



TOWN OF HUNTERTOWN ALLEN COUNTY, INDIANA STANDARDS AND SPECIFICATIONS

15617 Lima Road – P.O. Box 95
Huntertown, Indiana 46748

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**TOWN OF HUNTERTOWN
ALLEN COUNTY, INDIANA
STANDARDS AND SPECIFICATIONS**

REFERENCE NUMBERS

<u>Department</u>	<u>Number</u>	<u>Contact</u>	<u>Position</u>
Call Before You Dig	800-382-5544		
Emergency	911		
Clerk - Treasurer	260-637-5058		Clerk -Treasurer
Utilities	260-637-5058		Town Manager

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PART 1 - GENERAL REQUIREMENTS

1.1 General Procedures

- A. To promote consistency and uniformity in developments within the Town of Huntertown ("Town") and for developments outside of the Town for which interconnection to the Huntertown Utilities will be requested, the following procedures shall be followed:
- B. All applications for commercial, industrial, and residential plats and development plans shall be submitted to the Allen County Department of Planning ("DPS") and meet the ordinance standards of Huntertown as administered by DPS, or its successors. The Town will review and comment on all commercial, industrial, and planned residential projects, and issue a letter of comment to DPS. The Town will also review the projects for compliance with adopted standards of construction and use of material.
- C. The Town of Huntertown may authorize deviations from these standards and specifications upon written request from a Contractor / Property Owner / Developer.
- D. The Contractor / Developer shall conduct a preliminary meeting with the Town to conceptually review project scope. The Developer or Contractor shall submit construction drawings for a plat or development plan to the Town for review and approval prior to any approval by the Allen County Area Plan Commission. Requests for variances shall be submitted in writing to the Town.
- E. Details in the construction drawings prepared shall adhere to applicable standards, provisions, restrictions, rules, and conditions set forth in the Standards and Specifications for the Town of Huntertown.
- F. No work may begin until an approved application or executed contract is on file with the Town, all permits are in place, all permitting fees have been paid.

1.2 Plan Review

- A. All improvements must be reviewed and approved by the Huntertown Town Council, Utility Service Board, and Superintendent of Utilities or their designated representatives (Town Engineer, Allen County Highway Department, Allen County Surveyor's Office, or any other Town-designated reviewer). See the Huntertown application for water and sewer service available at the Town Hall for detailed application requirements and review procedures.
- B. There will be no prior approvals by the Town. However, pre-application for new projects for review by DPS pursuant to Allen County Code 4-1-3-2 is encouraged.

1.3 References and Standards

- A. Huntertown has adopted and is subject to the following ordinances and standards by reference;
 - 1. Huntertown Zoning Ordinance
 - 2. Huntertown Comprehensive Plan

3. Allen County Code Title 5 Highway Department, Article 2 General and Detailed Specifications for Highway Work
 4. Allen County Code Title 5 Highway Department, Article 2 Standard Plans
 5. Fort Wayne-New Haven-Allen County Access Standards Manual, latest edition.
 6. Allen County, Indiana, Storm Water Ordinance.
 7. Allen County, Indiana, Stormwater Technical Standards Manual, latest edition.
 8. 327 IAC Article 3 Wastewater Treatment Facilities; Issuance of Permits; Construction and Permit Requirements.
 9. 327 IAC Article 8 Public Water Supply.
- B. If there are conflicts between the Huntertown Standards and Specifications and the County ordinances, then the more stringent standards, provisions, restrictions, rules and conditions shall be controlling.

1.4 **Subdivision Control**

- A. In addition to Huntertown Code of Ordinances Chapter 154, the following applies.
- B. In order to make the most of the opportunities related to the subdivision and to conserve time, effort and expense, the Owner or Subdivider shall consult with the County Plan Commission and other public officials prior to the preparation of the tentative plan of the subdivision. The Comprehensive Plan should be reviewed to determine how the proposed plan will fit into the Comprehensive Plan. Requirements of the highway plan; school and recreational sites; shopping centers; community facilities; sanitation; water supply and drainage; and relationship to other developments, existing and proposed in the vicinity, should be determined in advance of the subdivision plan. A thorough estimate of the situation will result in sound decisions with respect to the form, character and extent of the proposed subdivision. No land shall be subdivided for residential use unless adequate access to the land over improved streets or thoroughfares exists or will be provided by the Subdivider, or if such land is considered by the Commission to be unsuitable for such use by reason of flooding or improper drainage.
- C. **Markers**
1. The intersection of all boundary lines at the exterior boundaries of a plat shall be marked by a galvanized or wrought iron pipe or iron or steel bar at least two feet in length and not less than one inch in diameter. Such markers shall be set so that the center of the marker will coincide exactly with the intersection of the lot or property lines at that point and shall be set so that the top of the marker is level with the surface of the surrounding ground.
- D. **Streets**
1. Streets according to the type designated in the thoroughfare plan, shall be improved to the minimum widths specified in Allen County Code Title 5 Article 2-3-2.
- E. **Review, Approval, Inspection and Acceptance Requirements**
1. Any Developer of a new subdivision presenting to the Town Council of the Town of Huntertown a plat that is to be submitted to the Allen County Plan Commission, or a property owner petitioning for the extension of an existing sewage collection sewer, water distribution main, or storm sewer shall be subject to the following provisions:
 2. Submittals, review and approval.

