STANDARDS FOR
DESIGN AND CONSTRUCTION
BIGFORK WATER & SEWER DISTRICT

REVISION DATE:

April 10, 2024

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Appendicies

SECTION I – GENERAL PROVISIONS

GP-01 Definition of Terms

1. Words and phrases in these Standards have the same meaning as those in the Montana Public Works Standard Specifications (MPWSS).
2. Bigfork County Water and Sewer District: "District"
3. Development: Construction of new buildings and/or infrastructure on a lot/parcel or multiple lots/parcels, replacement of existing buildings and/or infrastructure on a lot/parcel or multiple lots/parcels, subdivision of land, or change of use of an existing building/property.
4. Developer: Entity funding and in charge of a development.
5. Developer's Project Engineer: Engineer hired by the Developer to design the development in accordance with the appropriate design standards and certify construction was completed in accordance with the approved plans, specifications, and design standards.
6. District Engineer: Engineer hired by the District to review the Developer's design and verify construction complies with the approved plans, specifications, and design standards as requested by the District.
7. Accessory Dwelling Unit: "ADU": Additional dwelling on a lot/parcel.
8. Bigfork Water and Sewer District Standards for Design and Construction: "Standards"
9. Montana Department of Environmental Quality: "MDEQ"
10. Montana Department of Transportation: "MDT"
11. Manual on Uniform Traffic Control Devices: "MUTCD"
12. Home Owner's Association: "HOA"
13. Bigfork County Water and Sewer District Rules and Regulations: "District Rules and Regulations"

GP-02 Applicability

1. These standards shall govern all construction and upgrading of facilities both in the public right-of-way (off-site) and for private development (on-site) for water system and sanitary sewer facilities and improvements.

GP-03 Standards

1. Design detail, workmanship and materials shall be in accordance with the current edition of the MPWSS, except where the Standards provide otherwise. Any conflict or differences between MPWSS and the Standards shall be resolved in favor of the Standards.
2. The most current edition of the rules and regulations of MDEQ shall also be applicable.
3. New construction will be built under the Standards in effect at the time of construction.
4. If construction of the approved plans is not completed within 36 months from the date of design approval, the design plans, specifications, and reports shall be resubmitted for District review and approval.

GP-04 District Fees

1. Water and Sewer Connection Fee

    A. A fee shall be paid, in accordance with the District Rules and Regulations, for the connection of each new water and sewer service to the system. This fee must be paid even though a service line has previously been stubbed to the property line or other accessible location. This fee must be paid before the service is activated by the District.

2. Plan Review Fee

    A. A fee as defined in the District Rules and Regulations shall be paid to the District for the review of design reports, construction drawings, and specifications as required in these Design Standards. The Developer will be invoiced for these services as outlined in the District Rules and Regulations.

3. Construction Inspection Fee

    A. A fee as defined in the District Rules and Regulations shall be paid to the District for construction inspection and administration. The fee will be based on the proposed level of construction inspection and administration by the Developer's Project Engineer. To that end, the District will hire their own Engineering Firm to conduct inspections and administration as appropriate to ensure the improvements are installed in accordance with the approved plans, specifications, and these Standards. The Developer will be invoiced for these services as outlined in the District Rules and Regulations.

4. Constructing a Water Service

    A. When it is necessary to tap an existing water main for a service connection, the developer or their contractor shall provide all equipment, material and labor to

excavate, expose and tap the main. The developer or their contractor shall install the tap and stop, as directed and approved by the District. The District shall provide the meter and pit and the developer or their contractor shall install it, as directed by the District. The developer or their contractor shall provide all equipment, labor and materials to install the service line from the corporation stop to the point of service and restore the pavement or other surface in the public right-of-way to its pre-construction condition.

5. Constructing a Sanitary Sewer Service

    A. When it is necessary to tap an existing sewer main for a service connection, the developer or their contractor shall provide the equipment, labor and materials required to excavate, expose and tap the main, install the service line from the main to the point of use, and restore the pavement or other surface in the public right-of-way to its pre-construction condition.

GP-05 Right of Way Encroachment Permit

1. All work within the public right-of-way shall require an Encroachment Permit issued by the Flathead County Road Department, MDT, or other applicable regulatory agency.
2. Work within a private easement shall require an approval from the property owner.
3. Provide a copy of the completed permit to the District prior to construction.

GP-06 Applicable Laws and Indemnification of the District

1. The Contractor shall give all notices and comply with all federal, state and local laws, ordinances and regulations affecting the conduct of the work, and shall indemnify and hold harmless the District against any claim or liability arising from, or based on, the violation of any such law, ordinance, regulation, etc., whether by themself or their employees.

GP-07 Interruption of Service

1. Any construction that will interrupt normal operation of water or sewer will require a District approved method of notifying affected individuals. The Contractor should present the news release to the news media at least 2 days prior to the beginning of any construction activity. The Contractor shall notify individuals affected by the project of the type and duration of the interruption.
2. All street closures or interruptions must be coordinated with the Flathead County Road Department. Notify affected individuals as required by the Flathead County Road Department prior to beginning any construction activity.

3. The Contractor shall be responsible to notify emergency services of any road closures or interruptions in service.
4. Under emergency conditions, the Contractor shall notify the District as soon as possible. To the extent possible, the Contractor shall also dispatch members of their staff to notify affected individuals in person.

GP-08 Traffic and Pedestrian Control

1. A Traffic and Pedestrian Control Plan shall be submitted to and approved by the District for all work within the public right-of-way.
    A. Conform to the latest edition of MUTCD.
    B. Show the location and description of all Traffic and Pedestrian Control Devices.
    C. No work shall commence on the project until the plan is approved.
    D. Keep all devices in place and maintained throughout the project.
    E. The District reserves the right to reject any devices observed to be in substandard condition.
2. If the Contractor fails to maintain the Traffic and Pedestrian Control Devices in accordance with the approved plan, the District reserves the right to correct the deficiency and all labor, equipment, material, and administrative costs will be billed to the Contractor.
3. Emergency access to the work area and all affected properties shall be maintained at all times.
4. In the event of an emergency interruption of access or street closure, the Contractor shall notify the District, Flathead County Sheriff's Department, and Bigfork Fire Department immediately. The Contractor shall immediately dispatch members of their staff to notify affected individuals.

GP-09 Liability Insurance and Bonding

1. Liability Insurance
    A. The Contractor shall procure and maintain, at their own expense, during the construction period, General Public Liability and Property Damage Insurance including vehicle coverage issued to the Contractor and protecting them from all claims for personal injury, including death, and all claims for destruction or damage to property, arising out of or in connection with any operations covered by the contract documents, whether such operations be by themself or by any Subcontractor under them.
    B. Insurance shall be written with a limit of liability not less than $750,000 for each claim and $1,500,000 for each occurrence. The Contractor shall hold harmless, indemnify and defend the District and each of its agents arising, or alleged to arise

from the performance of the work described herein, but not including the sole negligence of the District or its representatives. Each policy or certificate shall bear an endorsement or statement waiving the right of cancellation or reduction in coverage without ten (10) days written notice being delivered by certified mail to the District.

C. All construction work within the public right-of-way or easement will require the property owner/contractor to provide the District with a Performance Bond. The Bond shall be equal to the value of the project and shall remain in force for one year.

D. Bonds may be in the form of a Surety Bond, a Certificate of Deposit (CD), a Certified Check, or an irrevocable Letter of Credit issued by a bank licensed to do business in the State of Montana.

GP-10 Guarantee for Equipment, Materials, and Workmanship

1. The contractor shall guarantee all materials and equipment furnished, and construction work performed for maintenance and repair work on new infrastructure for a period of 2 years from the date of written acceptance by the District.
2. Guarantees shall be in the form of a maintenance bond.
    A. Required prior to Final Plat or acceptance by the District.
    B. Equal to 20% of the total value of the public infrastructure constructed.
    C. Shall remain in force throughout the guarantee period.
    D. The District reserves the right to draw on the maintenance bond for repairs not completed by the responsible party within 30 calendar days of being advised that repairs are required.
    E. Maintenance bonds may be in the form of a Surety Bond, a Certificate of Deposit (CD), a Certified Check, or an irrevocable Letter of Credit issued by a bank licensed to do business in the State of Montana.

GP-11 Dust and Pollution Control

1. The Contractor shall be responsible to maintain the construction site and all haul routes in accordance with the current requirements of MDEQ. If the Contractor fails to meet this requirement, the District will complete the cleanup and all labor, equipment, material and administrative costs will be billed to the Contractor.

GP-12 Storm Water Discharge Permit

1. The Montana Pollutant Discharge Elimination System regulations require a storm water discharge permit for construction activity in which clearing, grading and excavating will result

in the disturbance of 1 or more acres. A Storm Water Erosion Control Plan must be approved by MDEQ prior to construction.

GP-13 Pavement Restoration

1. Pavement restoration must meet Flathead County Road Department Standards, MDT Standards, HOA requirements, and/or the conditions of the Encroachment Permit.
2. Any damage to the existing asphalt surface caused by the Contractor's operations shall be repaired at the expense of the Contractor, including but not limited to gouges, scrapes, outrigger marks, backhoe bucket marks, etc. A slurry seal shall be considered the minimum standard for repair to existing surfacing.
3. The Contractor shall be responsible for maintain the area in a smooth and drivable condition until the permanent pavement is placed. If the ground is frozen, the road cut shall be temporarily repaired with a minimum thickness of 2 inches of cold patch material. The temporary repair shall be maintained by the Contractor for safe winter usage until the permanent pavement is installed. The permanent pavement shall be installed as soon as the ground is thawed in the spring.
4. If the Contractor fails to restore the pavement, the District reserves the right to complete the restoration and all labor, equipment, material, and administrative costs will be billed to the Contractor.

GP-14 Stop Work Order

1. A written Stop Work Order may be issued by the District if the work in progress does not meet the Standards. Work may resume only after the Stop Work Order has been rescinded by the District.

GP-15 Cleanup

1. The Contractor shall clean the construction site of all debris, construction materials, etc., immediately upon completion of the project. On District initiated projects, if the Contractor fails to meet this requirement, the District will complete the cleanup and all labor, equipment, material and administrative costs will be billed to the Contractor.

GP-16 Call Before You Dig

1. Montana Law requires anyone who excavates must notify the one-call notification center to have underground facilities marked prior to excavation.
2. All Property Owners, Developers, and/or Contractors are responsible for notification of all utilities in advance of any construction. Please visit https://www.montana811.org/ for more information.

GP-17 General Notes

1. The general notes outlined in the standard details shall appear on the plan sheets.

GP-18 Pre-Development Meeting

1. Prior to beginning design of water or wastewater facility improvements within the District, the Developer and Developer's Engineer are strongly encouraged to meet with District staff to discuss the proposed project and to get input regarding the improvements that will be required.

SECTION II – PLAN SUBMITTALS

PS-01 Plan Submittals

1. Plans:
    A. Shall be provided in PDF format.
    B. The Professional Engineer(s) responsible for the design portions of the project shall stamp the project cover sheet and each individual sheets of the design.
2. Reports and Specifications:
    A. Shall be provided in PDF format.
    B. The Professional Engineer(s) responsible for the individual sections specified above shall stamp the front cover of each separate document.
3. Water and sanitary sewer system designs shall be submitted for concurrent review with MDEQ. Once MDEQ approval is received, provide a copy of the approval letter to the District.
4. Incomplete plans, specifications, and design reports will be returned without review.

PS-02 Plan Re-Submittals

1. Plans:
    A. Individual sheets may be provided.
    B. All changes shall include revision bubbles.
    C. Revision notes shall be provided on the sheet including:
        1) Revision number
        2) Revision date
        3) Any applicable notes
2. Reports and Specifications
    A. Shall be resubmitted in their entirety.
    B. All changes shall include revision bubbles.

PS-03 Deviations

1. Will only be granted when minimum standards cannot be met or when the proposed item meets or exceeds minimum standards as determined by the District. Deviations will not be considered on basis of cost, “engineering judgement”, or “professional opinion”.
2. Provide a copy of all MDEQ deviation requests to the District for review and concurrence.
3. Requests shall be made in writing and shall:

A. Identify the specific section of the standards requiring a deviation.

B. State the standard as currently adopted.

C. State the standard as proposed for the deviation.

D. Provide adequate justification for the deviation.

E. Include a Professional Engineer stamp.

4. Requests shall be approved by the District in writing.
5. Deviations from the Standards not individually approved as indicated above are not approved, even if shown in approved plans, specifications, or reports.

SECTION III – DEVELOPMENT REQUIREMENTS

DR-01 General

1. All subdivisions and developments shall comply with these Standards.
2. Utilities shall be constructed from the existing facilities to the far property line of the development or such other point within the development that may be specified by the District.
    A. Extension of water mains beyond the property line may be required as determined by the District for looping and redundancy.
    B. All utilities shall be within a public right-of-way or easement to permit free and unobstructed access.
3. Obtain and provide the District with all easements and rights-of-way necessary to extend roadways and utilities to the far property line of the development.
    A. Obtain written approval from the District stating they have reviewed and approved the location of easements for the future extension of utilities.
    B. Provide a copy of the preliminary/final plat and/or easement document with exhibit showing the locations of all easements.

DR-02 Utilities

1. District utility collection and distribution mains shall be located within the paved portion of the street or alley.
2. Water transmission mains, sewer interceptor mains, and sewer force mains shall be located as approved by the District.
3. Utility Easements:
    A. All public utility easements shall be a minimum of 20 feet wide for a single pipeline.
    B. For easements with two pipelines, the minimum width shall be 30 feet.

SECTION IV – CONSTRUCTION STANDARDS

CS-01 Contractor Requirements

1. Registration
    A. The Contractor shall have a current Montana Contractor's License.
2. Insurance and Bonding
    A. Insurance and bonding shall be in accordance with Section I as applicable.
3. Shop Drawing Submittal:
    A. If items to be installed differ from the approved plans, specifications, or these Standards, shop drawings shall be submitted for review and approval at least 10 business days prior to the proposed installation.
4. Preconstruction Meeting:
    A. Prior to the start of any construction, a preconstruction conference shall be held. The District, District Engineer, Developer's Project Engineer, Developer, Contractor, and any other pertinent parties to the project shall be represented. The following information shall be discussed at the meeting:

        1) Identify a Construction Manager who is responsible for coordinating all construction related activities, including scheduling all quality control testing with the District and/or District Engineer.

        2) Construction schedule that identifies overall construction duration and planned project milestones.

        3) Shop drawing submittals

        4) Material testing

        5) Quality control testing

        6) Insurance and Bonding
5. Bi-weekly Construction Progress Meetings:
    A. While construction is ongoing, bi-weekly construction progress meetings shall be held. The District, District Engineer, Developer's Project Engineer, Developer, Contractor, and any other pertinent parties to the project shall be represented. At minimum, this meeting should address the following items:

        1) Previous work activities and quality control testing.

        2) Planned work activities and upcoming quality control testing.

        3) Schedule updates

        4) Tie-ins to existing infrastructure and utility shutdowns.

5) Document any changes to the plans, specifications, or schedule as required to the appropriate agency (District, MDEQ, etc.)

CS-02 Construction Inspection

1. All work designed by an Engineer shall be inspected and certified by the same Engineer to ensure conformance to plans, specifications, and these Standards. Failure to submit required testing and other documentation shall be considered valid justification for non-acceptance of construction work and/or public infrastructure.
2. The following quality control procedures shall apply to all projects. The District reserves the right to conduct independent quality assurance testing during any phase of construction. The contractor shall bear the expense of failed tests and the expense of any materials, equipment, and labor to correct the failed test.
    A. All water main valves, fittings, fire hydrants, sewer manholes, wet wells, and sewer/water main crossings shall be inspected and approved by the Developer's Project Engineer or their representative prior to backfilling.
    B. Water and sewer construction testing shall be performed in accordance with the Modifications to MPWSS for Water Distribution and Sanitary Sewer Collection Systems (see Appendix B and C) as applicable.
    C. The Developer's Project Engineer or their representative shall be present for all quality control tests required. A written record of all test results shall be submitted to the District.
3. It is the Contractor's responsibility to notify the District, District Engineer, and Developer's Project Engineer of any work requiring inspection at least two (2) days in in advance of the work.
4. The Developer's Project Engineer shall submit daily construction diaries to the District at the end of each week. At minimum, the dairies should address the following items:
    A. Weather conditions
    B. A description of work activities
    C. Photographs of work activities
    D. Quality control testing activities and results including at minimum:
        1) Compaction tests
        2) Pressure tests
        3) Water quality tests
    E. Document any changes from the approved design.

CS-03 Compaction Testing

1. The following minimum compaction testing procedures shall apply to all projects. An independent accredited testing laboratory shall be retained to provide the following tests and frequency. The following are minimum compaction test requirements:

    A. Utility Trenches and Underground Structures

        1) Set of Tests:

            a) For trenches up to 8 feet in depth, density tests shall be taken at 12 inches above the pipe, at one-half the trench depth, and at the surface.

            b) For trenches greater than 8 feet in depth, density tests shall be taken at 12 inches above the pipe, at one-third and two-third of the trench depth levels, and at the surface.

        2) The minimum density shall be 95% Standard Proctor, +/- 3% optimum moisture.

        3) Horizontal frequency:

            a) Utility Mains – One set of tests per 150 feet.

            b) Service Lines – One set of tests per 3 services, per utility type.

            c) Open Pits – Minimum of one set of tests per open pit (i.e. manhole, water valve, vault, etc.)

