CITY OF KINDRED
STANDARD SPECIFICATIONS
FOR
CONSTRUCTION

I hereby certify that the attached specifications and details were prepared by me or under my direct supervisions and that I am a duly registered Professional Engineer under the laws of the State of North Dakota.

/S/ 09.07.2022
Brandon Oye, PE Date
City Engineer

This document was originally
issued and sealed by
Brandon Oye,
Registration Number
PE-6873
on 09.07.2022 and the original
document is stored
at Kindred City Hall.

USER NOTES:

These Standard Specifications for Construction have been reviewed by the City Engineer and Public Works Superintendent, and approved by the Kindred City Council. This review and approval does not eliminate the potential for errors or omissions within these documents. If it appears there are errors or omissions in any of the documents, please contact the City Engineer to discuss prior to utilizing those documents.

In addition, these documents were considered the “Standard” on the date they were reviewed and approved. All standards should be updated when possible to reflect best practices in the field of engineering and construction. If those that use these documents feel that the practices listed within these standards are not current, please contact the City Engineer to discuss prior to utilizing those documents.

CITY OF KINDRED
STANDARD SPECIFICATIONS FOR CONSTRUCTION

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31 - EARTHWORK

SECTION 310513 - SOILS FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Subsoil materials.
2. Topsoil materials.

B. Related Requirements:

1. Section 310516 - Aggregates for Earthwork: Coarse and fine aggregate materials.
2. Section 312316.13 - Trenching: Excavating as required for utilities.
3. Section 329300 - Plants: Preparation of subsoil and topsoil, topsoil bedding, trees, plants, ground cover, mulch, fertilizer, pruning, and maintenance.

1.2 REFERENCE STANDARDS

A. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
2. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
3. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Product Data: Submit name of imported materials source.

B. Samples: Submit, in airtight containers, 35-lb. sample of each type of fill to testing laboratory.

1.4 QUALITY ASSURANCE

A. Furnish each subsoil and topsoil material from single source throughout Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subsoil:

1. Type S2:
   a. Excavated and reused material.
   b. Graded.
   c. Free of lumps larger than 3 inches, rocks larger than 6 inches, frost, and debris.
   d. Organic content of less than 3 percent for material placed below structures.
   e. Organic content of less than 5 percent for materials placed within 3 vertical feet of the top of finished pavement subgrades.

B. Topsoil:

1. Type S4:
   a. Excavated and reused material.
   b. Graded.
   c. Free of roots, rocks larger than 1 inch, subsoil, debris, large weeds, and foreign matter.
2. Type S5:
   a. Imported borrow.
   b. Friable loam.
   c. Reasonably free of roots, rocks larger than 1 inch, subsoil, debris, large weeds, and foreign matter.

2.2 SOURCE QUALITY CONTROL

A. Testing and Analysis:

1. Subsoil Material: Comply with ASTM D698 and ASTM D6938.
2. If tests indicate materials do not meet specified requirements, replace material or modify in place and retest.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Excavation:

1. Excavate subsoil and topsoil from designated areas.
2. Strip topsoil to full depth of topsoil in designated areas.
3. Remove excess excavated materials, subsoil, and topsoil not intended for reuse from Site.
4. Remove excavated materials not meeting requirements for subsoil and topsoil materials from Site.

B. Stockpiling:

1. Stockpile excavated material meeting requirements for subsoil and topsoil materials.
2. Stockpile materials on Site at locations as designated by Engineer.
3. Stockpile in sufficient quantities to meet Project schedule and requirements.

4. Separate differing materials with dividers or stockpile apart to prevent intermixing of soil types or contamination.
5. Direct surface water away from stockpile to prevent erosion or deterioration of materials.
6. Stockpile hazardous materials on impervious material and cover to prevent erosion and leaching until they are disposed.

3.2 CLEANING

A. Stockpile:

1. Remove stockpile and leave area in clean and neat condition.
2. Grade Site surface to prevent freestanding surface water.
3. If directed by Engineer, leave unused materials in neat, compact stockpile with slopes not to exceed 4:1.

END OF SECTION 310513

SECTION 310516 - AGGREGATES FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Coarse-aggregate materials.
2. Fine-aggregate materials.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Fill and grading materials.
2. Section 312316.13 - Trenching: Excavating as required for utilities.
3. Section 331413 – Public Utility Distribution Piping: Pipe materials and fittings.
4. Section 331417 - Site Water Service Utility Laterals: Pipe materials and fittings.
5. Section 333111 – Public Sanitary Sewerage Gravity Piping: Pipe materials and accessories normally encountered with gravity sanitary piping.

1.2 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.

B. ASTM International:

1. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
3. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
4. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
5. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Product Data: Submit name of imported materials source.

B. Samples: Submit, in airtight containers, 35-lb. sample of each type of Type of aggregate to testing laboratory.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate materials from single source throughout Work.

B. Perform Work according to North Dakota Department of Transportation standards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Coarse Aggregate:

1. Type A1 (base): Conforming to North Dakota Department of Transportation Class 5, see Table 816-01 of the Standard Specifications for Road and Bridge Construction with the following revisions:

Sieve Size	Percent Passing
No. 200	6-10

2. Type A2 (recycled base): Conforming to North Dakota Department of Transportation Salvaged Base Course, see Section 817 of the Standard Specifications for Road and Bridge Construction.
3. Type A3 (surface): Conforming to North Dakota Department of Transportation Class 13, see Table 816-01 of the Standard Specifications for Road and Bridge Construction.
4. Type A4 (drainage): Conforming to North Dakota Department of Transportation Class 7, see Table 816-01 of the Standard Specifications for Road and Bridge Construction.
5. Coarse Aggregate Type A5 (pipe bedding and cover): Conforming to North Dakota Department of Transportation Class 3, see Table 816-01 of the Standard Specifications for Road and Bridge Construction.
6. Coarse Aggregate Type A6 (crushed): Washed, crushed rock with nominal size of 1.25 inches.

B. Fine Aggregate:

1. Type A7 (Sand): Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded according to ASTM D2487 Group Symbol SW; within the following limits:
   a. Percent Passing per Sieve Size:
      1) No. 4 100.
      2) No. 14 10 to 100.
      3) No. 50 5 to 90.
      4) No. 100 4 to 30.
      5) No. 200 Zero.

2.2 SOURCE QUALITY CONTROL

A. Testing and Analysis:

1. Aggregate Material: Comply with AASHTO M 147.
2. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Stockpiling:

1. Stockpile materials on Site at locations as designated by Engineer.
2. Stockpile in sufficient quantities to meet Project schedule and requirements.
3. Separate different aggregate materials with dividers or stockpile apart to prevent intermixing of aggregate types or contamination.
4. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 CLEANING

A. Stockpile:

1. Remove stockpile and leave area in clean and neat condition.
2. Grade Site surface to prevent freestanding surface water.

END OF SECTION 310516

SECTION 312316.13 - TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Section 310513 - Soils for Earthwork: Soils for fill.
2. Section 310516 - Aggregates for Earthwork: Aggregates for fill.
3. Section 331413 - Public Water Utility Distribution Piping: Water piping and bedding.
4. Section 331417 - Site Water Service Utility Laterals: Pipe materials and fittings.
5. Section 333111 – Public Sanitary Sewerage Gravity Piping: Pipe materials and accessories normally encountered with gravity sanitary piping.

1.2 REFERENCES

A. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
2. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 QUALIFICATIONS

A. Prepare excavation under the direction of a Competent Person in accordance with OSHA standards and comply with requirements of OSHA 29 CFR, Part 1926, Subpart P, requirements for excavation and trenching operations.

B. OSHA requires a Registered Professional Engineer to evaluate slopes or excavations over 20 feet in depth.

1.5 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS - Not Used

2.1 FILL MATERIALS

A. Subsoil Fill: Type S2 as specified in Section 310513 - Soils for Earthwork.

B. Structural Fill: Type A1 as specified in Section 310516 - Aggregates for Earthwork.

C. Granular Fill: Type A5 as specified in Section 310516 – Aggregates for Earthwork.

PART 3 - EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Local Utility Line Information service North Dakota One Call at 800-795-0555 or 811 within the statutory timelines before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

A. Excavate subsoil required for utilities.

B. Remove lumped subsoil, boulders, and rock up to 1/6 cubic yard, measured by volume.

C. Perform excavation within 24 inches of existing utility service in accordance with utility's requirements.

D. Do not advance open trench more than 100 feet ahead of installed pipe.

E. Cut trenches sufficiently wide to enable installation, meet requirements of compaction equipment, and allow inspection. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 24 inches wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

H. Do not interfere with 45 degree bearing splay of foundations or structures.

I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.

J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill Type S2 and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

M. Correct over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

N. Remove excess subsoil not intended for reuse, from site.

1. If directed by Engineer, stockpile excess subsoil in area designated on site in accordance with Section 310513.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place material in continuous layers as follows:

1. Subsoil Fill: Maximum 12 inches loose depth.
2. Structural Fill: Maximum 6 inches compacted depth.
3. Granular Fill: Maximum 6 inches compacted depth.

D. Employ placement method that does not disturb or damage utilities in trench, and surrounding structures.

E. Maintain moisture content of fill materials to attain required relative compaction.

F. Do not leave more than 50 feet of trench open at end of working day, unless determined by the Engineer that site conditions are unsatisfactory.

G. Protect open trench to prevent danger to Owner and the public.

3.6 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.04 feet from required elevations.

B. Top Surface of General Backfilling: Plus or minus 0.08 feet from required elevations.

3.7 FIELD QUALITY CONTROL

A. Perform laboratory material tests in accordance with ASTM D698.

B. Perform in place compaction tests in accordance with the following:

1. Density and Moisture Tests: ASTM D6938

C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

D. Frequency of Tests:

1. One test along Utility trenches at maximum 500 foot intervals per 2 feet of vertical lift.
2. Two tests per structure (manhole) at ⅓ and ⅔ depth.
3. One test per service trench.

3.8 PROTECTION OF FINISHED WORK

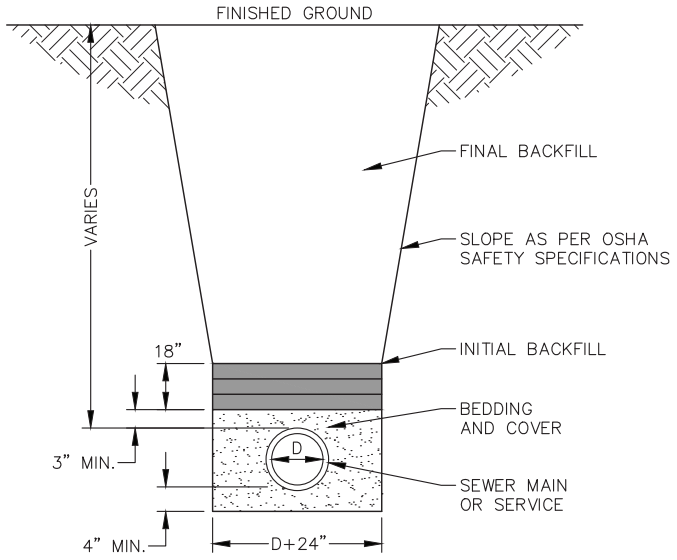
A. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.9 SCHEDULE

A. Water and Sanitary Piping:

1. Cover pipe and bedding to subgrade elevation with:
   a. Fill Type S2 for combined mainline and service trench installations.
   b. Fill Type A5 for individual service trench installations.
2. Compact uniformly to minimum 95 percent of Standard Proctor (ASTM 698) maximum dry density. Moisture shall be not less than 1 percentage point below, nor more than 5 percentage points above optimum moisture content.

END OF SECTION 312316.13



SANITARY SEWER MAIN OR SERVICE TRENCH		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 312316.13	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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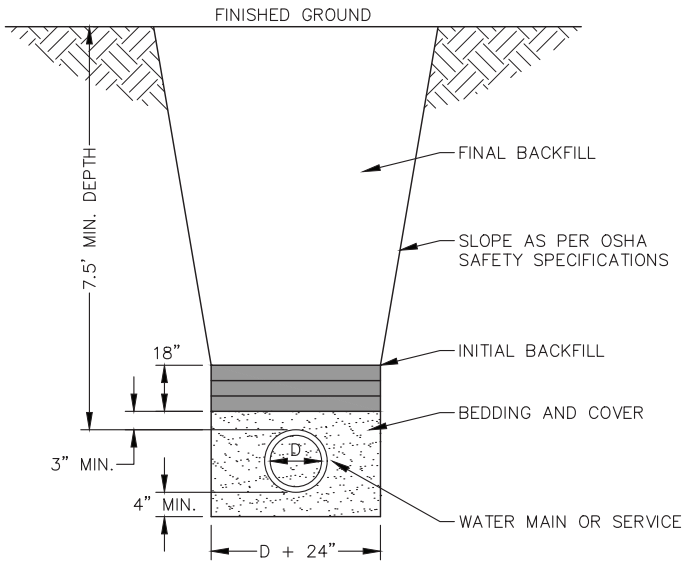

WATER MAIN OR SERVICE TRENCH		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 312316.13	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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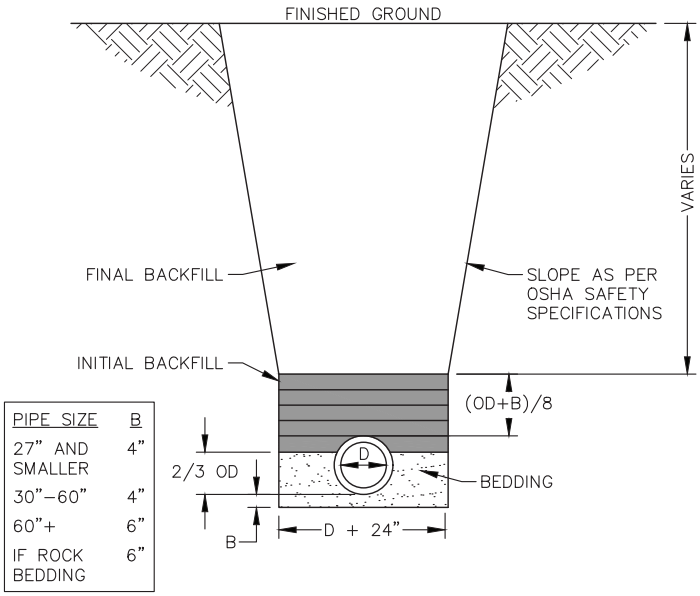

PIPE SIZE	B
27" AND SMALLER	4"
30"–60"	4"
60"+	6"
IF ROCK BEDDING	6"

RCP STORM SEWER TRENCH		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 312316.13	DRAWING No. 3	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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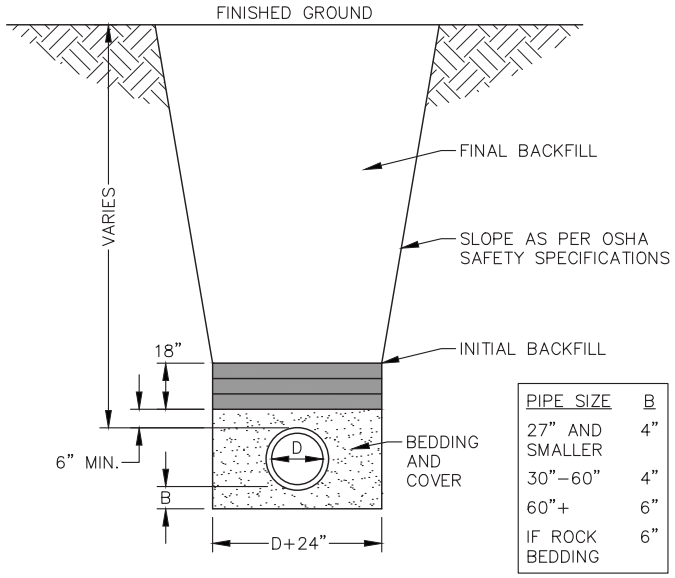

PIPE SIZE	B
27" AND SMALLER	4"
30"–60"	4"
60"+	6"
IF ROCK BEDDING	6"

NOTE:
1. CS PIPE IS CONSIDERED A FLEXIBLE PIPE.

FLEXIBLE PIPE STORM SEWER TRENCH		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 312316.13	DRAWING No. 4	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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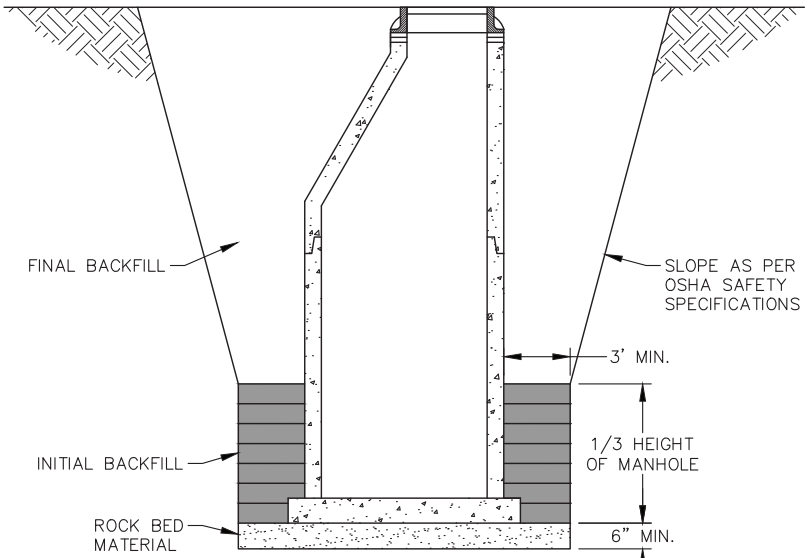

NOTE:
1. DETAIL SHALL BE USED FOR ALL MANHOLES AND CATCH BASINS.

MANHOLE/CATCH BASIN TRENCH		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 312313.13	DRAWING No. 5	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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33 - UTILITIES

SECTION 330110.58 - DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Disinfection of potable water distribution system.
2. Testing and reporting of results.

B. Related Requirements:
1. Section 331417 - Site Water Service Utility Laterals: Pipe materials and fittings.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA B300 - Hypochlorites.
2. AWWA B302 - Ammonium Sulfate.
3. AWWA B303 - Sodium Chlorite.
4. AWWA C651 - Disinfecting Water Mains.

1.3 SUBMITTALS

A. Disinfection Procedure:

1. Submit description of procedure, including type of disinfectant and calculations indicating quantities of disinfectants required to produce specified chlorine concentration.

B. Product Data: Submit manufacturer information for proposed chemicals and treatment doses.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Certify that final water complies with disinfectant quality standards of the North Dakota Department of Environmental Quality.

E. Test and Evaluation Reports: Indicate testing results comparative to specified requirements.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

G. Qualifications Statements:

1. Submit qualifications for manufacturer and applicator.

1.4 CLOSEOUT SUBMITTALS

A. Disinfection Report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and completion.
3. Test locations.
4. Name of person collecting samples.
5. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
6. Date and time of flushing start and completion.
7. Disinfectant residual after flushing in ppm for each outlet tested.

B. Bacteriological Report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Submit bacteriologist's signature and authority associated with testing.

1.5 QUALITY ASSURANCE

A. Perform Work according to AWWA C651.

B. Perform Work according to North Dakota Department of Environmental Quaility standards.

C. Testing Laboratory
Fargo Cass Public Health
435 14th Avenue S
Fargo, ND 58103
701-298-6986

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. All products that may come into contact with water intended for use in a public water system shall meet American National Standards Institute (ANSI)/National Sanitation Foundation International (NSF) Standards 60 and 61. A product will be considered as meeting these standards if so

certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify such products.

B. Chemicals:

1. Hypochlorite: Comply with AWWA B300.
2. Ammonium Sulfate: Comply with AWWA B302.
3. Sodium Chlorite: Comply with AWWA B303.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.

B. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

3.2 PREPARATION

A. Coordination with City:

1. City contact for all coordination issues shall be Public Works Superintendent.

3.3 INSTALLATION

A. Provide required equipment to perform Work of this Section.

B. Introduce treatment into piping system.

C. Maintain disinfectant in system for 24 hours.

D. Flush, circulate, and clean until required disinfectant quality standard has been achieved using municipal domestic water.

E. Replace permanent system devices that were removed for disinfection.

3.4 FIELD QUALITY CONTROL

A. Disinfection, Flushing, and Sampling:

1. Disinfect pipeline installation according to AWWA C651.
2. Use of liquid chlorine is not permitted.

3. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
4. Disposal:
   a. Legally dispose of chlorinated water.
   b. If chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
5. After final flushing and before pipeline is connected to existing system or placed in service, certify that disinfectant level meets quality standards of the North Dakota Department of Environmental Quality.
6. Provide sampling in accordance with the latest AWWA C651 standard with the frequency of one of the following options:
   a. Option A: Take an initial sample and then resample again after a minimum of 16 hours per 1,200 feet of new water main, plus one set from the end of the line and at least one set from each branch greater than one pipe length. All sets of samples must pass for the main to be approved for release.
   b. Options B: Let the water main sit for a minimum of 16 hours without any water use. Collect two sets of samples a minimum of 15 minutes apart while the sampling taps are left running and without flushing the main. Sets of samples shall be collected every 1,200 feet of the new water main plus one set from the end of the line and at least one set from each branch greater than one pipe length. All sets of samples must pass for the main to be approved for release.

END OF SECTION 330110.58

SECTION 330130.11 - TELEVISION INSPECTION OF SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipeline flushing and cleaning.
2. Television inspection of sanitary sewer and storm sewer pipelines.
3. Television inspection of sanitary sewer services.
4. Audio-video recording of pipeline interior.

1.2 DEFINITIONS

A. DVD: An optical disc storage format, offering higher storage capacity than compact discs (CDs) while having the same dimensions.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Television Inspection of Sewers:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes pipeline flushing and cleaning, bypass pumping, television inspection, and audio-video recording of pipeline.

1.4 COORDINATION

A. Coordinate Work of this Section with City of Kindred.

1. City contact for all coordination issues shall be Public Works Superintendent.

1.5 SUBMITTALS

A. DVDs:

1. Submit three copies of completed narrated color DVDs identified by Project name, street name, right-of-way property name, and manhole numbers.
2. DVDs become property of Owner.
3. USB flash drives may be substituted for DVD’s with the permission of the owner.

B. Inspection Logs:

1. Submit cleaning and television inspection logs for each section of sewer line to be rehabilitated.
2. Include following minimum information:
   a. Stationing and location of lateral services, wyes, or tees.
   b. Date and clock time references.
   c. Pipe joints.
   d. Flow direction.
   e. Footage readings in feet.
   f. Screenshots of all defects (thumbnails).
   g. Infiltration/inflow defects.
   h. Cracks.
   i. Leaks.
   j. Offset joints.
   k. Other information to access condition of sewer.

C. Submit specific detailed description of proposed bypass pumping system, including written description of plan addressing schedule, quantity, capacity, and location of pumping equipment.

D. Submit spill plan to address any spills that might occur.

1.6 QUALITY ASSURANCE

A. Perform Work according to NASSCO standards.

PART 2 - PRODUCTS

2.1 DVDs

A. Description: Digital video formatted discs.

B. Audio track containing simultaneously recorded narrative commentary and evaluations of videographer, describing in detail condition of pipeline interior.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify location of sewer pipelines to be inspected.

3.2 PREPARATION

A. Cleaning:
   1. Flush and clean pipeline to remove sludge, dirt, sand, stone, grease, and other materials to ensure clear view of interior condition.

B. Debris:

   1. Remove and dispose of debris off site.

C. Bypassing:

   1. Furnish temporary bypass pumping system around Work area for time required to complete television inspection.
   2. Provide standby pump of equal or greater capacity at bypass location.
   3. Provide safety precautions, including barricades, lights, and flaggers..

D. Flow Control:

   1. Provide temporary flow control as needed during televising operation.

3.3 APPLICATION

A. Closed-Circuit Television (CCTV) Camera System:

   1. Use cameras specifically designed and constructed for closed-circuit sewer line inspection.
   2. Use camera equipment with pan-and-tilt capability to view each lateral connection at multiple angles.
   3. Produce a clear, in-focus picture of the entire periphery of the inside of the pipe for a minimum distance of six feet.

3.4 FIELD QUALITY CONTROL

A. Pipeline Inspection:

   1. Audio-video record sections of sewer pipeline between designated manholes.
   2. Tilt camera up to view interior of manholes at the beginning and end of each segment televised.
   3. Maintain accurate footage counter which shall display on the monitor at all times.
   4. Begin footage measurements in at the interior face of the manhole wall.
   5. Center camera inside pipe keeping it above the flow as reasonably possible.
   6. Identify and record locations of flat grades, dips, deflected joints, open joints, broken pipe, protrusions into pipeline, and points of infiltration.
   7. Locate and record service connections.
   8. Record locations of pipeline defects, connection horizontal distance in feet, and direction from manholes.

9. Video record with pipe section plugged, as to view 100 percent of inside pipe diameter; use flow-control methods as specified for bypass pumping system to eliminate surcharging and reduce flow.
10. Notify the Engineer of the time and date of proposed work if nighttime work is necessary.
11. Use flow-control methods as specified for bypass pumping system to eliminate surcharging and to reduce flow.
12. Re-televise the sewer and provide a new recording of good quality, if recording are of such poor quality that the Engineer is unable to evaluate the condition of the sewer, locate sewer service connections, or verify cleaning.

B. Services

1. Existing Service Connections:
   a. Televise from wye to connection to termination of new pipe material.
   b. Utilize lateral launching equipment (from sewer main).
2. New Services:
   a. Televise sewer services from wye to televising riser.
   b. Use push camera through televising riser or lateral launching equipment.

C. Site Cleaning:

1. Clean and restore the work areas prior to leaving the site.

D. Retrieval of Materials and Equipment:

1. Remove materials and equipment that may have become lodged in the sewer from the cleaning and televising operation.

END OF SECTION 330130.11

SECTION 330130.86 - MANHOLE RIM ADJUSTMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Raising manhole frames and covers.
2. Replacing manhole frames and covers.

B. Related Requirements:

1. Section 333111 - Public Sanitary Sewerage Gravity Piping: Execution requirements for sewerage piping as required by this Section.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Adjust Manhole Cover:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes installing adjustment ring insert and sealant.

C. Adjust Manhole Casting:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes removal of old frame and cover, reinstalling existing frame and cover, adding or removing manhole riser rings, chimney seal, and joint sealant.

D. Replace Manhole Casting:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes removal of old frame and cover, installing new frame and cover, manhole riser rings, chimney seal, and joint sealant

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
2. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
3. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
4. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
5. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
6. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
7. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer information for manhole covers and riser rings construction, features, configuration, and dimensions.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.5 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual grade-adjusted elevation of manholes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.7 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.

2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 FRAMES AND COVERS

A. Manufacturers:

1. Neenah Foundry
   2121 Brooks Avenue
   Neenah, WI 54956
2. EJ (East Jordan Iron Works)
   301 Sprint St
   East Jordan, MI 49727
3. or equal.