- a. Submittal of three sets of drawings and specification for the proposed sanitary sewers, water distribution main or storm sewers and appurtenances shall be prepared and signed by a professional engineer licensed in the State of Indiana. These drawings and specifications are to be reviewed by the Town's Engineer and staff with regards to compliance with the Huntertown "Standards and Specifications," latest revision, operational considerations, downstream sanitary sewer capacity, downstream sewage pump station(s) capacity, and water system capacity. The plans are to be reviewed by the Allen County Highway Department for street infrastructure and the Allen County Surveyor's Office for storm infrastructure and downstream storm sewer capacity.
 - b. Submittal to and approval by the IDEM including the issuance of an IDEM construction permit in accordance with 327 IAC Article 3 for the sanitary sewers and 327 IAC Article 8 for water distribution mains.
 - c. Preparation and receipt of all county, IDNR, INDOT, IDEM Rule 5 and other applicable permits as well as payment of all fees associated therewith.
 - d. The payment of all construction costs associated with the design, permitting, installation and testing of sanitary sewers and appurtenances, water distribution mains, and storm sewers shall be the responsibility of the Developer unless the Town requests changes which will benefit future users and are not required to serve the Developers' or property owners' need, in which case the request and appropriate allocation shall be memorialized by contract or resolution. In addition, the Developer will be responsible for all costs associated with downstream improvements deemed necessary to receive and convey the proposed wastewater or storm water flows in a safe, reliable and efficient manner or water distribution main improvements to serve the area.
 - e. Approvals shall be subject to applicable Town policies, resolutions and ordinances regarding the allocation and use of available capacity for development.
 - f. Payment of an "area connection fee," if any, and tap connection fees for each equivalent single-family dwelling unit for each new structure to be connected to the sanitary sewer system or water distribution system shall be paid upon connection to the system. The monthly user fee shall commence at the time of connection of each structure to the system. Area connection, tap connection and user fees shall be as per Town ordinances regarding rates and charges.
3. Inspection of work.
- a. All water mains, sewers, and appurtenances are to be installed and tested at the total expense of the Developer or property owners in accordance with the project specifications, the Town specifications and the IDEM construction permit.
 - b. Inspection fees incurred by the Town shall be billed to the Developer at the Town's and/or inspection firm's rate.
 - c. During the installation of all sanitary sewers, water distribution mains or storm sewers and appurtenances, a Town inspector must be present or aware of the work being done at all times. The Developer shall notify the Town's inspector 48 hours in advance of commencing any construction. At no time shall sewer or water main construction take place without the presence or knowledge of a Town representative.
 - d. The Town of Huntertown shall be present for any tapping / connection to Huntertown's infrastructure. The Contractor shall call in for tap inspections on both sanitary sewer laterals and water services from the main to the house or

business. Call for the service inspection twenty four (24) hours in advance of your inspection needs.

- e. Tap inspections: No trench shall be backfilled until the service has been inspected. Trenches found backfilled and not inspected shall be re-excavated. An occupancy permit shall not be granted without a documented acceptable water and sewer service inspection.
 - f. The Town may order the uncovering and re-examination of questioned work. If so ordered, the Developer shall be responsible for the cost of re-examination and/or replacement.
4. Acceptance and dedication.
- a. All new sewers, water mains and appurtenances shall become the property of the Town and the Developer will not be permitted to seek a reimbursable amount from the Town or any party making future extensions or connections to these sewers and appurtenances.
 - b. Final acceptance of new sewers, water mains and appurtenances will not be made until the Developer has completed to the satisfaction of the Town the following:
 - 1) All testing of sewers, water mains and appurtenances installed in accordance with the project specifications, the Town specifications and the IDEM construction permit.
 - 2) Repair and/or replacement of all work found to be inadequate or defective.
 - 3) Preparation and submittal of two sets of record as-built drawings, including the results of all testing.
 - 4) Restoration of all properties and/or utilities disturbed during construction.
 - 5) Payment of any outstanding fees or charges imposed by the Town.
 - 6) Provided Town with a maintenance bond in an amount and with a surety acceptable to Town for a period of one year from acceptance.
 - 7) Provided Town with documentation that all sewers, water mains and appurtenances are located within easements or rights-of-way dedicated to the Town.
 - c. **Final acceptance of sewers, water mains and appurtenances shall not relieve the Developer of responsibility for faulty workmanship, materials or design. The Developer shall remedy any defects that appear within a period of one year from the date of acceptance by the Town.**
 - d. The Developer shall convey ownership of all sanitary sewers, water distribution mains, storm sewers easements and warranties to the Town through preparation of dedication documents as provided or approved by the Town.
5. Service tap permits and installation.
- a. A service tap permit shall be obtained by the Developer, property or building owner prior to connecting any dwelling to the system. All applicable inspection fees, as established by Town ordinances and/or standards, shall be paid in full prior to issuance of a service tap permit.
 - b. All service tap connections and building sewer and water installations shall be installed in accordance with Town specifications and ordinances.
 - c. All service tap connections and building sewer installations shall be inspected and approved by a Town inspector prior to backfilling.