    B. Street Subgrade

        1) Sub-base: 95% Standard Proctor, +/- 3% optimum moisture. Provide one random density test for every 200 square yards of sub-base course placed.

        2) Crushed gravel base: 95% Standard Proctor, +/- 3% optimum moisture. Provide one random density test for every 200 square yards of base course placed.

        3) As required by any applicable encroachment permit.

    C. Asphalt Surface

        1) Contractor's testing agency will provide core samples and testing of asphalt concrete pavement courses to check in place density and compacted depth. The cores shall be minimum 4-inch diameter. Asphalt concrete testing will be taken at least every 1,000 square yards of asphalt paving, or a minimum of two per day of paving. Materials and acceptance tests will be made by the Contractor's testing agency to determine the Contractor's compliance with the specifications.

        2) Contractor's testing agency shall conduct field density and thickness compliance tests.

    D. Concrete

        1) All tests shall be permed by a technician with a minimum of an ACI Grade I certification.

2) Concrete seal shall be used on all new concrete.

3) Air content, slump, unit weight, and temperature are required on every truck of structural concrete delivered to the project.

4) 4-inch or 6-inch concrete compressive strength cylinders shall be cast a minimum of once per day (when concrete is placed) or every 50 cubic yards placed.

5) Cylinder sets shall include:

a) One 7-day cylinder

b) Two 28-day cylinders

c) One hold cylinder (for break error or low break)

CS-04 Record Drawings, Project Acceptance and Operation and Maintenance.

1. Certification

   A. Upon Project completion and before final acceptance, the Developer's Project Engineer shall certify to the District that the construction of the project meet the requirements of the approved plans, specifications, and these Standards.

2. Record Drawings

   A. The Developer's Project Engineer shall submit one full-size set of drawings (hard copy and pdf), construction diaries, and testing results to the District. Until record drawings have been submitted to, and approved by the District, the District will not accept the project as complete.

3. Acceptance

   A. After the record drawings have been submitted to the District, the District will issue written acceptance to the Owner. The Contractor shall be responsible for operation and maintenance until the District provides written acceptance. The two-year guarantee period begins from the date of written acceptance by the District.

CS-04 Two-Year Guarantee Inspection

1. The Developer's Project Engineer or their representative shall conduct a two-year guarantee inspection to be attended by a representative of the District.
2. The maintenance bond will be released when systems are certified and accepted by the District as meeting construction standards. The Developer's Project Engineer shall notify the Contractor of any work found to be defective. The necessity of renewing the bond and extending the guarantee period will be determined by the District.

SECTION V – WATER SYSTEMS

WS-01 General

1. Water systems shall be designed, constructed and tested in accordance with these Standards, the current edition of MDEQ Circular DEQ-1 – Standards for Water Works, and MPWSS as modified by the current edition of the Modifications to MPWSS 02660 - Water Distribution (see Appendix B).
2. The meter and meter pit will be provided to the Owner upon payment of hook-up fees.
3. The Contractor or person performing the work shall provide proof of insurance prior to tapping or connecting to District water lines.
4. Pressure test and bacteriological results will be furnished to the District prior to final acceptance.
5. The general notes outlined in the standard details must appear in the project plans.

WS-02 Design of Water Systems

1. All water systems necessary to provide service to and within a development shall be constructed at the Developer's expense and shall be designed by a Professional Engineer. Plans, specifications, and basis of design reports shall bear the seal of the Engineer in responsible charge of the design.
2. Water system designs shall be reviewed by the District and MDEQ with approval from both. All required approvals shall be obtained prior to beginning construction.
3. Design calculations and testing results shall be submitted to the District as required. Calculate the average day demand, max day demand, and peak hour demand.
4. Identify the number of Equivalent Dwelling Units (EDUs) that are proposed as part of the development. Requests to modify the number of EDUs after approval must be submitted in writing and approved by the District and MDEQ prior to construction.
5. The basis of design report shall include hydrant flow tests or modeled flow results showing the static pressure of the system and the ability of the development to meet fire flow requirements with a 20-psi residual pressure. For residential developments having more than 100 EDUs or that require utilization of a pressure booster pump(s), the report may be required by the District to show the adequacy to meet fire flow and domestic flow requirements. The normal operating range of pressure allowed for water systems is 40-100 psi.
6. The fire flow required for structures and fire hydrant locations shall be determined by the Bigfork Fire Department. The minimum fire flow for any structure shall be 1,000 gpm.
7. All fire suppression systems for structures shall have backflow preventers installed.
8. All ADUs shall be served by an independent service line and meter pit the connects directly to the water main.

WS-03 Water Mains

1. Size

    A. The minimum main size shall be 8-inch or as recommended by the current Water System PER.

    B. Fire hydrant leads shall be 6-inch.

    C. Capacity of the water main shall be calculated using max day demand plus fire flow demand.

    D. Velocity shall not exceed 15 feet per second.

    E. C value for flow calculations shall be 130.

2. Location

    A. To minimize dead-end water mains, all water main extensions shall be looped where deemed reasonable by the District. Where the District deems not reasonable to loop, all mains must be extended to the end of the property where they will be valved and capped to allow for future extension. Developments with corner lots may be required to extend mains to property lines in multiple directions.

    B. Easements must be provided for future developments to connect to the water system as determined by the District.

    C. Existing lots without direct access to a water main must extend the main to the far edge of their property line.

    D. Water mains shall be buried a minimum of 6 feet and a maximum of 8 feet. Mains buried greater than 7 feet require extensions at valves with centering donuts.

    E. Fire Hydrant leads shall not exceed 20 feet in length.

    F. Deflections at pipe joints shall not exceed 50% of the manufacturer's recommendations.

WS-04 Water Services

1. General

    A. New or modified existing structures containing two or more residences under separate ownership, such as townhouses, shall have separate service lines, service valves and meters for each residence.

    B. Structures containing two or more residences, offices or businesses that are rental units under common ownership may have one service line, valve and meter for all occupants within a single structure subject to District approval.

C. Each structure on a property with plumbing for water shall have an independent service line, curb stop and meter pit.

D. When a lot or parcel is developed to a permitted use, all duplicate, excess, and/or unused water services and fire services, including stub-outs, shall be abandoned at the main.

E. Aggregation of parcels will trigger abandonment of unused water and fire services at the main.

F. New or reconstructed services shall meet current standards, including location of curb stops and meter pits.

G. Water services shall not be tapped on a fire service line or fire hydrant lead.

H. Tracer wire shall be provided for all water service lines.

2. Irrigation

A. Irrigation services shall provide appropriate backflow prevention.

1) Pressure Vacuum Breakers shall be installed 12 inches above the highest sprinkler head on the system.

2) Reduced Pressure Zone Assemblies shall be installed 12 inches above the ground.

B. Submit irrigation backflow prevention design to the District for review and approval prior to construction.

3. Size

A. The minimum service line size shall be 1-inch. The 1-inch service line may be reduced at the meter pit to accommodate a ¾" meter.

B. The size and capacity of the service line shall be calculated using the most current version of AWWA M-22 or other method approved by the District.

C. Irrigation services shall provide appropriate backflow prevention. Submit irrigation backflow design to the District for review prior to construction.

4. Location

A. Services shall connect to and extend from the main perpendicularly.

B. Curb stops and meter pits shall be located outside of the roadway pavement between the edge of pavement and road right-of-way or road easement. In the event that this cannot be met, a utility easement must be established across the front of the property to allow installation of District equipment. The District shall approve the location of all curb stops, meter pits and utility easements prior to installation.

C. All service lines shall be installed prior to the blow off/drain appurtenance on dead-end water mains.

D. Construction drawings shall show the location of all water service lines and include the stationing where the service leaves the main.

E. Water service lines shall be buried a minimum of 6 feet and a maximum of 8 feet.

WS-05 Valves

1. Size and Type
    A. 12-inch diameter and smaller shall be gate valves.
    B. Larger than 12-inch diameter shall be butterfly valves.
2. Location
    A. Maximum spacing shall not exceed 500 feet unless approved by the District.
    B. Valves shall be installed at each leg of every tee and cross and at every intersection crossing.
    C. Valves shall not be installed underneath curb and gutters, sidewalks, or the wheel path of a vehicular travel lane.

WS-06 Fire Hydrants

1. Location
    A. Coordinate with the Bigfork Fire Department for fire hydrant placing and provide their approval with the design submittal. Hydrants spacing shall not exceed 500 feet in residential areas, 300 feet in commercial areas, and 200 feet in industrial areas.
    B. Provide hydrants at the end of dead-end mains for flushing purposes. Flushing hydrants may be substituted at the discretion of the District.
    C. Provide a 2-foot separation from the face of the barrel to the back of the curb, edge of road, or edge of sidewalk.
    D. Provide bollards for hydrants unprotected by curbs.
    E. Place hydrants outside the ditch line and ensure they are not subject to flooding.

WS-07 Water System Construction Standards

1. General
    A. The District has standardized materials for the construction of infrastructure that is to be owned by the District. Any equals must be reviewed and approved by the District prior to construction.
    B. Water mains and appurtenances shall maintain horizontal and vertical offsets as required by MDEQ Circular DEQ-1 – Standards for Water Works.

C. All underground electrical, gas, phone, fiber, and cable lines must be installed at least 3 feet horizontally and 1 foot vertically from water mains and services.

2. Water Pipe

   A. Water main piping from 6 to 12 inches in diameter shall be DR 14 PVC Pipe conforming to AWWA C-900 Standards.

   B. Water main piping larger than inches in diameter shall be DR 18 PVC Pipe conforming to AWWA C-900 Standards.

   C. Pipe bedding shall be placed in accordance with District Standard Details and haunched under the pipe with a shovel.

3. Valves

   A. Shall be MJ x MJ

   B. Gate Valves shall be Mueller Resilient Wedge Gate Valves, or an approved equal, conforming to AWWA C-509 Standards.

   C. Butterfly valves shall be Class 250B Mueller Lineseal Butterfly Valves, or an approved equal, conforming to AWWA C-504 Standards.

4. Valve Boxes

   A. Valve boxes shall be Tyler 6860 Series "DD" – Screw Type, #6 Base to be marked "WATER."

   B. Extensions with centering donut shall be provided and installed for valves on mains with more than seven (7) feet of bury depth.

5. Fire Hydrants.

   A. Fire hydrants shall be Red Mueller Super Centurion 250 Fire Hydrants (5–1/4", 3-way) conforming to AWWA C-502 Standards.

   B. Cover fire hydrants until placed into service.

6. Service Saddles

   A. Service saddles shall be Romac model 306, stainless steel, with CC Threads, (1"– 12"), or an approved equal. No single or double strap type is allowed on PVC pipe.

7. Curb Stops

   A. Curb stops shall be Ford Ball Curb, Minneapolis Pattern w/ Grip Joints Both Ends for IPS PE Pipe (Ford B66-444M-G), or an approved equal.

8. Corporation Valves

   A. Corporation Valves shall be 1" Ford Ball Corp. W/ "CC" Thread Inlet and Grip Joint Outlet for IPS PE Pipe (Ford FB1001-4-G) or an approved equal.

9. Service Fittings

   A. Shall be Ford Ultra-Tite compression fittings or an approved equal.

B. Stainless steel inserts must be used with all compression type fittings when used with polyethylene pipe, as recommended by manufacturer.

10. Curb Boxes

A. Curb boxes shall be Ford, or an approved equal, cast iron extension type with Minneapolis Style Thread, 1 ¼" I.D. upper section, minimum length 6 ½ feet, with a shut off and/or lid having a pentagon nut in the plug.

11. Service Pipe

A. Service pipe up to 3 inches in diameter shall be polyethylene (PE), 3408, IPS, Class 200, SDR-7 pipe conforming to AWWA C-901 Standards.

B. Service pipe four (4) inches or larger in diameter shall be DR 14, Class 200 PVC pipe, conforming to AWWA C-900 Standards.

12. Meter Pits and Vaults

A. Services up to 1-inch in diameter shall be Mueller Thermo-coil meter pits with side-locking composite lids and insulation pads or an approved equal.

B. Services from 1.5-inch to 2-inch shall be Mueller EZ Vault with side-locking composite lids and insulation pads or an approved equal.

C. Meters larger than 2-inch will require a custom meter pit sized appropriately to accommodate isolation valves, the meter(s), and pertinent backflow prevention device(s). Proposed meter pit design shall include steps and shall be submitted for review and approval prior to construction.

D. Bypass lines or other branches shall not be installed before the meter.

E. Backflow preventors are required for all service sizes and applications and shall be placed downstream of the meter.

F. Meter pits installed in areas where the lids could be driven over, such as road or driveway shoulders, shall have traffic rated lids installed.

13. Tapping Sleeves

A. Tapping sleeves shall be Power Seal Model 3490 AS (Stainless Steel), or an approved equal.

B. Tapping Sleeve shall be installed a minimum of 24" from the nearest joint on the existing pipe to be tapped.

C. No size-on-size tapping sleeves will be allowed.

14. Ductile Iron Fittings

A. Shall be MJ.

B. Shall be Class 350 SSB fittings conforming to AWWA C-153 Standards.

C. Provide thrust blocks in accordance with MPWSS.

D. Bolts for ductile iron fittings shall be Cor-Blue.

15. Couplings

    A. Romac Macro Series for connections to steel or cast iron, or an approved equal.

    B. Romac Alpha Series for connections to PVC or ductile iron, or an approved equal.

16. Mechanical Joint Restraints

    A. Shall be Megalug or approved equal.

    B. Bolts for mechanical joint restraints shall be Cor-Blue.

17. Toner Wire

    A. Shall be 12-gauge HDPE or HMWPE insulated solid core.

    B. Shall be approved for direct bury.

    C. Shall be taped every 5 feet to the top of the pipe.

    D. Shall be spliced with moisture displacement connectors.

    E. Shall be made accessible in accordance with District Standard Details.

18. Warning Tape

    A. Shall be a minimum of 5 mils thick.

    B. Shall be 3 inches wide.

    C. Shall conform to APWA colors.

    D. Shall be buried 12 to 18 inches below final grade.

19. Marker Posts

    A. Shall be used when the main is located outside of a paved surface.

    B. Shall be APWA compliant Rhino TriView or an approved equal.

    C. Shall be installed at a maximum spacing of 150 feet.

    D. Shall be installed at every valve or valve cluster and every change in direction.

20. Cleaning and Disinfection

    A. The Continuous Feed Method, per MPWSS is the required method of disinfecting all water mains.

    B. Clearing the Main of Heavily Chlorinated Water.

        1) After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with the pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.

        2) Heavily chlorinated water shall not be disposed of in sanitary sewers or storm drains. The Contractor shall dispose of all heavily chlorinated water in an

environmentally safe manner. If there is any question that the heavily chlorinated water will cause damage to the environment, a reducing agent may be applied to neutralize the chlorine.

21. Bacteriological Testing

A. Samples for bacteriological testing shall be taken after final flushing and before the water main is placed in service.

B. Samples shall be taken by the Contractor from a minimum of two (2) separate locations in each area to be determined by the District.

C. Two separate samples shall be taken and submitted for testing no less than 24 hours apart.

D. If the original set of water samples cannot be certified by an approved laboratory as suitable for drinking, the Contractor may submit a second set. If a sample from the second set proves to be contaminated, the water main must be re-chlorinated. Whenever the main is flushed prior to sampling, a waiting period of not less than five (5) days will be observed before samples are taken.

E. The Contractor shall be responsible for all costs associated with testing.

SECTION VI – SANITARY SEWER SYSTEMS

SS-01 General

1. Sanitary Sewer systems shall be designed, constructed and tested in accordance with these Standards, the current edition of MDEQ Circular DEQ-2 – Design Standards for Public Sewage Systems, and MPWSS as modified by the current edition of the Modifications to MPWSS 02730 - Sanitary Sewer Collection Systems (see Appendix C).
2. The Contractor or person performing the work shall provide proof of insurance prior to connecting to District sewer lines.
3. Quality control testing results will be furnished to the District prior to final acceptance.
4. The general notes outlined in the standard details must appear in the project plans.

SS-02 Design of Sanitary Sewer Systems

1. All sanitary sewer systems necessary to provide service to and within a development shall be constructed at the Developer's expense and shall be designed by a Professional Engineer. Plans, specifications, and basis of design reports shall bear the seal of the Engineer in responsible charge of the design.
2. Sanitary sewer system designs shall be reviewed by the District and MDEQ with approval from both. All required approvals shall be obtained prior to beginning construction.
3. Design calculations and testing results shall be submitted to the District as required. Calculate the average day flow, peak hour flow, and other applicable design criteria.
4. Identify the number of Equivalent Dwelling Units (EDUs) that are proposed as part of the development. Requests to modify the number of EDUs after approval must be submitted in writing and approved by the District and MDEQ prior to construction.
5. Existing lots without direct access to a sewer main must extend the main to the far edge of their property line.
6. The basis of design report shall include the following:
    A. Sanitary sewer flows at full build-out, including average daily flows, peak hour flow, and any other applicable design criteria.
    B. Assess the ability of the existing collection system to handle the peak design flow from the project and the impact to the Wastewater Treatment Plant.
    C. Provide the following for new lift stations:
        1) A description of the proposed wet well, pumping system, and force main.
        2) The capacity of the proposed pumps and potential for upgrading.
        3) A map showing the proposed lift station service area.

4) A list of the existing users and their average design flows (if applicable).

5) The proposed peak design flow and reserve capacity.

6) The pump run and cycle times for the proposed average and peak design flows.

7) The hydraulic capacity of the proposed force main(s).