B. Description:

1. Material:
   a. Cast iron.
   b. Comply with ASTM A48/A48M, Class 30B.
2. Lid:
   a. Bearing Surface: Machined flat.
   b. Configuration: Removable.
   c. Solid with closed pickholes.
   d. Self-sealing gasket.
   e. Marked “Sanitary Sewer” or “Storm Sewer”.
   f. Security: None, unless noted on plans.
3. Frame:
   a. In asphalt pavement or non-paved areas.
      1) Neenah R-1733
      2) EJ 1205Z2.
   b. In concrete pavement: Self leveling
      1) Neenah R-1955-1
      2) EJ 3025

2.2 RISER RINGS

A. Riser Rings:

1. Thickness: 2 to 6 Inches:
   a. Precast concrete.

2.3 COVER ADJUSTMENT RINGS

A. Manufacturers:

1. Neenah Foundry
   2121 Brooks Avenue
   Neenah, WI 54956
2. Ess Brothers & Sons, Inc.
   9350 County Road 19
   Loretto, MN 55357
3. or equal.

B. Solid gray or ductile iron. Steel is not allowed.

C. Locking or non-locking to match existing frame and cover.

D. Assorted thicknesses (1/2" to 1") as necessary to achieve final grade.

E. Apply EBS Super Glue adhesive, per manufacturer's recommendations. No traffic for a minimum of 8 hours after glue application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify and locate manholes requiring grade adjustment.

3.2 EXISTING WORK

A. Saw cut existing paving.

B. Excavate.

C. Clean manholes.

D. Remove existing manhole frames and covers.

E. Repair waterproofing.

3.3 INSTALLATION

A. Adjust Manhole Cover.

1. Locate and raise manhole covers to grade as indicated on Drawings.
2. Use cover adjustment rings to achieve elevation indicated for cover.
   a. Minimum elevation 3/8 inch below final pavement/ground elevation.

b. Maximum elevation 0 inch above final pavement/ground elevation.

3. Do not adjust cover elevation more than 3 inches with cover adjustment rings.
4. In asphalt paving areas provide 1" ring under cover as part of total adjustment. Adjustment over 1" will require multiple rings.
5. Seal joints between manhole top and cover adjustment ring with sealant.
6. Reinstall removed manhole cover.

B. Adjust Manhole Casting.

1. Locate and raise manhole castings to grade as indicated on Drawings.
2. Remove existing manhole frame and cover.
3. Add or remove riser rings.
4. Reset existing manhole frame and cover.
5. Use riser rings to achieve elevation indicated for cover.
   a. Minimum elevation 3/8 inch below final pavement/ground elevation.
   b. Maximum elevation 0 inch above final pavement/ground elevation.
6. Do not adjust cover elevation more than 3 inches with cover adjustment rings.
7. In asphalt paving areas provide 1" ring under cover as part of total adjustment.
8. Seal joints between manhole top and cover adjustment ring with sealant.
9. Reinstall removed manhole cover.

C. Replace Manhole Casting:

1. Locate manholes for replacement of frames and covers as indicated on Drawings.
2. Remove existing manhole frames and covers to enable reuse.
3. Install new frames and covers for manholes as indicated on Drawings.
4. Adjust new frames and covers to match finished grade as indicated on Drawings.
5. Seal joints between manholes and manhole frames.

END OF SECTION 330130.86

SECTION 330505.31 - HYDROSTATIC TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Hydrostatic testing of pressure piping.

B. Related Requirements:

1. Section 331413 - Public Water Utility Distribution Piping: Pipe materials and accessories normally encountered with pressurized water distribution systems.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.3 SUBMITTALS

A. Submit following items prior to start of testing:

1. Testing procedures.
2. List of test equipment.
3. Testing sequence schedule.
4. Provisions for disposal of flushing and test water.
5. Certification of test gage calibration.

B. Test and Evaluation Reports: Indicate results of piping tests.

1.4 QUALITY ASSURANCE

A. Perform Work according to the North Dakota Department of Environmental Quality standards.

PART 2 - PRODUCTS

2.1 HYDROSTATIC TESTING

A. Equipment:

1. Pressure pump.

2. Pressure hose.
3. Water meter.
4. Test connections.
5. Pressure relief valve.
6. Pressure Gage: Calibrated to 0.1 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that piping is ready for testing.

B. Verify that trenches are backfilled.

C. Verify that pressure piping thrust restraints have been installed.

3.2 FIELD QUALITY CONTROL

A. Testing of Pressure Piping:

1. Test system according to AWWA C600 and following:
   a. Hydrostatically test each portion of pressure pipe, including valved section, at not less than 150 psi. Do not test at a pressure that exceeds the design pressure of the pipe however.
   b. Conduct hydrostatic testing for at least two hours.
   c. Slowly fill with water portion of piping to be tested, expelling air from piping at high points.
   d. Install corporation cocks at high points.
   e. Close air vents and corporation cocks after air is expelled.
   f. Raise pressure to specified test pressure.
   g. Observe joints, fittings, and valves undergoing testing.
   h. Remove and renew cracked pipes, joints, fittings, and valves that show visible leakage.
   i. Retest.
   j. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
   k. Maintain pressure within plus or minus 5.0 psi of test pressure.
   l. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of testing.
   m. Compute maximum allowable leakage using following formula:
      1) L = [SD x sqrt(P)]/C.
      2) L = testing allowance, gph.
      3) S = length of pipe tested, feet.
      4) D = nominal diameter of pipe, inches.
      5) P = average test pressure during hydrostatic testing, psig.
      6) C = 148,000.

7) If pipe undergoing testing contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each pipe size.

2. If testing of piping indicates leakage greater than that allowed, locate source of leakage, make corrections, and retest until leakage is within acceptable limits.
3. Correct visible leaks regardless of quantity of leakage.

END OF SECTION 330505.31

SECTION 330505.41 - AIR TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Low-pressure air testing of gravity sewer piping.

1.2 SUBMITTALS

A. Submit following items prior to start of testing:

1. Testing procedures.
2. List of test equipment.
3. Testing sequence schedule.
4. Provisions for disposal of flushing and test water.
5. Certification of test gage calibration.

B. Test and Evaluation Reports: Indicate results of piping tests.

1.3 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Environmental Quality standards.

PART 2 - PRODUCTS

2.1 AIR TESTING

A. Equipment:

1. Air compressor.
2. Air supply line.
3. Shutoff valves.
4. Pressure regulator.
5. Pressure relief valve.
6. Stopwatch.
7. Plugs.
8. Pressure Gage: Calibrated to 0.1 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that piping is ready for testing.

B. Verify that trenches are backfilled.

3.2 PREPARATION

A. Coordination with City:
   1. City contact for all coordination issues shall be Public Works Superintendent.

B. Lamping:

   1. Lamp gravity piping after flushing and cleaning.
   2. Perform lamping operation by shining light at one end of each pipe section between manholes.
   3. Observe light at other end.
   4. Pipe not installed with uniform line and grade will be rejected.
   5. Remove and reinstall rejected pipe sections.
   6. Clean and lamp until pipe section is installed to uniform line and grade.

C. Plugs:

   1. Plug outlets, wye branches, and laterals.
   2. Brace plugs to resist test pressures.

3.3 FIELD QUALITY CONTROL

A. Low-Pressure Air Testing:

   1. Test each reach of gravity sewer piping between manholes.
   2. Introduce air pressure slowly to approximately 4 psig.
   3. Determine ground water elevation above spring line of piping.
   4. For every foot of ground water above spring line of piping, increase starting air test pressure by 0.43 psi.
   5. Do not increase pressure above 10 psig.
   6. Allow pressure to stabilize for at least five minutes.
   7. Adjust pressure to 3.5 psig or to increased test pressure as determined above when ground water is present.
   8. Do not make allowance for laterals.
   9. Minimum Testing Duration in Minutes Per 100 Feet:
      a. Pipe Size 3 Inches: 0.2.
      b. Pipe Size 4 Inches: 0.3.
      c. Pipe Size 6 Inches: 0.7.
      d. Pipe Size 8 Inches: 1.2.

e. Pipe Size 10 Inches: 1.5.
f. Pipe Size 12 Inches: 1.8.
g. Pipe Size 15 Inches: 2.1.
h. Pipe Size 18 Inches: 2.4.
i. Pipe Size 21 Inches: 3.0.
j. Pipe Size 24 Inches: 3.6.
k. Pipe Size 27 Inches: 4.2.
l. Pipe Size 30 Inches: 4.8.
m. Pipe Size 33 Inches: 5.4.
n. Pipe Size 36 Inches: 6.0.

10. Record drop in pressure during testing period.
11. If air pressure drops more than 1.0 psi during testing period, piping has failed.
12. If 1.0-psi air pressure drop has not occurred during testing period, piping is acceptable; discontinue testing.
13. If piping fails, test reach of piping in incremental stages until leaks are isolated, repair leaks, and retest entire reach between manholes.
14. If unsatisfactory testing results are achieved, make necessary repairs and retest until result meets criteria.
15. Repair visible leaks regardless of quantity of leakage.

END OF SECTION 330505.41

SECTION 330509.33 - THRUST RESTRAINT FOR UTILITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete Thrust Blocking.
2. Mechanical Joint Restraint.

B. Related Requirements:

1. Section 312316.13 - Trenching: Trenching and backfilling requirements for Site utilities.
2. Section 331413 - Public Water Utility Distribution Piping: Requirements for piping Work as required by this Section.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C110
2. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

B. ASME International:

1. ASME B1.1 - Unified Inch Screw Threads, UN and UNR Thread Form.

C. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
6. ASTM A536 – Standard Specification for Ductile Iron Castings.
7. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
8. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance.
9. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
10. ASTM E8 – Tension Testing of Metallic Materials.

11. ASTM F436 - Standard Specification for Hardened Steel Washers.

1.3 COORDINATION

A. Coordinate Work of this Section with installation of fittings and joints that require restraint.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer catalog information for restrained joint details and installation instructions.

B. Shop Drawings:

1. Indicate restrained joint details and materials being used.
2. Submit layout drawings showing piece numbers and locations.
3. Indicate restrained joint locations.

C. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of joint restraints.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.8 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Provide concrete thrust blocking as indicated on the Drawings.

B. When indicated on the Drawings, provide restraint devices for mechanical joint restraints and appurtenances in addition to concrete thrust blocking.

2.2 MECHANICAL JOINT RESTRAINTS

A. Manufacturer:

1. Megalug by EBAA Iron, Inc.
2. One-Lok SLCE with CORRSAFE coating by Sigma Corporation.
3. or approved equal.

B. Design:

1. Consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ASNI/AWWA C110/A21.10 for nominal pipe sizes 3 inch through 36 inch.
2. Include a minimum safety factor of 2:1 in all sizes for rating for water pressure.

C. Material:

1. Cast from grades 65-45-12 ductile iron material in accordance with ASTM A536 for gland body, wedges and wedge actuating components.

D. Coating:

1. Consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.
2. Surface pretreated with a phosphate wash, rinse and sealer before drying.
3. Electrostatically applied and heat cured.
4. Polyester based power to provide corrosion, impact and UV resistance.

E. Approvals:

1. Listed by Underwriters Laboratories in the 4 inch through 12 inch sizes.
2. Factory Mutual Approved in the 4 inch through 12 inch sizes.
3. Meet or exceed the requirements of ASTM F1674 of the latest revision for Mechanical Joint Restraints, 4 inch through 24 inch.

2.3 MATERIALS

A. Steel:

1. High-Strength Low-Alloy Steel: Comply with ASTM A588/A588M, heat treated.
2. High-Strength Low-Alloy Steel: Comply with ASTM A588/A588M.
3. Carbon Steel: Comply with ASTM A36/A36M.

2.4 FINISHES

A. Zinc Plating:

1. Factory applied.
2. Comply with ASTM B633.

B. Galvanizing:

1. Factory applied.
2. Comply with ASTM A153/A153M.

2.5 CONCRETE

1. Compressive Strength 4000 psi at 28 days.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pipe and fittings are ready to receive Work.

B. Field measure and verify conditions for installation of Work.

3.2 PREPARATION

A. Coordination with City:

1. City contact for all coordination issues shall be Public Works Superintendent.

3.3 INSTALLATION

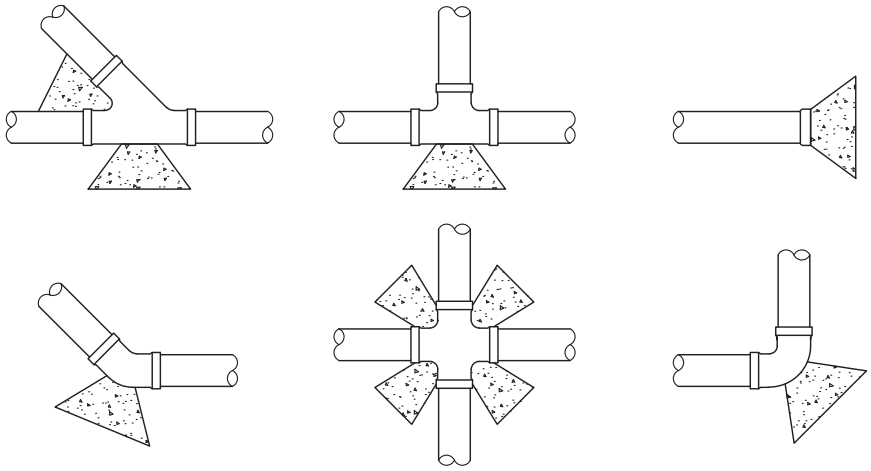
A. According to AWWA C600.

B. Install joint restraint system such that joints are mechanically locked together to prevent joint separation.

C. Install concrete thrust blocks according to the Drawings.

D. Install mechanical joint restraint by conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly. Ensure proper actuation of the gripping wedges with torque limiting twist off nuts.

END OF SECTION 330509.33



MINIMUM THRUST BLOCK SIZES										
	REQUIRED BEARING AREA (S.F.)									
PIPE DIAMETER	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
CROSS, DEAD END OR TEE	2	4	7	11	16	21	28	36	44	63
90 BEND	3	6	10	16	22	30	39	50	62	88
45 BEND	2	3	6	9	12	17	21	27	34	48
22 1/2 BEND	1	2	3	5	7	9	14	17	17	25
NOTE: ALL THRUST BLOCKS A MINIMUM OF 12" THICK AND MUST BEAR AGAINST UNDISTURBED SOIL.										

8/21/2019 1:38:00 PM

THRUST BLOCKS		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 330509.33	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

FILE LOCATION: L:\BLOCKS\DETAILS\Kindred Standard Details\Kindred Details.dwg

SECTION 330561 – CONCRETE MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manholes for sanitary sewer collection systems.
2. Modular precast concrete manholes and structures with tongue-and-groove joints and masonry transition to cover frame, covers, anchorage, and accessories.
3. Bedding and cover materials.
4. Vertical adjustment of existing manholes and structures.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
2. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 330130.86 - Manhole Rim Adjustment: Resetting existing castings and grates.
4. Section 333111 - Public Sanitary Sewerage Gravity Piping: Piping connections to manholes.

1.2 DEFINITIONS

A. Bedding: Specialized material placed under manhole prior to installation and subsequent backfill operations.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Manholes:

1. Basis of Measurement: By each manhole.
2. Basis of Payment: Includes excavating, concrete foundation slab, concrete structure sections, cover frame and cover, to indicated depth, concrete adjustment rings, chimney seal, aggregate base, backfilling, and forming and sealing of pipe inlets and outlets.

C. Drop Manholes:

1. Basis of Measurement: By each manhole.
2. Basis of Payment: Includes excavating, concrete foundation slab, concrete structure sections, cover frame and cover, to indicated depth, external drop (PVC pipe, PVC fittings, and concrete encasement or concrete horse shoes filled with concrete), concrete adjustment rings, chimney seal, aggregate base, backfilling, and forming and sealing of pipe inlets and outlets.

D. Adjust Manhole:

1. Basis of Measurement: by each manhole.
2. Basis of Payment: Includes excavating, adding/removing concrete structure sections or cutting/extending concrete structure section, removal of existing frame and cover, reinstalling existing frame and cover, riser rings, chimney seal, and joint sealant.

1.4 REFERENCE STANDARDS

A. American Association of State Highway Transportation Officials:

1. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
4. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
5. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
6. ASTM D648 – Test Method for Deflection Temperature of Plastics Under Flexural Load in Edgewise Position.
7. ASTM D2584 – Test Method for Ignition Loss of Cured Reinforced Resins.
8. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
9. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
10. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
11. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
12. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
13. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.5 COORDINATION

A. Coordinate Work of this Section with connection to municipal sewer utility service and trenching.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, and dimensions.

B. Shop Drawings:

1. Indicate structure locations and elevations.
2. Indicate sizes and elevations of piping, and penetrations.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.7 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of manholes and connections, and record invert elevations.

1.8 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Environmental Quality standards.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Handling: Comply with precast concrete manufacturer instructions and ASTM C913 for unloading and moving precast manholes and drainage structures.

C. Storage:

1. Store materials according to manufacturer instructions.
2. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
3. Repair property damaged from materials storage.

PART 2 - PRODUCTS

2.1 CONCRETE MANHOLES

A. Manufacturers:

1. Forterra Pipe and Precast
   6655 Wedgwood Road, Suite 130
   Maple Grove, MN 55311
2. Hancock Concrete Products Company, Inc.
   17 Atlantic Avenue
   Hancock, MN 562444
3. or equal.

B. Manhole Sections:

1. Materials:
   a. Reinforced Precast Concrete: Comply with ASTM C478.
   b. Gaskets: Comply with ASTM C923.
2. Joints:
   a. Comply with ASTM C913.
   b. Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.
3. Top Section:
   a. Eccentric Cone or as indicated on the Drawings.
4. Base: monolithic precast with shaped flow channels and bench.
5. Shape: Cylindrical
6. Dimensions: As indicated on the Drawings.

C. Structure Joint Gaskets:

1. Comply with ASTM C361.
2. Material: Rubber.

2.2 FRAMES AND COVERS

A. Manufacturers:

1. Neenah Foundry
   2121 Brooks Avenue
   Neenah, WI 54956
2. EJ (East Jordan Iron Works)
   301 Sprint St
   East Jordan, MI 49727
3. or equal.

B. Description:

1. Material:
   a. Cast iron.

b. Comply with ASTM A48/A48M, Class 30B.

2. Lid:
   a. Bearing Surface: Machined flat.
   b. Configuration: Removable.
   c. Solid with closed pickholes.
   d. Self-sealing gasket.
   e. Marked “Sanitary Sewer”.
   f. Security: None, unless notes on plans.
3. Frame:
   a. In asphalt pavement or non-paved areas.
      1) Neenah R-1733
      2) EJ 1205Z2
   b. In concrete pavement: Self leveling
      1) Neenah R-1955-1
      2) EJ 3025

2.3 RISER RINGS

A. Riser Rings:

1. Thickness of 2 to 6 Inches:
   a. Precast concrete.

2.4 COVER ADJUSTMENT RINGS

A. Manufacturers:

1. Neenah Foundry
   2121 Brooks Avenue
   Neenah, WI 54956
2. Ess Brothers & Sons, Inc.
   9350 County Road 19
   Loretto, MN 55357
3. or equal.

B. Solid gray or ductile iron. Steel is not allowed.

C. Locking or non-locking to match existing frame and cover.

D. Assorted thicknesses (1/2” to 1”) as necessary to achieve final grade.

E. Apply EBS Super Glue adhesive, per manufacturer’s recommendations. No traffic for a minimum of 8 hours after glue application.

2.5 MATERIALS

A. Cover and Bedding:

1. Bedding: Fill Type A6 as specified in Section 310516 - Aggregates for Earthwork.
2. Cover: Fill Type A5, as specified in Section 310516 - Aggregates for Earthwork.

2.6 ACCESSORIES

A. Steps:

1. Rungs: Formed PP.
2. ½" Grade 60 steel reinforcement.
3. Width:
   a. 12 inches.

4. Spacing:
   a. As indicated on Drawings.

B. Flexible Pipe Boot For Manhole Pipe Entrances

1. Manufacturers:
   a. Press-Seal Gasket Corporation
      2424 W State Blvd.
      Fort Wayne, IN 46808
   b. Substitutions: Section 016000 - Product Requirements
   c. or Equal.

2. Flexible Pipe Boot: ASTM C923, Series 300 stainless steel clamp and Series 304 stainless steel hardware.

C. Strap Anchors:

1. Shape: Bent steel.
2. Finish: Stainless

D. Joint Sealant:

1. Internal: Comply with ASTM C361 or C443.
2. External required on joints deeper than 20': Infi-Shield Gator Wrap

E. Fasteners: Stainless steel; ASTM F593

F. External Drop

1. Made from PVC pipe and fittings per Section 333111 - Public Sanitary Sewerage Gravity Piping.
2. Embed in concrete or utilize precast concrete horseshoes filled with concrete.

G. External Chimney Seal

1. Manufacturers:
   a. Cretex Specialty Products
      N16 W23390 Stone Ridge Drive, Suite A

Waukesha, WI 53188

b. Strike Products
31785 64th Avenue
Cannon Falls, MN 55009.

c. Sealing Systems Inc. – Infi-Shield with stainless steel bands
9350 County Road 19
Loretto, MN 55357.

d. Substitutions: Section 016000 - Product Requirements.

H. Soil Backfill from above pipe to finish grade.

1. Soil Type S2, as specified in Section 310513 - Soils for Earthwork.
2. Subsoil: No frozen earth, or foreign matter, or rocks more than 6 inches in diameter.

2.7 FINISHES

A. Interior Manhole Coating:

1. Two coats Bitumastic 300M by Carboline, Hi-Build Tneme-Tarby Tnemec or equal.

2.8 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of completed assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that items provided by other Sections of Work are properly sized and located.

B. Verify that built-in items are in proper location and are ready for roughing into Work.

C. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Prepare and implement temporary bypass pumping plan on work involving live sewers. Plan shall be approved by Engineer.

B. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.

C. Coordinate placement of inlet and outlet pipe or duct sleeves as required by other Sections.

D. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.

E. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.

B. Correct over-excavation with Coarse Aggregate Type A6.

C. Remove large stones or other hard matter impeding consistent backfilling or compaction.

D. Protect manhole from damage or displacement while backfilling operation is in progress.

E. Excavating:

1. As specified in Section 312316.13 - Tenching and in indicated locations and depths.
2. Provide clearance around sidewalls of manhole or structure for construction operations.
3. If ground water is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.
4. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation as approved by Engineer.

F. Precast Concrete Manholes:

1. Lift precast components at lifting points designated by manufacturer.
2. When lowering manholes into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
3. Assembly:

    a. Assemble multisection manholes and structures by lowering each section into excavation.
    b. Install rubber gasket joints between precast sections according to manufacturer recommendations.
    c. Lower, set level, and firmly position base section before placing additional sections.

4. Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.
5. Maintain alignment between sections by using guide devices affixed to lower section.
6. Joint sealing materials may be installed on Site or at manufacturer's plant.
7. Verify that installed manholes meet required alignment and grade.
8. Cut pipe flush with interior of structure.

G. Castings and Rings:

1. Set frames using mortar and masonry.
2. Seal between composite rings.
3. Install external chimney seal per manufacturer's recommendations.
4. If paving will not take place as part of project, install casting only and stockpile rings and chimney seal at location determined by Engineer.

H. Riser Rings

1. Install 1" riser ring below cover on all new manholes and structures in asphalt paving areas.
2. Clean riser ring mounting area with wire brush.
3. Install ¼" bead of adhesive at 360°.
4. Do not allow traffic on riser rings for a minimum of 8 hours after adhesive application.

I. Installation Standards: Install Work according to North Dakota Department of Environmental Quality standards.

3.4 FIELD QUALITY CONTROL

A. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

B. Testing:

1. Compaction Testing:
   a. Comply with ASTM D698 and ASTM D6938.
   b. Testing Frequency: two tests per structure at ⅓ and ⅔ depth.
   c. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

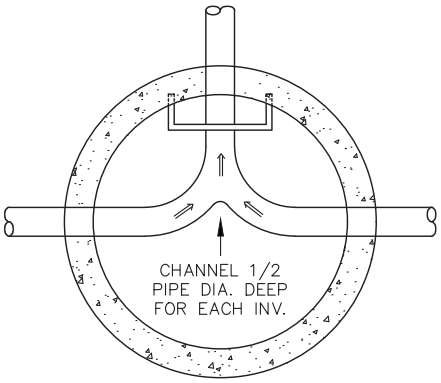
3.5 ADJUSTING

A. Vertical Adjustment of Existing Manholes and Structures:

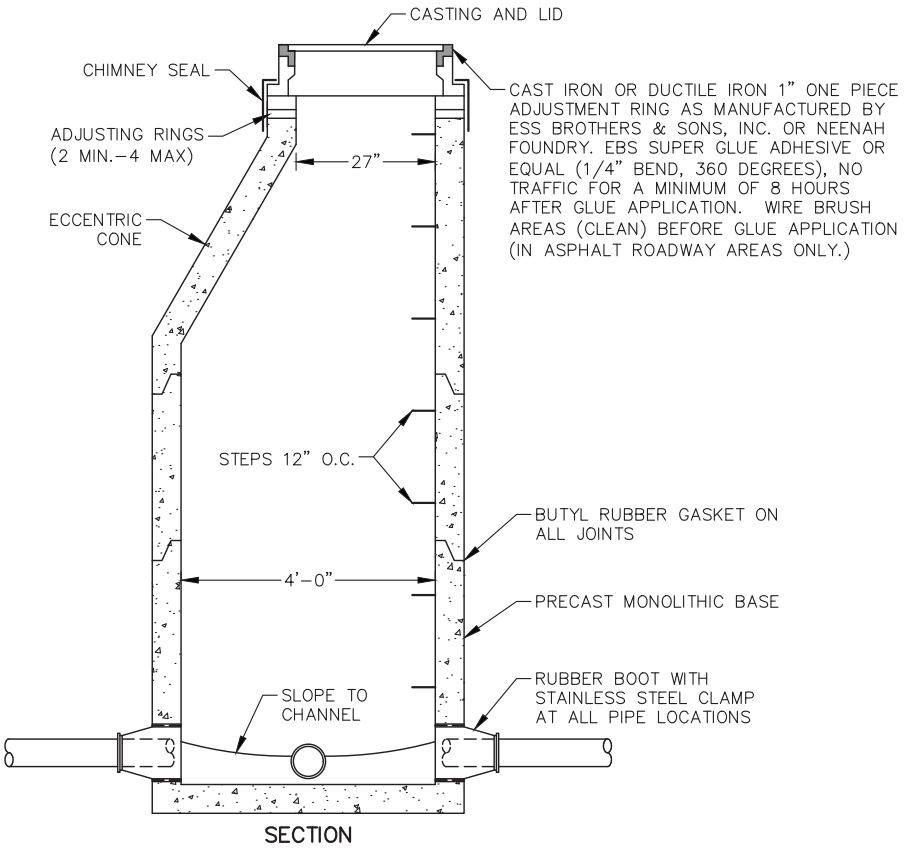
1. As specified in Section 330130.86 - Manhole Rim Adjustment.
2. If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
3. Frames, Grates, and Covers:
   a. Remove frames, grates, and covers cleaned of mortar fragments.
   b. Reset to required elevation according to requirements specified for installation of castings.
4. Manhole Sections:
   a. Remove and/or add precast concrete manhole sections to reach the desired grade.
   b. If cutting existing structure is required:
      1) Reinforcing Bars:
         a) Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.
         b) Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.

2) Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete.

END OF SECTION 330561



TOP VIEW



SECTION

NOTE:
1. MANHOLE SHALL BE MARKED WITH TEMPORARY UTILITY MARKER.