F. Storm Sewers

1. An adequate storm water system with surface inlets shall be installed by the Developer / Subdivider. The plans for the drainage of the subdivision showing topography, direction of flow, size, location, material, profiles and all connections thereto, shall meet the requirements of and be approved by the County Surveyor.

G. **Street Signs**

1. Standard county street signs shall be provided and installed by the Subdivider or Developer at all street intersections, at the direction of the County Plan Commission and the Allen County Highway Department. The Subdivider or Developer may provide alternative street signs only with the written approval of the Town and the Department of Planning Services.

1.5 **Existing Utilities**

- A. The location of existing utilities as shown in Town records or any Town utility Contract Documents are approximate and are to be verified by the Contractor, prior to initiation of construction. The Contractor is responsible to provide notice of work to utilities and request utility locates prior to construction, allowing sufficient time for respective utility companies to mark the underground utilities prior to construction. The telephone number for utility locates is 811 or 1-800-382-5544. Minor relocations of the mains will be possible with written permission of Town and Utility.
- B. Various underground conduits, and other structures are shown on the drawings, as marked or taken from the records of the respective utilities, but other structures not shown on the drawings may be encountered. The Contractor is responsible to protect existing utilities. The Contractor shall be held responsible for the repair of all facilities broken or otherwise damaged.
- C. The Contractor shall notify the Town if a conflict exists and wait for instruction prior to construction or any rework will be at the Contractor's expense. Documentation of field verification shall be submitted to the Town prior to commencing Work.

1.6 **Permits for Construction**

- A. All permits for construction shall be the complete responsibility of the Contractor, unless noted otherwise. The Contractor will be responsible for complying with all conditions of all permits including the payment of any and all special bonding or inspection charges emanating there from, unless noted otherwise.

1.7 **Protection of the Work**

- A. The Contractor shall take all necessary precautionary measures as may be required to prevent damage to the work. Contractor is also responsible for storage of the material, waste containment bins and the furnishing and maintaining barricades, flares, and flagmen. Any damage caused by the lack of proper caution on the part of the Contractor shall be repaired or replaced to original or better condition at no cost to the Town.

1.8 Shop Drawings

- A. Provide the Town with six (6) copies of the shop drawings for all components of the proposed system prior to construction, as set out in these specifications. Shop drawings shall be approved by the Design Engineer prior to submitting to the Town.
- B. Should the Contractor fail to provide shop drawings prior to construction, the system will not be accepted by the Town and no wastewater from the system will be accepted.

1.9 Inspection

- A. All materials furnished by the Contractor are subject, at the discretion of the Town, to inspection and approval at the plant of the manufacturer.
- B. All pipe and appurtenances shall be laid, jointed and tested for defects and leakage in the manner specified and in the presence of and as approved by the Town / Engineer Representative.
- C. The Town shall be present for any tapping / connection to Hometown's infrastructure. The Contractor shall call in for tap inspections on both sanitary sewer laterals and water services from the main to the house or business. Call for the service inspection twenty-four (24) hours in advance of your inspection needs or provide notification to an individual in Town's main office during normal business hours.
- D. Copies of the Contractor's construction documents shall be made available to the Superintendent or his authorized representative.
- E. Tap inspections: No trench shall be backfilled until the service has been inspected. Trenches found backfilled and not inspected shall be re-excavated. An occupancy permit shall not be granted without a documented acceptable water and sewer service inspection.
- F. Inspection Fees: All inspection fees shall be paid for by the Owner / Developer / Contractor. The Owner / Developer / Contractor will be responsible to compensate Town for inspection provided by Town. Additional compensation will be required for any inspection considered "overtime". "Overtime" includes but is not limited to, working before or after Town's normal operation hours, holidays, or weekends.

1.10 Equipment Manuals

- A. The Contractor shall furnish three (3) sets of equipment manufacturer's operation and maintenance materials and manuals for inclusion in the Operation and Maintenance Manual. The O & M Manual must include the manufacturer's manuals and sources of service and parts.
- B. The material furnished under this sub-section shall not necessarily be considered a part of the Shop Drawing requirements as set in the General Conditions.
- C. A printed legible and bound operation and maintenance manual shall be provided for every mechanical and electrical equipment item, i.e. lift stations, generators, grinder stations, water

booster stations, etc. The manuals shall be furnished to the Engineer prior to the time at which construction is 50% complete.