8) A list of the proposed users and their average design flows.

9) The proposed average and peak design flows to the lift station.

10) The reserve capacity of the lift station with the proposed project at full capacity.

11) The pump run and cycle times for the proposed average and peak design flows.

12) Strategies for improvements that may be necessary to accommodate future sewer extensions (i.e. increased storage, pumping or auxiliary power capacity).

13) A statement of the pump selection process, including the engineer's calculations for the total dynamic head, total discharge head, net positive head and other pertinent pump selection criteria.

14) The designed pump operating curve plotted on a manufacturer's pump performance chart with the designed operating point clearly identified.

D. Provide the following for a project that will contribute flow to an existing lift station:

1) A description of the existing wet well, pumping system and force main.

2) The capacity of the existing pumps and potential for upgrading.

3) A map showing the potential lift station service area.

4) A list of existing users and their average design flows.

5) The existing peak design flows and reserve capacity.

6) The pump run and cycle times for the existing average and peak design flows.

7) The hydraulic capacity of the force main.

8) A list of proposed users and their average design flows.

9) The proposed average and peak design flows to the lift station.

10) The reserve capacity of the lift station when the proposed project is online and at full capacity.

11) The pump run and cycle times for the proposed average and peak design flows.

12) Recommendations for improvements, if necessary, to enable the lift station to serve the proposed project.

7. No development shall introduce any sewage into the District sewer facility that is not consistent with normal domestic sewage or ordinance of the District.

8. All ADUs shall be served by an independent service line the connects directly to the sewer main.

SS-03 Gravity Mains

1. The District requires all main extensions to be conventional gravity flow systems. Service delivery systems other than gravity sanitary sewer service will require review and approval of the District prior to connection to the sewer system. In the event that the District grants an exception, the system must be designed with the following standard materials.

    1) Pipe materials must be polyethylene or HDPE.

    2) Saddles must be fused or stainless steel.

    3) Shut off valves must be installed on each service line at the property line. Valves must be brass construction.

    4) Valve box risers must be marked "SEWER".

2. Size

    A. The minimum main size shall be 8-inch or as recommended by the current Wastewater System PER.

    B. Design capacities of sewer mains shall be based on the ratio of modeled flow within the gravity main segment to the theoretical open channel flow rate (q/Q) of 75%. The effects of the proposed development's sewer loading on downstream sewer lines shall be analyzed.

    C. The minimum velocity, in either gravity or force mains, shall be two (2) feet per second based upon flowing full conditions for gravity mains. The maximum velocity shall be ten (10) feet per second, unless otherwise approved by the District.

3. Location

    A. Sanitary sewer gravity mains shall be horizontally located within the paved portion of the street or alley and meet horizontal and vertical offsets as required in MDEQ Circular DEQ-2 – Design Standards for Public Sewage Systems.

    B. The minimum depth of gravity sewer mains shall be four (4) feet to flow line. The minimum depth of force mains shall be six (6) feet to top of pipe.

    C. Easements must be provided for future developments to connect to the sanitary sewer system as determined by the District.

4. Gravity main cleanouts are not allowed.

SS-04 Manholes

1. Shall be provided at terminations, changes in pipe diameter, and changes in direction.
2. Shall have a minimum diameter of 4 feet.

3. Inverts:
    A. The invert of the outlet pipe shall be a minimum of 0.1 feet lower than the invert of the lowest inlet pipe for changes in direction less than 45 degrees.
    B. The invert of the outlet pipe shall be a minimum of 0.2 feet lower than the invert of the lowest inlet pipe for changes in direction greater than 45 degrees.
    C. Changes in direction greater than 90 degrees are not allowed.
4. Location:
    A. Sanitary sewer gravity mains shall be horizontally located within the paved portion of the street or alley and meet horizontal and vertical offsets as required in MDEQ Circular DEQ-2 – Design Standards for Public Sewage Systems.
    B. Shall not be located in low points, flow lines, or curb and gutter.
    C. Spacing:
        1) For pipe diameters less than 15", the maximum spacing between sanitary sewer manholes shall be 400 feet.
        2) For pipe diameters greater than 15", the maximum spacing between sanitary sewer manholes shall be 500 feet.

SS-05 Lift Stations

1. Meet the design requirements of MDEQ Circular DEQ-2 – Design Standards for Public Sewage Systems.
2. Lift Station shall be a packaged system with a minimum duplex pump setup.
3. Emergency power supply and/or provisions for emergency bypass pumping will be required for all lift stations.
4. An alarm system shall be provided that is capable of detecting power interruption, high water and high motor temperature conditions. The alarm signals and notification procedures shall be installed as directed by the District.

SS-06 Force Mains

1. Meet the design requirements of MDEQ Circular DEQ-2 – Design Standards for Public Sewage Systems.
2. Sanitary sewer force mains shall be located as approved by the District.
3. Force Main Cleanouts
    A. Pressure type cleanouts, of the same size as the force main, shall be installed on all force mains.
    B. The maximum spacing between cleanouts on force mains shall be 600 feet.

SS-07 Sanitary Sewer Service Lines

1. General
    A. Shall follow the current version of District Rules and Regulations.
    B. New or modified structures containing two or more residences under separate ownership, such as townhouses, shall have separate sanitary sewer service lines for each residence.
    C. Structures containing two or more residences, offices or businesses that are rental units under common ownership may have one sanitary sewer service line for all occupants within a single structure subject to District approval.
    D. Each structure on a property with sanitary sewer service shall have an independent service line.
    E. Construction drawings shall show the location of all sewer service lines and include the stationing where the service leaves the main.
    F. When a lot or parcel is developed to a permitted use, all duplicate, excess, and/or unused sewer services, including stub-outs, shall be abandoned at the main.
    G. Aggregation of parcels will trigger abandonment of unused sewer services.
    H. New or reconstructed services shall meet current standards.
2. Size
    A. The minimum service line size shall be 4-inch.
3. Location
    A. Services shall connect to and extend from the main perpendicularly.
    B. Construction drawings shall show the location of all sewer service lines and include the stations where the service leaves the main.

SS-08 Sanitary Sewer System Construction Standards

1. General
    A. The District has standardized materials for the construction of infrastructure that is to be owned by the District. Any equals must be reviewed and approved by the District prior to construction.
    B. All underground electrical, gas, phone fiber, and cable lines must be installed at least 3 feet horizontally and 1 foot vertically from sanitary sewer mains and services.
2. Video Inspection
    A. A video inspection shall be provided by the contractor for sewer mains in accordance with MPWSS Section 02730.

B. The contractor shall flush the main immediately prior to the inspection.

C. Manholes and laterals shall be included in the video inspection. Inspection results shall be provided to the District in an electronic format.

D. Upon review of the video inspection by the District, any deficiencies found shall be corrected by the contractor prior to acceptance.

E. The video shall include the distance traveled so that laterals and items of concern can be accurately located.

F. The camera shall be equipped with a turret in order to inspect all services from a facing view of the camera.

G. The crawler shall be equipped with means of measuring ponded water in bellies that may be in the pipe to meet the minimum requirements of MPWSS.

3. Gravity Sewer Pipe

A. Shall be SDR 35 PVC with gasketed joints and fittings.

B. Connections to existing mains shall be made with PVC gasketed coupling or stainless steel sleeve flexible coupling.

C. Shall not be directionally drilled.

4. Force Mains

A. Sewer force mains 2 inches in diameter and smaller shall be DR11 HDPE.

B. Sewer force mains larger than 2 inches shall be either DR11 HDPE or DR14 C900 PVC Pipe.

C. Service taps are not allowed on District force mains.

D. Toner wire shall meet the same requirements as for a water main.

E. Testing

1) Testing of the force main shall be done in accordance with the MPWSS.

2) Test results will be furnished to the District prior to final acceptance.

5. Manholes

A. Manhole Ring and Cover

1) The sanitary sewer manhole ring and cover shall be Inland Foundary 722-A, Olympic Model 37 or an approved equal. The cover shall be marked SEWER.

2) Watertight gasketed manhole covers shall be used in all locations where flooding may occur.

B. Chimney Seals

1) Whirly Gig Manhole Riser Collar System;

2) Cretex External Chimney Seal; or

3) Approved equal product.

6. Service Lines
    A. Gravity sewer services shall be SDR 35 PVC.
    B. Taps
        1) Taps for new construction shall be made with an appropriately sized PVC wye.
        2) Sewer saddles shall be Romac style “CB” Sewer Saddle or approved equal for connections to existing mains.
7. Warning Tape
    A. Shall be installed above all sanitary sewer gravity and force mains.
    B. Shall be a minimum of 5 miles thick.
    C. Shall be 3 inches wide.
    D. Shall conform to APWA colors.
    E. Shall be buried 12 to 18 inches below final grade.
8. Marker Posts
    A. Shall be used when the main is located outside of a paved surface.
    B. Shall be APWA compliant Rhino TriView or an approved equal.
    C. Shall be installed at a maximum spacing of 150 feet.
    D. Shall be installed at every manhole, valve, or change in direction.
9. Lift Stations
    A. Manufacturer
        1) Lift Stations shall be a package system manufactured by Gorman Rupp;
        2) Approved equal.
            a) Developer’s Design Engineer shall provide all necessary information to justify the product as an equal;
            b) Design Engineer shall submit a list of 3 lift stations of the type proposed which have been in operation at least 5 years; and
            c) The District reserves the right to accept or reject the proposed lift station.
    B. Pump Type: Submersible.
    C. Provide one full joint of cement lined, ductile iron pipe for the influent pipe into the lift station wet well.
    D. Provide 12-foot minimum width paved access road for maintenance.
    E. Bypass

1) Shall have a dedicated valve.
2) Shall connect downstream of the lift station check valves.
3) Provide a 4-inch cam-lock style connection with cap.

F. Electrical:

1) Backup Power
    a) CAT or approved equal.
    b) Natural gas fueled.
    c) Noise emissions not to exceed 65 dbA at 20 feet from the power supply.
    d) Shall be installed on a concrete pad per manufacturer recommendations.
    e) Shall include an automatic transfer switch, manufactured by the same manufacturer as the generator.
2) Alarm Conditions
    a) High water
    b) Low water
    c) Seal failure
    d) Power interruption
    e) High motor temperature
3) Controls
    a) Each pump shall have:
        (1) Hour meter
        (2) Suction pressure gauge tap and valve
        (3) Discharge pressure gauge tap and valve
    b) Pump run alternator
    c) Amperage meter on each leg of the electrical wiring
    d) Lightning protection for the power supply
    e) Level control
        (1) Primary control – Pressure transducer
        (2) Backup control – 3-float switch system to be installed and function if primary control is lost.
    f) Transfer switch and control panels shall be placed on a Unistrut stand with steel frame embedded in concrete.

4) Yard lighting shall be provided and connected to the power supply.

G. Fencing

1) 6-foot chain link security or other style approved by the District.

2) 3-foot-wide personnel gate

3) 12-foot-wide gate with two 6-foot leaves

4) Shall provide adequate room for access and facility maintenance

5) 3-foot minimum offset from all structures and appurtenances

6) Gate placement shall promote maintenance vehicle access for pump removal

7) Gate installations shall include duckbill style gate holdbacks

H. SCADA integration:

1) Consult with the District prior to design.

A. O&M and Training

1) Provide O&M Manuals for lift station, generator, transfer switch, and any other applicable lift station equipment.

2) Manufacturer of the equipment shall perform training at startup.

SECTION VII – PRETREATMENT

PT-01 Grease Interceptors

1. General

    A. Food preparation sinks, dishwashing sinks, dishwashers, floor drains, floor sinks, mop sinks and any other fixtures producing grease laden waste shall discharge to the interceptor.

    B. Dishwashers shall be commercial grade, low temperature, chemical sanitizing models. Water entering the interceptor shall not exceed 150°F.

    C. Food waste processors or grinders, garbage disposers, enzymes, and drain maintenance chemicals are prohibited.

    D. Installation, operation, and maintenance shall be in accordance with manufacturer's specifications.

    E. Cleaning frequency shall be determined by the District.

    F. Floor sinks shall be equipped with stainless steel flanged floor sink strainers.

    G. Install in accordance with the manufacturer's specifications.

    H. Grease interceptors shall be designed by a Professional Engineer.

    I. Grease interceptors shall be for gray water use only; black water shall be carried by separate sewer.

2. Types

    A. Interior Grease Interceptor

        1) Shall only be utilized when an exterior gravity grease interceptor is not feasible, such as modifications to plumbing on existing buildings.

        2) Sizing shall comply with the Uniform Plumbing Code and utilities the fixture capacity formula with a minimum flow of 20 gpm.

        3) Shall be Schier Great Basin Series or approved equal.

        4) Locate in an area which permits easy access for cleaning and inspection.

    B. Exterior Gravity Grease Interceptor

        1) Minimum acceptable capacity is 750 gallons.

        2) Sizing shall comply with the Uniform Plumbing Code. Use table titled "Gravity Grease Interceptor Sizing" which uses DFU's to determine sizing.

        3) Shall be precast concrete type or alternate approved by the District.

        4) Locate in an area which permits easy access for cleaning and inspection.

PT-02 Sand/Oil Separators

1. Shall be provided as required by the Uniform Plumbing Code.
2. Shall be sized as required by the Uniform Plumbing Code.
3. Minimum acceptable capacity is 750 gallons.

APPENDIX A
STANDARD DETAILS

GENERAL NOTES:

1. ALL ITEMS OF WORK SHALL BE COMPLETED IN ACCORDANCE WITH MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS (MPWSS), SEVENTH EDITION, AS MODIFIED BY THE BIGFORK WATER AND SEWER DISTRICT SPECIAL PROVISIONS AND THE BIGFORK WATER AND SEWER DISTRICT STANDARDS FOR DESIGN AND CONSTRUCTION.
2. THE CONTRACTOR SHALL NOTIFY MONTANA 811 TO LOCATE EXISTING UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO PROTECT ALL EXISTING UTILITIES FROM DAMAGE DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL EXCAVATE ALL UTILITY LINES PRIOR TO BEGINNING TRENCH EXCAVATION TO ENSURE ADEQUATE CROSSING CLEARANCE.
4. THE CONTRACTOR SHALL MAINTAIN SERVICE TO ALL EXISTING UTILITIES. IF A UTILITY IS DAMAGED DURING CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY REPAIR THE DAMAGE AT THEIR EXPENSE.
5. THE CONTRACTOR SHALL NOTIFY THE BIGFORK WATER AND SEWER DISTRICT A MINIMUM OF 48 HOURS PRIOR TO BEGINNING ANY WORK.
6. THE CONTRACTOR SHALL PLAN AND COORDINATE ANY UTILITY SHUTDOWNS WITH THE BIGFORK WATER AND SEWER DISTRICT AT LEAST 7 DAYS IN ADVANCE OF THE TIE-IN.
7. ALL TRENCHES SHALL HAVE TYPE 'A' BACKFILL. SOIL INSUFFICENT FOR BACKFILL, AS DETERMINED BY THE BIGFORK WATER AND SEWER DISTRICT, SHALL BE HAULED OFF-SITE AND REPLACED WITH 3" MINUS SUBBASE PER MPWSS SECTION 02234.
8. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST AND EROSION DURING CONSTRUCTION.
9. THE CONTRACTOR SHALL RESTORE ALL ROADWAY SURFACES TO EQUAL OR BETTER CONDITION THAN EXISTED PRIOR TO EXCAVATION AS DETERMINED BY THE OWNER OF THE ROADWAY AND/OR THE BIGFORK WATER AND SEWER DISTRICT.
10. THE CONTRACTOR SHALL ADJUST ALL VALVE BOXES, CURB BOXES, AND MANHOLES TO FINAL GRADE UPON COMPLETION OF CONSTRUCTION.
11. CONTRACTOR WILL BE REQUIRED TO EMPLOY THE SERVICES OF A REGISTERED LAND SURVEYOR TO REPLACE ANY MONUMENTS AND CORNERS THAT ARE DISTURBED DURING CONSTRUCTION.