SANITARY SEWER MANHOLE		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 330561	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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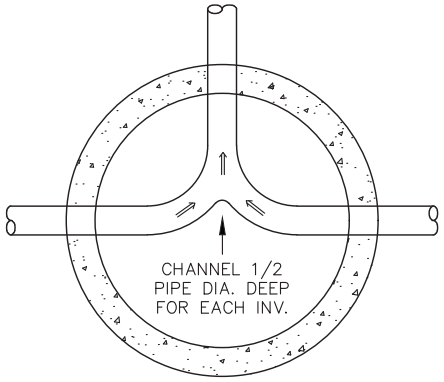
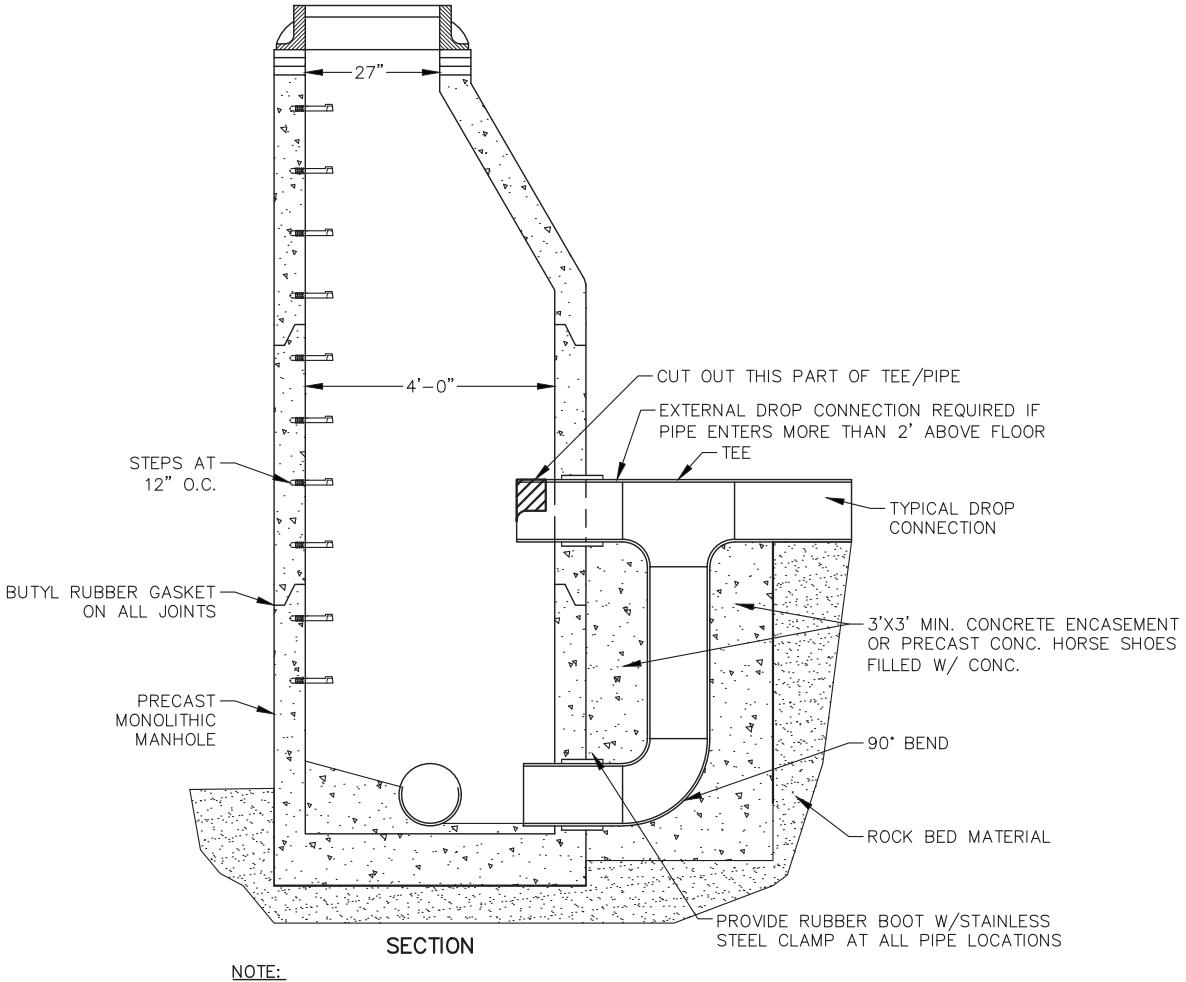


TOP VIEW



SECTION

NOTE:

1. VERIFY W/OWNER ON STEPS. DELETE STEPS IF REQUIRED

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SANITARY SEWER MANHOLE (EXTERNAL DROP)		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 330561	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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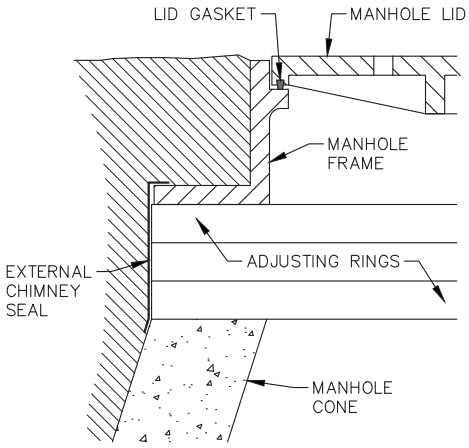
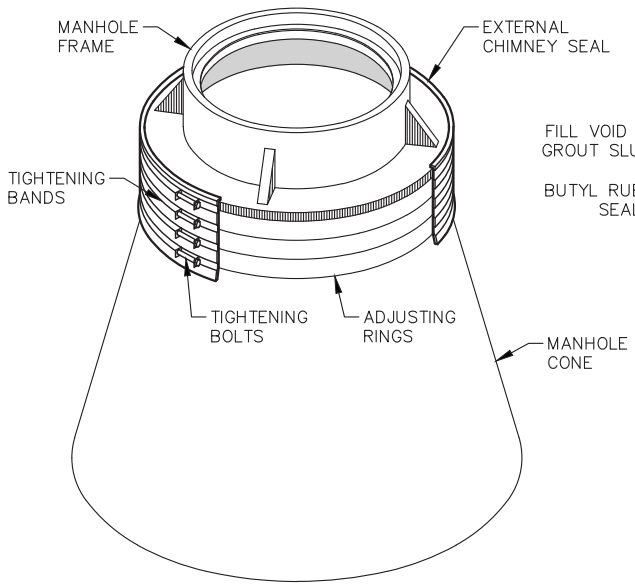
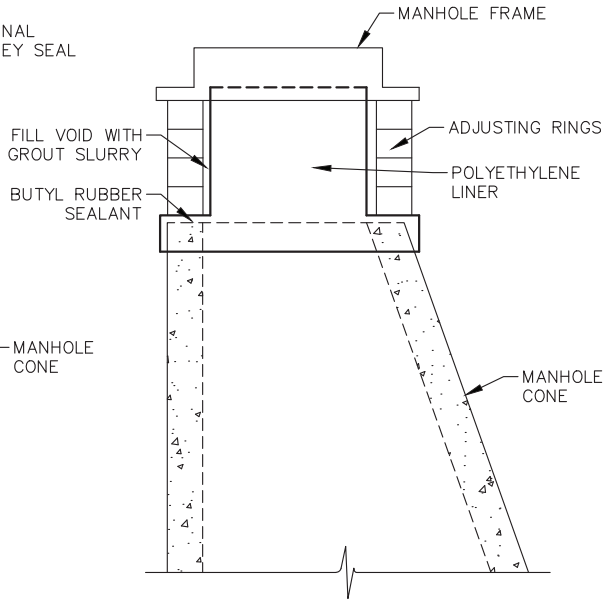




EXTERNAL MANHOLE SEAL



INTERNAL MANHOLE SEAL

NOTE:
1. INSTALL MANHOLE SEALS PER MANUFACTURER RECOMMENDATIONS.

MANHOLE SEALS		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 330561	DRAWING No. 3	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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SECTION 330597 - IDENTIFICATION AND SIGNAGE FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Trace wire for placement above direct-buried utility.
2. Permanent and temporary utility markers.

B. Related Requirements:

1. Section 312316.13 - Trenching: Backfilling considerations for installation of trace wire.
2. Section 331413 - Public Water Utility Distribution Piping: Piping, valves, and appurtenances requiring identification marking.
3. Section 333111 - Public Sanitary Sewerage Gravity Piping: Piping, valves, and appurtenances requiring identification marking.

1.2 REFERENCES

A. ASTM International:

1. ASTM B910 / B910M: Standard Specifications for Annealed Copper-Clad Steel Wire.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer catalog information for each specified product.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of products installed.

1.5 QUALITY ASSURANCE

A. Trace Wire:

1. Verify all installed trace wire is operational using Owner’s locating equipment.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in undamaged, unopened container, bearing manufacturer’s original labels. Inspect for damage.

B. Protect materials from damage by storing in a secure location.

1.7 COORDINATION

A. Furnish testing schedule for products requiring owner testing.

PART 2 - PRODUCTS

2.1 TRACE WIRE

A. Manufacturers:

1. Copperhead Industries, LLC
   PO Box 1081
   Monticello, MN 55362

B. Trace wire for direct bury applications:

1. 12 AWG high-strength copper clad steel (CCS) wire.
2. 300-lb minimum rated break strength.
3. 30 mil HDPE insulation.

C. Trace wire for directional drilling applications:

1. Extra high-strength copper clad steel (CCS) wire.
2. 2700-lb minimum rated break strength.
3. 45 mil HDPE insulation.

D. Trace wire for pipe bursting:

1. 3/16” high-strength stranded copper clad steel (CCS) wire.
2. 4700-lb minimum rated break strength.
3. 50 mil HDPE insulation.

E. Insulation color coded to marked utility according to the American Public Works Association (APWA) uniform color standards.

2.2 SPLICE CONNECTORS

A. Manufacturers:

1. Copperhead Industries, LLC
   PO Box 1081
   Monticello, MN 55362

B. Trace wire splices shall be made using a sealant-filled splice connector designed for direct bury installation in damp, wet, or submersible locations.

2.3 TERMINAL BOXES

A. Manufacturers:

1. Copperhead Industries, LLC (SnakePit & Cobra T3)
2. Valvco, Inc.
3. Approved equal.

B. Flush mount terminal boxes:

1. Minimum 36” long, 2-1/2” diameter ABS shaft.
2. Flared shaft bottom.
3. Permanently magnetic cast or ductile iron cover, frame and lid.
4. Variable size wire terminal blocks beneath lid.
5. Integral direct connection terminal to allow connection of locator without removing the lid.
6. 2 terminals with ground switch capable of disengaging the ground connection without removing the lid.
7. Locking cover with pentagonal nut.
8. Lid stamped with utility type and color coded to marked utility according to the American Public Works Association (APWA) uniform color standards.

C. Above grade terminal boxes:

1. PVC terminal box with 1” diameter conduit connection.
2. Minimum 2 terminals with jumper.
3. Color coded to marked utility according to the American Public Works Association (APWA) uniform color standards.

2.4 GROUNDING ROD

A. Manufacturers:

1. Copperhead Industries, LLC
   PO Box 1081
   Monticello, MN 55362
2. Substitutions: Section 016000 – Product Requirements.

B. Drive-in type magnesium grounding rod.

1. Minimum 1-lb magnesium.
2. Minimum 20’ of factory installed copper clad steel wire.

2.5 UTILITY MARKERS

A. Permanent

1. Manufacturer

a. Carsonite: CRM Utility Marker
2. Color:
a. Sanitary: Green
b. Water: Blue

B. Temporary

1. 2”x2” pine wood, 36” above grade.
2. Painted:
a. Sanitary: Green
b. Water: Blue

2.6 CASTINGS

A. Traffic rated utility assess castings for use when curb stop and/or trace wire access point is located in a driveway or sidewalk.

1. Manufacturers
a. AY McDonald: Model 74M1A
b. Ford Meter Box Company: Meter Box Cover – A1 Style

PART 3 - EXECUTION

3.1 INSTALLATION

A. Trace Wire:

1. Install trace wire in such a manner that allows proper access for connection of line tracing equipment, and successful signal reception without distortion or loss of signal due to damaged wires, loops, coils, kinks, discontinuities, unapproved connections/terminations, or multiple instances of trace wire installed in close proximity to one another.
2. Install trace wire system as a continuous single wire. No looping, coiling, or kinking of wire is allowed.
3. Attach trace wire to utility pipes and services at 10’ intervals using tape or plastic zip ties installed all the way around the utility pipe. Allow for 1 to 3 inches of slack between the pipe and trace wire between attachment points.
4. Install mainline pipe trace wire continuously on the south or east side of utility pipes, running around or through valves, manholes, or other structures as shown on the details.
5. Make all connections between individual trace wires with approved splice connectors only.
6. Repair immediately any damage occurring during installation of the trace wire using an approved waterproof method. Taping and/or spray coating shall not be allowed.
7. Connect the new and existing trace wires using approved splice connectors where existing trace wire is encountered on an existing utility to be tied into or extended.
8. Leave a 3’ pigtail of trace wire lay horizontally beyond the pipe where trace wire is to be terminated at a mainline dead end/stub. Terminate the line by installing an approved splice connector with magnesium grounding rod.

9. Install branching mainline, service pipe, or hydrant lead trace wire as a single continuous wire between the mainline wire and a terminal box as shown in the details. Connect to the mainline wire with an approved connector without cutting the mainline trace wire. No looping, coiling, or kinking of wire is allowed.
10. Install trace wire for boring, directional drilling, and pipe bursting applications as one single continuous wire. Splice connectors are prohibited.
11. Install grounding rod whenever the line is terminated.
12. Install grounding rods vertically and penetrating undisturbed soil. Rods not driven into undisturbed soil will be considered defective work.
13. At dead ends, connect the grounding rod leader wire to the trace wire and trim the rod leader wire to length.
14. At terminal boxes, connect the outside leader wire directly to one of the terminals. Do not connect the rod leader wire directly to the trace wire.

B. Flush-mount terminal boxes:

1. Install flush-mount terminal boxes at finished ground elevations as shown in the drawings and details, or as directed by the Engineer.
2. Provide 3’ of extra trace wire in the flush mount terminal box to allow for connection of line tracing equipment.
3. Connect trace wire to flush-mount terminal box cap according to manufacturer’s instructions.

C. Above grade terminal boxes:

1. Install above grade terminal boxes as shown in the drawings and details, or as directed by the Engineer.
2. Provide 4” of extra trace wire in the terminal box to allow for connection of line tracing equipment.
3. Connect trace wire to the terminal post according to manufacturer’s instructions.

3.2 FIELD QUALITY CONTROL

A. Prohibited products and methods:

1. Uninsulated trace wire or insulated trace wire using any insulation other than HDPE.
2. Twist on wire nuts or other unapproved connectors.
3. Tape or spray on waterproofing.
4. Any installation involving multiple instances of wire twisted together or in close proximity to one another.
5. Connecting the trace wire to any conductive utilities.
6. Looping, coiling, or kinking the trace wire.
7. Using any other HDPE jacket color than specified by the American Public Works Association (APWA) uniform color standards.
8. Leaving excess trace wire in the trench.
9. Utilization of connectors in boring, directional drilling, and pipe bursting applications.

B. Post-installation test:

1. Locate all new trace wire installations using standard line tracing equipment, witnessed by the contractor, Engineer, or Engineer's Representative, and facility owner as applicable, prior to acceptance of ownership.
2. Perform this verification upon completion of rough grading and again prior to final acceptance of the project.
3. Continuity testing in lieu of line tracing shall not be accepted.

3.3 TRACE WIRE SCHEDULE

A. Public water infrastructure as shown on the plans:

1. Mains
2. Service lines
3. Hydrant leads

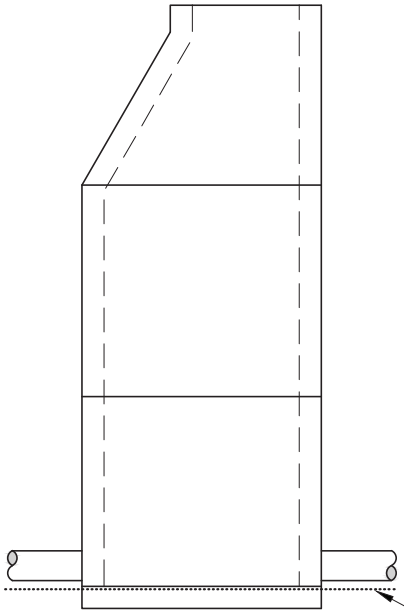
B. Public sanitary sewer infrastructure as shown on the plans:

1. Gravity mains
2. Forcemains
3. Service lines

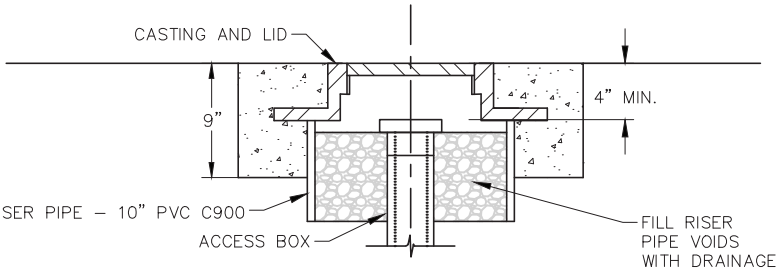
C. Public storm sewer infrastructure as shown on the plans:

1. Forcemains

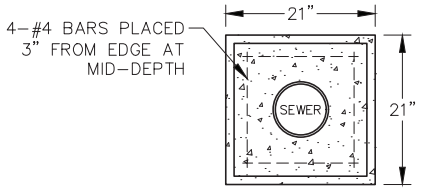
END OF SECTION 330597



SANITARY SEWER MANHOLE SECTION

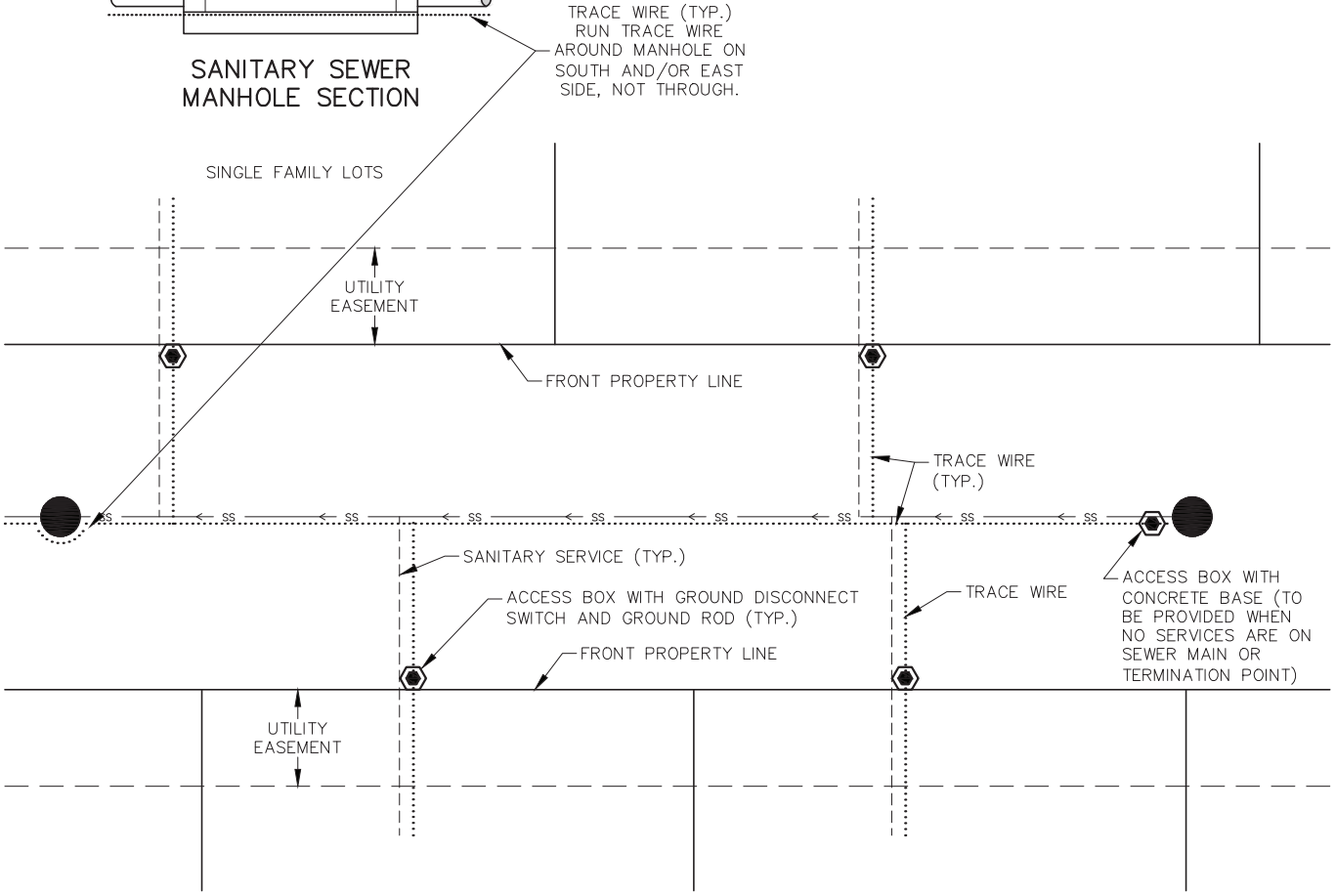


ACCESS BOX



CONCRETE BASE

NOTES:
1. FOR TRACING SANITARY SEWER IN ROAD WITHOUT SERVICES, INSTALL AT GRADE TERMINAL BOX 5' FROM MANHOLE OVER MAIN.
2. ENSURE TRACE WIRE IS ACCESSIBLE THROUGH CASTING OPENING.
3. IN CONCRETE STREET, INSTALL CASTING INTEGRAL TO PAVEMENT.



PLAN VIEW

NOTES:
1. TRACE WIRE SHALL BE INSTALLED AT SOUTH AND EAST SIDES OF PIPELINE.
2. TERMINATION OF MAINLINE TRACE WIRE SHALL CONNECT TO EXISTING SYSTEM IF AVAILABLE.
3. CONTRACTOR SHALL INSTALL A GROUND ROD AT ALL DEAD ENDS.

SANITARY SEWER TRACE WIRE		CITY ENGINEER APPROVED: BLO	DATE: 01.29.20
SECTION No. 330597	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 01.27.20
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 02.05.20	

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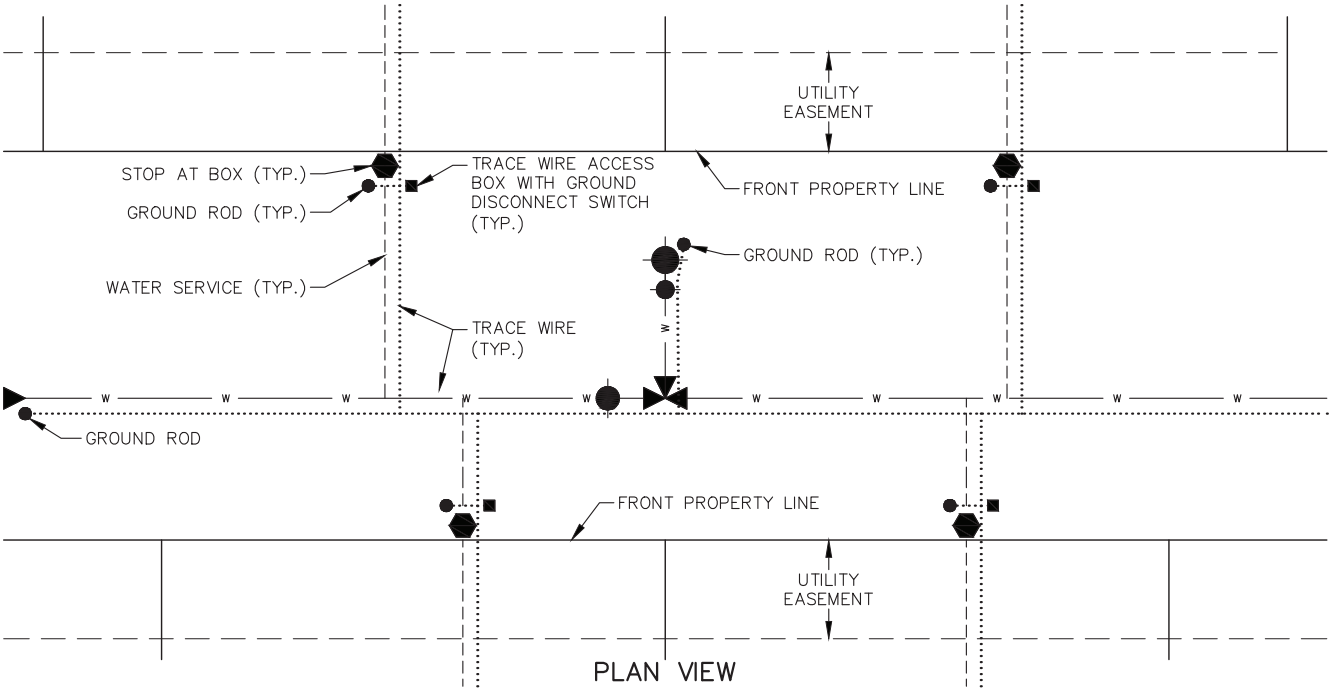

PLAN VIEW

NOTES:
1. TRACE WIRE SHALL BE INSTALLED AT SOUTH AND EAST SIDES OF PIPELINE.

2. CONTRACTOR SHALL INSTALL A GROUND ROD AT ALL DEAD ENDS.

WATER MAIN TRACE WIRE		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 330597	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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SECTION 331413 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for public line.
2. Tapping sleeves and valves.
3. Bedding and cover materials.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
2. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 312316.13 - Trenching: Excavation and backfill as required by this Section.
4. Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of water mains and appurtenances.
5. Section 330509.33 - Thrust Restraint for Utility Piping: Tied joint restraint system to anchor and resist forces developed in underground closed pipeline systems.
6. Section 331417 - Site Water Service Utility Laterals: Water main service connections.
7. Section 331419 - Valves and Hydrants for Water Utility Service: Fire hydrants, valves, and valve boxes for fire hydrant and water main installations.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Pipe and Fittings:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes excavation and backfill; pipe, fittings and appurtenances, couplings, bedding, thrust restraints, and trace wire system.

C. Taps:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes tapping sleeve, tapping valves, and accessories.

1.3 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

B. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123.
3. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
4. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3).
5. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
6. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
7. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
8. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
9. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
10. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

C. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
7. AWWA C153 - Ductile-Iron Compact Fittings.
8. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
9. AWWA C606 - Grooved and Shouldered Joints.
10. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm), for Water Transmission and Distribution.

D. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

E. National Fire Protection Association:

1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

F. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.4 COORDINATION

A. Coordinate Work of this Section with termination of water main connection at Site boundary, connection to municipal water utility service and trenching.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer information regarding pipe materials and pipe fittings.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 60 and 61 and NSF 372. A product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify such products.