1.11 **As-Built Drawings**

- A. Within ninety (90) days after satisfactory completion of the Work and prior to acceptance of public infrastructure, the Engineer or Developer shall furnish to the Owner two sets of ("As-Built") Record Drawings.
- B. Said drawings shall note all deviations from the original design and include location and elevation of all water mains, hydrants, valves, sewers, manholes, taps, services, field tiles, utility lines, etc. placed in the Work or encountered during construction.
- C. Record drawings submittal shall include certification that all parts of the water or wastewater system to be maintained by the Town lie within dedicated utility easements.
- D. Contractor shall also provide a type written listing of each sewer tap or water service referenced to each lot number or street address. The tap or service line shall be dimensioned from property corners, manholes, fire hydrants, or other in-field locatable reference points. Sewer tap logs shall include depth of tap at the main, as well as, at the property line. Contractor shall record tap location on the main.
- E. Submittal:
 - 1. The prints and electronic file shall include, but not be limited to the following:
 - a. Property Boundary/Lot Lines with Street Names, Address, Building Line, and Easements OR Plat with Street Names, Lot Numbers, Addresses, Boundary, Lot Lines, Building Lines, and Easements (If Applicable)
 - b. Elevation information shall be provided relative to Project Benchmark
 - c. Plan Sheets:
 - 1) Location of Branches, Valves, and Structures Tied to Physical Features
 - 2) Utility Centerline Tied to Physical Features
 - 3) Line Designations and Branch Line Designations
 - 4) Sewer Flow Direction Arrows
 - 5) Utility Line Lengths, Sizes, and Material Type
 - 6) Indicate any Portions Installed by Directional Drilling Method
 - d. Profile Sheets:
 - 1) Finished Grade above Sewer Line
 - 2) Location of Branches, Water Taps, Sewer Taps, Valves, and Structures
 - 3) Utility Lengths, Sizes, and Material Type
 - 4) Indicate any Portions Installed by Directional Drilling Method
 - 5) Elevations of Key Elements of Profile, including but not limited to:
 - a) Pressure Water or Sewer Line
 - b) Gravity Sewer
 - c) Invert(s) at Manhole(s)
 - d) Top of Casting(s)
 - e) Low Pressure Sewer
 - f) Invert(s) at Air Release Valve(s)
 - g) Low Point(s) in Line

- h) High Point(s) in Line
 - i) Intervals not more than 50 Feet
 - j) Information for Pipe Installed by Directional Drilling Method shall be provided at Intervals of not more than 50 Feet
- 6) Grade of Gravity and/or Directional Drilled Pipe

PART 2 - STREET DESIGN STANDARDS

2.1 Allen County Standards & Specifications

- A. For all public street and alley and all access driveway work in the Town of Huntertown, the following standards are incorporated by reference:
 - 1. Allen County Code Title 5 Highway Department, Article 2 General and Detailed Specifications for Highway Work
 - 2. Allen County Code Title 5 Highway Department, Article 2 Standard Plans
 - 3. Fort Wayne-New Haven-Allen County Access Standards Manual, latest edition.

2.2 Pavement Cross Sections

- A. In addition to the requirements of the Allen County Highway Department, all concrete pavements shall be placed over 6" of compacted INDOT #53 aggregate.
- B. Deep strength asphalt installations per Allen County standards will be permitted only with express written permission of Town.
- C. "HAC" asphalt mixes referenced in the Allen County standards shall be replaced with corresponding "HMA" mixes in accordance with INDOT specifications as directed by the Town.
- D. Underdrains corresponding to INDOT standards shall be provided for all new construction unless approved otherwise in writing by the Town.

2.3 Utility Locations in Right of Way

- A. Utilities shall be located in right of way as directed by the Town.

2.4 Curb Ramps & Detectable Warnings

- A. Sidewalks, curb ramps, and detectable warnings for accessible sidewalks and pedestrian access routes shall comply with the Public Rights of Way Accessibility Guidelines (PROWAG), latest edition, and with the Indiana Department of Transportation (INDOT) Standard Specifications Section 604 and Standard Drawings E-604-SDWK and E-604-SWCR series.
- B. Detectable warnings shall be brick, cast iron, cast in composite polymer, or alternative material per the requirements of INDOT Standard Specifications Section 905.05. Detectable warnings shall be constructed using materials from the INDOT approved list of Detectable Warning Elements maintained by the INDOT Office of Materials Management.

2.5 Dedications and Bonds

- A. Dedications and acceptance of streets and rights of way shall comply with Town ordinances and standard procedures. Bonds shall meet all Town policies.

2.6 Street Lighting and Maintenance

- A. All street lighting shall be in accordance with County standards.

- B. Maintenance of street lighting shall be by the Developer, Business Owner, or the Community Association as applicable.

PART 3 - STORMWATER DESIGN STANDARDS

3.1 Allen County Standards & Specifications

- A. For all stormwater drainage and storm infrastructure work in the Town of Huntertown, the following standards are incorporated by reference:
 - 1. Allen County, Indiana, Stormwater Technical Standards Manual, latest edition.
 - 2. Allen County, Indiana, Stormwater Ordinance.