G–1 GENERAL CONSTRUCTION NOTES

BIGFORK WATER & SEWER DISTRICT

ADDRESS
PO BOX 1108
108 Harbor Heights Blvd
Bigfork, MT 59911

PHONE
406.837.4566

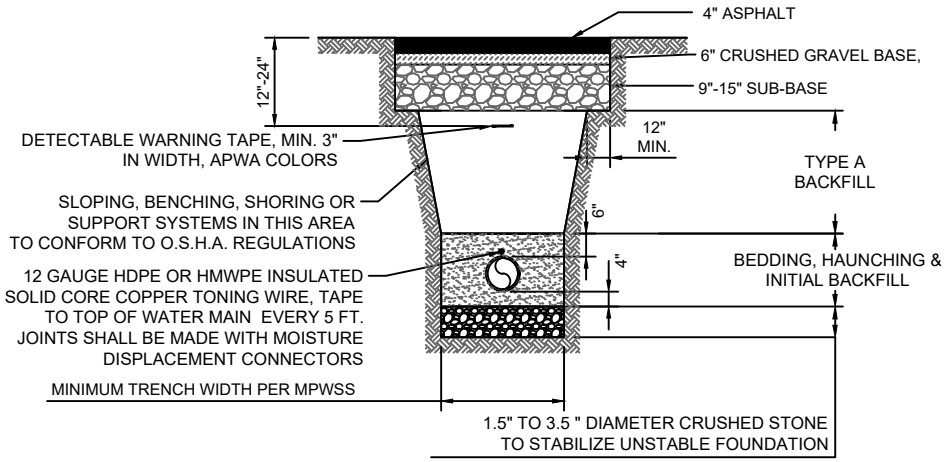
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS

BIGFORK MONTANA

SHEET NUMBER 1

GENERAL DETAILS SHEET 1

DRAWING NUMBER G-1



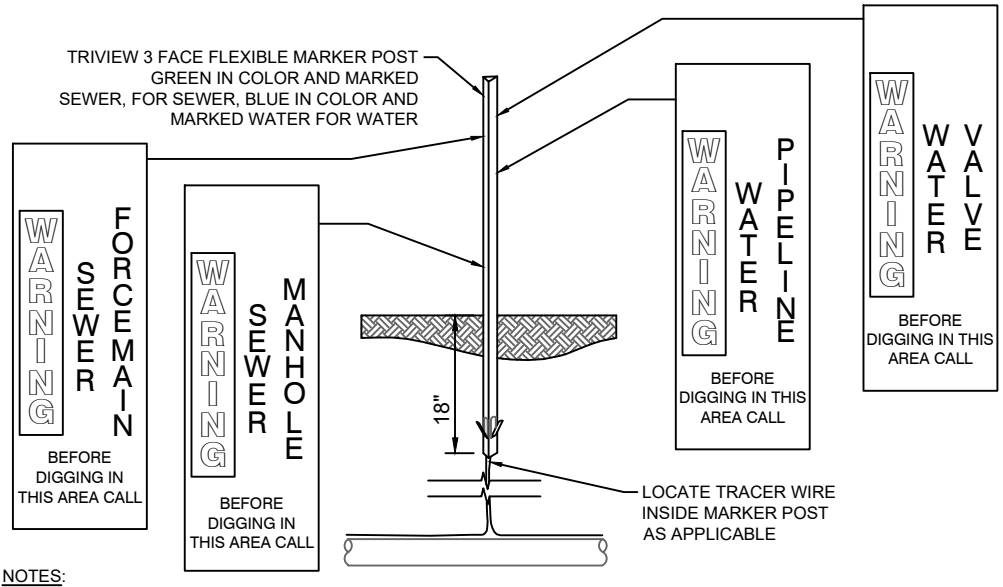
ALL PIPE BEDDING AND TRENCH BACKFILL SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY IN ACCORDANCE WITH AASHTO T-99

ALL TRENCH CONSTRUCTION SHALL CONFORM TO CURRENT OSHA STANDARDS - EXCAVATIONS

INSTALL DETECTABLE WARNING TAPE AND TONER WIRE ON ALL WATER MAINS AND SEWER FORCE MAINS PER DISTRICT STANDARDS.

BEDDING, HAUNCHING & INITIAL BACKFILL SHALL BE A CLEAN SAND MEETING USCS CLASSIFICATION SYSTEM SW, OR A CLASS I MATERIALS AS DEFINED IN ASTM D 2321 WITH A MAXIMUM PARTICLE SIZE OF 3/4" AND MEETING MIGRATION REQUIREMENTS OF THE SAME STANDARD (SECTION X.1.8)

G–2 TYPICAL UTILITY TRENCH SECTION DETAIL



NOTES:
1. TRIVIEW, 3 FACE MARKER POSTS SHALL BE INSTALLED AT ALL BENDS, VALVES, MANHOLES, AND AT A SPACING OF EVERY 150 FEET FOR ALL WATER MAINS, SEWER MAINS, FORCEMAINS, AND STORM MAINS NOT LOCATED IN PAVED OR GRAVELED AREAS.
2. TRIVIEW, 3 FACE MARKER/TRACING STATIONS SHALL BE USED FOR MAINLINES AT INTERVALS OF EVERY 150 FEET. TRACER WIRE SHALL BE BROUGHT TO SURFACE INSIDE MARKING POST AT EACH POST.

G–3 TYPICAL UNDERGROUND MARKER POST

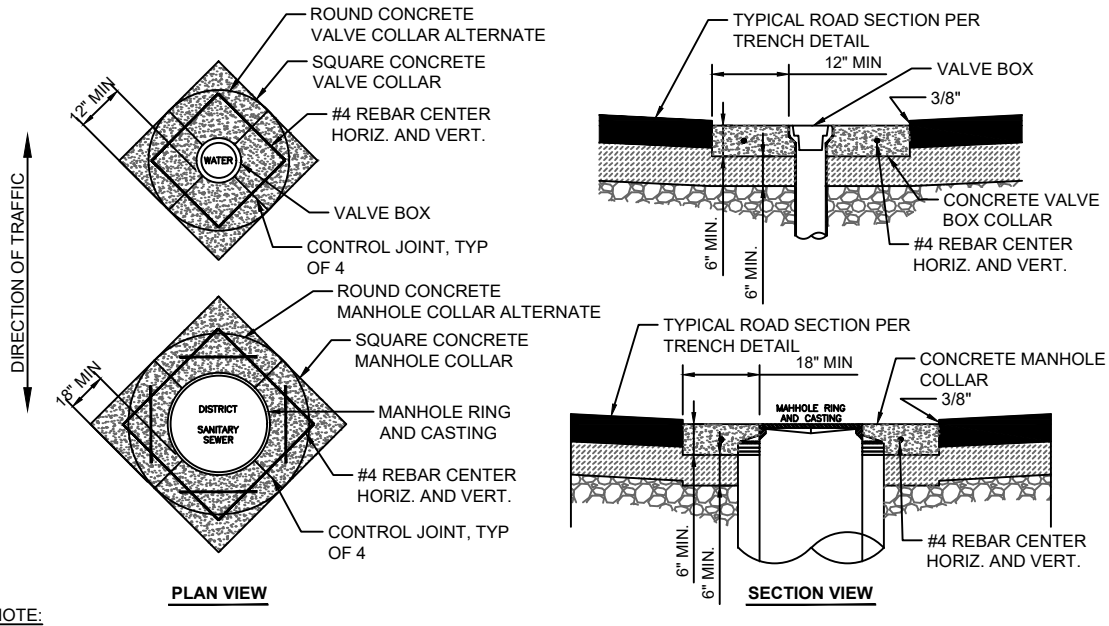
BIGFORK WATER & SEWER DISTRICT
ADDRESS
PO BOX 1108
108 Harbor Heights Blvd
Bigfork, MT 59911
PHONE
406.837.4566

BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS
BIGFORK MONTANA

GENERAL DETAILS SHEET 2

SHEET NUMBER 2

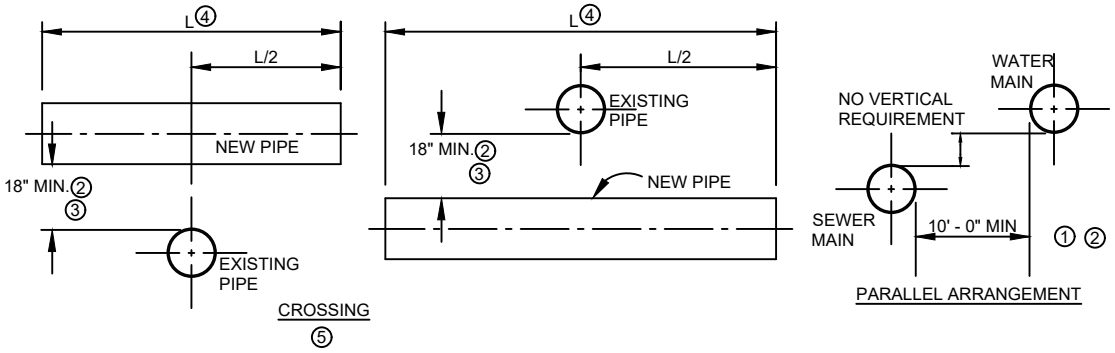
DRAWING NUMBER G-2



NOTE:

1. ALL VISIBLE EDGES AND JOINTS SHALL BE ROUNDED WITH A 1/4" RADIUS EDGING TOOL.
2. CONCRETE SHALL BE M-4500 WITH 3/4" MAX. AGGREGATE, MIN. 28 DAY STRENGTH OF 4500 PSI, 5% TO 8% AIR ENTRAINMENT AND MAX SLUMP OF 4".
3. ALL JOINTS SHALL BE SAW CUT.

G–4 CONCRETE COLLAR DETAILS



NOTE:

① SPECIFIC MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY APPROVAL IS REQUIRED FOR A DISTANCE LESS THAN 10 FEET BETWEEN WATER AND SANITARY SEWER.

② NO EXCEPTION TO THE PIPE SEPARATION REQUIREMENT IS PERMITTED WHEN THE SEWAGE PIPE IS A FORCEMAIN. AT CROSSINGS, ONE FULL LENGTH OF WATER MAIN PIPE SHALL BE LOCATED SO THAT BOTH JOINTS WILL BE AS FAR FROM THE FORCEMAIN AS POSSIBLE.

③ LESS THAN 18" OF SEPARATION IS PERMITTED WHEN THE GRAVITY SEWER AT THE CROSSING IS MADE FROM ONE SINGLE 20 FOOT LENGTH OF AWWA PRESSURE PIPE AND THE CROSSING ANGLE IS APPROXIMATELY 90°. SPECIFIC MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES APPROVAL IS REQUIRED FOR A VERTICAL SEPARATION OF LESS THAN 18" BETWEEN WATER MAIN AND SANITARY SEWER.

④ "L" IS A LENGTH OF PIPE AS SUPPLIED BY THE MANUFACTURER.

⑤ ADEQUATE STRUCTURE SUPPORT FOR PIPES AT CROSSING SHALL BE PROVIDED.

G–5 WATER MAIN AND SEWER MAIN SEPARATION

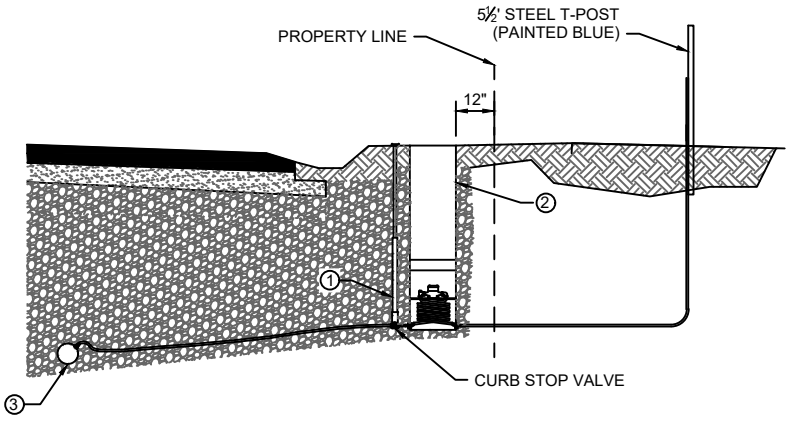
(MPWSS SD No. 02660-2)

WATER SYSTEM CONSTRUCTION NOTES:

1. MECHANICAL JOINT RESTRAINTS AND THRUST BLOCKING ARE REQUIRED AT ALL TEES, BENDS, CAPS, WATER MAIN VALVES, AND FIRE HYDRANTS IN ACCORDANCE WITH MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS.
2. THE CONTRACTOR SHALL MAINTAIN A MINIMUM OF 6.0 FEET COVER ON ALL WATER LINES INSTALLED.
3. MAINTAIN 18" MINIMUM VERTICAL SEPARATION, OUTSIDE OF PIPE TO OUTSIDE OF PIPE, BETWEEN WATER AND SEWER LINES AT CROSSINGS
4. WATER MAINS SHALL BE INSTALLED WITH 12 GAUGE SOLID CORE COPPER TONING WIRE WITH HDPE OR HMWPE INSULATION APPROVED BY THE MANUFACTURER FOR DIRECT BURY. THE TONER WIRE SHALL BE TAPED TO THE TOP OF THE WATER MAIN AT INTERVALS NO MORE THAN 5 FT. TONER WIRE SHALL BE EXTENDED TO THE SURFACE AT ALL FIRE HYDRANT LOCATIONS. TONER WIRE SHALL BE ROUTED UP BEHIND EACH HYDRANT WITH THE LAST 3 FEET OF THE WIRE BELOW THE SURFACE BEING ENCLOSED IN SNAKE PITS. TONER WIRE SHALL BE ACCESSIBLE WITH 3 FT OF EXCESS TO CONNECT WITH TONING EQUIPMENT.
5. DETECTOR TAPE (6" WIDE, 5 MIL. W/50 GAUGE FOIL CORE) SHALL BE REQUIRED OVER ALL WATER MAINS AND SERVICES. DETECTOR TAPE SHALL BE CONNECTED TO EXISTING TAPE AT WATER MAIN AND SHALL BE BROUGHT TO THE SURFACE AT VALVE BOXES, WATER SERVICE CURB BOXES AND SEWER MANHOLES. TAPE SHALL BE APPROPRIATELY MARKED "WATER LINE BURIED BELOW" AT FREQUENT INTERVALS. TAPE SHALL BE PLACED 12" TO 24" BELOW FINISHED GROUND.
6. ALL IRON FITTINGS AND METAL PARTS SHALL BE WRAPPED IN POLYETHYLENE ENCASEMENT.
7. CONCRETE COLLARS SHALL BE INSTALLED AT WATER VALVE BOX RISERS AND MANHOLE RING AND CASTINGS.
8. TEMPORARY WATER SERVICES SHALL BE SUPPLIED DURING CONSTRUCTION WHEN WATER SERVICE WILL BE INTERRUPTED FOR MORE THAN FOUR (4) HOURS. A TEMPORARY WATER SERVICE PLAN SHALL BE SUBMITTED TO AND APPROVED BY THE DISTRICT PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. ALL TEMPORARY WATER SERVICES SHALL COMPLY WITH MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY DESIGN CIRCULAR 1.
9. CURB STOPS SHALL BE MARKED WITH STEEL FENCE POSTS PAINTED BLUE.
10. CONTRACTOR SHALL PERFORM HYDROSTATIC LEAK TESTING IN ACCORDANCE WITH MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS AS MODIFIED BY DISTRICT SPECIAL PROVISION 02660.
11. ALL NEW, CLEANED OR REPAIRED WATER MAINS SHALL BE FLUSHED AND DISINFECTED IN ACCORDANCE WITH MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS AS MODIFIED BY DISTRICT SPECIAL PROVISION 02660.
12. THE CONTRACTOR SHALL BE RESPONSIBLE TO TAKE ALL BAC-T TESTS UNDER THE SUPERVISION OF DISTRICT STAFF. ALL TESTING SHALL BE AT THE EXPENSE OF THE CONTRACTOR.

W–1

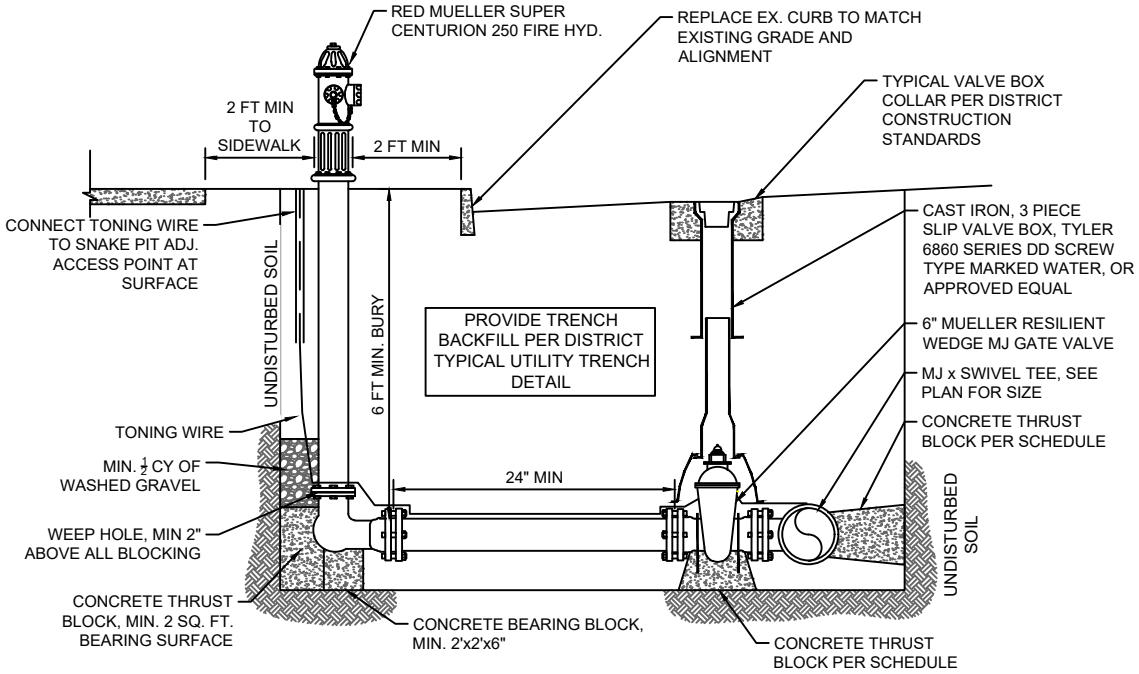
WATER SYSTEM CONSTRUCTION NOTES



NOTES:

1. CURB STOP PER BIGFORK WATER AND SEWER DISTRICT STANDARDS FOR DESIGN AND CONSTRUCTION AND SPECIAL PROVISIONS FOR WATER DISTRIBUTION.
2. METER PIT PER BIGFORK WATER AND SEWER DISTRICT STANDARDS FOR DESIGN AND CONSTRUCTION AND SPECIAL PROVISIONS FOR WATER DISTRIBUTION.
3. 3. MAIN TAP PER MPWSS STANDARD DRAWING NO. 02660-6."