B. Perform Work according to North Dakota Department of Environmental Quality standards.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Storage:

1. Store materials according to manufacturer instructions.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
4. Store PE and PVC materials out of sunlight.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 WATER PIPING

A. Ductile-Iron Pipe:

1. Comply with AWWA C151.
2. Bituminous Outside Coating: Comply with AWWA C151.
3. Pipe Mortar Lining:
   a. Comply with AWWA C104.
   b. Thickness: Double.
4. PE Encasement: Comply with AWWA C105.
5. Pipe Class:
   a. Comply with AWWA C151.
   b. Class 53.
6. Fittings:
   a. Material: Ductile iron; comply with AWWA C110.
   b. Compact Fittings: Comply with AWWA C153.
   c. Coating and Lining:
      1) Bituminous Coating: Comply with AWWA C110.
      2) Cement-Mortar Lining: Comply with AWWA C104; double thickness.
   d. All pipe sizes.
7. Joints:
   a. Mechanical and Push-on Joints: Comply with AWWA C111.
   b. Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal, when indicated on the drawings.
8. Jackets: PE; comply with AWWA C105.

B. PVC:

1. Comply with AWWA C900, Class 235
2. Fittings (4” to 8” pipe):
   a. Comply with AWWA C900 and C907
   b. Blue in color.
   c. Pipe Sizes: 4” to 8”
   d. Manufacturer by IPEX USA or approved equal.
3. Fittings (all sizes):
   a. Material Ductile iron; comply with AWWA C110.
   b. Compact Fittings: comply with AWWA C153.
   c. Coating and Lining:
      1) Bituminous Coating: Comply with AWWA C110.
      2) Cement-Mortar Lining: Comply with AWWA C1O4; double thickness.
   d. Joints:
      1) Comply With AWWA C111.
         a) Push-on Joints
         b) Mechanical Joints for restrained fittings only
      2) Restrained Joints: Per Section 330509.33 - Thrust Restraint for Utility Piping, when indicated on the drawings.
   e. Jackets: PE; comply with AWWA C105.

4. Joints:
    a. Comply with ASTM D3139 and F477.
    b. Seals: PVC flexible elastomeric.
    c. Solvent-cement couplings are not permitted.

2.2 TAPPING SLEEVES AND VALVES

A. Tapping Sleeves:

1. Manufacturers:
    a. Romac Industries, Inc.
    b. Powerseal.
    c. Ford
    d. or equal.

2. Description:
    a. Material: Stainless Steel.

B. Tapping Valves:

1. Manufacturers:
    a. As listed in Section 331419 – Valves & Hydrants for Utility Service.
2. Description:
    a. AWWA C509. Resilient-seated gate vales with non-rising stem.
    b. Inlet flanges, conforming to ANSI B16.1, Class 125 and MSS Sp-60.
    c. Mechanical joint outlets conforming to AWWA C111.
    d. Mark manufacturer’s name and pressure rating on valve body.

2.3 COUPLINGS

1. Products:
    a. Macro by Romac Industries, Inc.
    b. or equal.

2. Description:
    a. Two (2) bolt wide range coupling.

2.4 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.
2. Cover: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.
3. Soil Backfill from above Pipe to Finish Grade:
    a. Soil Type S2 as specified in Section 310513 - Soils for Earthwork.
    b. Subsoil with no rocks greater than 6 inches in diameter, frozen earth, or foreign matter.

2.5 FINISHES

A. Steel: Hot-dip galvanized after fabrication, according to ASTM A123/A123M.

2.6 ACCESSORIES

A. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

B. Steel Rods, Bolt, Lugs, Nuts, and Brackets:

1. 304 Stainless Steel.

C. Protective Coating:

1. Bituminous coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing utility water main size, location, and invert are as indicated on Drawings.

3.2 PREPARATION

A. Obtain all required permits from the City of Kindred.

B. Coordination with City:

1. City contact for all coordination issues shall be Public Works Superintendent.

C. Pipe Cutting:

1. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
2. Use only equipment specifically designed for pipe cutting; use of chisels or hand saws is not permitted.
3. Grind edges smooth with beveled end for push-on connections.

D. Remove scale and dirt on inside and outside before assembly.

E. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Bedding:

1. Excavation:

a. As specified in Section 312316.13 - Trenching.
b. Hand trim for accurate placement of pipe to elevations as indicated on Drawings.

2. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
3. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches of compacted depth, and compact to 90 percent of maximum density.

B. Piping:

1. Comply with AWWA C605.
2. Handle and assemble pipe according to manufacturer instructions and as indicated on Drawings.
3. Steel Rods, Bolts, Lugs, and Brackets: Coat buried steel before backfilling.
4. Ductile-Iron Piping and Fittings: Comply with AWWA C600.
5. Field Welding Materials: Comply with AWWA C206.
6. Flanged Joints: Do not use in underground installations except within structures.
7. Route pipe in straight line, and re-lay pipe that is out of alignment or grade.
8. High Points:
   a. Install pipe with no high points.
   b. If unforeseen field conditions arise that necessitate high points, install air-release valves as directed by Engineer.
9. Bearing:
   a. Maintain bearing along entire length of pipe.
   b. Excavate bell holes to permit proper joint installation.
   c. Do not lay pipe in wet or frozen trench.
10. Prevent foreign material from entering pipe during placement.
11. Allow for expansion and contraction without stressing pipe or joints.
12. Close pipe openings with watertight plugs during Work stoppages.
13. Install access fittings to permit disinfection of water system performed under Section 330110.58 - Disinfection of Water Utility Piping Systems.
14. Cover:
   a. Establish elevations of buried piping with not less than 7.5 feet of cover.
   b. Measure depth of cover from final surface grade to top of pipe barrel.

C. Separation Distances from Contamination Sources:

1. For maximum protection of municipal water systems where water mains and sewers cross, the following methods of construction for various conditions are recommended.
2. Parallel Installation:
   a. Water mains shall be laid at least 10 feet horizontally from any existing or proposed gravity sanitary or storm sewer, sanitary forcemain, septic tank, or subsoil treatment system. The distance shall be measured edge to edge.
3. Crossings:
   a. Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer with preference to the water main located above the sewer.
   b. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required. Where water main crosses over an existing sewer.

4. Sewer Manholes
    a. No water pipe shall pass through or come in contact with any part of a sewer manhole. Water main should be located at least 10 feet from sewer manholes.

D. Tapping Sleeves and Valves: As indicated on Shop Drawings and according to manufacturer instructions.

E. PE Encasement:

1. Encase piping in PE as indicated on Drawings to prevent contact with surrounding backfill material.
2. Comply with AWWA C105.
3. Terminate encasement 3 to 6 inches above ground where pipe is exposed.

F. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

G. Service Connections: As specified in Section 331417 - Site Water Service Utility Laterals.

H. Backfilling:

1. Backfill around sides and to top of pipe with cover fill in minimum lifts of 6 inches, tamp in place, and compact to 90 percent of Standard Proctor (ASTM 698) maximum dry density.
2. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
3. Maintain moisture content of bedding material to attain required relative compaction.
4. Backfilling: Backfill above pipe as specified in Section 312316.13 - Trenching.

I. Disinfection of Potable Water Piping Systems: As specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

J. Installation Standards: Install Work according to North Dakota Department of Environmental Quality standards.

3.4 TOLERANCES

A. Install pipe to indicated elevation within tolerance of 5/8 inch.

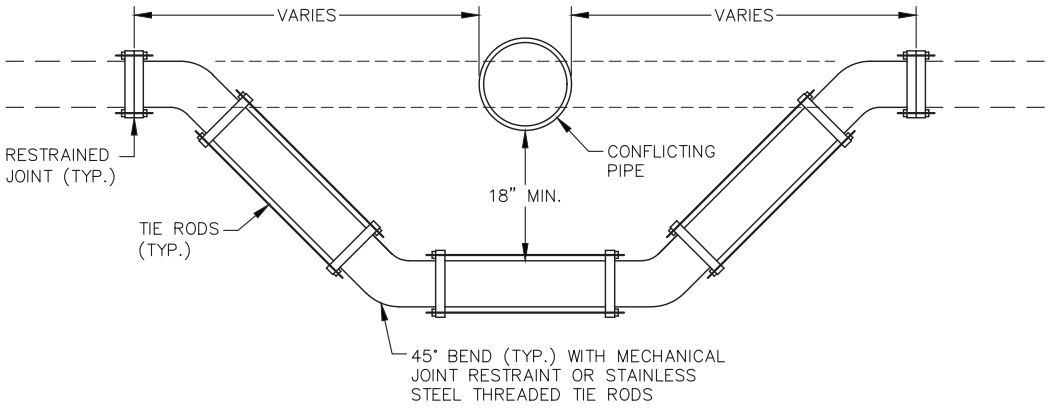
3.5 FIELD QUALITY CONTROL

A. Testing:

1. Pressure Testing: As specified in Section 330505.31 – Hydrostatic Testing.
2. Compaction Testing:
    a. Comply with ASTM D698 and ASTM D6938.
    b. Testing Frequency: one test along utility trenches at maximum 500 foot intervals per 2 feet of vertical lift.

c. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION 331413



NOTES:

1. ALL LOWERING AREA FITTINGS OR RODS SHALL BE COVERED WITH POLYETHYLENE PLASTIC.
2. INSULATE IF CLOSER THAN 24" TO CONFLICTING STORM PIPE OR CLOSER THAN 7.5' FROM FINISHED GROUND.
3. ADJUST AS SHOWN ON PLANS, OTHERWISE WATER MAIN MAY BE BELOW OR ABOVE CONFLICTING PIPE.

WATER MAIN ADJUSTMENT		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 331413	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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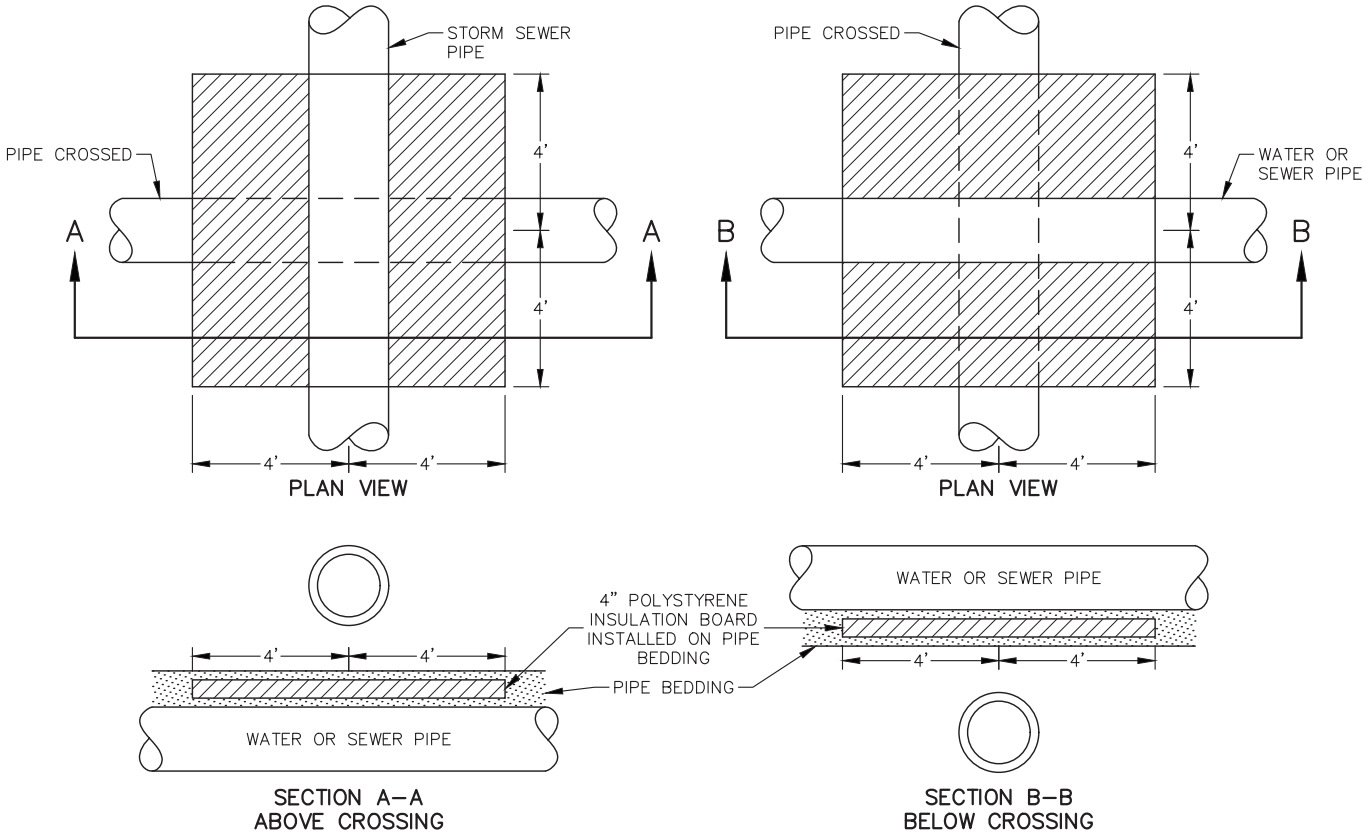

NOTES:
1. THIS DETAIL APPLIES TO BOTH MAINS & SERVICES WHERE CROSSING IS WITHIN 24".
2. WATER SERVICES MAY BE INSULATED WITH AN APPROVED ENCASEMENT INSULATION IN LIEU OF DETAIL.

INSULATION FOR STORM CROSSING		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 331413	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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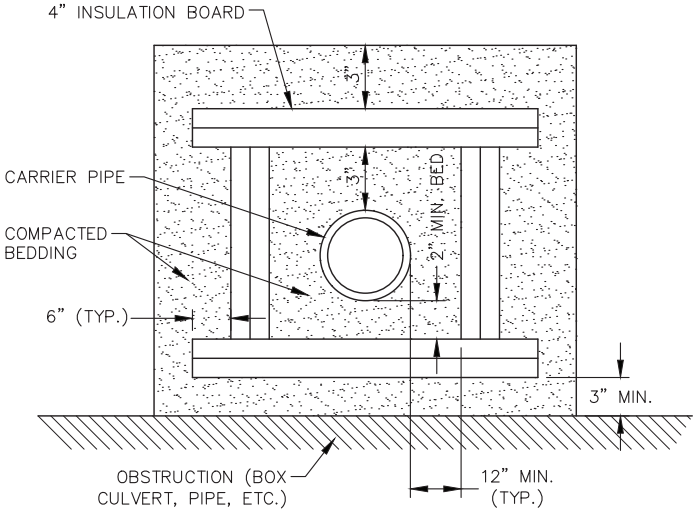

TOTAL ENCASEMENT INSULATION		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 331413	DRAWING No. 3	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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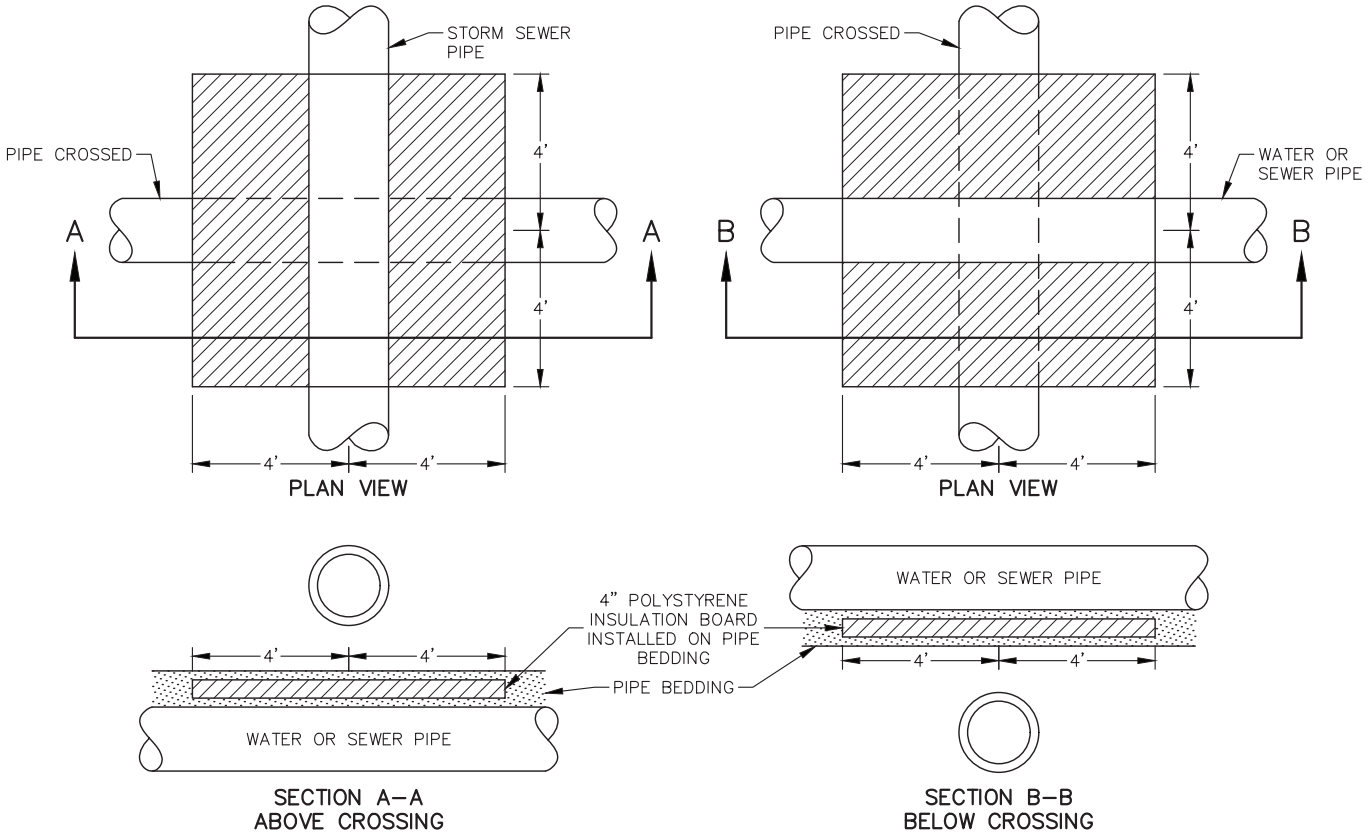

NOTES:
1. THIS DETAIL APPLIES TO BOTH MAINS & SERVICES WHERE CROSSING IS WITHIN 24".
2. WATER SERVICES MAY BE INSULATED WITH AN APPROVED ENCASEMENT INSULATION IN LIEU OF DETAIL.

INSULATION FOR UTILITY CROSSING		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 331413	DRAWING No. 4	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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SECTION 331417 - SITE WATER SERVICE UTILITY LATERALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for water service connections to buildings.
2. Corporation stop assemblies.
3. Curb stop assemblies.
4. Backflow preventers.
5. Meter setting equipment.
6. Meter boxes.
7. Trenching, bedding, and cover.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Backfill-soil type.
2. Section 310516 - Aggregates for Earthwork: Bedding- and cover-material type.
3. Section 312316.13 - Trenching: Excavation of pipe trench.
4. Section 330110.58 - Disinfection of Water Utility Piping Systems: Flushing and disinfecting of water system.
5. Section 330509.33 - Thrust Restraint for Utility Piping: Thrust restraints as required by this Section.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Pipe and Fittings:

1. Basis of Measurement: By linear **foot**.
2. Basis of Payment: Includes hand-trimming excavation, pipe and fittings, bedding, backfill, and trace wire system.

C. Water Service Connection:

1. Basis of Measurement: By unit.
2. Basis of Payment: Includes corporation stop, curb stop, curb box and cover, casting, fittings, accessories, temporary utility marker, and connection to existing services (when applicable).

1.3 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

B. American Society of Sanitary Engineering:

1. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.
2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.

C. ASTM International:

1. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
2. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
3. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
4. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
5. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
6. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
7. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
8. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

D. American Welding Society:

1. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding.

E. American Water Works Association:

1. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
2. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
3. AWWA C800 - Underground Service Line Valves and Fittings.
4. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service.
5. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

F. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventers, and accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, pressure-pipe centerline elevations, and gravity-pipe invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 60 and 61 and NSF 372. A product will be considered as meeting these standards if so certified by NSF, the Underwriters Laboratories, or other organization accredited by ANSI to test and certify such products.

B. Perform Work according to North Dakota Department of Environmental Quality standards.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 WATER PIPING AND FITTINGS

A. Copper Tubing:

1. Comply with ASTM B88.
2. Type: K, annealed.
3. Fittings: Cast copper; ASME B16.18 or wrought copper; ASME B16.22.
4. Joints: Compression connection.

B. PE Pipe:

1. Comply with AWWA C901, ASTM D2239, SIDR 7, PE4710, I.P.S.
2. Fittings:
   a. Type: Molded.
   b. Comply with AWWA C901,
3. Joints: Compression.

C. Pipe sizes

1. 1”, 1 ½” and 2”
2. Larger than 2” see Section 331413.00 – Public Water Utility Distribution Piping.

2.2 CORPORATION STOP ASSEMBLIES

A. Manufacturers:

1. A.Y. McDonald Mfg. Co.
   PO Box 508
   Dubuque IA 52004
2. Ford Meter Box Company, Inc.
   775 Manchester Avenue
   Wabash, Indiana 46992
3. or equal.

B. Corporation Stops:

1. Comply with ASTM B62.
2. Body: Brass or red brass alloy.
3. Inlet End: Threaded for tapping according to AWWA C800.
4. Outlet End: Suitable for service pipe specified.
5. Corporation Stops for 1” copper services shall be flared or compression style plug corporations A.Y. McDonald 4701 and 4701-22 series or Ford F600 and F1000 series or Equal.
6. Corporation Stops for 1 ½” and 2” copper services shall be ball corporation style either flared or compression McDonald 4704B and 4704B-22 Series or Ford FB700 and FB1100 series or Equal.

7. Corporation Stops for 1" polyethylene services shall be compression style McDonald 4701-33 series or Ford F1001 series or Equal.
8. Corporations for 1 ½" and 2" polyethylene services shall be compression ball type McDonald 4704B-33, Ford BF1101 series or Equal.
9. Use of the proper size of insert stiffeners is required for compression corporations for polyethylene.

C. Service Saddles:

1. Type: Double strap. Stainless steel, gasketed, full width sleeve with integral tapped outlet.
2. Ford FS303, PowerSeal 3412AS, or Romac 306.
3. or Equal

2.3 CURB STOP ASSEMBLIES

A. Manufacturers:

1. A.Y. McDonald Mfg. Co.
   PO Box 508
   Dubuque IA 52004
2. Ford Meter Box Company, Inc.
   775 Manchester Avenue
   Wabash, Indiana 46992
3. or Equal.

B. Curb Stops:

1. Body: Brass or red brass alloy.
2. Comply with ASTM B62.
3. Valve Type: Ball.
4. Sealing: Positive pressure.
5. Curb stops for copper services shall be either flared or compression McDonald 6104 and 6104-22 series, Ford B22 or B44 series or Equal.
6. Curb stops for polyethylene services shall be McDonald 6104-33 or Ford B66 series or Equal.
7. Use of proper size of insert stiffeners is required for compression joints for polyethylene.

C. Curb Boxes and Covers:

1. McDonald 5622 or Equal
2. Body:
   a. Cast iron.
   b. 8' total height
   c. 1 ½" riser
3. Type: Extension.
4. Base: Minneapolis.
5. Lid:
   a. Inscription: WATER.
   b. Plug: Pentagonal.

6. Stationary Rod:
   a. 5/8”
   b. 6’ height.

2.4 CASTINGS

A. Manufacturers

1. AY McDonald: Model 74M1A
2. Ford Meter Box Company: Meter Box Cover – A1 Style

2.5 MATERIALS

A. Bedding and Cover:

B. Bedding: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.

C. Cover: Fill Type A5 as specified in Section 310516 - Aggregates for Earthwork.

D. Soil Backfill from Above Pipe to Finish Grade:

1. Soil Type S2 as specified in Section 310513 - Soils for Earthwork.
2. Subsoil: No rocks greater than 6 inches in diameter, frozen earth, or foreign matter.

2.6 ACCESSORIES

A. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

PART 3 - EXECUTION

3.1 PREPARATION

A. Obtain all required permits from the City of Kindred.

B. Coordination with City:

1. City contact for all coordination issues shall be Public Works Superintendent.

C. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.

D. Remove scale and dirt from inside and outside of piping before assembly.

E. Prepare pipe connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Corporation Stop Assemblies:

1. Make connection for each different kind of water main, using suitable materials, equipment, and methods as approved by Engineer.
2. Provide service clamps for mains constructed of materials other than cast iron or ductile iron.
3. Location:
   a. Screw corporation stops directly into tapped and threaded iron main at 10- and 2-o'clock positions along main's circumference.
   b. Locate and stagger corporation stops at least 12 inches apart longitudinally.
4. Plastic Pipe Mains:
   a. Provide full support for service clamp for full circumference of pipe, with minimum 2-inch width of bearing area.
   b. Exercise care against crushing or causing other damage to mains at time of tapping or installation of service clamp or corporation stop.
5. Use seals or other devices such that no leaks are present in mains at points of tapping.
6. Do not backfill and cover service connections until installation has been approved by Engineer.

B. Bedding:

1. Excavate pipe trench as specified in Section 312316.13 - Trenching.
2. Placement:
   a. Place bedding material as indicated on Drawings.
   b. Level fill materials in one continuous layer not exceeding 6 inches of compacted depth.
   c. Compact to 90 percent maximum density.
3. Backfill around sides and to top of pipe with cover fill, tamp in place, and compact to 90 percent maximum density.

C. Pipe and Fittings:

1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed gravity sanitary or storm sewer, septic tank, or subsoil treatment system. The distance shall be measured outside edge to outside edge.
2. Install pipe to allow for expansion and contraction without stressing pipe or joints.
3. Install access fittings to permit disinfection of water system.
4. Thrust Restraints: Form and place concrete for thrust restraints at each elbow or change of direction of pipe.
5. Establish elevations of buried piping with not less than 7.5 feet of cover.

D. Backfilling:

1. Backfill around sides and to top of pipe with cover fill in minimum lifts of 6 inches, tamp in place, and compact to 90 percent of Standard Proctor (ASTM 698) maximum dry density.

2. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
3. Maintain moisture content of bedding material to attain required relative compaction.
4. Backfilling: Backfill above pipe as specified in Section 312316.13 - Trenching.

E. Curb Stop Assemblies:

1. Set curb stops on solid bearing.
2. Boxes:
   a. Center and plumb curb boxes over curb stops.
   b. Set box cover flush with finished grade.