3.2 Cover Requirements

- A. Storm sewers: Per Allen County Standards

3.3 Sump Pump Discharges

- A. Sump pump discharges to a sanitary sewer system are prohibited. Sump pump discharges must connect to the storm system or discharge over ground, but not across adjoining property. Sump pump discharges are prohibited within the public right of way.

PART 4 - WATER DESIGN STANDARDS

4.1 Basis of Design

- A. All mains shall be sized large enough to provide for maximum daily demand plus fire protection flows to the respective project areas. The Town reserves the right to oversize mains to provide service for future needs.
- B. Sound engineering judgment shall be utilized when determining locations for water mains. The locations must adhere to the water main extension policy. Existing easements and rights-of-way shall be utilized if at all possible. Service needs of both the present service area and future service areas should be thoroughly evaluated.

4.2 Quality Assurance

- A. Regulatory Requirements:
 - 1. Comply with requirements and recommendations of authorities having jurisdiction over the Work, including.
 - a. Indiana Title 327 Water Pollution Control Division
 - b. Indiana Department of Environmental Management

4.3 Design Criteria

- A. General: Sound engineering judgment should be employed when designing water distribution systems. The following sections outline specific design requirements and considerations.
- B. Pressure & Flowrate: All potable water distribution system projects shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under maximum daily demand plus fire flow demand. In addition, all distribution systems shall be designed to maintain a minimum static (no flow) pressure of 35 psi.
- C. Design Demand: Water mains shall be designed to provide for the Design Demand in accordance with 327 IAC 8-3.3.
- D. Fire flow is the fire protection demand based upon the type of construction, size, number of floors, type of occupancy and exposure of the structures.
 - 1. Residential-In the case of residential areas, water mains shall be designed to provide a minimum fire flow demand of 1,000 gpm at the most remote fire hydrant in the project area.
 - 2. Commercial and Industrial-Commercial and industrial demand rates will be dependent on the type of facility constructed. These flows will need to be evaluated on a case-by-case basis taking specific facility activity into account. Information from the I.S.O. "Guide for Determination of Required Fire Flow" can provide guidance. Generally, commercial areas range from 1,500 -2,500 gpm and industrial areas range from 2,000-3,500 gpm. In the absence of other information, the high end of the above ranges shall be utilized.
 - 3. Above typical fire flow rates desired by individual facilities may not be possible without private, on-site fire hydrants, water storage tanks, and fire pumping facilities. The Town shall be consulted early in the design process to evaluate.

4.4 **Hydraulic Calculations**

- A. Hydraulic calculations that demonstrate the adequacy of design must be submitted with each proposed project. The calculations must be consistent with the requirements for calculations and shall address the existing conditions and translation of the flow test results as well as the determination of the changes in these conditions along existing water mains. The calculations must demonstrate that the proposed design meets required performance criteria at all most remote points in the proposed potable water distribution system.
- B. Hydraulic calculations completed for distribution system design must be reproducible using the Hazen-Williams equation. Commercial programs may be utilized to compute distribution system hydraulic calculations but if requested by the Town must be reproduced utilizing Hazen-Williams related equations.
- C. Flow testing results, provided by the Town, representative to each of the points of connection of the proposed project are required to base the design of the proposed project and determine the adequacy of the system to handle anticipated demands.
- D. The flow test pressure hydrant will likely not be the point of connection for the proposed water main. As such, the effect of the existing water mains between the pressure hydrant and the proposed point of connection must be determined. These effects are calculated by minor losses (if required), friction losses, and changes in elevation. Changes in elevation must address both the elevation of the pressure hydrant and the point(s) of connection.

4.5 **General Location Requirements**

- A. All public mains shall be located in the middle of their associated easement unless authorized otherwise by the Town.
- B. Water mains are preferred to cross other utility conduits, highways, and railroads at 90 degree (90°) angles. The minimum angle of intersection between any water main and sanitary or storm sewer should be 45 degrees (45°).
- C. Hydrant Spacing: Fire hydrants should be located at every major intersection and shall not exceed average spacing intervals of 500 feet (500') in residential areas, 400 feet (400') in commercial areas, and 350 feet (350') in industrial or other higher risk areas. In addition, commercial and industrial areas may require on-site "private" hydrants under the direction of the developer or owner. Flushing devices consisting of fire hydrants or blow-off assemblies shall be placed at permanent or temporary end points of water mains. Fire hydrants are the preferred method of ending a main.
- D. Structures located outside the roadway shall be adjusted to final grade by the Owner / Builder / Developer.
- E. Under no circumstances will a structure (valve box, curb box, hydrant, etc.) be allowed to be in the driveway or sidewalk.
 - 1. All Curb Boxes shall be located at the right-of way or property side of the easement, whichever is greater.

2. Where fire hydrant must be located in a paved area provide a minimum of 5-foot by 5-foot concrete block-out, with expansion joints on all sides.
 3. Valves shall be placed on two sides of a tee, with one placed on the dead end line.
- F. Water services shall be located at the corner of the property unless authorized differently by the Town. Provide 10' clearance to sewer mains and laterals.