W–2 WATER SERVICE CONNECTION DETAIL



W–3 STANDARD FIRE HYDRANT DETAIL

BIGFORK WATER & SEWER DISTRICT

ADDRESS
PO BOX 1108
108 Harbor Heights Blvd
Bigfork, MT 59911

PHONE
406.837.4566

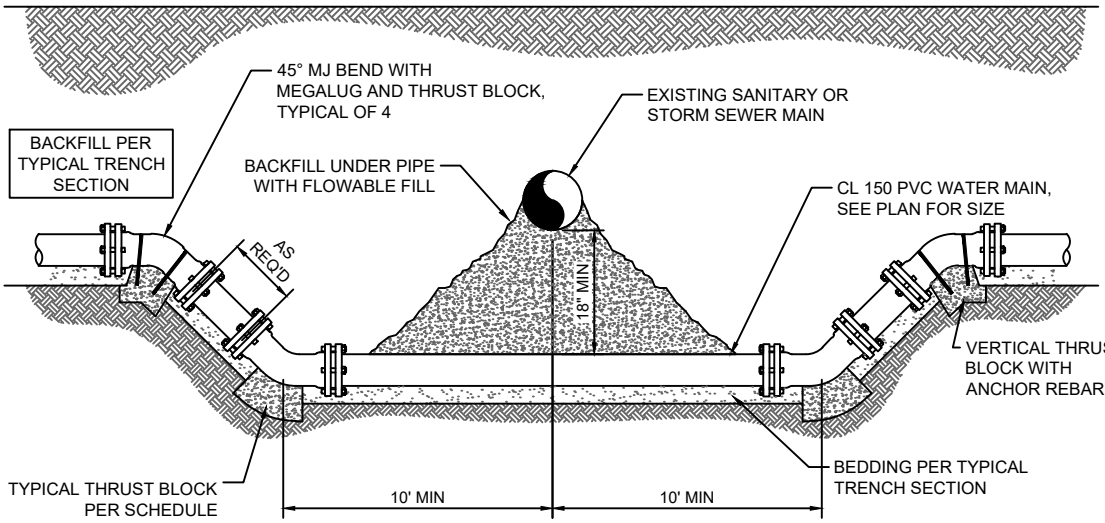
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS

BIGFORK MONTANA

WATER DETAILS SHEET 2

SHEET NUMBER 5

DRAWING NUMBER W-2



W-4 WATER MAIN LOWERING SECTION DETAIL

BIGFORK WATER & SEWER DISTRICT

ADDRESS
PO BOX 1108
108 Harbor Heights Blvd
Bigfork, MT 59911

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406.837.4566

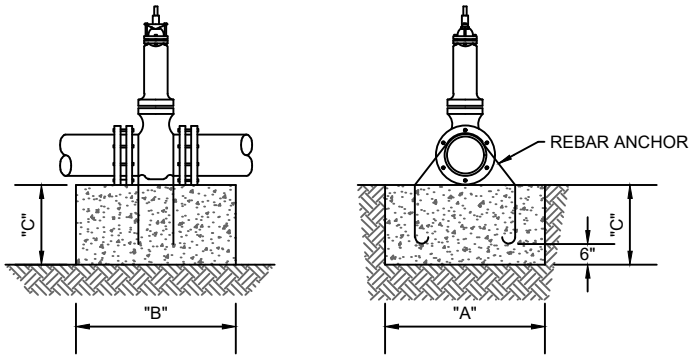
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS

BIGFORK MONTANA

WATER DETAILS SHEET 3

SHEET NUMBER 6

DRAWING NUMBER W-3



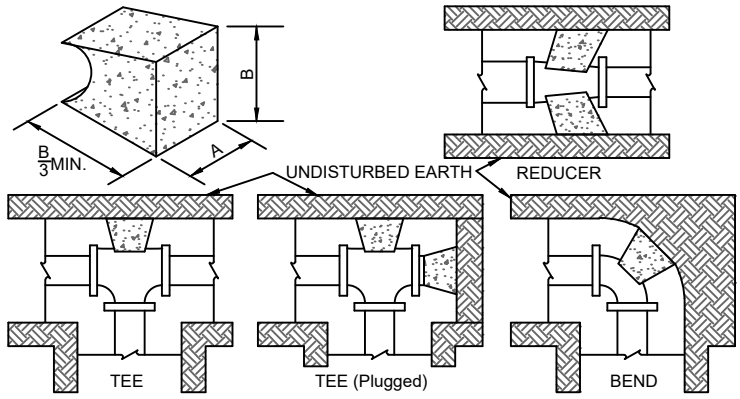
NOTE:
1. COAT RODS WITH A BITUMASTIC NO. 50 COATING OR EQUAL.
2. PRESSURES SHOWN ARE MAXIMUM WORKING PRESSURES IN THE SYSTEM

STANDARD THRUST BLOCK DIMENSIONS

ANCHOR ROD SIZE	VALVE SIZE	100 PSI			150 PSI			200 PSI			250 PSI			300 PSI		
		"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"
3/4"	6" & 8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-7"
3/4"	10"	2'-0"	2'-0"	2'-0"	2'-6"	2'-6"	2'-0"	2'-9"	2'-6"	2'-6"	3'-0"	3'-0"	3'-0"	3'-7"	3'-0"	3'-0"
3/4"	12"	2'-3"	2'-0"	2'-0"	3'-0"	3'-0"	2'-8"	3'-5"	3'-0"	3'-0"	4'-3"	3'-0"	3'-0"	5'-1"	3'-0"	3'-0"
1"	14"	2'-3"	2'-0"	2'-4"	3'-5"	3'-0"	3'-0"	4'-6"	3'-0"	3'-0"	4'-0"	4'-0"	4'-0"	4'-9"	4'-0"	4'-0"
1 1/8"	16"	3'-0"	3'-0"	2'-11"	4'-4"	3'-0"	3'-0"	4'-1"	4'-0"	4'-0"	5'-1"	4'-0"	4'-0"	6'-1"	4'-0"	4'-0"
1 1/4"	18"	3'-8"	3'-0"	3'-0"	5'-5"	3'-0"	3'-0"	5'-1"	4'-0"	4'-0"	6'-4"	4'-0"	4'-0"	5'-9"	5'-0"	5'-0"
1 3/8"	24"	4'-4"	4'-0"	4'-0"	6'-5"	4'-0"	4'-0"	6'-6"	5'-0"	5'-0"	6'-5"	6'-0"	6'-0"	7'-8"	6'-0"	6'-0"

W–5

THRUST BLOCKING FOR WATER MAIN VALVES



NOTES:
1. THESE TABLES ARE BASED ON 150 PSI MAIN PRESSURE & 2000 PSF SOIL BEARING PRESSURE.
2. WRAP ALL FITTINGS WITH POLYETHYLENE.

STANDARD DIMENSIONS FOR THRUST BLOCKING

FITTING SIZE	TEES & PLUGS		90° BEND		45° BEND & WYES		REDUCERS & 22° BEND	
	A	B	A	B	A	B	A	B
4"	1'-7"	1'-2"	1'-9"	1'-6"	1'-8"	0'-10"	1'-7"	0'-6"
6"	2'-0"	1'-11"	2'-5"	2'-2"	1'-10"	1'-7"	1'-9"	0'-10"
8"	2'-8"	2'-6"	3'-2"	3'-0"	2'-5"	2'-1"	1'-9"	1'-6"
10"	3'-4"	3'-3"	4'-0"	3'-10"	3'-0"	2'-9"	2'-2"	1'-11"
12"	4'-0"	3'-10"	4'-8"	4'-8"	3'-8"	3'-3"	2'-7"	2'-3"
14"	5'-5"	3'-10"	6'-6"	4'-11"	4'-9"	3'-5"	3'-5"	2'-5"

W–6

THRUST BLOCKING FOR WATER MAIN FITTINGS

(MPWSS SD No. 02660-1)

BIGFORK WATER & SEWER DISTRICT

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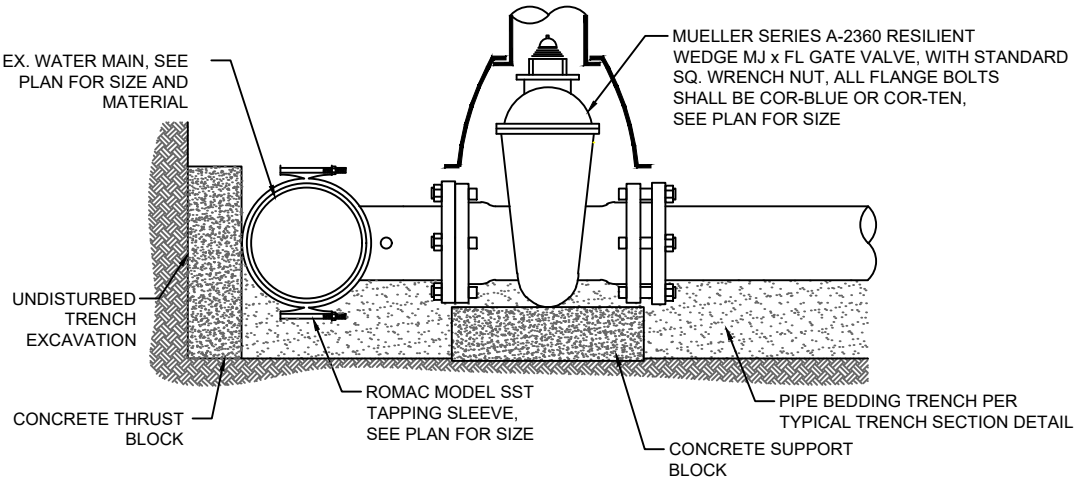
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS
BIGFORK MONTANA

WATER DETAILS SHEET 4

SHEET NUMBER 7

DRAWING NUMBER W-4



W-7

WATER MAIN TAPPING SADDLE

BIGFORK WATER & SEWER DISTRICT

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PO BOX 1108
108 Harbor Heights Blvd
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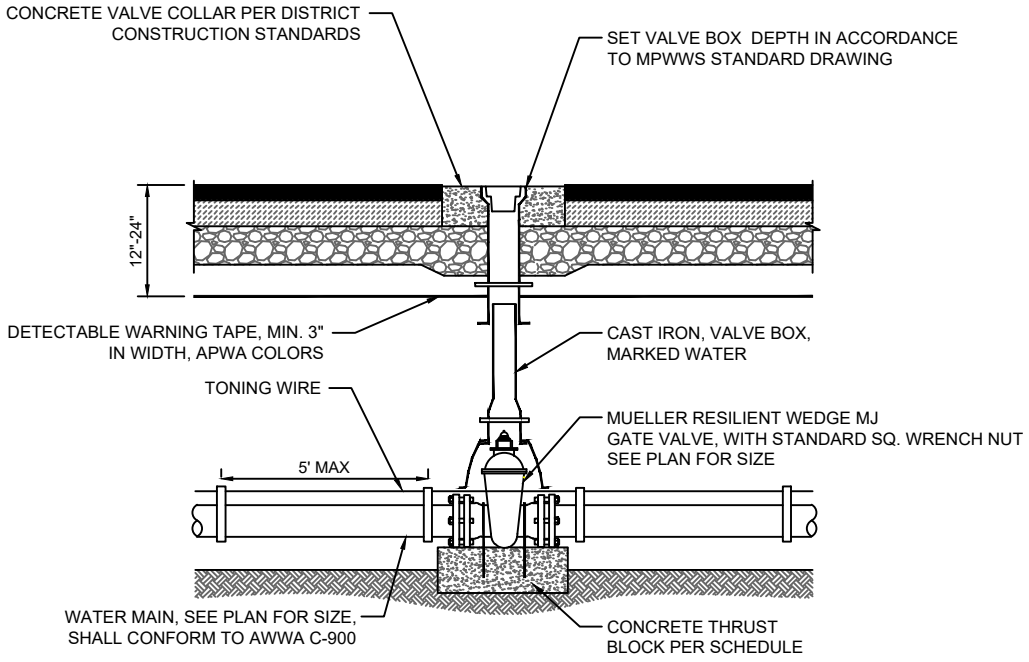
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS

BIGFORK MONTANA

WATER DETAILS SHEET 5

SHEET NUMBER 8

DRAWING NUMBER W-5



W-8 TYPICAL MJ GATE VALVE SECTION DETAIL

BIGFORK WATER & SEWER DISTRICT

ADDRESS
PO BOX 1108
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BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS

BIGFORK MONTANA

WATER DETAILS SHEET 6

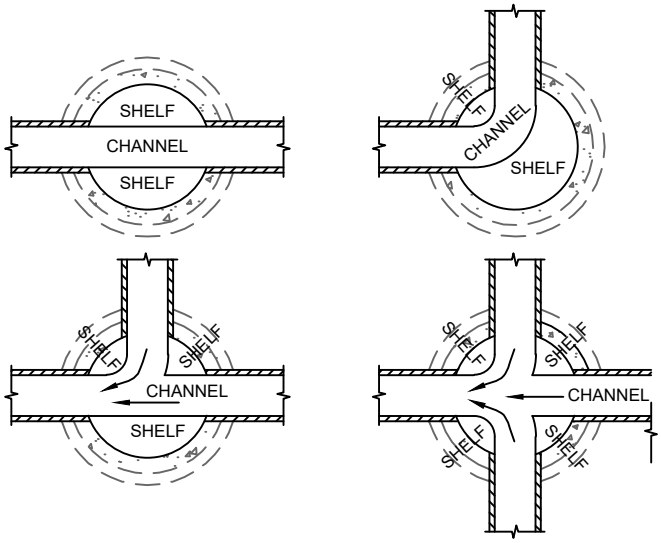
SHEET NUMBER 9

DRAWING NUMBER W-6

SANITARY SEWER SYSTEM CONSTRUCTION NOTES:

