVE A TRACER WIRE, TERMINATE LATERAL WIRE AT THE SEWER MAIN AND INSTALL A WATERPROOF END CAP/WIRE NUT.
NOTE: SPACING BETWEEN SAN. WATER AND STORM LATERALS IS TO BE 2' MINIMUM. ACTUAL SPACING MAY BE GREATER DUE TO VARIATIONS IN DEPTH AND SOIL CONDITIONS. WHEN THE "MEICH" FOR EACH LATERAL IS CONSTRUCTED.

SECTION VIEWED FROM STREET TO LOT

SERVICE LATERAL

EXIST GROUND ELEVATION

2' TYP.

STORM

BACKFILL MATERIAL

WATER

SAN

NATURAL GROUND

STORM SEWER

CURB

WATERMANS

FRONT YARD EASEMENT

R/W

O.W.S.

1/2 TYP. BETWEEN GROUPINGS

SANITARY SEWER

STORM SEWER

LOT X

CURB

PROPOSED STREET

R/W

2' TYP. TO WATER STOP

FRONT YARD EASEMENT

LOT Y

City of Manitowoc

12/29 8th

FORM NO. 428

NO SCALE
NOTE:
MANHOLE OPENING AND STEPS
SHOULD BE LOCATED ON WALL
AWAY FROM LARGER SEWER PIPES AND
AND AWAY FROM VEHICLE TIRE TRAFFIC.

TOP VIEW SHOWN WITHOUT
CASTING AND ADJUSTING RINGS

SEWER

3" MINIMUM

HAUNCHES REQUIRED

SEWER

24" DIA

TYPE J
MANHOLE CASTING

FINISHED GRADE

2" TO 3" MAX.

PRECAST CONCRETE ADJUSTING RINGS
4" TO 10" OF ADJUSTMENT ONLY

PRECAST REINFORCED CONCRETE
MANHOLE FLAT TOP WITH
OFFSET OPENING

PRECAST STEP

REINFORCED CONCRETE
RISE SECTION (BARREL)

STRUCTURE HEIGHT Varies

VARIESAES

NOTE:
PRECAST CONCRETE BASE IS OPTIONAL

SEE DETAIL 401 & 402 FOR ADDITIONAL INFORMATION

NO SCALE

TYPE 9
BOX MANHOLE DETAIL

City of Manitowoc
ENGINEERING DEPARTMENT

Rev. 1/10
FORM NO.
429
TYPE 9
CATCH BASIN BOX MANHOLE

OPENING SHOWN IS FOR AN TYPE "H" CASTING.

PRECAST STEPS

PROVIDE 6" FUTURE LATERAL OPENING

1" MIN.

HAUNCHES REQUIRED

TOP VIEW

FINISHED GRADE

2'-3" MAX

PRECAST CONCRETE ADJUSTING RINGS.
4" TO 10" OF ADJUSTMENT ONLY
2" UP TO 6" THICK RINGS ALLOWED.

PRECAST CONCRETE ADJUSTING RINGS

PRECAST REINFORCED CONCRETE MANHOLE FLAT TOP WITH 2'X 3' OPENING

REINFORCED CONCRETE RISER SECTION (BARREL)
TOTAL HEIGHT VARIABLE

PIPE

1" MIN.

3" MIN.

3" MIN.

PRECAST CONC BOTTOM

SECTION VIEW

NO SCALE

City of Manitowoc
ENGINEERING DEPARTMENT

FORM NO. 430

Rev. 1/10