4.6 Cover Requirements:

- A. Water mains and water services equal to or greater than 2 inch diameter: 5 feet minimum.
- B. Water services smaller than 2 inch diameter: 4.5 feet minimum.
- C. No water line shall be installed at a depth of greater than seven feet (7') of cover to top of pipe unless approved by Town on project specific basis.
- D. In order to verify potential utility conflicts and cover requirements, a profile of the water main will be required for all proposed water main extensions.

4.7 Pipe Materials

- A. Water mains shall be ductile iron, PVC, or HDPE pressure piping per the Materials specification.
- B. HDPE may only be used where it will not be tapped in the future. Use is limited to force mains, directionally drilled water and sewer, and water services 2" and smaller.
- C. Water service piping two inch diameter and smaller shall be HDPE DR 9, Type K Copper, or SDR 21 PVC per the Materials specification. No other water service piping material permitted for services two inch diameter and smaller without the written permission of the Town. Larger services shall utilize water main materials.

4.8 Water Service Connections

- A. Service taps on a water main shall include the saddle, corporation stop, service line, curb stop and box, and reconnection to existing service if applicable. The curb stop shall include a cast iron curb box with lid marked water.
- B. Owner / Builder / Developer is responsible for supplying and installing all materials necessary to make a water tap.
- C. Trenchless Service Connections: Install pipe under street and highway pavements by pushing or boring in accordance with the Directional Drilling requirements of these Specifications.
- D. All taps and services shall be inspected by the Town prior to covering.
- E. All services that are extended to vacant lots shall be clearly marked at the termination point for future reference and extend a minimum of 24" above grade.
- F. Water Meter

1. All water meters shall match the service piping size unless approved otherwise by the Town in writing.
 2. Water meters shall be installed at the same time as the water service. If not, the service will remain shut off at the curb box.
 3. Owner / Builder is responsible for rough in for the water meter. The plumber shall obtain a water meter coupler from the Town and install during rough in. A Town employee will install the meter.
 4. All water services are required to have a bronze ball valve with full port design for unrestricted flow installed on both upstream and downstream sides of the water meter. If a valve is not installed on both sides of the meter, the water will not be turned on. See Town Standard Detail.
 5. All water services are required to have a tee and cap placed after ball valve on upstream side for future irrigation installation.
 6. All water meters shall be readily accessible to the meter reader / repairman.
 7. If the water meter is installed in the garage, provisions shall be made to protect it from freezing.
- G. In no case, shall the water be turned on to building without a water meter or the approval of the Town.
- H. Large Service Connections (Larger than 2 Inch) on New Mainline
1. Install tee compatible with the mainline material.
 2. Install a standard gate valve and valve box.
- I. Large Service Connections (Larger than 2 Inch) on Mainlines In Service
1. Install tapping sleeve compatible with the mainline material.
 2. Install a tapping valve and standard valve box.
- 4.9 Pipe Tracer Wire**
- A. Tracer wire shall be required on all water mains and water services.
- B. All service lines shall be installed with tracer wire to the water meter valve in the house as well as to the top of the curb box. Ensure connectivity is maintained between the mainline tracer wire and the service connection tracer wire.
- 4.10 Polyethylene Wrap (Polywrap)**
- A. Polywrap shall be placed on all ductile iron and ductile iron pipe and fittings where the soil survey indicates the presence of corrosive soils, the soils are assumed to be corrosive, or when a soil survey has not been performed.
- 4.11 Valves**
- A. Valves used in water distribution systems shall be resilient seat gate valves unless the valves are not available in a required size. Butterfly valves may be used in water lines of diameters 20-inch and greater.

4.12 **Blow Off Assembly**

- A. Minimum working pressure of 200 psig. Include separate curb valve and restrained joints in supply piping. See Standard Drawings.

4.13 **Testing Requirements**

- A. Provide hydrostatic testing for all water main piping at a test pressure of 150 psi, unless approved otherwise by Town in writing. Unless otherwise specified, required test pressures are at lowest elevation of pipeline segment being tested.
- B. Pressure tests shall conform to the applicable AWWA and ASTM standard.
- C. Disinfect water lines in accordance with IDEM regulations and these Standards & Specifications.

PART 5 - WASTEWATER DESIGN STANDARDS

5.1 Basis of Design

- A. Sound engineering judgment shall be utilized when determining locations for sanitary sewers. Existing easements and rights-of-way shall be utilized if at all possible. Service needs of both the present service area and future service areas should be thoroughly evaluated.

5.2 Quality Assurance

- A. Regulatory Requirements:
 - 1. Comply with requirements and recommendations of authorities having jurisdiction over the Work, including.
 - a. Indiana Title 327 Water Pollution Control Division
 - b. Indiana Department of Environmental Management
- B. At no time shall sources of non-sewage flows be permitted to enter the sewer system. Downspouts, sump pumps, perimeter drains, leaking pipe joints, etc. are strictly forbidden.