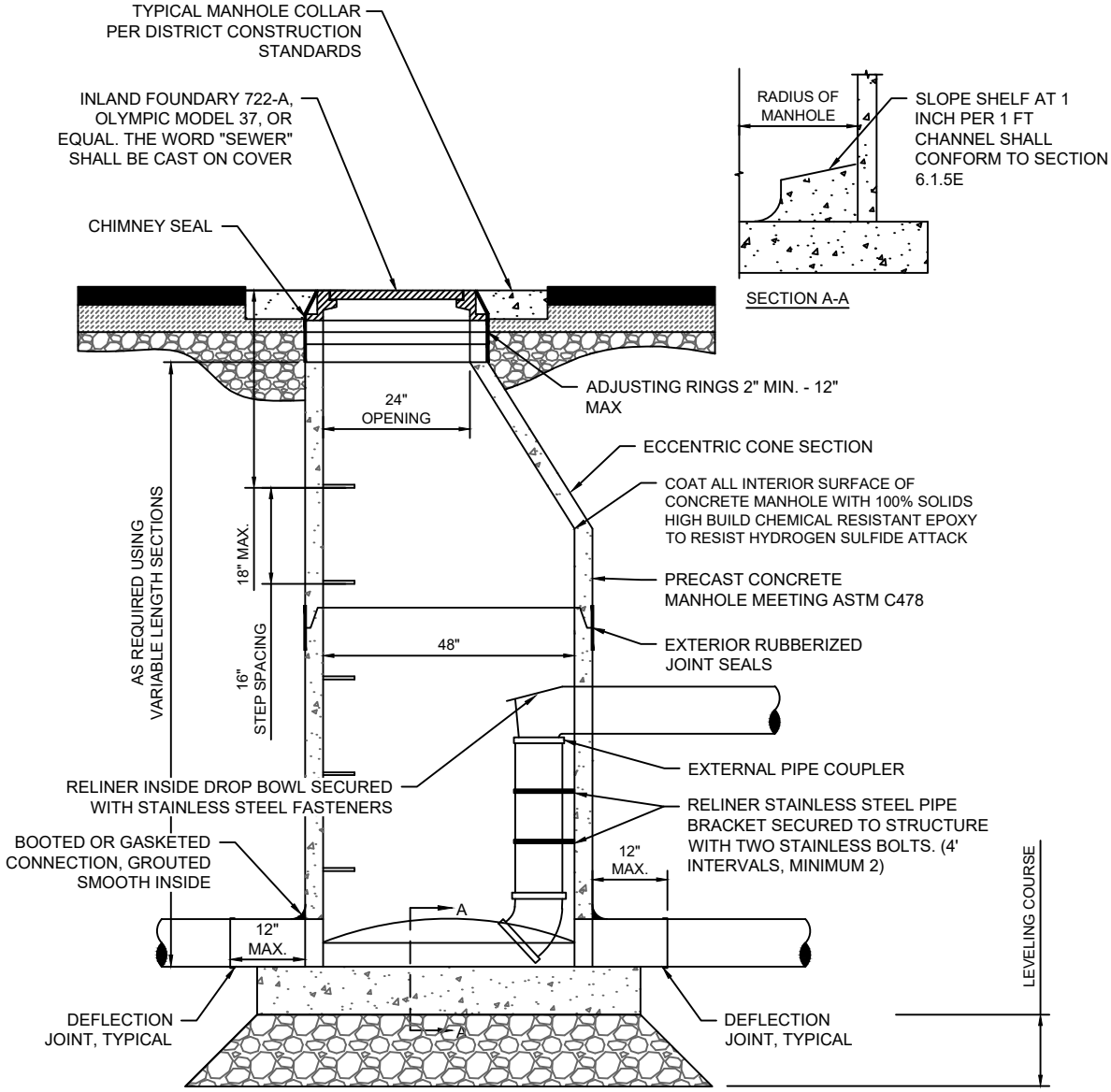
1. ROOF DRAINS, FOUNDATION DRAINS, STORM SEWERS, SUMP PUMPS AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER ARE STRICTLY PROHIBITED.
2. GRAVITY SANITARY SEWER SHALL BE SDR35 PVC SEWER PIPE CONFORMING TO ASTM D-3034. PIPES SHALL BE CONSTRUCTED MEETING THE MINIMUM PIPE SLOPE REQUIREMENTS OF MONTANA DEQ CIRCULAR 2.
3. ALL PIPE SHALL BE CAPPED OR PLUGGED AT THE END OF EACH WORK DAY.
4. ALL MANHOLES AND FORCEMAIN VALVE BOXES SHALL HAVE A CONCRETE COLLAR PER DISTRICT STANDARDS FOR DESIGN AND CONSTRUCTION.
5. SEWER FORCEMAINS SHALL BE INSTALLED WITH A 12 GAUGE SOLID CORE COPPER TONING WIRE WITH HDPE OR HMWPE INSULATION APPROVED BY THE MANUFACTURER FOR DIRECT BURY. THE TONER WIRE SHALL BE TAPED TO THE TOP OF THE SEWER FORCEMAIN AT INTERVALS OF NO MORE THAN 5 FT. TONER WIRE SHALL BE EXTENDED TO THE SURFACE AT ALL VALVE BOXES, LIFT STATIONS, AND AT MARKER POSTS. TONER WIRE SHALL BE ACCESSIBLE AT THE SURFACE WITH A MINIMUM 3 FEET OF EXCESS WIRE.
6. ALL WATER AND SEWER CROSSINGS SHALL BE MADE AT PERPENDICULAR ALIGNMENTS. A MINIMUM OF 18 INCHES OF OUTSIDE PIPE WALL SEPARATION MUST BE MAINTAINED. A MINIMUM OF 10 FEET OF HORIZONTAL SEPARATION MUST ME BE MAINTAINED BETWEEN SANITARY SEWER AND POTABLE WATER MAINS.
7. THE TERMINAL END OF ALL SERVICE STUBS SHALL BE MARKED WITH METAL "T" POST AS INDICATED IN THE DISTRICT STANDARDS FOR DESIGN AND CONSTRUCTION.
8. ALL GRAVITY SANITARY SEWER MAIN SHALL BE LAID UPSTREAM WITH THE SPIGOT ENDS POINTING DOWNSTREAM. ALL PIPES SHALL BE SET AT CONSTANT GRADE AND ALIGNMENT BETWEEN MANHOLES.
9. SANITARY SEWER PIPE LINE AND APPURTENANCES SHALL BE CLEANED AND TESTED UPON COMPLETION OF BACKFILL OPERATIONS. ALL TESTING SHALL BE UNDER THE SUPERVISION OF THE PROJECT ENGINEER AND REPRESENTATIVE OF THE DISTRICT.
10. SANITARY SERVICES SHALL NOT BE INSTALLED LESS THAN 36 INCHES BELOW FINAL GRADE ON PRIVATE PROPERTY, OR AT A MINIMUM OF 6 INCHES BELOW KNOWN FROST LEVELS, WHICHEVER IS GREATER.
11. THE CONTRACTOR SHALL MAINTAIN A MINIMUM OF 6.0 FEET COVER ON ALL SEWER FORCE MAINS INSTALLED.
12. INSULATION IS REQUIRED OVER ANY GRAVITY SEWER MAIN WITH LESS THAN 4.0 FEET OF COVER OVER THE PIPE. INSULATION SHALL BE PLACED TO A THICKNESS OF 2 INCHES AND A WIDTH OF 3.5 FEET, CENTERED 6 INCHES OVER THE PIPE. THE INSULATION SHALL BE CLOSED CELL HIGH-DENSITY URETHANE FOAM BOARD. PIPE BEDDING SHALL BE COMPACTED AND LEVELED PRIOR TO PLACEMENT OF INSULATION BOARD.
13. DETECTOR TAPE (6" WIDE, 5 MIL. W/50 GAUGE FOIL CORE) SHALL BE REQUIRED OVER ALL SEWER MAINS AND ALL SEWER SERVICES. DETECTOR TAPE SHALL BE CONNECTED TO EXISTING TAPE AT WATER MAIN OR SEWER MAINS AND SHALL BE BROUGHT TO THE SURFACE AT WATER MAIN VALVE BOXES, WATER SERVICE CURB BOXES AND SEWER MANHOLES. TAPE SHALL BE APPROPRIATELY MARKED "SEWER LINE BURIED BELOW" AT FREQUENT INTERVALS. TAPE SHALL BE PLACED 12" TO 24" BELOW FINISHED GROUND.

S–1 SEWER SYSTEM CONSTRUCTION NOTES



NOTES:
1. SLOPE ALL SHELVES TO CHANNEL AT 1" PER FOOT
2. SEE PLAN-PROFILE SHEETS FOR SLOPE OF CHANNEL.

S–2 TYPICAL MANHOLE CHANNEL DETAIL



MANHOLE NOTES:

1. ECCENTRIC MANHOLES REQUIRED ON ALL 4 FT DIAMETER MANHOLES GREATER THAN 5 FT IN OVERALL HEIGHT UNLESS SPECIFIED OTHERWISE.
2. ALL JOINTS BETWEEN MANHOLES SECTIONS, ADJUSTING RINGS, MANHOLE RING AND TOP SECTION, AND AROUND ALL SEWER PIPE IN MANHOLE SHALL BE WATER TIGHT. JOINTING MATERIAL SHALL BE "RAM-NEK" OR EQUAL FOR ALL JOINTS EXCEPT BETWEEN SEWER PIPE AND MANHOLE WALL.
3. FIELD SET COVER TO GRADE WHEN MANHOLE IS LOCATED WITHIN A STREET OR ALLEY.
4. SHELVES SHALL SLOPE AT 1" PER FOOT TOWARD CHANNEL.

S-3

SANITARY SEWER MANHOLE DETAIL

BIGFORK WATER & SEWER DISTRICT

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406.837.4566

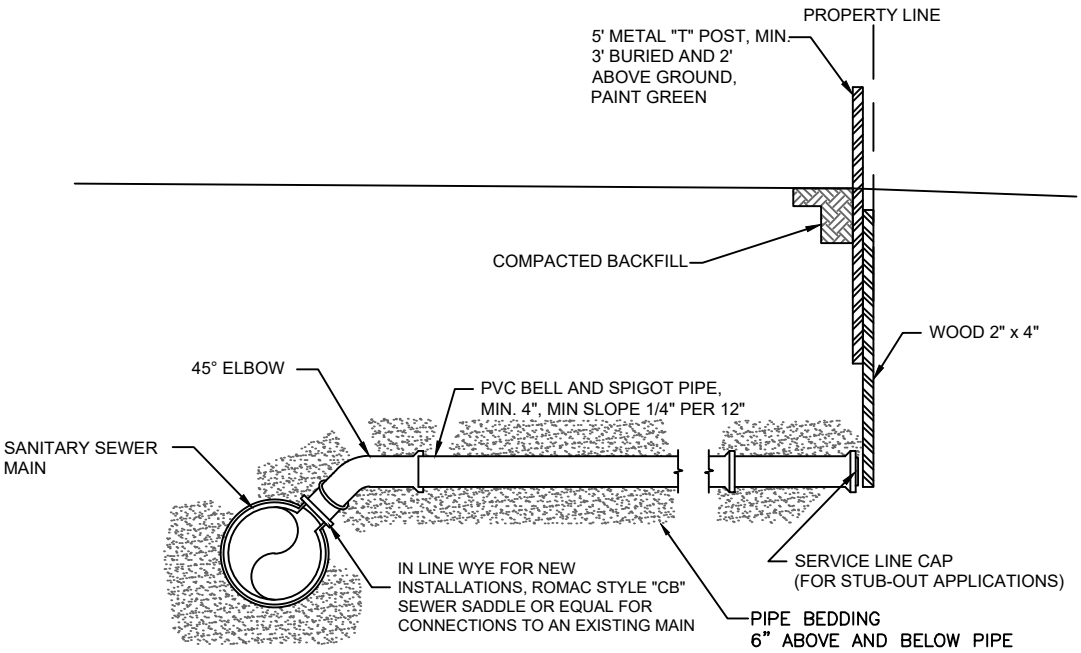
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS

BIGFORK MONTANA

SEWER DETAILS SHEET 2

SHEET NUMBER 11

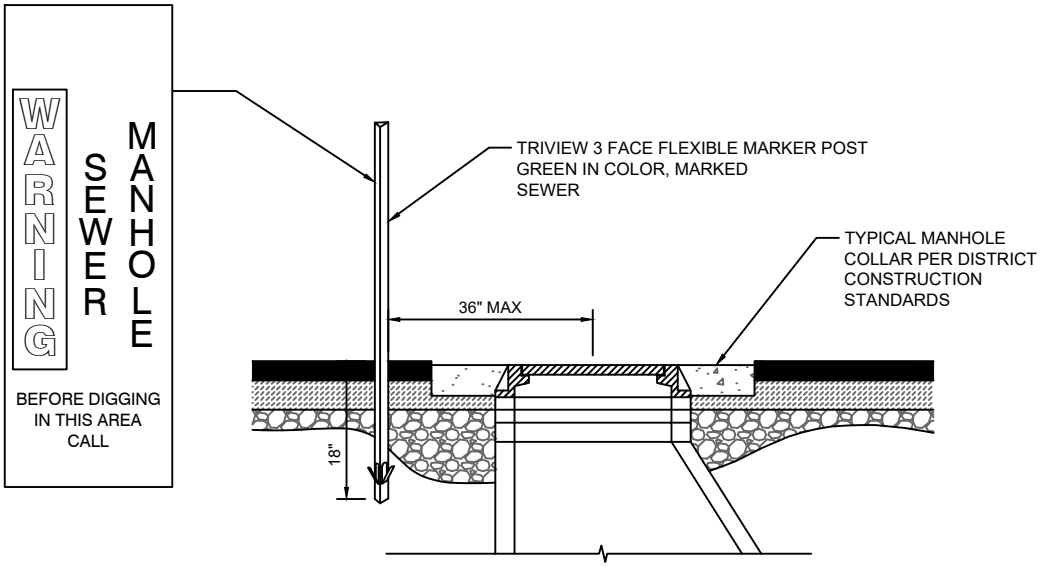
DRAWING NUMBER S-2



NOTES:
1. NO SERVICE CONNECTIONS SHALL BE MADE AT MANHOLES.

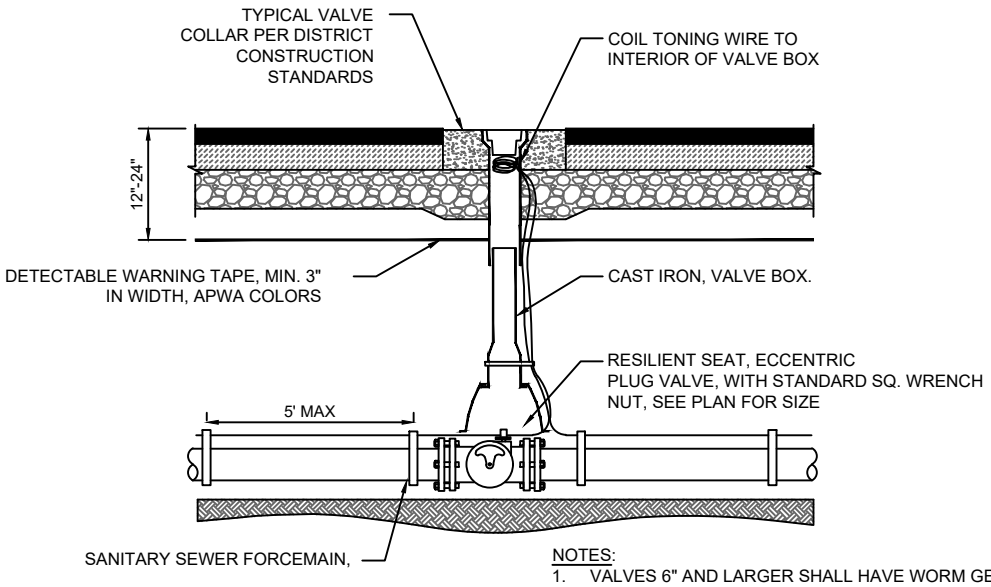
S–4

TYPICAL SANITARY SERVICE TO EXISTING MAIN



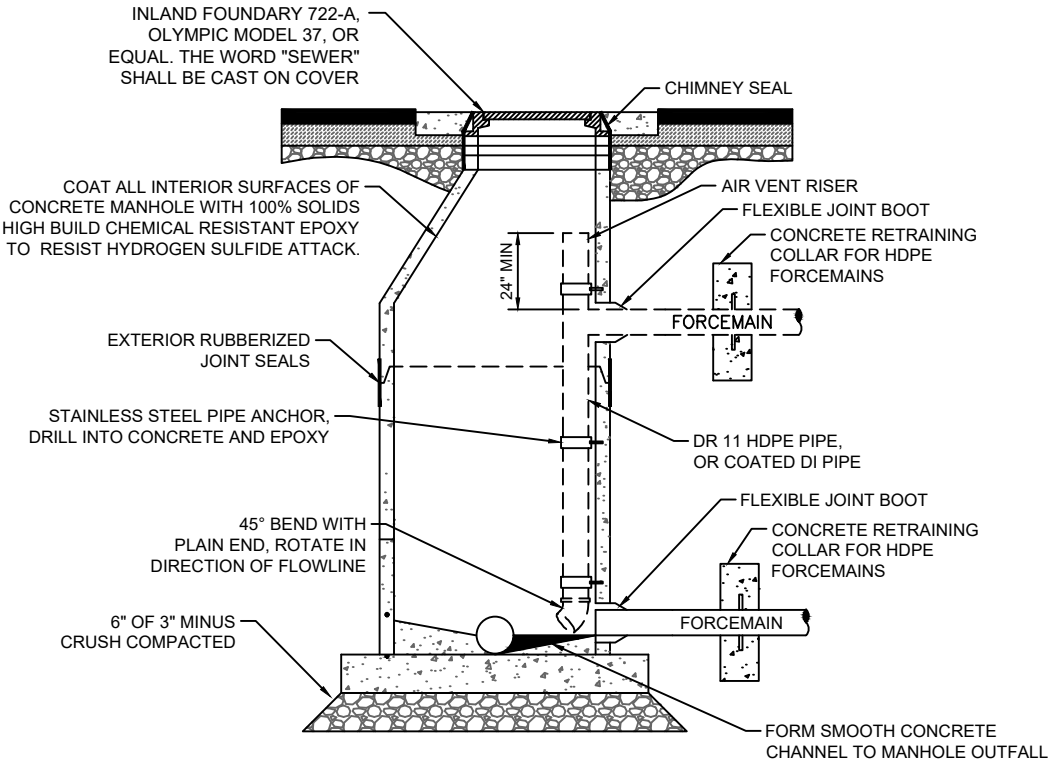
NOTES:
1. SEWER TRIVIEW MARKER POSTS SHALL BE INSTALLED FOR ALL MANHOLES LOCATED OUTSIDE OF PAVED OR GRAVEL AREAS.

S–5 TYPICAL SEWER MANHOLE MARKER POST

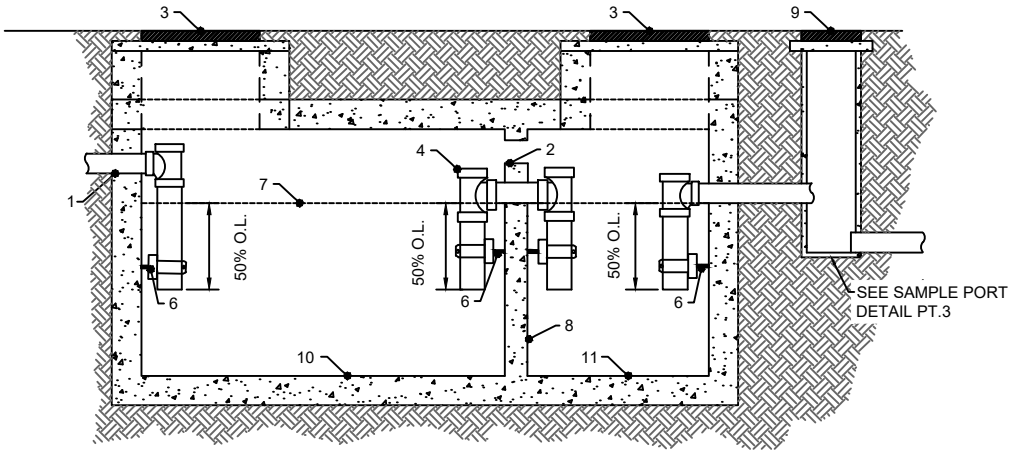


NOTES:
1. VALVES 6" AND LARGER SHALL HAVE WORM GEAR REDUCTION ACTUATOR WITH 2" SQUARE NUT.
2. VALVES INSTALLED WITH WORM GEAR SHALL FLOW ENTERING SEAT END OF VALVE AND THE PLUG BEING UP IN OPEN POSITION.