F. Service Connections:

1. Install water service according as indicated on Drawings.

G. Disinfection of Water Piping System: Flush and disinfect system as specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

3.3 TOLERANCES

A. Install pipe to indicated elevation to within tolerance of 5/8 inch.

3.4 FIELD QUALITY CONTROL

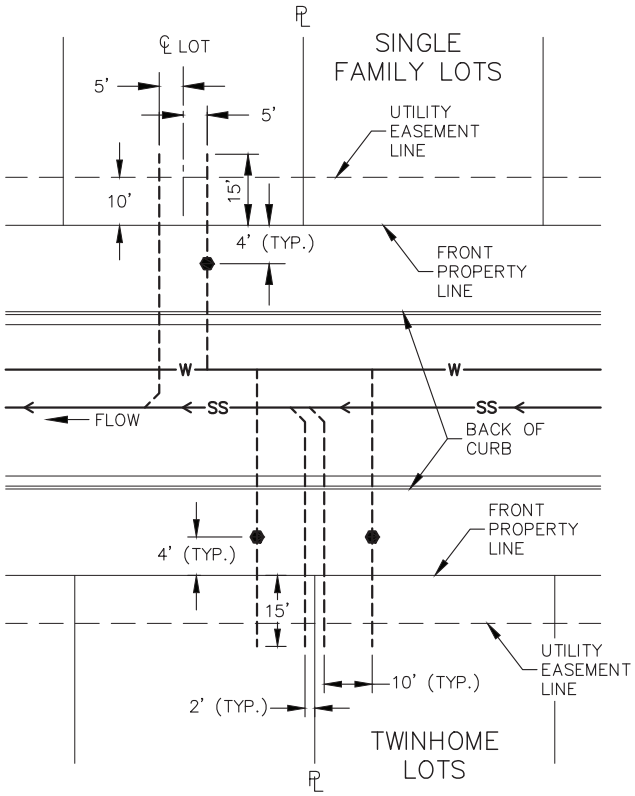
A. Testing:

1. Pressure Testing: As specified in Section 330505.31 – Hydrostatic Testing

B. Compaction Testing:

1. Comply with ASTM D698 and ASTM D6938.
2. Testing Frequency: one test per service trench.
3. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION 331417



NOTES:

1. SERVICES INSTALLED AS SHOWN UNLESS SHOWN OTHERWISE ON PLANS.

2. TRENCH EXCAVATION LIMIT BEYOND PROPERTY LINE SHALL BE 20' FOR FRONT PROPERTY LINE AND 10' FOR SIDE PROPERTY LINE TO PREVENT EXCAVATION EXTENDING INTO BUILDING FOUNDATION AREA.

SERVICE LAYOUT		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 331417	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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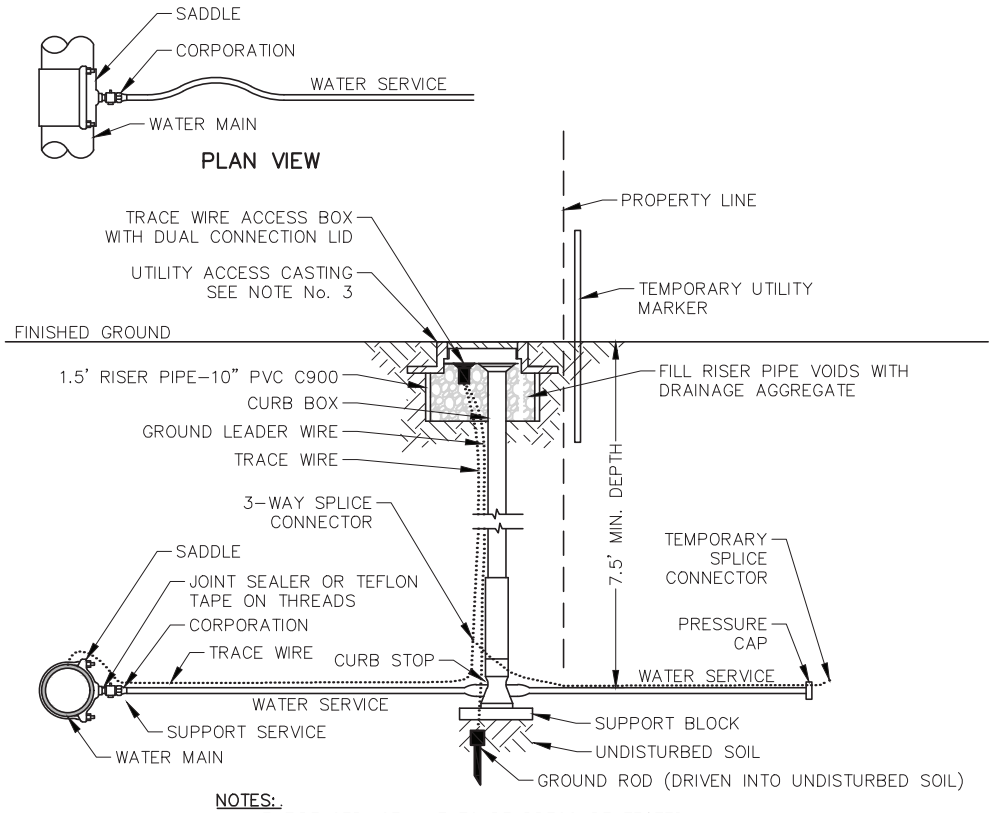

NOTES:

1. ENTIRE SERVICE LINE TO BE PRESSURE TESTED.
2. SEE SERVICE LAYOUT DETAIL OR PLAN SHEETS FOR LOCATION OF CURB STOP AND END OF SERVICE.
3. SET CURB STOP AND TRACE WIRE ACCESS BOX 2–4" BELOW GRADE. CURB STOP TO BE HALFWAY EXTENDED. ENSURE CURB STOP AND TRACE WIRE ACCESS BOX ARE ACCESSIBLE WITHIN UTILITY CASTING.

WATER SERVICE		CITY ENGINEER APPROVED: BLO	DATE: 01.29.20
SECTION No. 331417	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 01.27.20
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 02.05.20	

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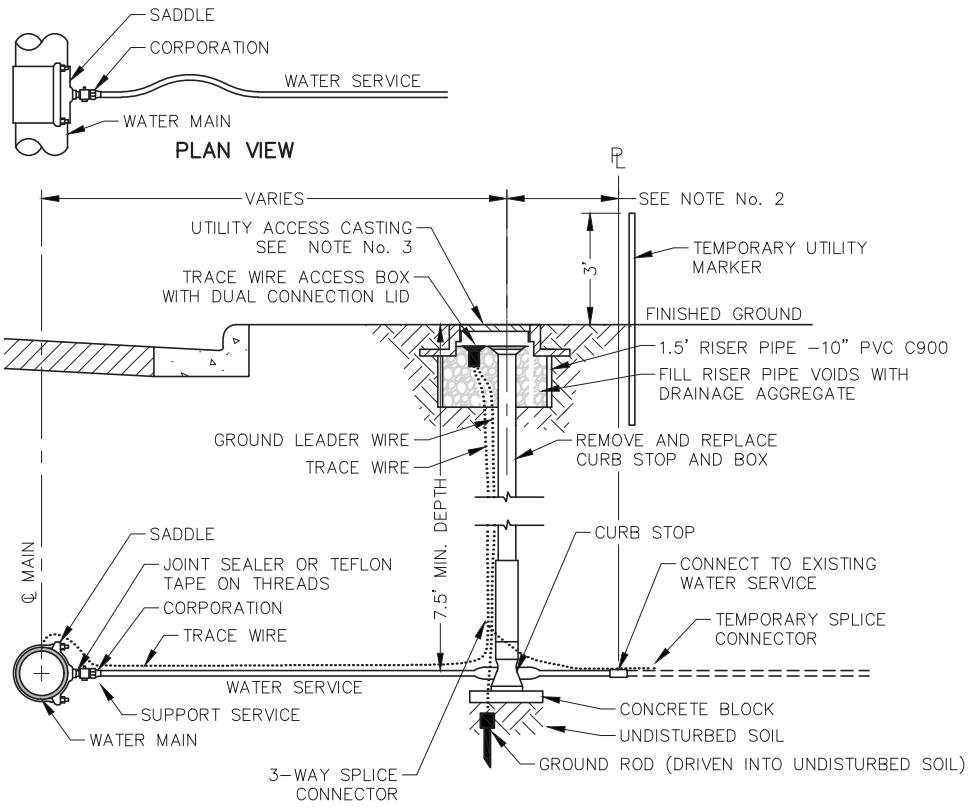

NOTES:

1. IF EXISTING WATER SERVICE HAS LESS THAN 7.5' COVER, ADJUST EXISTING SERVICE DOWN AS NEEDED TO PROVIDE 7.5' COVER AT NEW CURB STOP AND BOX.
2. DETERMINE LOCATION OF CURB STOP IN FIELD.
3. SET CURB STOP AND TRACE WIRE ACCESS BOX 2–4" BELOW GRADE. CURB STOP TO BE HALFWAY EXTENDED. ENSURE CURB STOP AND TRACE WIRE ACCESS BOX ARE ACCESSIBLE WITHIN UTILITY CASTING.

WATER SERVICE REPLACEMENT		CITY ENGINEER APPROVED: BLO	DATE: 01.29.20
SECTION No. 331417	DRAWING No. 3	PUBLIC WORKS APPROVED: RAS	DATE: 01.27.20
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 02.05.20	

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SECTION 331419 - VALVES AND HYDRANTS FOR WATER UTILITY SERVICE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Valves.
2. Valve boxes.
3. Fire hydrants.

B. Related Requirements:

1. Section 310516 - Aggregates for Earthwork: Drainage Aggregate.
2. Section 330110.58 - Disinfection of Water Utility Piping Systems: Requirements for flushing and disinfecting.
3. Section 330509.33 - Thrust Restraint for Utility Piping: Thrust restraints as required by this Section.
4. Section 331413 - Public Water Utility Distribution Piping: Pressure testing of valves and hydrants.
5. Section 331417 - Site Water Service Utility Laterals: Piping, trenching, backfilling, and compaction requirements.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Valves:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, valve, valve box, accessories, bedding, and backfill.

C. Fire Hydrants:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, hydrant, hydrant marker, accessories, foundation bedding, and backfill.

D. Hydrant Barrel Extension:

1. Basis of Measurement: by each.
2. Basis of Payment: Includes removal of hydrant, installation of barrel extension, re-installation of hydrant and tracer wires, accessories, testing and backfill.

1.3 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
2. AWWA C502 - Dry-Barrel Fire Hydrants.
3. AWWA C503 - Wet-Barrel Fire Hydrants.
4. AWWA C515 - Resilient-Seated Gate Valves for Water Supply Service.
5. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.

B. National Fire Protection Association:

1. NFPA 291 - Recommended Practice for Fire Flow Testing and Marking of Hydrants.

C. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.4 COORDINATION

A. Coordinate Work of this Section with installation of water mains.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer information regarding component materials, fittings, assembly and parts diagram, and accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

D. Qualifications Statements:

1. Submit qualifications for manufacturer and installer.
2. Submit manufacturer's approval of installer.

1.6 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

B. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.

C. Perform Work according to North Dakota Department of Environmental Quality standards.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Seal valve and hydrant ends to prevent entry of foreign matter.
2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 RESILIENT-WEDGE GATE VALVES:

A. Manufacturer:
1. American Cast Iron Pipe Company (American Flow Control & Waterous)

B. Description:
1. Valves 2”-66” shall be resilient wedge type rated for 250 psi cold water working pressure. All cast ferrous components shall be ductile iron. This includes but is not limited to Stuffing Box, Valve Body, Valve Bonnet and Wrench nut /Operating nut.
2. Valves 3”-16” shall be in full compliance with AWWA C-515. The words "Dl' or "Ductile Iron" shall be cast on the valve or stamped on a permanently attached corrosion resistant metal. All cast ferrous parts of the valve shall be made of ductile iron ASTM A536, minimum 65,000 psi tensile strength.
3. Valves 3”-12” shall be furnished with a stem seal (Debris Seal) above the stuffing box O-rings. This seal shall also be capable of sealing against internal or external pressure equal to the valve’s rated working pressure.
4. Valves shall have a label or tag, exhibiting a barcode that when scanned by a Trimble mobile device or approved smartphone and necessary software application, the device associates high accuracy GPS coordinates, photos, product description and specifications with the valve or hydrant asset. The application shall provide interoperability with existing ESRI® ArcGIS, computerized maintenance management systems (CMMS), or enterprise resource planning databases
5. MJ connecting pipe bolt holes must have anti-rotation lugs to aid in installation

6. Valves stems shall be full diameter from thrust collar to wrench nut, without any reduced area that allows premature failure. Stems with fracture grooves will not be accepted.
7. Wedge nut shall be held in place on three sides. Valves with wedge nuts held in place by less than three side will not be accepted.
8. The wedge shall be symmetrical and seal equally well with the flow in both direction and have wedge covers on both wedge guides made of Delrin.
9. Seal between bonnet and body shall be a flat gasket with integral O-ring, allowing bolting to pass through. Standard O-rings or standard flat gaskets without integral O-rings will not be accepted.
10. Valves 2"-66" shall be NSF Standard 61 certified.
11. Valve shall have factory installed 304 stainless steel exterior bolting. All bolting on valves 4” and larger must be at least 5/8" diameter. Metric bolts, Allen head, and socket head cap screws will not be accepted.
12. Operating nuts on non-geared valves shall be made of ductile iron and shall have four flats at stem connection to assure even torque input to the stem.
13. Stem shall be sealed by three pressure sealing O-rings.
14. Valve shall have thrust washers located with one above and one below the thrust collar to assure trouble-free operation of the valve.
15. All internal and external surfaces of the valve body and bonnet shall be epoxy coated, complying with ANSI/AWWA C550.
16. 4”-12” Valve inlet shall be restrained for use with ductile iron, cast iron, HDPE and PVC materials. Inlet shall incorporate a stab-fit design using a single Type 304 stainless steel fastener and heat-treated ductile iron grippers. The joint shall work with pressure to achieve joint restraint. All valves inlets shall be the Romac ALPHA design, as furnished by AMERICAN Flow Control.
17. MJ shall be allowed as an alternative to be used at contractor’s discretion.

2.2 FIRE HYDRANTS

A. Manufacturer:

1. American Cast Iron Pipe Company (American Flow Control & Waterous)

B. Description:

1. Fire hydrants shall meet or exceed ANSI/AWWA C502, latest revision. Rated working pressure shall be 250 psi.
2. The nozzle section, caps, upper/lower standpipes and hydrant base shall be ductile iron.
3. Nozzles shall be mechanically attached by retaining collars. Pinned, threaded-in, screwed in or nozzles using set screws will not be allowed.
4. Nozzles shall be two 2 ½ size and 4 ½ pumper
5. Nozzle section will be designed for easy 360 degree rotation by the loosening of no more than four bolts.
6. All external bolting must be Standard and a nut and bold design. Metric, Allen bolts, or threaded castings in place of nuts will not be accepted.
7. Hydrant shall measure 30” inches from ground line to center of nozzle. (22” upper barrel)
8. External bolting below grade shall be stainless steel bolting that meets the requirements of ASTM F 593 Standard Specification for Stainless Steel Bolts, Type 304, Alloy Group 1, CW condition and ASTM F 594 Standard Specification for Stainless Steel Nuts, Type 304, Alloy Group 1, CW condition.

9. Hydrant shall be open Left
10. External surfaces above grade shall be coated with two-part epoxy primer and a two-part high-gloss urethane topcoat. Color RED
11. 4.5” nozzle must be facing roadway
12. Above grade painted area of Hydrant shall be protected from damage during installation.
13. Valve or hydrant shall be supplied with a label or tag from the manufacture exhibiting a barcode that when scanned by a Trimble mobile device or approved smartphone and necessary software application, the device associates high accuracy GPS coordinates, photos, product description and specifications with the valve or hydrant asset. The application shall provide interoperability with existing ESRI® ArcGIS, computerized maintenance management systems (CMMS), or enterprise resource planning databases.
14. Hydrant must have an internal travel stop nut located in the top-housing. Hydrant must have a double oil reservoir so that operating threads are oil lubricated and will be O-ring sealed from water, moisture and foreign matter.
15. Hydrant must have a traffic flange design allowing for quick and economical repair of damage resulting from a vehicle's impact. The rod coupling must be two half sleeves bolted on by two stainless steel studs and four brass lock nuts. Pins, standard nuts and bolts not allowed.
16. The seat diameter shall be 5 1⁄4”, opening against the pressure and closing with the pressure. Hydrant must be designed so that removal of all working parts can be accomplished without excavating. The lower valve washer must be fusion-bonded epoxy coated. The bronze seat must be threaded into mating threads of bronze for easy field repair.
17. The draining system of the hydrant shall be bronze and be positively activated by the main operating rod. Hydrant to be furnished with a sliding bronze drain valve. Sliding drain valves made of *rubber, plastic or leather* will not be allowed.
18. Connection shall be MJ or Restrained push-on joint that use water pressure to achieve restraint (AFC Alpha)
19. Hydrant model must have at least 50 years of service history and maintained complete interchangeability of internal parts.
20. Coating System Performance Requirements for Exterior Surfaces above Grade
    a. Hydrants shall be coated to meet the minimum coating requirement of the latest edition of AWWA/ANSI C502.
    b. Primer: Primer shall be used on all surfaces and shall be cross-linked two-part liquid epoxy. Epoxy primer shall be applied using an electrostatic spray process.
    c. Topcoat: Surfaces shall be top coated with high-gloss two-part liquid urethane that uses an aliphatic isocyanate catalyst to produce a cross-linked cure. Topcoat shall be applied using an electrostatic spray process.
    d. The hydrant base shall be coated with fusion-bonded epoxy on interior and exterior surfaces using materials and coating application procedures that meet or exceed the requirements of the latest edition of ANSI/AWWA C550 *Standard for Protective Epoxy Interior Coatings for Valves and Hydrants*
21. See attached Submittal Sheet and Product Acceptance Notice for additional specifications.

C. Hydrant Marker: E-Z Fold Down Fiberglass Hydrant Marker or equal.

2.3 VALVE BOXES

A. Manufacturers:

1. Tyler Union
   11910 CR 492
   Tyler, TX 75706
2. or equal.

B. Description:

1. 12-inch Diameter Valves and Smaller:
   a. Material: Cast iron.
   b. Type: Two piece; screw.
   c. Model: Tyler Union 6850 Series
2. Valves Larger than 12-inch Diameter:
   a. Material: Cast iron.
   b. Type: Three piece; screw.
   c. Base: Round.
   d. Model: Tyler Union 6860 Series
3. Lid Inscription: WATER.

2.4 ACCESSORIES

A. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

B. Valve Box Aligner: High-strength plastic device designed to automatically center valve box base and to prevent it from shifting off center during backfilling.

1. Manufacturers:
   a. Adaptor Inc.
      2151 S. 54th Street
      West Allis, WI 53219
   b. or equal.

C. Valve Stem Extension: Carbon steel tubing with centering plate, socket, and nut.

D. Fire Hydrant Drainage Gravel: As specified in Section 310516 - Aggregates for Earthwork.

E. Exterior Bolts and Nuts: 304 Stainless Steel.

F. Barrel Extension: Standpipe and road extension kit manufactured or approved by the hydrant manufacturer. Length as shown on the Drawings or as directed by the Engineer.

2.5 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of completed assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Determine exact location and size of valves from Drawings.

C. Identify required lines, levels, contours, and datum locations.

D. Verify that elevations of existing facilities prior to excavation and installation of valves and hydrants are as indicated on Drawings.

3.2 PREPARATION

A. Locate, identify, and protect from damage utilities to remain.

B. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

1. Notify Engineer not less than 48 hours in advance of proposed utility interruption.
2. Do not proceed without written permission from Engineer.

3.3 INSTALLATION

A. Perform trench excavation, backfilling, and compaction as specified in Section 331413 - Public Water Utility Distribution Piping.

B. Install valves and hydrants in conjunction with pipe laying.

C. Provide buried valves with valve boxes installed flush with finished grade. Isolation valve shall be between three and five feet from fire hydrant.

D. Provide support blocking and drainage gravel while installing fire hydrants; do not block drain hole.

E. Wrap all portions of hydrant below finished grade with 8 mil polyethylene plastic.

F. Orientation:

1. Set valves and hydrants plumb.
2. Set fire hydrants with pumper nozzle facing roadway.
3. Set fire hydrants with centerline of pumper nozzle 30 inches above finished grade and within 2” of manufacture bury depth line on lower barrel, but shall not cover traffic feature.
4. After main-line pressure testing, flush fire hydrants and check for proper drainage.

G. Disinfection of Water Piping System: Flush and disinfect valves and hydrants with water mains as specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

3.4 ADJUSTMENTS OF EXISTING VALVE BOXES

A. Adjustments of existing valve box shall involve raising or lowering the lid of the valve box to the new finished surface.

B. It shall involve some or all of the following:

1. Spin/twist/rotate the box up or down.
2. Install riser ring.

3.5 FIELD QUALITY CONTROL

A. Testing: Pressure test valves and hydrants with water mains as specified in Section 330505.31 – Hydrostatic Testing.

B. Compaction Testing:

1. Comply with ASTM D698 and ASTM D6938.
2. Testing Frequency: one test per hydrant lead.
3. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION 331419

AMERICAN Flow Control®
5-1/4" WATEROUS PACER® FIRE HYDRANT
SUBMITTAL SHEET

City Specfication: Kindred		**Customer PO:**	**Quantity:**
Style:	☒ Contemporary	☐ Classic	
Type:	☒ Traffic (Model WB67-250)	☐ Non-Traffic (Model W67-250)	
Direction to Open:	☒ Left (C.C.W.)	☐ Right (C.W.)	

Operating Nuts	**Operating Nut**		**Nozzle Cap Nuts**	
	☐ Non-Weathershield ☒ Weathershield		☐ Rocker Lug for Spanner Wrench or ☒ Same as Operating Nut	
	Nominal Size: 1 1/2	Shape: Pentagon	Nominal Size:	Shape:
	Waterous No. (If Known) 5		Waterous No. (If Known)	

Nozzles	**Nozzle Configuration (Check One)**	**Pumper Nozzle**	**Hose or IHG Valve Nozzle**
	☒ DDP (Two Hose, One Pumper) ☐ DDD (Three Hose) ☐ DD (Two Hose) ☐ PP (Two Pumpers) ☐ GGP (Two IHG Valves One Pumper) ☐ GG (Two IHG Valves)	Storz: ☐ 4 in. ☐ 5 in. Nat'l Std. ☒ Yes ☐ No	Nat'l Std: ☒ Yes ☐ No
		Size: 4.5 Pitch Dia: O.D. x T.P.I.	Size: 2.5 Pitch Dia: O.D. x T.P.I.
		Waterous Template (If Known):	Waterous Template (If Known):

Nozzle Cap Chains: ☒ Yes ☐ No	**Bury Depth:** (Depth of Trench)
Upper Standpipe Length: ☐ 10" ☐ 16" ☒ 22" ☐ 28" ☐ 34"	

Bottom (Base) Connection: (Check One)

☐ 6" Flanged ☑ 6" MJ ☐ 6" TYTON® ☐ 6" Plain End with Integral MJ Gland

☐ 6" Flanged Vertical Entry ☐ 4" MJ ☒ 6" ALPHA™ ☐ 6" ALPHA™ XL

Paint Color: Red					
UL Listed	☐ Yes	☒ No	FM Approved	☐ Yes	☒ No
Other Requirements: (List)					

Notes:

1. Meets or exceeds requirements of AWWA C502, latest revision.
2. 250 psig rated working pressure.
3. May be furnished in configurations that are UL Listed and Approved by FM Approvals.
4. Certified to NSF/ANSI Standard 61 and NSF/ANSI 372.
5. TYTON® is a registered trademark of United States Pipe and Foundry Co., LLC.
6. ALPHA™ is a trademark of Romac Industries, Inc. (U.S. Patent 8,894,100)

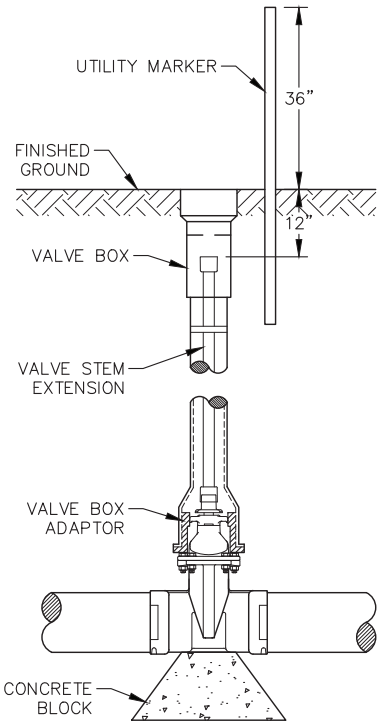
AMERICAN
THE RIGHT WAY

AMERICAN Flow Control Product Acceptance Notice

Date Accepted: 05-03-2022
Utility/Water System: Utility
City: City of Kindred State: North Dakota

Product	Description	Approved	Open Direction	Color	Nozzles (DDP: PP; DD)	Trench	ALPHA	Special Requirements
Hydrant:	5-1/4" WB67 (Classic Pacer)	X	Left	Red	DDP	TBD	Optional	Waterous Only
		Approved	Open Direction	End Connection	2" Op Nut	Bevel/Spur Gear	ALPHA	
Resilient Wedge Gate Valve:	Series 2500 (Sizes 2" - 12")	X	Left	MJ	X		Optional	AFC Only
	Series 2500 (Sizes 14" - 66")	X	Left	MJ		If spec		

Approval Authorized by: Rich Schock
Title: Public Works Superintendent



NOTES:

1. VALVE AND BOTTOM SECTION OF BOX SHALL BE BACKFILLED WITH GRANULAR MATERIAL.
2. PROVIDE RISER FOR NUT ON ANY VALVE OVER 7–1/2' DEEP.
3. TOP OF VALVE BOX SHALL BE SET TO PROVIDE 12" OF UPWARD ADJUSTMENT.
4. A TEMPORARY UTILITY MARKER SHALL BE INSTALLED NEXT TO THE VALVE BOX. A PERMANENT UTILITY MARKER SHALL REPLACE THE TEMPORARY UTILITY MARKER ONLY AT VALVES IN OPEN FIELDS AFTER ALL CONSTRUCTION WORK IS COMPLETED.
5. DO NOT PIN VALVE STEM EXTENSION TO NUT.

VALVE AND BOX		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 331419	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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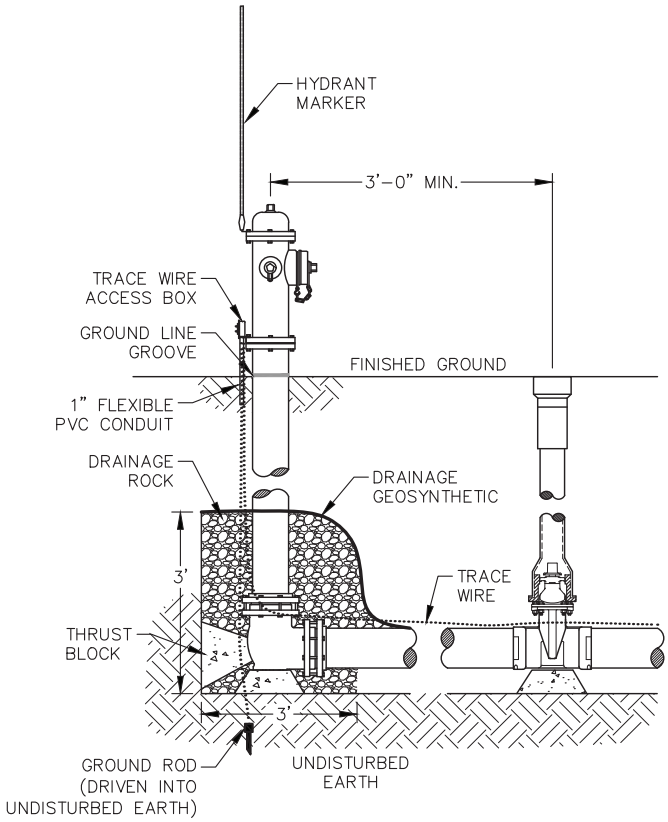

NOTES:

1. DO NOT BLOCK WEEP HOLE ON HYDRANT.
2. DO NOT COVER ANY JOINT WITH CONCRETE.
3. ALL UNDERGROUND METAL ITEMS TO BE WRAPPED WITH POLYETHYLENE.
4. NOZZLE HEIGHT SHALL BE A MINIMUM OF 30" OR AS SHOWN ON PLANS.
5. RESTRAIN ALL JOINTS.
6. DRAINAGE ROCK SHALL BE 1"-2" WASHED ROCK.