5.3 Design Flow

- A. The design flow for each sewer segment within the system shall be determined as follows:
 - 1. Prepare a Sanitary Sewer Service Area Map that defines the areas tributary to each element of the sewer. A Sanitary Sewer Service Area Map will be required for ALL projects unless waived by the Town.
 - 2. Examine each tributary area to determine existing population and future potential land use and equivalent population.
 - 3. Determine the average daily flow based on existing population and future equivalent population.
 - 4. Determine the design peak flow based on average daily flow and the appropriate peaking factor.
- B. In general, sewers shall be designed to accommodate the peak hourly flow within the sewer system.
- C. Design Demand: Water mains shall be designed to provide for the flow rates calculated in accordance with 327 IAC 3-6.

5.4 Design Criteria

- A. Hydraulic Grade Line: The hydraulic grade line for peak flows shall not rise above the crown of the pipe. If velocity entering a manhole is above critical, the hydraulic grade line must be computed to ensure that service connections will not experience surcharging that causes back-ups. In critical instances or when requested by the Town, the hydraulic grade line shall be computed to show its elevation at manholes, transition structures, and junction points. The calculations shall provide for losses at structures and elevation differences. When necessary, the pipe exiting the manhole must be adjusted in elevation to ensure that the energy gradient remains constant across the manhole.

- B. Velocity: The minimum velocity allowed in sanitary sewer pipes under design flow conditions shall be two (2.0) ft/sec. The maximum allowable velocity shall be 15 ft/sec.
- C. Slope: Pipes slopes shall meet the requirements of 327 IAC 3-6-12.
- D. Pipe Size: The minimum allowable inside diameter for sewer pipe, with the exception of building sewer connections, shall be eight inches (8"). All building sewer connections shall have a minimum inside diameter of six inches (6"). Commercial and industrial connections shall be discussed on a case-by-case basis.
- E. Pipe size of a private low pressure force main shall meet the pump manufacturer's recommendations for the system installation. Minimum size of the discharge from the pump station will be 1 1/4 inches. All other proposed sizes must meet a minimum cleansing velocity of two (2) feet per second through the private force main.

5.5 General Location Requirements

- A. All sanitary sewers shall be constructed with a straight alignment between manholes. Where sewer depth is ten feet (10') or less, sewer lines and manholes shall be located a minimum of ten feet (10') horizontally from any part of a building structure or its foundation. For sewer depths greater than ten feet (10'), this minimum distance shall be fifteen feet (15').
- B. The sanitary sewer elevation necessary to serve the entire tributary area shall be considered when designing a sanitary sewer line. This design shall include areas beyond the boundary of a design section.
- C. Basement elevations shall also be taken into account. In instances where only a limited number of houses on the sanitary sewer have existing basement facilities, the overall impact on the entire system shall be considered prior to providing gravity basement service. In areas where the lowest building level to be served by gravity sanitary sewer service is less than one foot (1') above the top of the manhole casting elevation of the first upstream manhole on the public sewer to which the connection is made, the Design Engineer shall design for backflow prevention devices to prevent sanitary sewer backups.
- D. The top of sanitary manholes shall be a minimum of two feet (2') above existing, proposed, or projected 100-year flood elevations. In instances in which this minimum elevation causes the manhole to be above natural ground creating an obstruction, the top of the manhole may be lowered to the natural ground elevation and a watertight manhole lid and frame shall be specified. Approval from the Town is required prior to the lowering of any manhole below the 100-year flood elevations.
- E. Structures located outside the roadway shall be adjusted to final grade by the Owner / Builder / Developer. Manholes shall be marked to 24" above casting elevation.
- F. All public mains shall be located in an easement wide enough to allow future maintenance and access by the Town. The easement shall be no less than 14' wide and the utility shall be no closer than 7' to the edge of the easement. These widths may protrude into the right of way.

- G. Under no circumstances will a structure (manhole, cleanout, valve box, etc.) be allowed to be in the driveway or sidewalk (residential only).

5.6 **Cover Requirements**

- A. Gravity sanitary sewer mains: 4 feet
- B. Gravity sanitary laterals: 3 feet
- C. Sanitary force mains: 5 feet
- D. Unless otherwise shown or approved by Town / Engineer on a project specific basis.

5.7 **Pipe Materials**

- A. Gravity sewer pipe materials shall be SDR-35 PVC per the Materials specification unless approved otherwise in writing by the Town or as depth requires, see 5.7.B.
- B. Allowable PVC materials by depth of cover:
 - 1. SDR35-maximum depth = 18'
 - 2. SDR26-maximum depth = 21'
 - 3. SDR21-maximum depth = 27'
 - 4. Installations deeper than 27', consult Town Engineer.
- C. Force mains shall be PVC or HDPE pressure piping per the Materials specification.
- D. In areas where the required separation distance between water and sewer piping cannot be maintained, the sewer piping may be replaced with Town-approved water main materials in accordance with the Specifications of Construction specification.