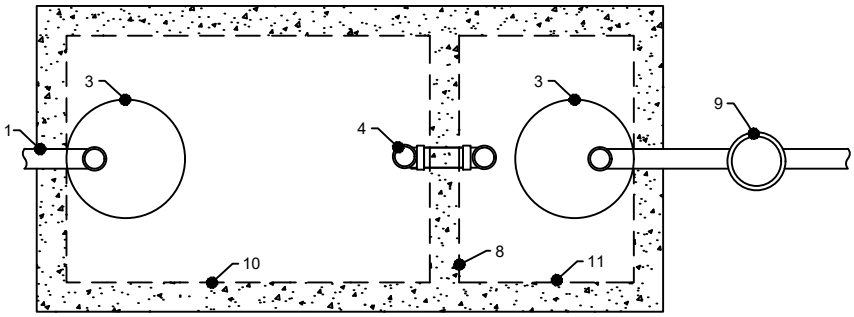
S–6 TYPICAL FORCEMAIN VALVE SECTION DETAIL



S–7 FORCEMAIN DISCHARGE MANHOLE DETAIL



ELEVATION VIEW



PLAN VIEW

NOTES:

1. INLET PIPING-SHALL BE A MINIMUM OF 3" ABOVE OUTLET PIPING.
2. 6" DIAMETER VENT SLEEVE
3. MINIMUM 24" DIAMETER OPENING WITH RING AND LID. IF IN A TRAFFIC AREA, MUST MEET H-20 LOADING REQUIREMENTS. CONCRETE LIDS ARE PROHIBITED.
4. ALL TEE PIPING SHALL EXTEND DOWN TO 50% OF THE OPERATING LEVEL.
5. ALL INTERIOR AND OUTLET PIPING SHALL BE THE SAME DIAMETER AS THE INLET PIPING.
6. PIPE SUPPORTS SEE DETAIL PT-5
7. OPERATING LEVEL
8. BAFFLE WALL
9. SAMPLE PORT-TO BE DESIGNED PER DETAIL PT-3. IF IN A TRAFFIC AREA, MUST MEET H-20 LOADING REQUIREMENTS. SHALL DISCHARGE TO DISTRICT'S SANITARY SEWER.
10. PRIMARY CHAMBER (⅔ TOTAL VOLUME).
11. SECONDARY CHAMBER (⅓ TOTAL VOLUME).
12. ALL JOINTS SHALL BE WATER TIGHT. JOINTING MATERIAL SHALL BE "RAM-NEK" OR EQUAL
13. SEE SECTION VII OF THE DESIGN AND CONSTRUCTION STANDARDS FOR INSTALLATION REQUIREMENTS.
14. ALL UNDER SLAB AND SUBSURFACE CONSTRUCTION REQUIRES DRAWINGS FROM A PROFESSIONAL ENGINEER AND MUST BE APPROVED BY THE DISTRICT PRIOR TO CONSTRUCTION.

PT–1 TYPICAL PRECAST CONCRETE EXTERIOR GREASE INTERCEPTOR

N.T.S

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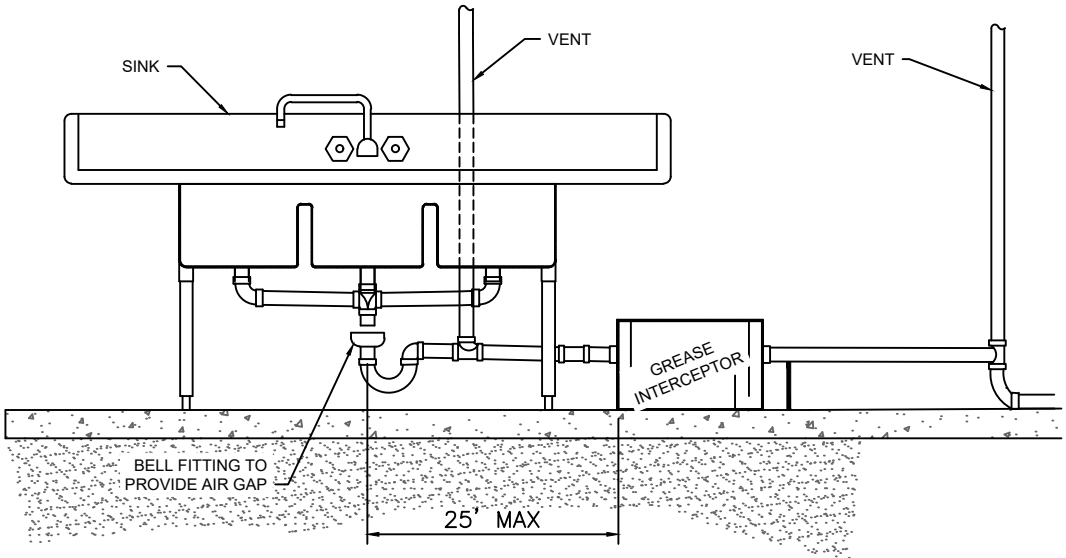
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS

BIGFORK MONTANA

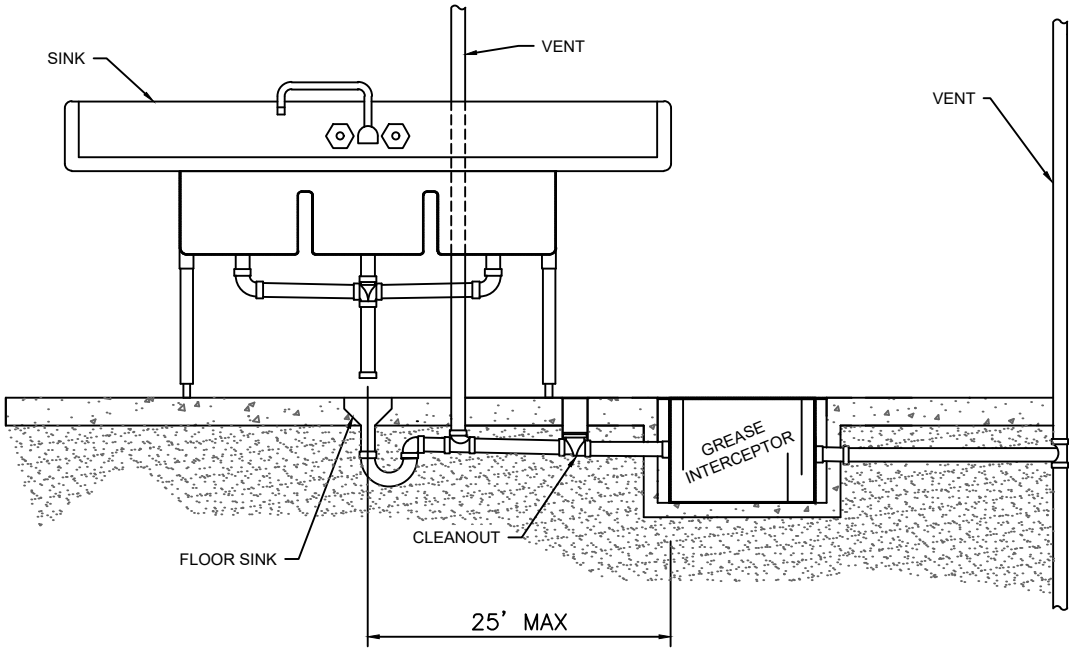
SHEET NUMBER 15

PRETREATMENT DETAILS SHEET 1

DRAWING NUMBER PT-1



INTERIOR ABOVE GRADE INTERCEPTOR



INTERIOR BELOW GRADE INTERCEPTOR

SEE SECTION VII OF THE DESIGN AND CONSTRUCTION STANDARDS FOR INSTALLATION REQUIREMENTS

PT–2

INTERIOR GREASE INTERCEPTOR
N.T.S.

BIGFORK WATER & SEWER DISTRICT

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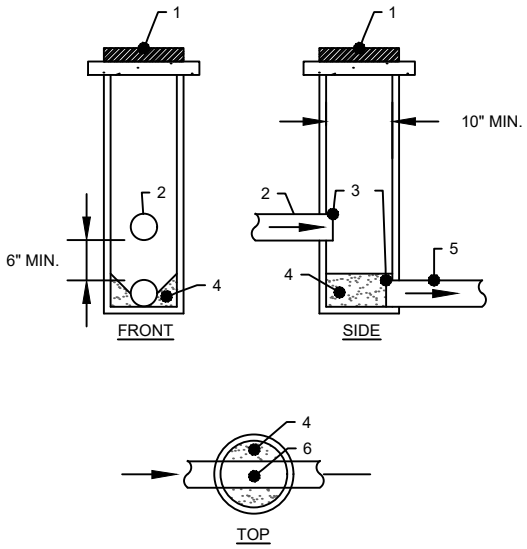
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS

BIGFORK MONTANA

SHEET NUMBER 16

PRETREATMENT DETAILS SHEET 2

DRAWING NUMBER PT-2



NOTES:
1. SAMPLE PORT RING AND LID
2. INTERCEPTOR DISCHARGE LINE
3. PIPE PENETRATION (EXTEND 1" PAST THE INSIDE WALL OF THE SAMPLE PORT - MUST BE SEALED TO PREVENT LEAKS. IF USING PVC, A SADDLE MUST BE USED)
4. GROUT (SLOPED TO WASTEWATER CHANNEL - THE SAMPLE PORT MUST DRAIN COMPLETELY AND NOT HOLD WATER)
5. SAMPLE PORT DISCHARGE LINE TO DISTRICT'S SANITARY SEWER
6. CHANNEL

REQUIREMENTS:
1. ALL INTERCEPTORS ARE TO BE INSTALLED WITH A SAMPLING PORT THAT RECEIVES FLOW FROM THE INTERCEPTOR'S EFFLUENT.
2. TEE PIPING ON THE INTERCEPTOR'S INTERIOR WILL NOT SUFFICE AS A SAMPLE PORT
3. SAMPLE PORTS MUST BE LOCATED IN AREAS PROTECTED FROM VEHICLE TRAFFIC.
4. SAMPLE PORTS ARE TO BE CLEANED AND INSPECTED DURING ROUTINE INTERCEPTOR PUMPING
5. SAMPLE PORTS WILL HAVE A MINIMUM 10" DIAMETER ACCESS COVER
6. SAMPLE PORTS WILL HAVE A MINIMUM 6" DROP BETWEEN INLET AND DISCHARGE PIPING
7. SAMPLE PORTS MUST DRAIN COMPLETELY AND NOT HOLD WATER. BOTTOM TO BE GROUTED AND SLOPED
8. INLET PIPE PENETRATION MUST EXTEND 1" PAST THE INSIDE WALL OF THE SAMPLE PORT. PENETRATIONS ARE TO BE SEALED TO PREVENT LEAKS
9. CHANNEL WIDTH SHALL BE A MINIMUM OF 5"

PT–3 SAMPLE PORT DESIGN
N.T.S.

BIGFORK WATER & SEWER DISTRICT

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Bigfork, MT 59911

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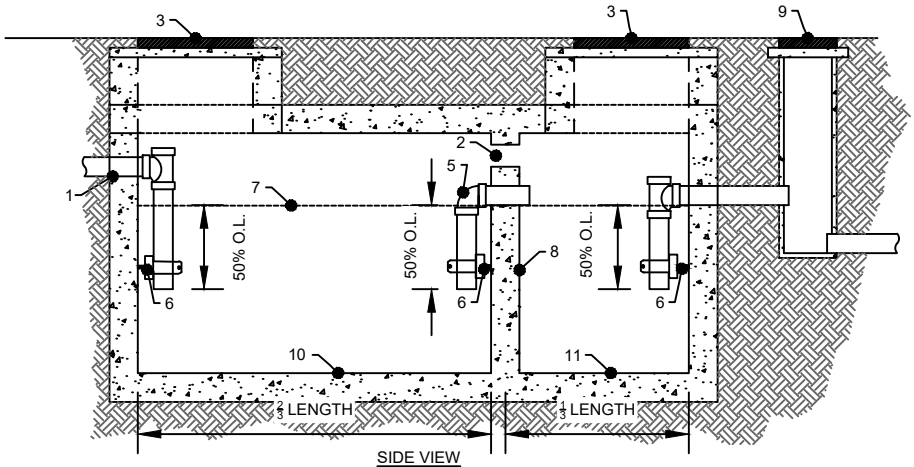
BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS
BIGFORK MONTANA

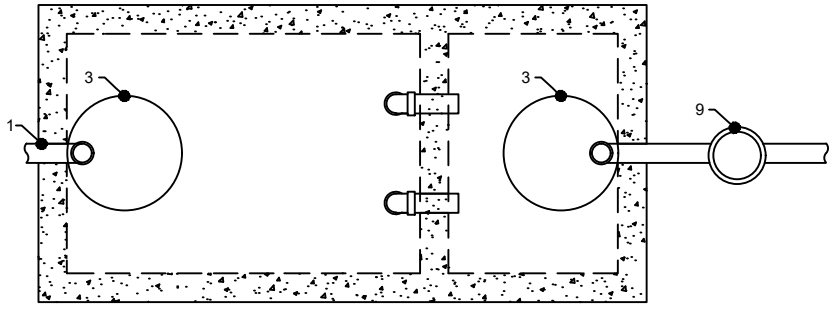
SHEET NUMBER 17

PRETREATMENT DETAILS SHEET 3

DRAWING NUMBER PT-3



SIDE VIEW



TOP VIEW

NOTES:

1. INLET PIPING-SHALL BE A MINIMUM OF 3" ABOVE OUTLET PIPING.
2. 6" DIAMETER VENT SLEEVE
3. MINIMUM 24" DIAMETER OPENING WITH RING AND LID. IF IN A TRAFFIC AREA, MUST MEET HS-20 LOADING REQUIREMENTS. CONCRETE LIDS ARE PROHIBITED.
4. ALL TEE PIPING SHALL EXTEND DOWN TO 50% OF THE OPERATING LEVEL.
5. ALL INTERIOR AND OUTLET PIPING SHALL BE THE SAME DIAMETER AS THE INLET PIPING.
6. PIPE SUPPORTS-SEE DETAIL PT-5
7. OPERATING LEVEL
8. BAFFLE WALL-SHALL HAVE (2) OPENINGS OF THE SAME DIAMETER AS THE INLET AND OUTLET PIPING AND AT THE SAME INVERT AS THE OUTLET PIPING. THE OPENINGS SHALL BE STAGGERED TO PREVENT SHORT CIRCUITING BETWEEN THE INLET AND OUTLET PIPES.
9. SAMPLE PORT-TO BE DESIGNED PER DETAIL PT-3 IF IN A TRAFFIC AREA, MUST MEET HS-20 LOADING REQUIREMENTS. SHALL DISCHARGE TO DISTRICT'S SANITARY SEWER.
10. PRIMARY CHAMBER (⅔ TOTAL VOLUME).
11. SECONDARY CHAMBER (⅓ TOTAL VOLUME).
12. ALL UNDER SLAB AND SUBSURFACE CONSTRUCTION REQUIRES DRAWINGS FROM A PROFESSIONAL ENGINEER AND MUST BE APPROVED BY THE DISTRICT PRIOR TO CONSTRUCTION.
13. SEE SECTION VII OF THE DESIGN AND CONSTRUCTION STANDARDS FOR ADDITIONAL REQUIREMENTS

PT–4 TYPICAL SAND, OIL AND GREASE SEPARATOR (SOG)
N.T.S

BIGFORK WATER & SEWER DISTRICT

ADDRESS
PO BOX 1108
108 Harbor Heights Blvd
Bigfork, MT 59911

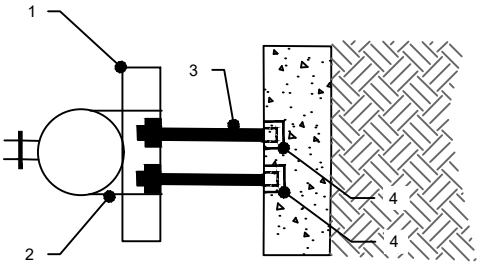
PHONE
406.837.4566

BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS
BIGFORK MONTANA

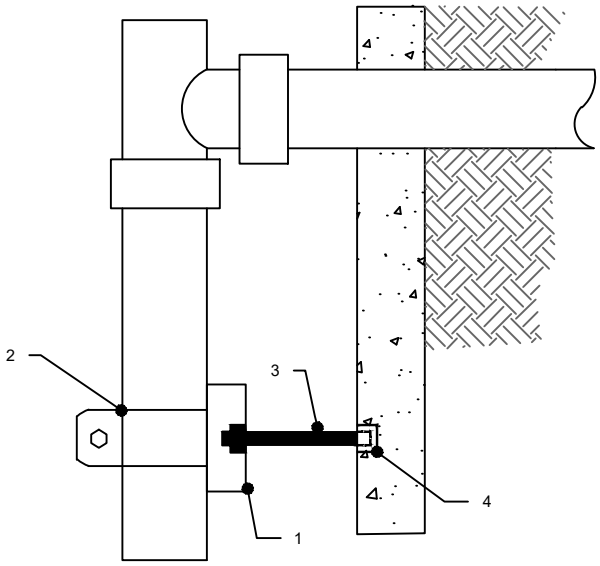
SHEET NUMBER 18

PRETREATMENT DETAILS SHEET 4

DRAWING NUMBER PT-4



TOP VIEW



SIDE VIEW

NOTES:
1. SS UNI-STRUT
2. SS PIPE/CONDUIT CLAMP
3. SS ALL THREAD
4. SECURE SS ALL-THREAD INTO CONCRETE WITH EPOXY

PT–5 TEE PIPE W/ SS SUPPORTS
N.T.S.