HYDRANT		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 331419	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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SECTION 333111 - PUBLIC SANITARY SEWERAGE GRAVITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sanitary sewerage piping.
2. Connection to existing manholes.
3. Wye branches and tees.
4. Sanitary laterals.
5. Bedding and cover materials.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
2. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 312316.13 - Trenching: Execution requirements for trenching required by this Section.
4. Section 330130.11-Television Inspection of Sewers
5. Section 330505.41 - Air Testing: Low Pressure air testing of gravity sewer piping.
6. Section 330561 - Concrete Manholes: Manholes for sanitary sewerage piping.

1.2 DEFINITIONS

A. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Pipe and Fittings:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes excavation, bedding, pipe and fittings, to indicated depth, backfill, trace wire system, and connection to existing sewer pipe.

C. Sanitary Sewer Service Connection:

1. Basis of Measurement: By the unit each.
2. Basis of Payment: Include excavation, backfilling, materials, and equipment necessary for furnishing and installing one (1) in-line sanitary sewer service connection including wye branch, televising riser (when required), and fittings. Pipe shall be measured as indicated above.

D. Cleanout:

1. Basis of Measurements: By the unit each.
2. Basis of Payment: Includes excavating, base, unit installation with accessories, connection to sewer piping and backfilling.

1.4 REFERENCE STANDARDS

A. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
2. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
3. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
4. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
5. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
6. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
7. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
8. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.5 COORDINATION

A. Coordinate Work of this Section with City of Kindred.

1. City contact for all coordination issues shall be Public Works Superintendent.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer catalog cuts and other information indicating proposed materials, accessories, details, and construction information.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.7 QUALITY ASSURANCE

A. Perform Work according to North Dakota Department of Environmental Quality standards.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Storage:

1. Store materials according to manufacturer instructions.
2. Store valves in shipping containers with labeling in place.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Provide additional protection according to manufacturer instructions.

1.10 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPING

A. Plastic Pipe:

1. Material: PVC.
2. Comply with ASTM D3034:
   a. Mains: SDR-35 or SDR-26
   b. Service Lines: SDR-26
3. Inside Nominal Diameter:
   a. Mains: as notes on plans
   b. Service Lines: 4 or 6 inch.

4. End Connections: Bell-and-spigot style, with rubber-ring-sealed gasket joint.
5. Fittings: PVC.
6. Joints:
    a. Elastomeric gaskets.
    b. Comply with ASTM F477.

2.2 FLEXIBLE COUPLINGS

A. Manufacturers:

1. Reinforced Flexible Coupling: Strong Back RC Series by Fernco.
2. Substitutions: As specified in Section 016000 - Product Requirements
3. or equal.

2.3 MATERIALS

A. Bedding and Cover:

1. Bedding and Cover: Fill Type A5, as specified in Section 310516 - Aggregates for Earthwork.
2. Soil Backfill from Above Pipe to Finish Grade:
    a. Soil Type S2, as specified in Section 310513 - Soils for Earthwork.
    b. Subsoil with no rocks more than 6 inches in diameter, frozen earth, or foreign matter.

2.4 ACCESSORIES

A. Cleanout Lids: Neenah R-1973 and labeled for sewer.

2.5 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of pipe.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench cut is ready to receive Work of this Section.

B. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Obtain all required permits from the City of Kindred.

B. Prepare and implement temporary bypass pumping plan on work involving live sewers. Plan shall be approved by Engineer.

C. Correct over-excavation with Coarse Aggregate Type A5.

D. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.

E. Protect and support existing sewer lines, utilities, and appurtenances.

F. Utilities:

1. Maintain profiles of utilities.
2. Coordinate with other utilities to eliminate interference.
3. Notify Engineer if crossing conflicts occur.

3.3 INSTALLATION

A. Bedding:

1. Excavate pipe trench as specified in Section 312316.13 - Trenching.
2. Excavate to lines and grades as indicated on Drawings.
3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
4. Provide sheeting and shoring as specified in Section 312316.13 - Trenching.
5. Placement:
   a. Place bedding material at trench bottom.
   b. Level materials in continuous layer not exceeding 6-inch compacted depth.
   c. Compact to 90 percent of Standard Proctor (ASTM 698) maximum dry density.

B. Piping:

1. Install pipe, fittings, and accessories according to ASTM D2321, and seal joints watertight.
2. Lay pipe to slope gradients with the following minimums:
   a. 4” Pipe: 1/4” per foot (2%)
   b. 6” Pipe: 1/8” per foot (1%)
3. Cover:
   a. Establish elevations of buried piping with not less than 7.5 feet of cover.
   b. Measure depth of cover from final surface grade to top of pipe barrel.
   c. For cover less than 7.5 feet provide insulation a minimum of 4 inch thick by 4 feet wide, the length of the trench.
4. Begin at downstream end of system and progress upstream.
5. Bedding: As indicated on Drawings.
6. Lay bell-and-spigot pipe with bells upstream.
7. Backfill and compact as specified in Section 312316.13 - Trenching.
8. Do not displace or damage pipe when compacting.
9. Connect pipe to existing sewer system with solid sleeve coupling.
10. Installation Standards: Install Work according North Dakota Department of Environmental Quality standards.

11. Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge.
12. Crossings:
    a. Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to maintain line and grade.

C. Connections to Existing Manholes:

1. Drilling:
    a. Core drill existing manhole to clean opening.
    b. Use of pneumatic hammers, chipping guns, and sledge hammers are not permitted.
2. Install watertight neoprene gasket and seal with nonshrink concrete grout.
    a. Use epoxy binder between new and existing concrete.

3. Prevent construction debris from entering existing sewer line when making connection.

D. Wye Branches and Tees:

1. Concurrent with pipe-laying operations, install wye branches and pipe tees at locations indicated on Drawings.
2. Use standard fittings of same material and joint type as sewer main.
3. Maintain minimum 5 foot separation distance between wye connection and manhole.
4. Use saddle wye or tee with stainless-steel clamps for taps into existing piping.
5. Mount saddles with gasket and secure with metal bands.
6. Lay out holes with template, and cut holes with mechanical cutter.

E. Sanitary Laterals:

1. Construct laterals from wye branch to terminal point as shown on the Drawings.
2. Where depth of main pipeline warrants, construct riser-type laterals from wye branch.
3. Minimum Depth of Cover over Piping: 8 feet.
4. Minimum Separation Distance between Laterals: 5 feet.
5. Install televising riser as shown on the Drawings.

F. Backfilling: As specified in Section –312316.13 - Trenching.

3.4 TOLERANCES

A. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.

3.5 FIELD QUALITY CONTROL

A. Request inspection by Engineer prior to and immediately after placing bedding.

B. Testing:

1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
2. Pipe Testing:
   a. Pressure Testing: As specified in Section 330505.41 - Air Testing.
3. Compaction Testing:
   a. Comply with ASTM D698 and ASTM D6938.
   b. Testing Frequency: one test along utility trenches at maximum 500 foot intervals per 2 feet of vertical lift.
   c. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

C. Television Inspection:

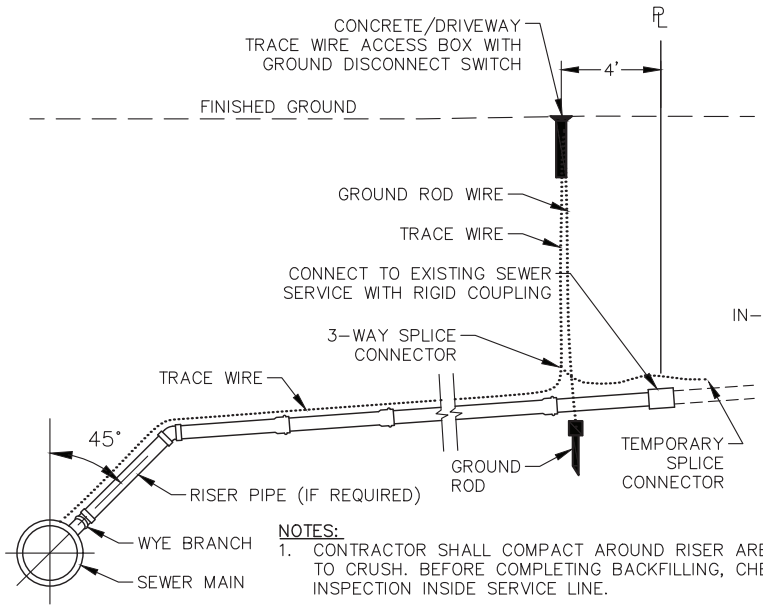
1. As specified in Section 330130.11 – Television Inspection of Sewers.
2. Shall be completed on new mains and services prior to street construction.
3. Engineer shall review television inspection recordings and reports within 7 days of receipt.
4. Deficiencies shall be repaired by the contractor prior to street construction.

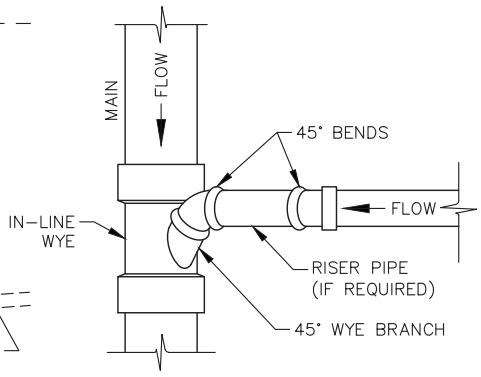
3.6 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

B. Cap open ends of piping during periods of Work stoppage.

END OF SECTION 333111





SEWER WYE CONNECTION

NOTES:

1. CONTRACTOR SHALL COMPACT AROUND RISER AREA BUT TAKE CARE NOT TO CRUSH. BEFORE COMPLETING BACKFILLING, CHECK INTEGRITY BY VISUAL INSPECTION INSIDE SERVICE LINE.

2. SEWER SERVICE GRADE SHALL NOT BE LESS THAN FOLLOWS:
   2.1. 4" PIPE: 1/4" PER FOOT (2%)
   2.2. 6" PIPE 1/8" PER FOOT (1%)

3. PRIOR TO INSTALLATION OF SANITARY SEWER SERVICE, CONTRACTOR SHALL VERIFY THAT NO CONFLICTS WILL OCCUR WITH OTHER UTILITY PIPES TO BE INSTALLED ON THE PROJECT.

SANITARY SEWER SERVICE REPLACEMENT		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 333111	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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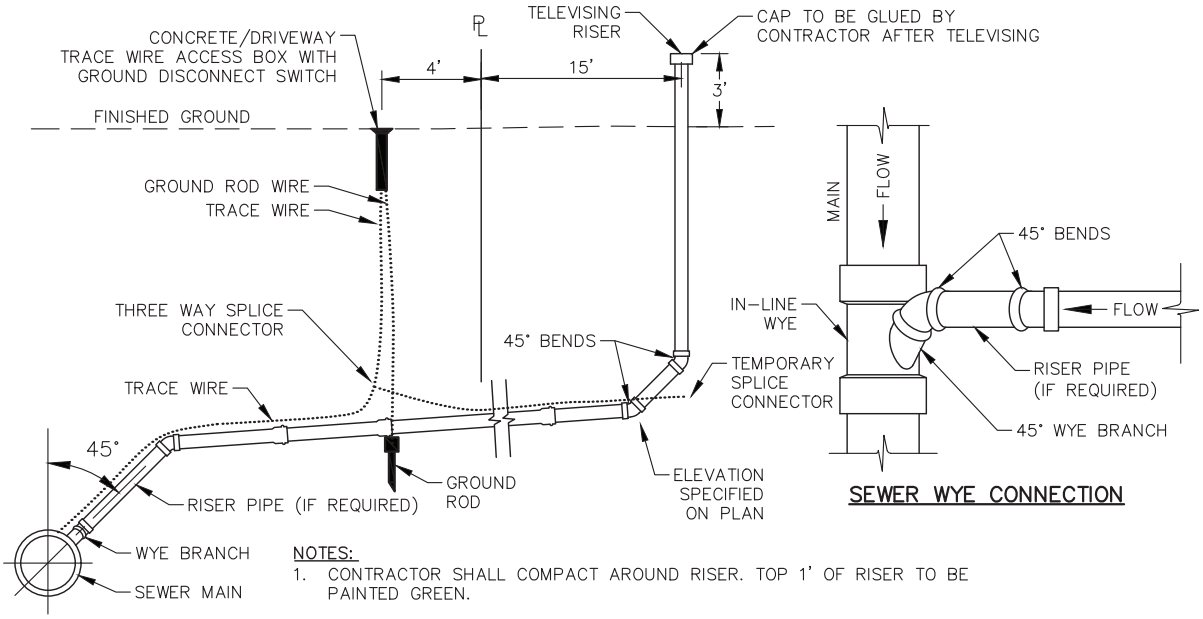

SEWER WYE CONNECTION

NOTES:

1. CONTRACTOR SHALL COMPACT AROUND RISER. TOP 1' OF RISER TO BE PAINTED GREEN.
2. SEWER SERVICE GRADE SHALL NOT BE LESS THAN FOLLOWS:
   2.1. 4" PIPE: 1/4" PER FOOT (2%)
   2.2. 6" PIPE 1/8" PER FOOT (1%)
3. PRIOR TO INSTALLATION OF SANITARY SEWER SERVICE, CONTRACTOR SHALL VERIFY THAT NO CONFLICTS WILL OCCUR WITH OTHER UTILITY PIPES TO BE INSTALLED ON THE PROJECT.

SANITARY SEWER SERVICE WITH TELEVISING RISER		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 333111	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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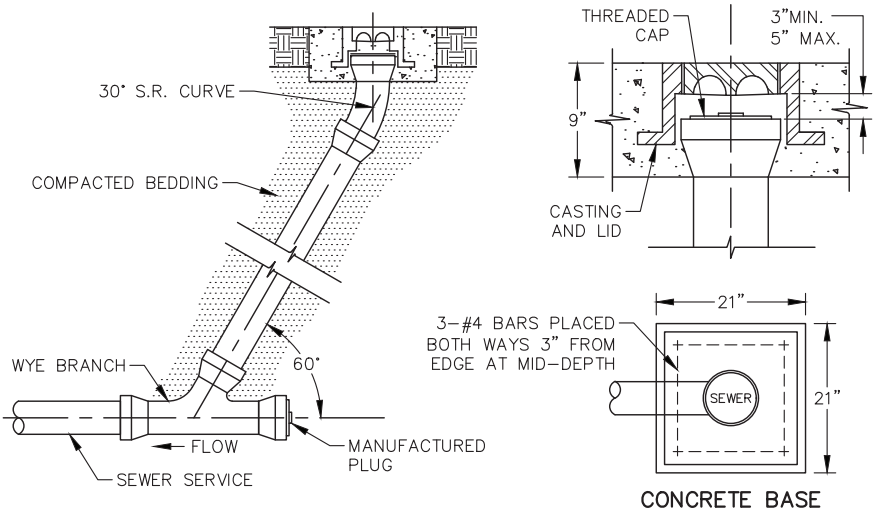

SANITARY SEWER CLEANOUT TYPE 1		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 333111	DRAWING No. 3	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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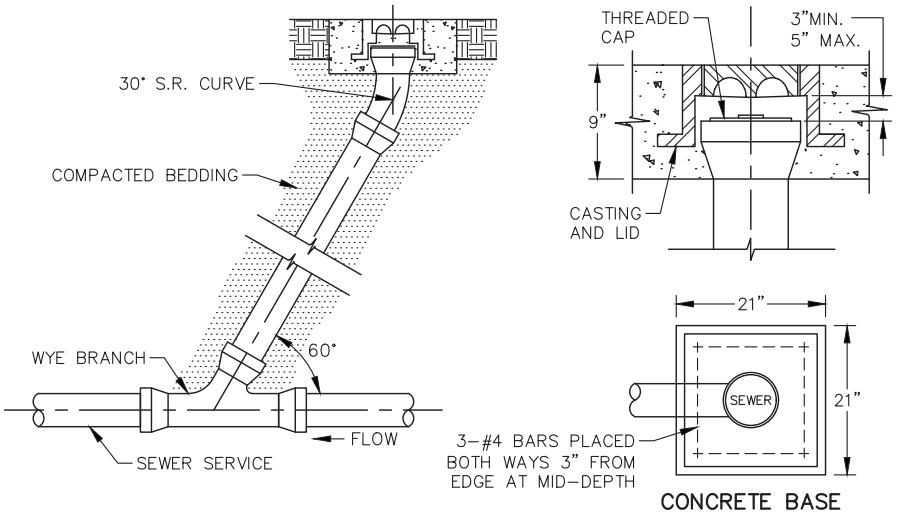

SANITARY SEWER SERVICE CLEANOUT TYPE 2		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 333111	DRAWING No. 4	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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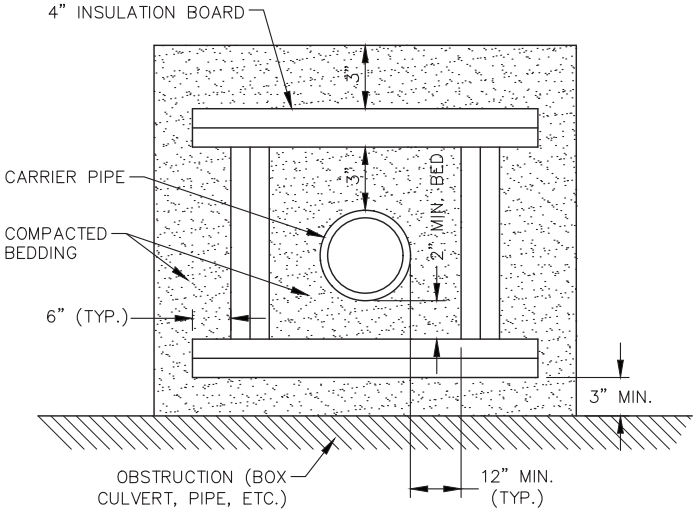

TOTAL ENCASEMENT INSULATION		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 333111	DRAWING No. 5	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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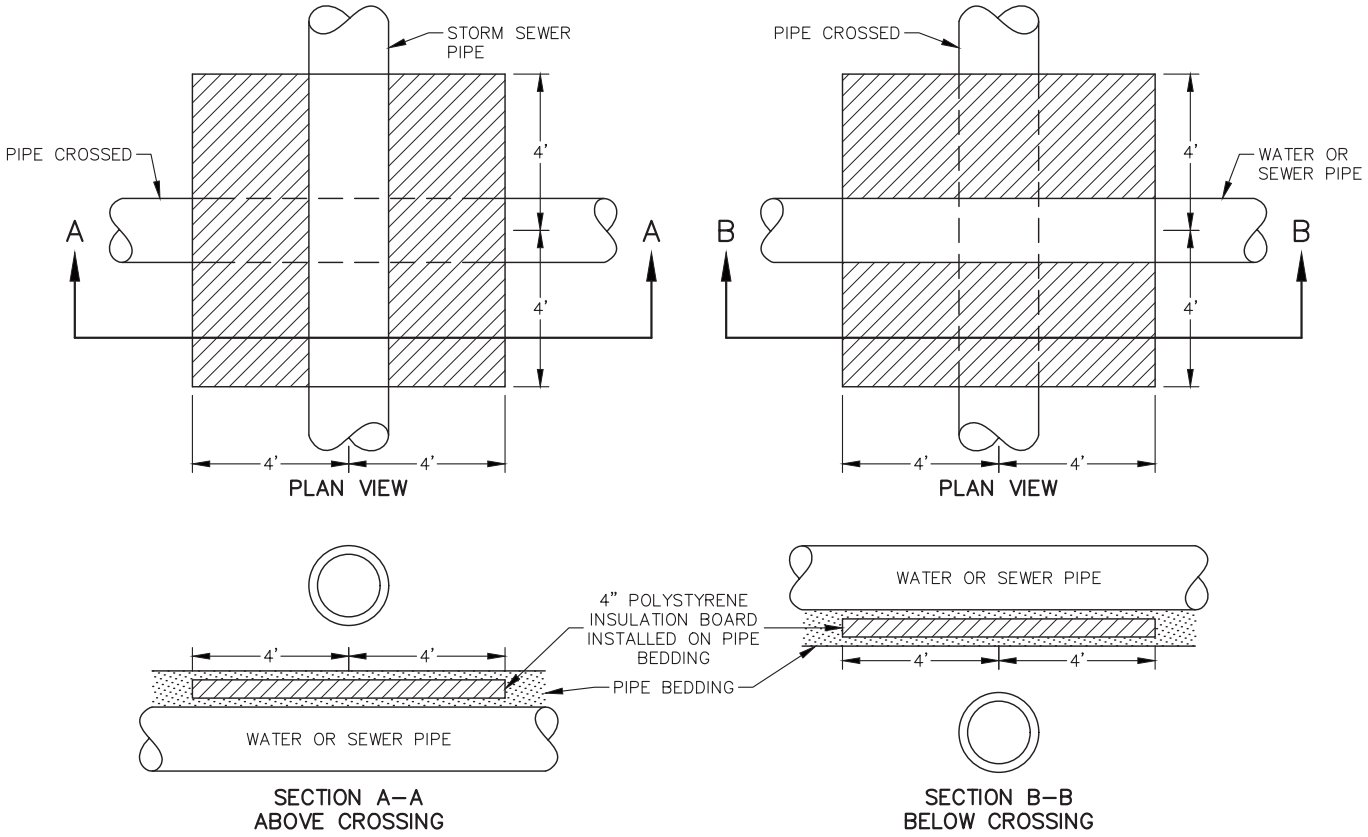

NOTES:
1. THIS DETAIL APPLIES TO BOTH MAINS & SERVICES WHERE CROSSING IS WITHIN 24".
2. WATER SERVICES MAY BE INSULATED WITH AN APPROVED ENCASEMENT INSULATION IN LIEU OF DETAIL.

INSULATION FOR UTILITY CROSSING		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 333111	DRAWING No. 6	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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PLAN NOTES

The notes provided in this section are for reference purposes only. Engineer to work with the City Engineer of the City of Kindred on revising, adding, or eliminating the plan notes as required for each project. Include recommendations from geotechnical report in notes.

GENERAL NOTES:

1. Testing requirements for NDDOT bid item numbers to be in accordance with the NDDOT field sampling and testing manual unless otherwise noted.

UNDERGROUND NOTES:

1. Notify the Engineer and City at least 48 hours prior to disruption of water service. Contact the City to locate necessary gate valves and to have the City shut appropriate valves after discussion with the engineer. Notifying any house/business in writing 24 hours prior to disruption of their water service. The maximum amount of time a house/business service may be disconnected from service is 4 hours, otherwise provide temporary water service to any affected house/business. No house/business service may be disconnected from service overnight, and limit the time any service is out of water.

NDDOT NOTES

105-P01 PAVEMENT SWEEPING: Sweep the roadway adjacent to the construction area at the end of each day. Sweep paved areas that were used by construction traffic before opening these areas to public traffic. Sweep all newly constructed pavement no more than 24 hours before a scheduled final inspection. Use a vacuum type sweeper to perform this work.

202-P01 SALVAGED ITEMS: If requested by the Owner, salvage manhole castings, inlet castings, fire hydrants, pumps, and street signs. Deliver to Owner at their designated storage location.

202-P01 STREET MAINTENANCE: Maintain streets where asphalt or concrete has been removed to allow for local traffic in and out of residences and businesses. This includes blading, watering, pumping, placing aggregate, or fixing soft areas if necessary. All street maintenance to be included in other items.

203-360 COMPACTION AND DENSITY CONTROL: Compact material as specified in section 203.04 E.2.b, "ND T-99". Moisture content no less than 1.0 percentage points below optimum and no more than 5.0 percentage points above optimum.

Manipulate embankment material with disking equipment.

203-P01 DENSITY AND MOISTURE TESTING: Field testing method for density and moisture control to be in accordance with ASTM D6938 - Standard Test Method for in-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

203-P02 TESTING FREQUENCY: Test embankment per the frequency listed below.

Compaction Curve:	1 for each change in soil
Density and Moisture:	1 test per 350 feet of roadway per 12” lift, 1 test per city block per 12” lift, or 1 test per 500 cubic yards of fill

203-P03 COMPACTION CONTROL: Meet the compaction control requirements below for embankment construction:

Location	Compaction Control
Work in public R.O.W.	Type A
Work outside public R.O.W.	Type B
Topsoil stockpile	Type C

216-P01 WATER: Include all water required for dust control and to obtain proper moisture content and compaction in the associated bid item.

216-P02 WATER FOR GRASS ESTABLISHMENT: Immediately begin watering all seeded and mulched areas to provide a minimum of 1.0 inch depth of moisture per week, no more than 2 times per week, until Final Stabilization per ND Department of Environmental Quality Construction General Permit NDR10-000. Water only during early morning hours to avoid excessive evaporation. Reduce water as necessary to account for rainfall during each week. Provide the Engineer weekly reports of watering operations including dates, times and quantity of watering or rainfall amounts to indicate minimum moisture is being obtained. Include all cost for labor, equipment, and water to complete the work in the price bid for Seeding Class III.

230-P01 SUBGRADE PREPARATION: Scarify and recompact subgrade areas under the roadway section to a depth of 6 inches.

Proof roll all pavement subgrades prior to aggregate placement, along all travel lanes to verify the uniformity of the underlying subgrade throughout the roadway section and to check for the presence of localized soft or weak zones. Perform proof roll under the observation of the engineer with a fully loaded, tandem axle dump truck with a weight of approximately 25 tons, or an approved equal. Proof roll at a vehicle speed of between 1 ½ and 3 miles per hour along the pavement subgrades such that unrolled areas between wheel paths are not wider than 1 foot. Typical yielding should be limited to less than 1 1/2-inches for pavement subgrades, provided the underlying subgrade does not display permanent deformation. Correct areas that display excessive yielding, pumping or rutting during the proof roll. Repeat proof roll procedures until accepted by the engineer.

Include all costs associated with scarifying, recompacting, and proof rolling the subgrade in the price bid for “Subgrade Preparation-Type A”.

251-P01 SEEDING AND HYDRAULIC-MULCHING: Seed and hydraulic-mulch disturbed ground. Apply hydraulic-mulch after the seed is drilled into the topsoil. Use a seed mixture as follows:

Species	Pounds Live Seed/Acre
Kentucky Bluegrass	120
Fine Leaf Perennial Ryegrass	60
Creeping Red Fescue	20
	200

*Include an additional 10 pounds/acre of oats for dormant seeding.

Use fertilizer mixture of 12-24-12 applied at a rate of 220 pounds per acre. Water after placement in order to provide sufficient moisture for growth as determined by the engineer. Reseed, at no cost to the Owner, any areas not established within 6 weeks for normal seeding or not established by July 1 for dormant seeding. All cost for labor, equipment, and materials necessary to complete the work included in the price bid for “Seeding Class III”.

Payment for seeding will be based on the table below:

Contract Amount Earned	Progress
50%	Completion of Seeding
100%	Fully Established

251-P04 FINAL STABILIZATION: All disturbed areas to receive permanent stabilization within 14 days after completion of work in the specific area.

302-P01 SALVAGED BASE COURSE: 100% concrete material meeting the gradation specified in Section 817 of the specification.

302-P02 GRADATION: Independent Testing Firm will collect three samples for each 250 tons of material placed.

302-P03 AGGREGATE BASE: Proof roll all aggregate bases prior to paving along all travel lanes to verify the uniformity of the underlying base throughout the roadway section and to check for the presence of localized soft or weak zones. Perform proof roll under the observation of the Engineer with a fully loaded, tandem axle dump truck with a weight of approximately 25 tons, or an approved equal. Proof roll at a vehicle speed of between 1 ½ and 3 miles per hour along the aggregate base such that unrolled areas between wheel paths are not wider than 1 foot. Typical yielding should be limited to less than ½-inches for aggregate bases, provided the aggregate base does not display permanent deformation. Correct areas that display excessive yielding, pumping or rutting during the proof roll. Repeat proof roll procedures until accepted by the engineer.

Include all costs associated with proof rolling the aggregate base in the price bid for "Aggregate Base Course CI5" and/or "Salvaged Base Course".

401-P01 LATE SEASON PAVING: If the top lift of asphalt is placed after September 30th, apply a fog seal to the top lift in accordance with section 401. Apply fog seal following final rolling while the pavement is still hot. If necessary, spread CI 44 blotter material to prevent tracking. Include all costs for the fog seal and blotter material in the price bid for "Superpave FAA 43".

411-P01 ASPHALT MILLINGS: All asphalt milling become the property of the owner and delivered to the owner's designated location.

430-P01 ASPHALT TESTING (QC): Contractor to provide Quality Control (QC) testing in accordance with the Section 430.02 of the North Dakota Department of Transportation Field Sampling and Testing Manual. Table 430-5 lists the tests to be conducted. Include all costs for QC testing in the price bid for "Superpave FAA 43".

Contractor will obtain samples at frequencies indicated. The Contractor will split the sample and give one half of the sample to the Independent Testing Firm for Quality Assurance (QA) testing. Aggregate samples collected at the plant, and asphalt mix samples collected behind the paver will be obtained by the Contractor under the observation of the Engineer.

Contractor to provide Daily Cut-Off Reports for asphalt cement on each individual lot. The average AC Content is to be calculated at the end of each production day and results recorded on SFN 9988, Mix Bitumen Cut-Off Report. SFN 9988 is to be completed prior to submission to the Engineer. Send results to the Engineer the following day.

Contractor responsibility as shown in section 430.03 B of the North Dakota Department of Transportation Field Sampling and Testing Manual will not apply.

430-P02 ASPHALT TESTING (QA): Independent Testing Firm to provide Quality Assurance (QA) testing in accordance with Section 430.03 of the North Dakota Department of Transportation Field Sampling and Testing Manual at a frequency of one set of tests per 1,500 Tons of mix production and will conduct a minimum of one set of tests per production day and a minimum of two sets of tests per project. Independent Testing Firm providing QA testing is not permitted to provide QC testing. All costs for QA testing will be included in the "Testing Allowance".

Independent Testing Firm must provide NDDOT certified personnel to conduct all required asphalt testing. Testing Results shall be sent to the Engineer within 24 hours of the sample being received.

The following QA tests will be conducted in accordance with the modified table below:

Table 430-8	
Test	Worksheet
ND T 27, "Sieve Analysis of Fine and Coarse Aggregates"	SFN 9987, Aggregate Sample Worksheet
ND T 11, "Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing"	SFN 9987, Aggregate Sample Worksheet

ND T 304, “Fine Aggregate Angularity”	SFN 51701, Uncompacted Void Content of Fine Aggregate
ND T 312, “Preparing and Determining the Density of Hot Mix Asphalt Specimens by Means of Superpave Gyratory Compactor”	SFN 50289, Maximum Density Worksheet
ND T 209, “Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt”	SFN 50289, Maximum Density Worksheet
ND T 166, “Bulk Specific Gravity of Compacted Hot Mix Asphalt Using Saturated Surface-Dry Specimens”	SFN 50289, Maximum Density Worksheet
AASHTO T 308, “Determining the Asphalt Binder Content of Hot mix Asphalt (HMA) by Ignition Method”	None

Independent Testing Firm will determine the asphalt content per AASHTO T 308. One sample will be taken from the first half of the project and a second will be taken from the second half of the project using random numbers to determine when sample shall be taken. The results of the tests will be used as a cross check for the AC Content from the Daily Cut-Off from that Lot. The recorded average asphalt contents of the lots will be totaled and divided by the number of lots within the production day to obtain the average asphalt content of the pavement, to be used in the Asphalt Content Adjustment Factor in Section 430.05 C.3 of the North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction.

The Independent Testing Firm will perform one set of tests per project as indicated in Table 430-10 of the North Dakota Department of Transportation Field Sampling and Testing Manual.

430-P03 IN-PLACE DENSITY TESTING: Independent Testing Firm to conduct In-Place Density Testing following each lift each day. The Engineer will divide the pavement into lots. A lot is equal to the amount of material, in tons, placed each production day.

A sublot is defined as a single lift, full street width, approximately 2 blocks in length or every 700 feet, whichever is less. If a partial sublot is less than 1 blocks or 350 feet, it will be included in the previous sublot. A partial sublot, greater than 1 block or 350 feet in length will be considered a separate sublot.

Engineer will direct the Independent Testing Firm to obtain two cores from each sublot. Coring will be conducted by the Independent Testing Firm and will be taken the following day prior to any successive lifts being placed.

The station and offset location of the cores will be determined using random numbers. If the location of the core falls within one foot of the edge of the pavement, the Engineer will adjust the location or generate new random numbers to select a different area. Coring will be observed by both the Engineer and paving Contractor. All costs for coring will be included in the “Testing Allowance”. If Contractor completes the cored samples, all costs for coring to be include in the price bid for “Cored Sample”.

The Engineer will record the information on SFN 10071, “Compaction Control” and will observe the coring procedure. The Independent Testing Firm will take immediate possession of the cores.

The Independent Testing Firm will determine the density of the cores in accordance with ND T 166, “Bulk Specific Gravity of Compacted Hot Mix Asphalt Using Saturated Surface-Dry Specimens,” and ND T 209, “Maximum Theoretical Density.” The Engineer

will determine the acceptance of the sublot based on the density of the core. The density of the core is recorded on SFN 59132, Density Pay Factor.

The density of a lot will be determined using the recorded average densities of the sublots contained within the lot. The recorded average densities of the sublots will be totaled and divided by the number of sublots within the lot to obtain the average density of the pavement.

Payment will not be made for densities over the adjustment factor of 1.000 in accordance with Section 430.06 C.4 of the North Dakota Department of Transportation Standard Specifications for Road and Bridge Construction.

430-P04 SUPERPAVE FAA 43: Include the cost for the asphalt cement (PG 58S-34) and tack required for the bituminous pavement in the unit price bid for "Superpave FAA 43."

708-P01 INLET PROTECTION: Install inlet protection in accordance with the detail in the plans. Leave all devices installed in place until the turf has been established. Include installing, cleaning, removing sediment, maintaining, and replacing damaged devices in the unit price bid for "Inlet Protection-Special".

Remove inlet protection devices in the fall and reinstall in the spring.

714-P01 CONCRETE PIPE TIES: Concrete pipe runs from drainage structure (i.e. inlet, manhole, etc.) to end section to have concrete pipe ties placed on all joints including the end section. Pipe ties are not required for concrete pipe placed from drainage structure to drainage structure.

714-P02 EDGEDRAIN NON-PERMEABLE BASE: Construct edgedrains in accordance with the detail in the Specifications. Include all costs required for installing the perforated PVC pipe, Cl 7 drainage aggregate, and outlets to structures in the price bid for "Edgedrain Non Permeable Base."

714-P03 STORM DRAIN: All storm drains [located under paved areas] to be reinforced concrete pipe. Reinforced concrete pipe to be Class III with bell and spigot joints and rubber gaskets per AASHTO M198. Storm drains located in unpaved areas may be reinforced concrete pipe or polypropylene pipe with bell and spigot joints and elastomeric gaskets per ASTM F477.

Install lift hole plugs in accordance with the manufacturer's instructions. Use concrete plugs and mortar for RCP pipe 12 inches through 36 inches, and POPIT plugs, as manufactured by POPIT, Inc, on RCP pipe 42 inches in diameter and larger.

722-100 INLETS AND MANHOLES: Inlets and manholes were designed with a minimum 4 foot riser height. Fill the bottom of each drainage structure with concrete, up to the lowest invert elevation.

722-P01 MANHOLE: Manhole riser sections will not be paid for separately but included in the price bid for "Manhole <size>in".

722-P03 MANHOLE CASTINGS: Manhole castings to be installed as follows:

<u>Outside pavement or in asphalt pavement:</u>

1) Neenah R-1733 with open pickholes and "STORM SEWER" lettering
2) East Jordan Iron Works 1205 with open pickholes and "STORM SEWER" lettering
3) Approved equal

<u>Inside concrete pavement:</u>

1) Neenah R-1955-1 (Self Leveling)
2) East Jordan Iron Works 3025 SELFLEVEL (Self Leveling)
3) Approved equal

722-P04 INLET CASTINGS: Inlet castings installed in curb and gutter, grass, or outside of pavement are as follows:

Grass or outside pavement:

1) Convex grate:
   a) Neenah R-2577 with convex casting grate
   b) East Jordan Iron Works 1205-M2 with convex casting grate
   c) Approved equal
2) Flat grate:
   a) Neenah R-1733 type c
   b) East Jordan Iron Works 1205 Type M
3) Stool:
   a) Neenah R-4342
   b) Approved equal

Curb & gutter:

1) Highback:
   a) Neenah R-3067-C with 2" radius open curb box
   b) East Jordan Iron Works 7030-M2 with T1 back
   c) Approved equal
2) Mountable:
   a) Neenah R-3067-C-C
   b) East Jordan Iron Works 7030-M2
   c) Approved equal
3) Knockdown:
   a) Neenah R-3067-C-Q
   b) Approved equal

722-P05 INLETS: Provide edge drain knockouts and rubber boots with plugs in all storm structures in curb and gutter.

722-P06 STORM MANHOLES: Storm sewer manholes to include Classic External Chimney Seal by Cretex Specialty Products, I & I Barrier by Strike Products, or Infi-Shield Uni-Band by Sealing Systems Inc. Provide steps in the bottom section only.

748-P01 CURB & GUTTER: Construct curb and gutter in accordance with the details in the Specifications. Include all curb and gutter types shown in the plans, high back curb, mountable curb and gutter, and knockdown curb and gutter, in the price bid for "Curb & Gutter - Type 1".

All curb and gutter to be tied to existing curb and gutter with (3) No.4 x 12" bars.

748-P02 CONTRACTION JOINTS: Sealing of contraction joints in curb and gutter or valley gutter as specified in NDDOT Standard Drawing D-748-1 is not required.

750-P01 SIDEWALKS: Sidewalks to be the thickness as indicated on the plans. Reinforce all sidewalks with a No.4 deformed reinforcing bar placed 24 inches on center both ways. Include an 18 inch minimum lap at splice locations. Use plastic chairs to support the bars at mid-depth of the slab and ensure a clearance of 3 inches to all side forms.

Saw a centerline longitudinal joint on concrete sidewalk greater than 8 feet in width. Saw all longitudinal and transverse contraction joints. Saw joints in a timely manner to prevent any uncontrolled random cracking. If random cracking occurs, remove and replace all damaged panels at the contractor's expense.

Tie all sidewalks to existing sidewalk with No.4 x 12" smooth dowels placed mid depth at 30" on center with ½" expansion joint material.

Sidewalk ramps to be 6” thick for a minimum of 5’ from existing curb and to be tied to curb and gutter with No.4 x 12” epoxy coated rebar placed mid depth at 18” on center.

Include all excavation, disposal of excess material, aggregate base, concrete, and reinforcing steel in the price bid for “Sidewalk Concrete <size>in”.

750-P02 DRIVEWAY CONCRETE: Construct driveways in accordance with the detail in section C-500 of the plans. Driveways to be reinforced with No.4 bars @ 24" on center both ways, placed mid-depth in the slab. All driveways to be tied to existing curb and gutter or existing sidewalk with No.4 x 12" dowel bars placed mid depth at 24” on center. All joints are to be sawed. Include all excavation, disposal of excess material, aggregate base, concrete, and reinforcing steel in the price bid for “Driveway Concrete <size>in Reinforced”.

750-P03 DETECTABLE WARNING PANELS: All detectable warning panels to be made of composite materials and yellow in color as specified in section 885 of the specification.

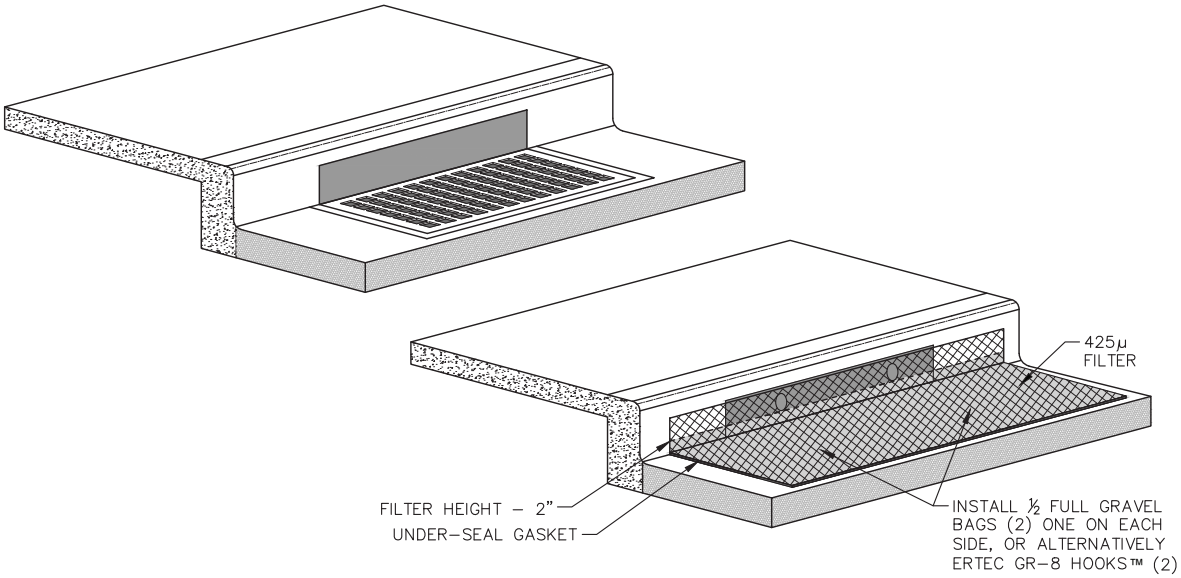
970-P01 WEED CONTROL: If weeds of any kind are present before seeding, control them with a pre-emergence herbicide applied at the rate as labeled by the manufacturer. If weeds of any kind are present after seed germination and during grass establishment, control them with a herbicide applied at the rate as labeled by the manufacturer.

Notify property owners in writing, a minimum of 5 days prior to herbicide application. When instructed by property owner, do not apply herbicide to their property and adjacent right of ways.

Herbicides will only be applied by qualified applicators, following herbicide labels and manufacturer’s recommendations for application rates. A qualified applicator is an individual who had been trained regarding the product and application method, and meets any federal, state and local laws and regulations. This individual is required to hold a certified applicators license, or be under the direct supervision of a certified applicator. Supervisors of qualified applicators are required to hold a certified applicators license in the State of North Dakota. Applicators must use extreme caution when applying herbicides near water, adjacent to properties with plants that might be damaged, or other landscape areas. Remedy damage resulting from improper use of herbicides. The applicator is responsible for the purchase, storage, record keeping, and disposal of herbicides. All herbicide applications will be reported to the Engineer on a weekly basis.

Include all costs necessary to complete the work in the price bid for “Herbicide Weed Control”.

MISCELLANEOUS DETAILS



NOTES:
1. INLET PROTECTION SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE OWNER.

2. (MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE MINNESOTA DEPARTMENT OF TRANSPORTATION'S EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED.)

3. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

INSTALLATION NOTES:
1. PLACE DEVICE TIGHTLY AGAINST DRAIN OPENING AND COVER ENTIRE GRATE. THE DEVICE SHOULD EXTEND AT LEAST 2 INCHES PAST GRATE TOWARD STREET.

2. OVERLAP THE SEGMENTS AT LONGER OPENINGS.

3. ANCHOR THE DEVICE SO THAT WATER CANNOT FLOW BEHIND IT.

INLET PROTECTION - CURB GRATE		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 260	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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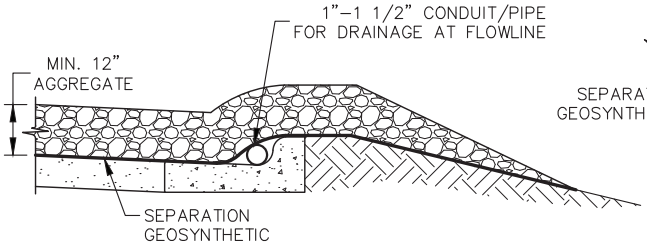
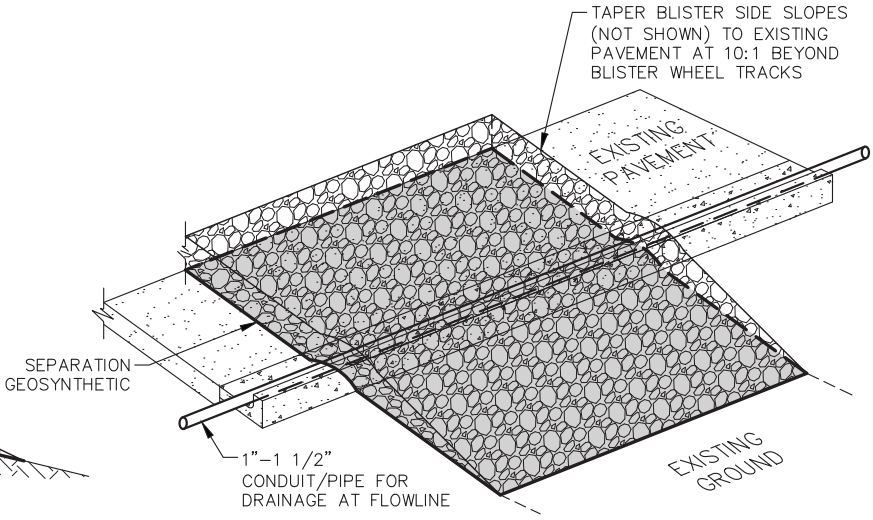
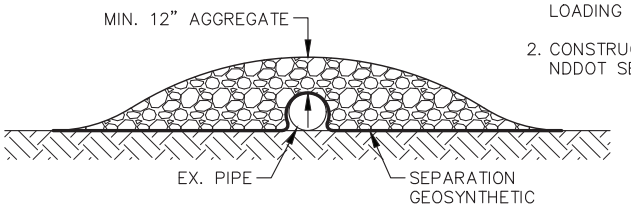


CURB CROSSING SECTION

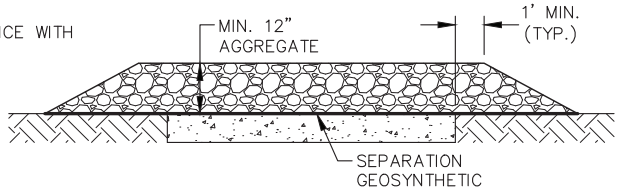


PAVEMENT CROSSING PLAN

NOTES:
1. CONTRACTOR SHALL USE ADEQUATE BLISTER THICKNESS BASED ON LOADING APPLIED.
2. CONSTRUCT IN ACCORDANCE WITH NDDOT SECTION 265



PIPE CROSSING SECTION



SIDEWALK CROSSING SECTION

PAVEMENT BLISTER		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 265	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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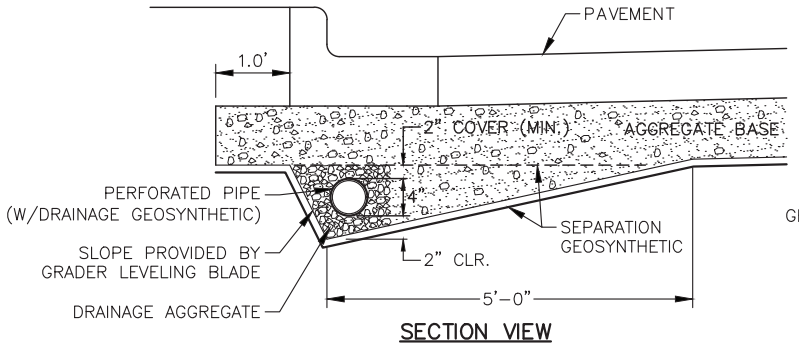
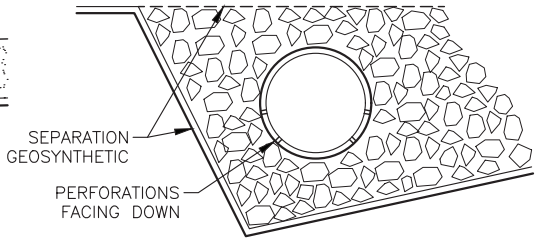
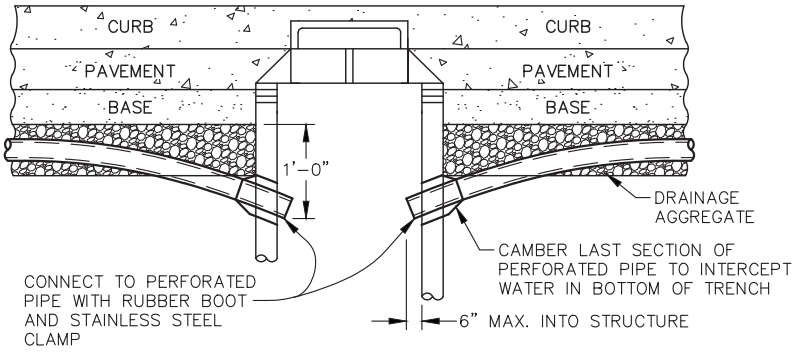


SECTION VIEW



PIPE DETAIL
PERFORATION LOCATIONS



STORM STRUCTURE CONNECTION

NOTES:
1. CONTRACTOR SHALL GLUE CAP ON END OF PIPE AT TERMINATION POINT.
2. BOOTS INSTALLED IN FIELD SHALL BE CORED.

PERFORATED PIPE UNDER CURB		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 714	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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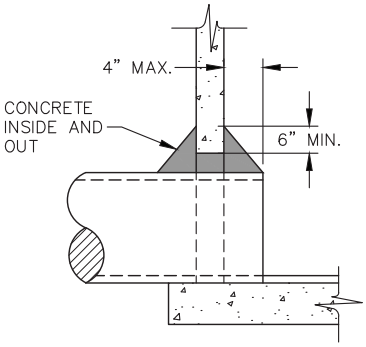
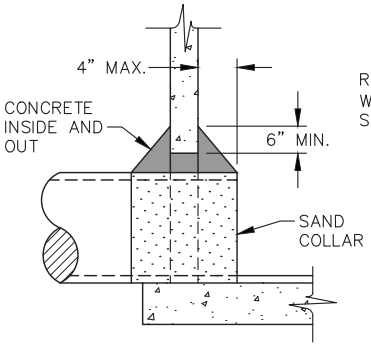
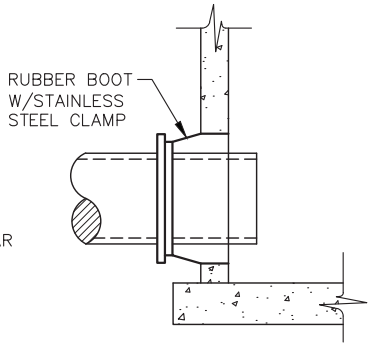


RCP PIPE



FLEXIBLE PIPE



FLEXIBLE PIPE

STORM SEWER PIPE CONNECTION		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 722	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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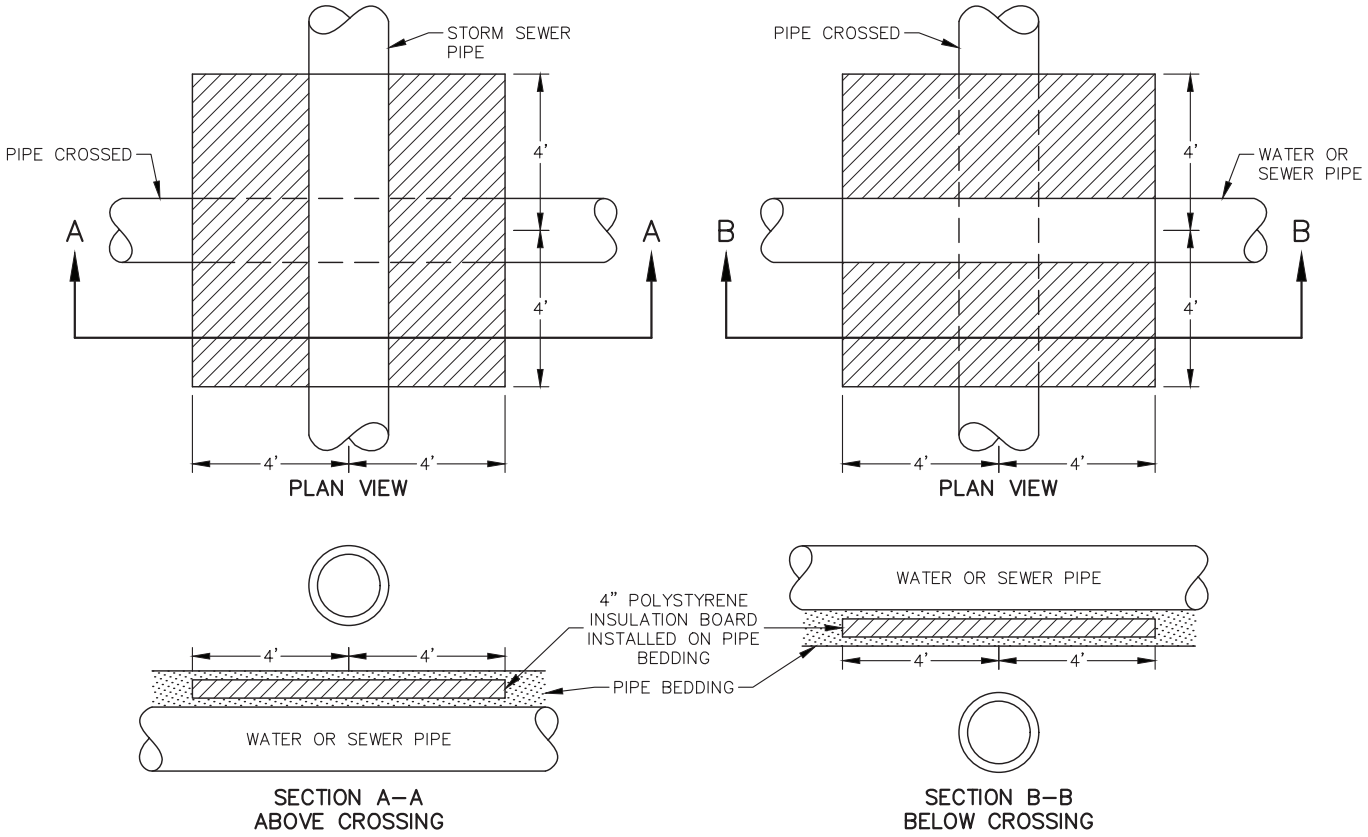

NOTES:
1. THIS DETAIL APPLIES TO BOTH MAINS & SERVICES WHERE CROSSING IS WITHIN 24".
2. WATER SERVICES MAY BE INSULATED WITH AN APPROVED ENCASEMENT INSULATION IN LIEU OF DETAIL.