BIGFORK WATER & SEWER DISTRICT

ADDRESS
PO BOX 1108
108 Harbor Heights Blvd
Bigfork, MT 59911

PHONE
406.837.4566

BIGFORK WATER & SEWER DISTRICT
STANDARD DETAILS
BIGFORK MONTANA

SHEET NUMBER
19

PRETREATMENT DETAILS SHEET 5

DRAWING NUMBER
PT-5

APPENDIX B
MODIFICATIONS TO MPWSS 02660
WATER DISTRIBUTION

BIGFORK COUNTY WATER AND SEWER DISTRICT
MODIFICATIONS TO MPWSS 02660
WATER DISTRIBUTION

PART 1 GENERAL

1.0 STANDARD SPECIFICATION

A. All applicable portions of the specification SECTION 02660 in the Montana Public Works Standard Specifications, Seventh Edition – April 2021 shall apply with the following additions, deletions, and/or modifications.

1.4 STANDARD DRAWINGS

Delete subsection 1.4.A of the standard in its entirety and replace with the following:

A. Standard Drawings applicable to this section can be found in the Bigfork Water and Sewer District Standards for Design and Construction as follows:

1. G-1 – General Notes
2. G-2 – Typical Utility Trench Section Detail
3. G-3 – Typical Underground Marker Post
4. G-4 – Concrete Collar Details
5. G-5 – Water Main and Sewer Main Separation
6. W-1 – Water System Construction Notes
7. W-2 – Water Service Connection Detail
8. W-3 – Standard Fire Hydrant Detail
9. W-4 – Water Main Lowering Detail
10. W-5 – Thrust Blocking For Water Main Valves
11. W-6 – Thrust Blocking For Water Main Fittings
12. W-7 – Water Main Tapping Saddle
13. W-8 – Typical Gate Valve Section Detail

PART 2 PRODUCTS

2.2 PIPE MATERIALS

Delete subsection B.3 of the standard in its entirety and replace with the following:

3. Fittings

   a. Furnish fittings meeting the following:

      1. Mechanical Joint Class 350 fittings meeting AWWA C153, latest edition, Ductile Iron Fittings for Water.

2. Provide Cor-Blue T-Bolts or equal as approved by Owner.

Delete subsection 2.2.B.5.a of the standard in its entirety and replace with the following:

5. Couplings

   a. Use pipe couplings meeting one the following;

      1. Ductile iron, mechanical joint solid sleeves, with a minimum 12-inch length.

      2. Romac Macro for connections to steel or cast iron pipe, or an approved equal.

      3. Romac Alpha for connections to PVC or ductile iron pipe, or an approved equal.

Delete subsection 2.2.C of the standard in its entirety and replace with the following:

C. Polyvinyl Chloride (PVC) Pressure Pipe

   1. Furnish PVC water main pipe meeting AWWA C900 requirements, made to ductile iron O.D.'s for "Push-On" joints. Assure pipe joints are bell and spigot having an elastomeric gasket. Use DR 14 Class 305 pipe for piping 6 to 12 inches in diameter and DR 18 Class 235 pipe for diameters larger than 12 inches.

Delete subsection 2.2.D of the standard in its entirety and replace with the following:

D. Water Service Pipe

   1. Use polyethylene pipe in water service line construction as specified in the contract documents and meeting the following specifications.

      a. Furnish service pipe of the size or sizes specified. If not specified, match the size of existing service lines being connected to or replaced.

         1) Furnish and install the service pipe from the main to the property line installing a curb stop, curb box, and meter pit or vault at the property or in the boulevard as applicable.

         2) Use pipe meeting AWWA Specification C901, "Polyethylene (PE) Pressure Pipe, Tubing and Fittings, 1/2 inch through 3 inch for Water" and ASTM PE3406-3408. PE pipe to be

pressure tubing meeting Table 6 requirements of said specification. Use class 200 with a DR of 7 Polyethylene pipe.

3) For all polyethylene service pipe, assure corporation stops, curb stops, couplings, and all other fittings have pressure connections designed specifically for polyethylene pipe as manufactured by Mueller (Insta-Tite Connection Series) or approved equivalent.

2.3 TAPPING SLEEVES AND VALVES

Delete subsection 2.3.A and 2.3.B of the standard in their entirety and replace with the following:

A. Tapping Sleeves:

1. Tapping sleeves shall be Power Seal Model 3490 AS (Stainless Steel), or an approved equal.

2.4 CORPORATION STOPS

Delete subsection 2.4.A of the standard in its entirety and replace with the following:

A. Corporation Valves shall be 1" Ford Ball Corp. W/ "CC" Thread Inlet and Grip Joint Outlet for IPS PE Pipe (Ford FB1001-4-G) or an approved equal.

2.6 CURB STOPS

Delete subsections 2.6.A and 2.6.B of the standard in their entirety and replace with the following:

A. Curb stops shall be Ford Ball Curb, Minneapolis Pattern w/ Grip Joints Both Ends for IPS PE Pipe (Ford B66-444M-G), or an approved equal.

2.7 CURB BOXES

Delete subsections 2.7.A and 2.7.B of the standard in their entirety and replace with the following:

A. Curb boxes shall be Ford, or an approved equal, cast iron extension type with Minneapolis Style Thread, 1 ¼" I.D. upper section, minimum length 6 ½ feet, with a shut off and/or lid having a pentagon nut in the plug.

2.8 VALVES

Delete subsection 2.8.A of the standard in its entirety and replace with the following:

A. Gate Valves

1. Unless designated otherwise, valves 12 inches in diameter or smaller will be gate valves. Furnish resilient seat gate valves with non-rising stems with design, construction, and pressure rating meeting AWWA C509 and the following requirements.

2. Assure stem seals are double “O” ring seals capable of replacing the seal above the stem collar with the valve under pressure in full-open position.

3. Furnish gate valves for underground installation equipped with a 2-inch square operating nut for key operation. All valves to open counterclockwise. Valves to be equipped with mechanical joints for pipe connections.

4. Furnish resilient seat gate valves as manufactured by Mueller or equal as approved by Owner.

Delete subsection 2.8.B.7 of the standard in its entirety and replace with the following:

A. Butterfly valves shall be Class 250B Mueller Lineseal Butterfly Valves, or an approved equal, conforming to AWWA C-504 Standards.

2.9 VALVE BOXES

Delete subsection 2.9.A of the standard in its entirety and replace with the following:

A. Valve boxes shall be Tyler 6860 Series “DD” – Screw Type, #6 Base to be marked “WATER.”

B. Extensions with centering donut shall be provided and installed for valves on mains with more than seven (7) feet of bury depth.

2.10 FIRE HYDRANTS

Delete subsection 2.10.B of the standard in its entirety and replace with the following:

A. Fire hydrants shall be Red Mueller Super Centurion 250 Fire Hydrants (5–1/4“, 3-way) conforming to AWWA C-502 Standards.

Add the following immediately after subsection 2.16:

2.17 METER PITS

A. For services up to 1 – inch, furnish:

1. Mueller Thermo-coil meter pit with side-locking composite lids and insulation pads (Part No. ###CS##72FS#SN).

2. Furnish Mueller EZ Vault or approved equal for 1.5-inch and 2-inch services, with dual check valve and composite side-locking lid. Meter shall be within 18-inches of the finished surface (Part No. ###VS##72FB#N).

2.18 SERVICE SADDLES

A. Service saddles shall be Romac model 306, stainless steel, with CC Threads, (1”– 12”), or an approved equal. No single or double strap type is allowed on PVC pipe.

2.19 SERVICE FITTINGS

A. Service Fittings shall be Ford Ultra-Tite compression fittings or approved equal.

B. Stainless steel inserts must be used with all compression type fittings when used with polyethylene pipe, as recommended by the manufacturer.

2.20 MECHANICAL JOINT RESTRAINTS

A. Shall be Megalug or approved equal.

B. Bolts for mechanical joint restraints shall be Cor-Blue.

2.21 TONER WIRE

A. Shall be 12-gauge HDPE or HMWPE insulated solid core.

B. Shall be approved for direct bury.

2.22 WARNING TAPE

A. Shall be a minimum of 5 mils thick.

B. Shall be 3 inches wide.

C. Shall conform to APWA colors.

2.23 MARKER POSTS

A. Shall be APWA compliant Rhino TriView or an approved equal.

PART 3 EXECUTION

3.4 TESTING, CLEANING & DISINFECTING WATER MAINS, VALVES & FITTINGS

Delete subsection 3.4.A.4 in its entirety and replace with the following:

4. Conduct the leakage test concurrently with the pressure test for 2 hours. Leakage is defined as the quantity of water supplied into the pipe, or any valved section thereof, necessary to maintain pressure within 0 psi of the pressure test after the pipe has been filled with water and purged of air.

Delete subsection 3.4.C.3 in its entirety and replace with the following:

3. Method of Chlorination

    a. The continuous feed method gives a 24-hour chlorine residual of not less than 25 parts per million (25 mg/L) free chlorine.

        i. Continuous Feed Method

            1. Before chlorinating, fill the main with water to eliminate air pockets and flush as specified above.

            2. Use water from the existing distribution system or other approved source of supply to flow at a constant, measured rate into the newly laid water main. At a point not more than 10 feet (3 m) downstream from the beginning of the new main, assure water entering the new main receives a dose of chlorine fed at a constant rate such that the water will have at least 50 parts per million (50 mg/L) free chlorine. To assure that this concentration is provided, measure the chlorine concentration at regular intervals.

            3. Appendix B provides information on the amounts of chlorine compound required for various pipe sizes.

            4. During chlorine application, position valves so that the chlorine solution in the main being treated does not flow into water mains in active service. Do not stop chlorine application until the entire main is filled with chlorinated water. Retain the chlorinated water in the main for at least 24 hours, operating all valves and hydrants in the section treated to disinfect the appurtenances. At the end of the 24-hour period, the treated water in all portions of the main must have a minimum free

chlorine residual of 25 parts per million (25 mg/L).

Add the following immediately after subsection 3.4.C.4.a:

b. After the appliable retention period, heavily chlorinated water should not remain in prolonged contact with the pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing the system or is acceptable for domestic use.

c. Heavily chlorinated water flushed from the mains shall not be placed in storm sewer or sanitary sewer and shall be disposed of per DEQ Standards.

    1. Flush main into a water truck with appropriate backflow prevention air gap and dispose of chlorinated water in environmentally friendly matter.

Delete subsection 3.4.D.1 of the standard in its entirety and replace it with the following:

1. After final flushing and before the water main is placed in service, test a sample, or samples, collected from the main(s) for turbidity and organisms. Collect at least one sample from the new main and one from each branch at a maximum of 500-foot intervals. Collect the samples and have the tests performed at an approved laboratory.

    a. Two sets of tests shall be completed for every sample point:

        1. One sample set shall be collected directly following final flushing.

            i. The Contractor shall provide all sample bottles and appurtenances necessary to take samples.

            ii. The Contractor shall collect sample(s) and mark the sample bottles.

            iii. The District shall witness sample collection and deliver sample bottles to a certified testing laboratory.

            iv. If the original set of water samples cannot be certified by an approved laboratory as suitable for drinking, the Contractor may submit a second set. If a sample from the second set proves to be contaminated, the water main must be re-chlorinated. Whenever the main is flushed prior to sampling, a waiting period of not less than five (5) days will be observed before samples are taken.

            v. The Contractor shall pay for all costs associated with sample tests, including District personnel costs for repeated tests due to

test failure or District personnel costs for any tests performed outside normal working hours. Normal working hours are (Mon – Fri 8:00 am – 5:00 pm).

b. After passing results of the first test are received, but no sooner than 24 hours following final flushing, the contractor shall take a second sample from the same location(s) as the first sample set.

c. Sample procedure shall be the same as those in Section 3.4.D.1.a.1, above.

d. After passing results have been delivered to and approved by the Owner, the new water main may be placed in service.

END OF SECTION

APPENDIX C

MODIFICATIONS TO MPWSS 02730 SANITARY SEWER COLLECTION SYSTEMS

BIGFORK COUNTY WATER AND SEWER DISTRICT
MODIFICATIONS TO MPWSS 02730
SANITARY SEWER COLLECTION SYSTEMS

PART 1 GENERAL

1.0 STANDARD SPECIFICATION

A. All applicable portions of the specification SECTION 02730 in the Montana Public Works Standard Specifications, Seventh Edition – April 2021 shall apply with the following additions, deletions, and/or modifications.

1.4 STANDARD DRAWINGS

Delete subsection 1.4.A of the standard in its entirety and replace with the following:

A. Standard drawings from Appendix A and the Bigfork Water and Sewer District Standards for Design and Construction applicable to this section are as follows:

1. G-1 – General Notes
2. G-2 – Typical Utility Trench Section Detail
3. G-3 – Typical Underground Marker Post
4. G-4 – Concrete Collar Details
5. G-5 – Water Main and Sewer Main Separation
6. S-1 – Sewer System Construction Notes
7. S-2 – Typical Manhole Channel Detail
8. S-3 – Sanitary Sewer Manhole Detail
9. S-4 –Typical Sanitary Sewer Service
10. S-5 –Typical Sanitary Sewer Manhole Marker Post
11. S-6 –Typical Forcemain Valve Section Detail
12. S-7 –Forcemain Discharge Manhole Detail
13. PT-1 –Typical Precast Concrete Exterior Grease Interceptor
14. PT-2 –Interior Grease Interceptor
15. PT-3 –Sample Port Design
16. PT-4 –Typical Sand, Oil, and Grease Interceptor (SOG)
17. PT-5 –Tee Pipe w/ SS Supports
18. Standard Drawing No. 02720-6 – Precast Manhole Bases
19. Standard Drawing No. 02730-1 – Nomograph for Air Testing Gravity Sewer Mains
20. Standard Drawing No. 02730-3 – Deep Sanitary Sewer Service Line

PART 2 PRODUCTS

2.2 PIPE MATERIALS

Delete subsection 2.2.A.2.a.3) of the standard in its entirety.

Delete subsections 2.2.A.3.a & 2.2.A.3.b in their entirety and replace with the following:

a. Pressure sewer pipe shall be DR11 HDPE for force mains 2 inches or smaller. Pressure sewer pipe shall be DR11 HDPE or DR14 C900 PVC for forece mains larger than 2 inches.

b. Use a nominal laying length of 20 feet, except shorter lengths may be used adjacent to bends or other appurtenances. Assure each pipe length is marked, as a minimum, with size, SDR, pressure rating or both, ASTM designation and manufacturer's name and code.

c. Directionally drilled HDPE shall incorporate engineered expansion and contraction restraints, approved by the District.

d. Service taps shall not be made on pressure sewer pipe.

e. Private pressure sewer mains shall be connected to the sewer collection system at a manhole as shown in the Standard Details. Private pressure sewer services shall be connected to gravity sewer services at the public right-of-way or easement.

f. Toner wire shall meet the same requirements as for water main, except pressure sewer main burst through existing mains or installed without continuous trench access shall be installed with 8-gauge, hard-drawn, high-carbon 1055 grade steel core, extra high-strength copper clad conductor (EHS-CCS), and insulated with 45 mil, high-density polyethylene (HDPE). The wire shall have a conductivity rating greater than 21 percent and a break load of greater than 2,500 pounds.

Delete subsection 2.2.B, 2.2.C, and 2.2.D of the standard in their entirety.

2.3 – MANHOLES

Add the following subsection directly following subsection 2.3.E:

F. Joint Seal

1. Furnish nine (9) inch minimum width exterior rubberized joint seals:

    a. Infi-Shield Gator Wrap
    b. Press-Seal EZ-WRAP

c. MacWrap
d. Riser-Wrap™
e. Equal product as approved by the District.

G. Chimney Seal:

1. Furnish one of the following acceptable chimney seals:

a. Whirly Gig Manhole Collar System
b. Cretex External Chimney Seal
c. Equal system as approved by the District.

H. Flexible Gasketed Joint

1. Furnish flexible gasketed joints for all pipe connections.

PART 3 EXECUTION

3.4 TESTS

Delete subsections 3.4.G.1, 3.4.G.2, and 3.4.G.3 in their entirety and replace with the following:

G. T.V. Inspection

1. All sanitary sewer mains shall be inspected using a television camera before final acceptance.

2. A sanitary sewer main is defective and unacceptable if:

a. the alignment is outside the specified limits;

b. Gravel, sediment, or other construction debris is visible in the pipe;

c. water ponding in any section is equal to or greater than 2 times the grade tolerance specified herein under Section 02730.3.1.E.1; or

d. the pipe has visible defects such as open joints, pinched gaskets, cracked barrels or bells or similar defects.

3. Perform the T.V. Inspection within 30-minutes of flushing the main. When flushing the main, add water at the upstream end of the main and do not stop adding water until water begins to flow out of the downstream end of the main.

4. Equip the camera with a visual measuring device capable of measuring ponding in the pipe to the level specified in part 2.b above.

5. Record all television inspections in a format acceptable to the District. Pull the camera through the sewer at 30 feet per minute maximum. If the camera is pulled by attaching to the hose of a hydraulic sewer cleaner, assure the hose is not active during the pulling process.

6. All main deemed by the Engineer as defective or unacceptable shall have repeated T.V. inspections completed by the Contractor until accepted by the Engineer.

Add the following subsection directly following subsection 3.4.J:

K. Manhole Testing

1. Perform vacuum tests on new manholes in accordance with the procedures described in ASTM C1244. Special caution should be exercised for manholes partially submerged in groundwater. If manhole pipe gaskets are not rated adequately for the vacuum plus groundwater pressure, the water test described in Section 3.4 D must be utilized.

END OF SECTION