INSULATION FOR STORM CROSSING		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 722	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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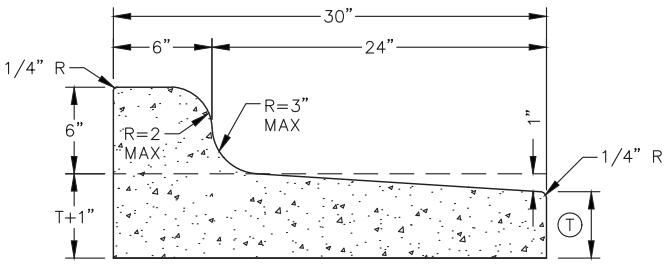
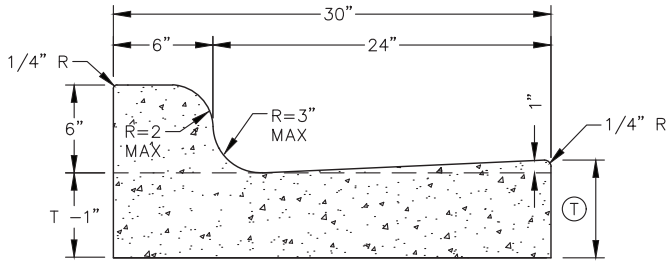


OUTFLOW



INFLOW

(T) 7" MIN. OR THICKNESS OF INTEGRAL CONCRETE PAVEMENT

CURB & GUTTER - HIGH BACK		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 748	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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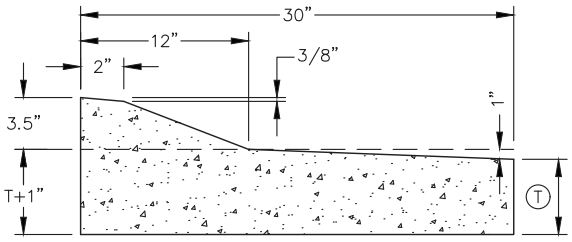
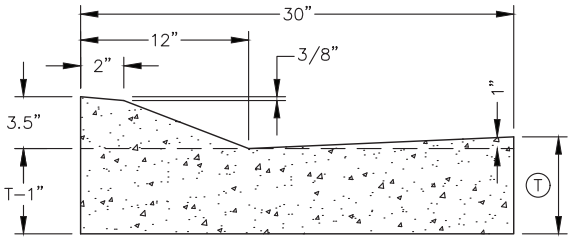


OUTFLOW



INFLOW

(T) 7" MIN. OR THICKNESS OF INTEGRAL CONCRETE PAVEMENT

CURB & GUTTER - MOUNTABLE		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 748	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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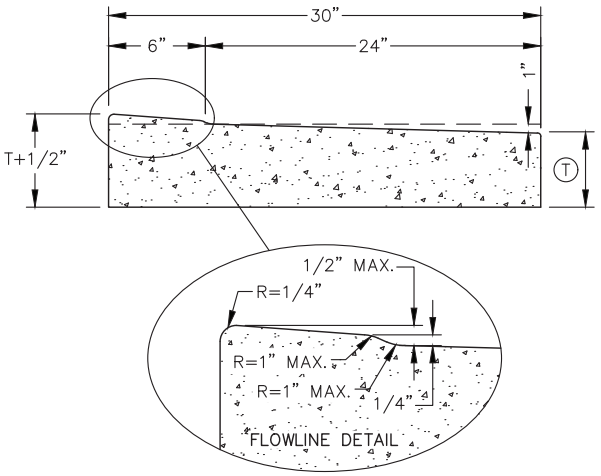
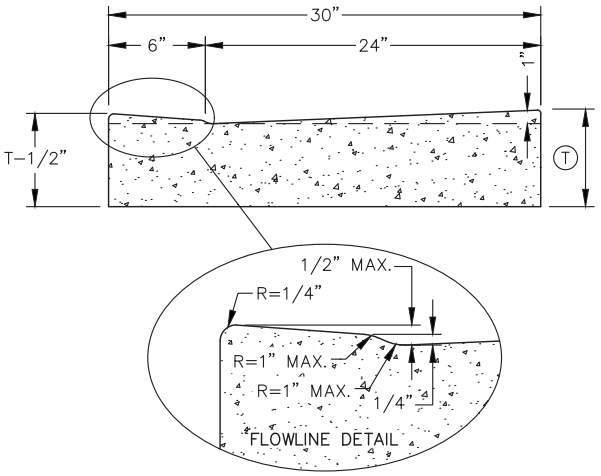


OUTFLOW



INFLOW

(T) 7" MIN. OR THICKNESS OF INTEGRAL CONCRETE PAVEMENT

NOTE: USED ONLY AT ADA RAMPS AND DRIVEWAYS.

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CURB & GUTTER - KNOCKDOWN		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 748	DRAWING No. 3	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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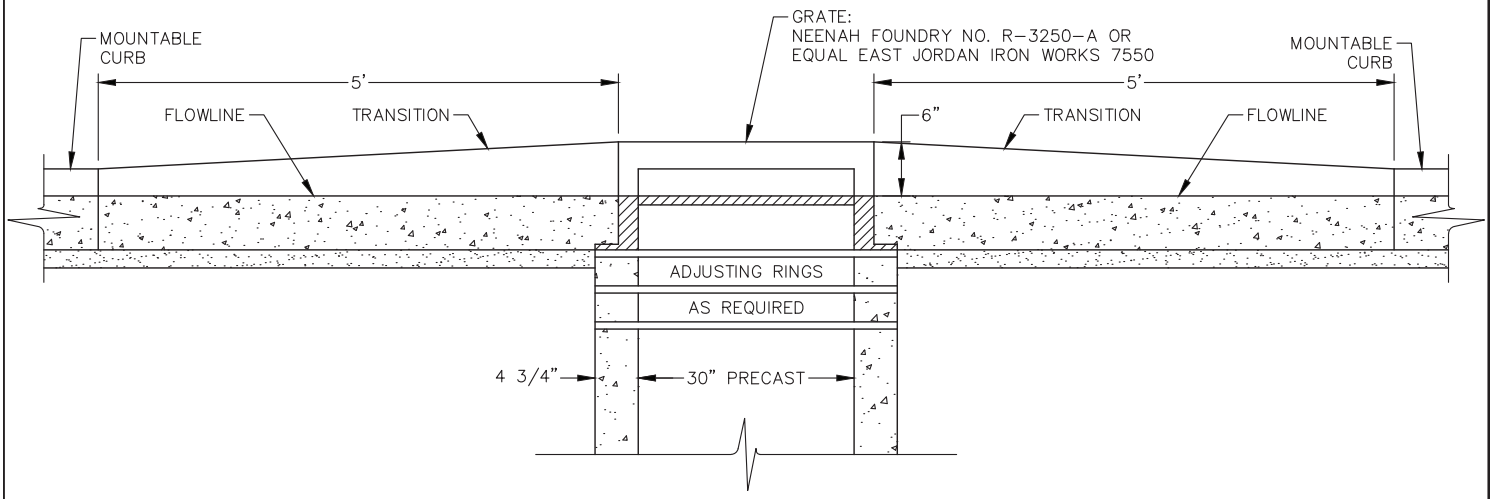

MOUNTABLE CURB TO INLET TRANSITION DETAIL		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 748	DRAWING No. 4	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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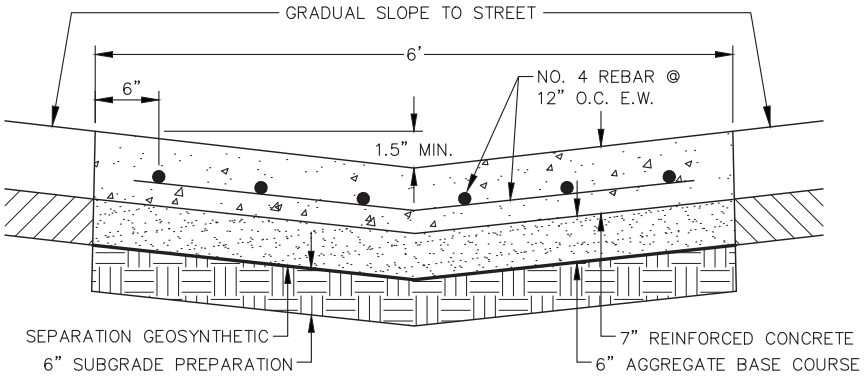
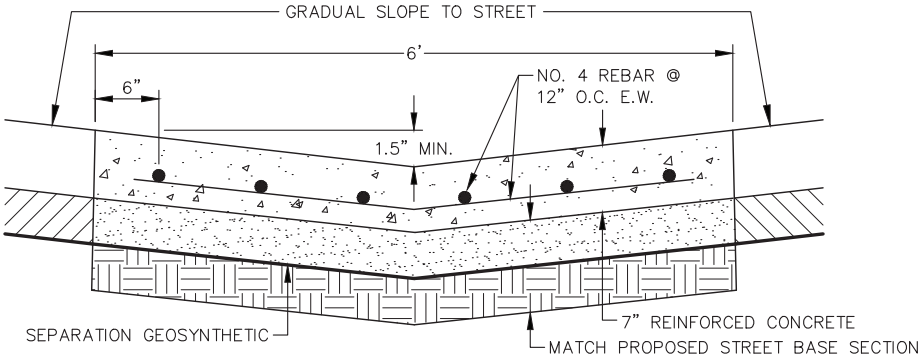
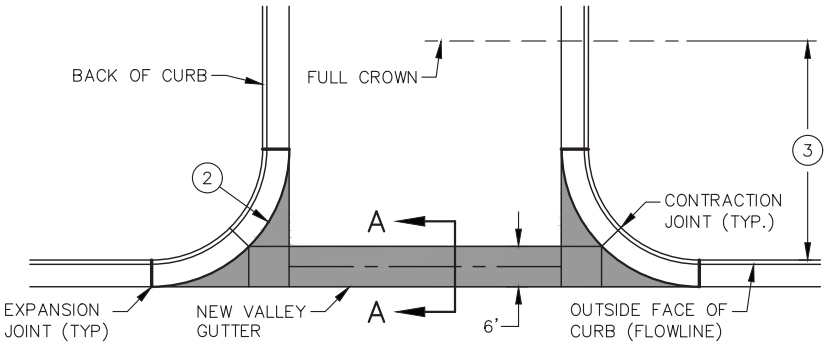


SECTION A–A REPAIR ONLY



SECTION A–A NEW CONSTRUCTION



PLAN

1. VALLEY GUTTER AND APRONS TO BE REINFORCED WITH NO. 4 REBAR @ 12" O.C.E.W.
2. PAY LIMITS FOR VALLEY GUTTER PER SY. CURB AND GUTTER PAID BY L.F. ALONG RADIUS.
3. USE 25' OR AS SHOWN ON GRADING PLAN.

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CONCRETE VALLEY GUTTER		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 748	DRAWING No. 5	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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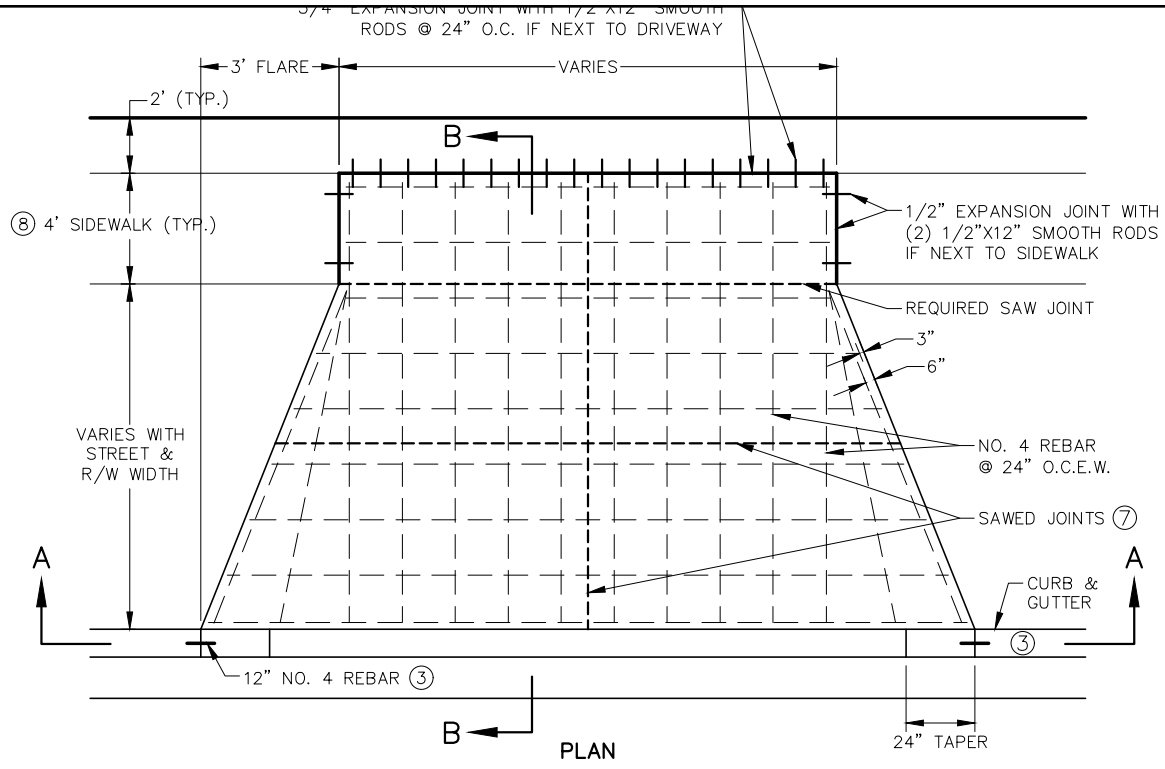
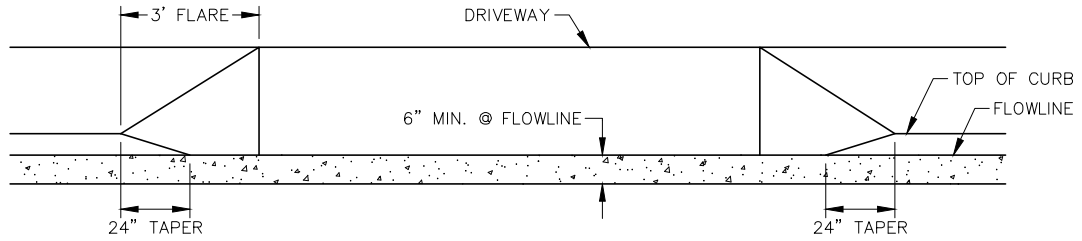
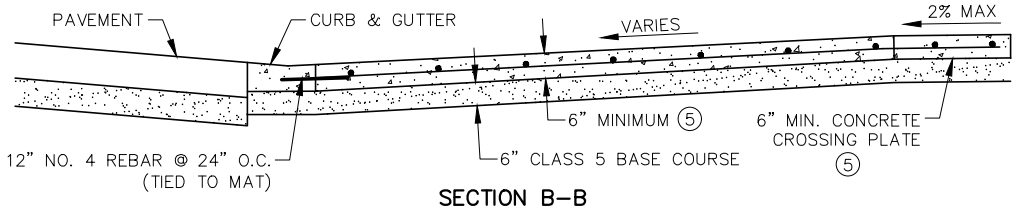


PLAN



SECTION AT HIGH BACK CURB FACE – SECTION A–A



SECTION B–B

NOTES:

① SAW CUT, REMOVE AND REPLACE 3' SECTION OF DRIVEWAY WHEN CURB & GUTTER IS BEING INSTALLED WITH EXISTING DRIVEWAY.

② WHEN DRIVEWAY IS BEING INSTALLED WITH EXISTING HIGH BACK CURB AND GUTTER, THE CURB AND GUTTER IS REMOVED AND REPLACED. NO INTEGRAL DRIVEWAY/CURB & GUTTER POURS SHALL BE ALLOWED.

③ THE DRIVEWAY SHALL BE TIED TO THE CURB AND GUTTER WITH NO. 4 REBAR 12" LONG 24" ON CENTER.

④ CHAIRS OR APPROVED SUPPORT DEVICES SHALL BE USED TO SUPPORT REINFORCEMENT BARS AT MID–DEPTH.

⑤ 8" THICK DRIVEWAYS SHALL BE USED FOR COMMERCIAL AND INDUSTRIAL DRIVEWAYS.

⑥ SMOOTH DOWELS SHALL NOT BE TIED TO REINFORCING MATS.

⑦ MAXIMUM JOINT SPACING SHALL BE 10'.

⑧ VERIFY WITH CITY ON SIDEWALK WIDTH.

CONCRETE DRIVEWAY		CITY ENGINEER APPROVED: BLO	DATE: 04.20.22
SECTION No. 750	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 04.21.22
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 05.04.22	

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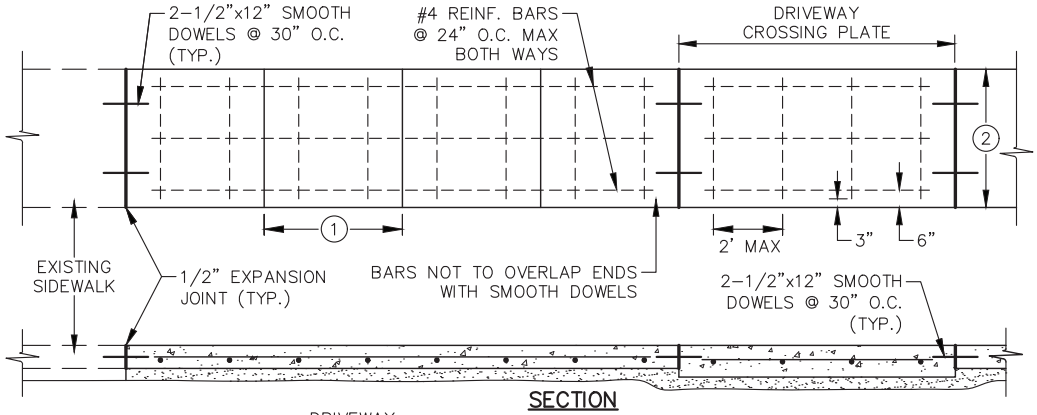
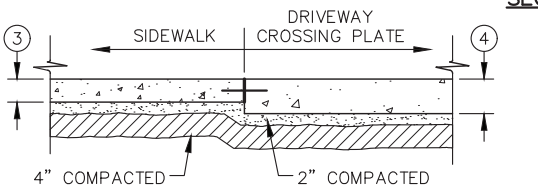


SECTION



SECTION

NOTATIONS:

(1) JOINTS TO BE SPACED AT 4' FOR SIDEWALK, OTHERWISE JOINT SPACING SHALL BE 5'.

(2) 4'-0" FOR TYPICAL SIDEWALK.
10'-0" FOR TYPICAL MULTI-USE PATH.

(3) 4" THICK FOR TYPICAL SIDEWALK.
5" THICK FOR MULTI-USE PATH.

(4) SAME AS DRIVEWAY.
- MIN. 6" FOR RESIDENTIAL.
- MIN. 7" FOR COMMERCIAL/INDUSTRIAL.

NOTES:

1. CROSS SLOPE SHALL BE 2.0%.
2. ALL JOINTS ON 6' PATH AND WIDER SHALL BE SAWED. LESS THAN 6' THEY MAY BE TOOLED OR SAWED.
3. CHAIRS OR APPROVED SUPPORT DEVICES SHALL BE USED TO SUPPORT REBAR AT MIDDEPTH.
4. CONTRACTOR STAMP TO BE PLACED AT EXPANSION JOINTS.
5. ALL EXPANSION JOINTS SHALL BE PLACED AT PROPERTY LINES WHERE POSSIBLE.
6. SAW CENTERLINE JOINT ON 10'-0" WIDTH OR LARGER PATHS. IT SHALL BE SPLIT WIDTH AND ON CURVES FOLLOW THOSE CURVES, I.E. NO STRAIGHT LINE SEGMENTS.
7. THESE STANDARDS APPLY UNLESS OTHERWISE NOTED ON THE PLANS.

SIDEWALK / MULTI-USE PATH		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. 750	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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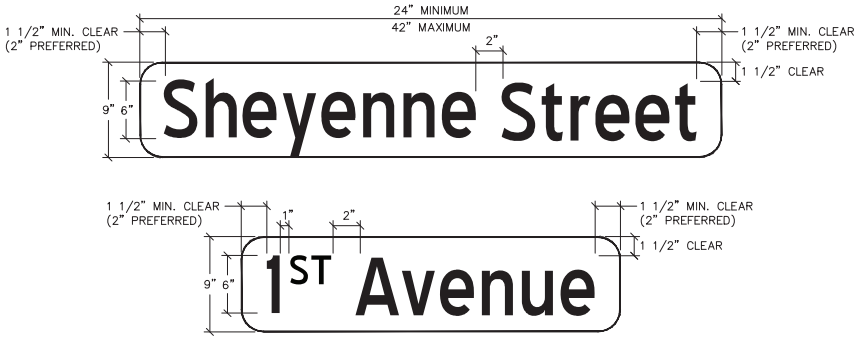
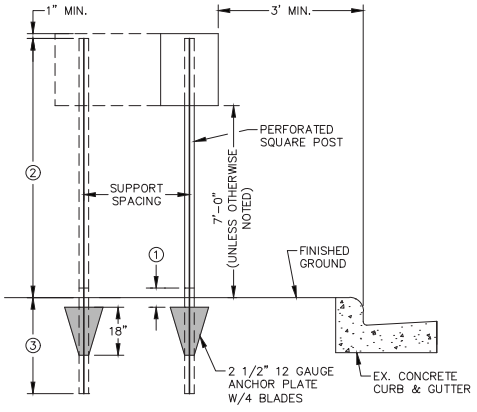


NOTES:

1. STREET NAME SIGNS SHALL UTILIZE 9" 80 GAUGE FLAT ALUMINUM 24" OR LARGER (IN 6" INCREMENTS), DEPENDING ON SPACE NEEDED NOT TO EXCEED 42".
2. THE SIGNS SHALL HAVE 6" SERIES "B" WHITE LETTERS WITH AN UPPER/LOWER CASE FORMAT. THE SUPERSCRIPTS SHALL BE 3" (HALF SIZE) CAPITAL LETTERS AND WILL LINE UP WITH THE TOP OF THE OTHER LETTERS AND NUMBERS.
3. ALL SIGNS SHALL BE MADE SO THAT THE MINIMUM AMOUNT OF SIGN SHALL BE USED. A SIGN PROOF SHEET WHICH INCLUDES ALL SIGNS AND DIMENSIONS SHALL BE SENT TO THE ENGINEER FOR APPROVAL. NO SIGNS SHALL BE MADE PRIOR TO APPROVAL.
4. NOTE THAT THE ABOVE STREET NAMES ARE USED FOR ILLUSTRATING DIFFERENT STYLES ONLY. SEE SIGNING SHEETS FOR ACTUAL STREET NAMES.
5. CENTER ALL WORDING VERTICALLY & HORIZONTALLY ON SIGN.

STREET NAME SIGN

NO SCALE



① POST AND ANCHOR OVERLAP SHALL BE 6 INCHES MIN.

② POST – PAY LENGTH

③ 4' ANCHOR – PAY LENGTH

④ REFER TO NDDOT STANDARD DRAWING D–754–24 FOR SIGN MOUNTING DETAILS ON PERFORATED TUBE. ANCHOR PLATE SHALL BE TYPE SHOWN ABOVE.

⑤ REFER TO NDDOT STANDARD DRAWING D–754–24 FOR SURFACE MOUNT ANCHOR BASE DETAIL. USE WHERE APPLICABLE (E.G. MEDIANS).

SIGN PLACEMENT - URBAN

NO SCALE

STREET NAME SIGNING AND PLACEMENT		CITY ENGINEER APPROVED: BLO	DATE: 01.29.20
SECTION No. 754	DRAWING No. 2	PUBLIC WORKS APPROVED: RAS	DATE: 01.27.20
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 02.05.20	

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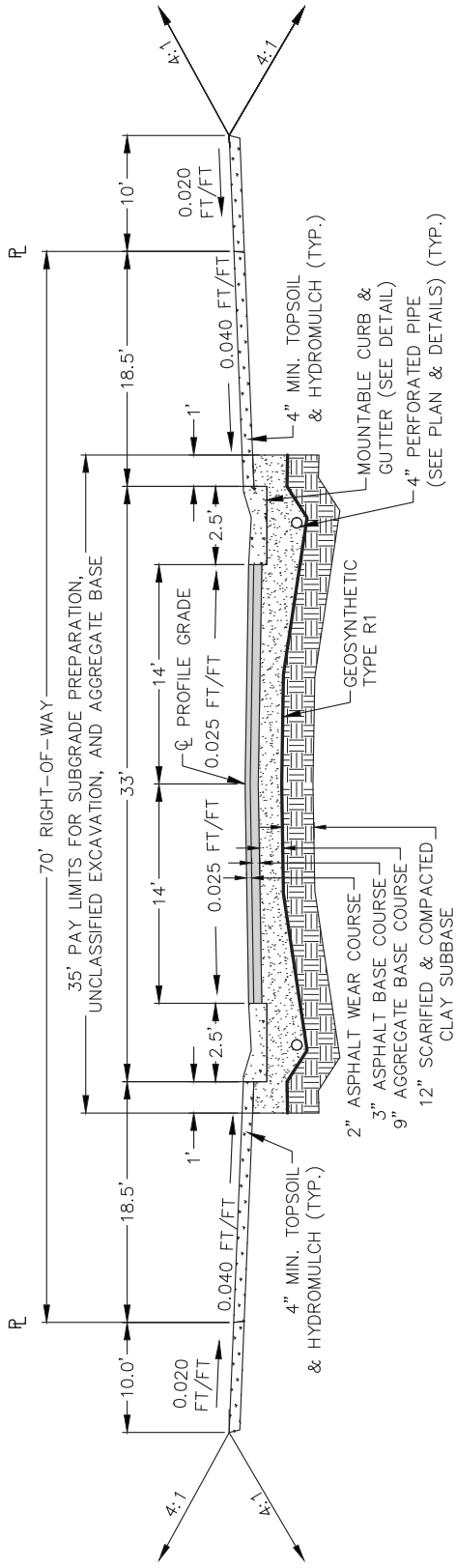

TYPICAL 33' URBAN STREET SECTION - 70' R.O.W.		CITY ENGINEER APPROVED: BLO	DATE: 08.23.19
SECTION No. TYP. SECT.	DRAWING No. 1	PUBLIC WORKS APPROVED: RAS	DATE: 08.23.19
CITY OF KINDRED ENGINEERING		CITY COUNCIL APPROVED DATE: 07.17.19	

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