5.8 **Manholes**

- A. No sewer laterals or building sewer connections shall be allowed to be connected directly to a manhole structure.
- B. Manholes shall be located at the following locations:
 - 1. Changes in sewer grades or alignment.
 - 2. Sewer junctions.
 - 3. Pipe diameter changes.
 - 4. Where spacing requirements justify placement.
- C. Manholes shall be placed at the following maximum intervals:
 - 1. Diameter 8" to 15": 400'
 - 2. Diameter 18" to 30": 500'
 - 3. Under special circumstances, manhole spacing may be increased. Water Resources will review such instances on a case-by-case basis.
- D. Flow Channel:

1. For all manholes with equal diameter influent and effluent pipes, a minimum 0.10 foot (0.10') drop between the inverts of the influent and effluent pipes shall be maintained to offset losses experienced at manhole structures.
2. The flow channel through a manhole shall be made to conform in shape, and slope to that of connecting sewers. The channel walls shall be shaped or formed to the full height of the crown of the outlet sewer so that maintenance, inspection, and flow in the manhole are not obstructed.

E. Bench

1. A bench shall be provided on each side of any manhole channel when the pipe diameter(s) are less than the manhole diameter. The bench shall be sloped no less than one-half ($\frac{1}{2}$) inch per foot (four percent).

- F. External Drop Inlets: An external vertical drop shall be provided for any pipe invert entering a manhole at an elevation greater than two feet (2') above the pipe invert exiting the manhole.

5.9 **Valves**

- A. Valves used in sanitary sewer collection systems shall be eccentric plug valves.

5.10 **Pipe Tracer Wire**

- A. Tracer wire shall be required on all force mains and sanitary sewer laterals.

5.11 **Sanitary Sewer Laterals**

- A. All gravity sewer service laterals connecting to a main line gravity sanitary sewer line shall be six inch (6") diameter SDR-35 PVC pipe conforming to the same specifications as the main line gravity sewer and shall be installed with a 2% minimum slope to within five feet (5') of the building.
- B. Connection to the main line gravity sewer shall be by means of a wye or tee installed with the main line sewer. In the event that a tap is made into an existing sewer, same shall be accomplished utilizing a manufactured wye or tee with rubber hub adapters or, only if approved in writing, a saddle on the pipe.
- C. All gravity sanitary lateral stubs shall be installed to the right of way line or property side of the easement, whichever is greater.
- D. Buried Piping Identification Tracing for Service Laterals:
1. Install #10 tracing wire for all service connections in accordance with the Contract Drawings and these Specifications.
 2. Tracing wire shall be installed from the mainline sewer to the building cleanout, where it is brought up to grade.
- E. Owner / Builder / Developer is responsible for supplying and installing all materials necessary to make a sewer tap.

- F. Sewer services shall be located at the property corner unless authorized differently by the Town. Provide 10' clearance to water mains and services.
- G. There shall be no change in direction of lateral in the right of way. A fitting at the main is permitted.
- H. A cleanout (4" minimum) shall be installed within 5 feet of the building and every 100 linear feet thereafter and at a changes of direction.
- I. All services shall be clearly marked at the termination point for future reference and extend a minimum of 24" above grade.
- J. Manholes located outside the roadway shall be adjusted to final grade by the developer and marked to 24" above casting elevation.
- K. All industrial sewer laterals shall include an inspection control manhole near the building that will be accessible to the Town employees at all times.
- L. All sewer taps and laterals shall be inspected by the Town prior to covering.
- M. Under no circumstances shall a manhole or cleanout be allowed to be in the driveway or sidewalk.

5.12 Testing Requirements

- A. Provide hydrostatic testing for all force main piping at a test pressure of 100 psi, unless approved otherwise by Town in writing. Unless otherwise specified, required test pressures are at lowest elevation of pipeline segment being tested.
- B. Pressure tests shall conform to the applicable AWWA and ASTM standard.
- C. Provide vacuum test of all sanitary manholes.
- D. Provide deflection and leakage testing of all gravity sanitary sewer mains.

5.13 Grease and Sand Traps

- A. A grease or sand trap may be required along a building sewer lateral to protect the sewer collection system and the wastewater treatment plant from grease, oil, sand or any other substance that may be discharged from that building. The minimum requirements are as follows:
 - 1. On all buildings with a kitchen that will be used in food preparation, processing, and service of food or food products that is above the normal family residential amount.
 - 2. The design and size of the traps shall meet the needs of the facility.
 - 3. All proposed plans for a grease or sand trap, including size, flow calculations, drawings, and a detailed maintenance plan shall be submitted to Huntertown Utilities Superintendent for approval.
 - 4. The installation of all grease traps shall be per the manufacturer's recommendations.

5.14 Existing Septic Systems:

- A. Existing on-site, septic systems shall be removed from service in accordance with the procedures and standards of the Fort Wayne-Allen County Department of Health or per ISDH 410 IAC 6-8.2-86. The contents of the septic tank to be decommissioned are to be disposed of by a licensed waste hauler and are in no event to be discharged directly to the new sewers recently installed in your area. Town and District Sewer Use Ordinances prohibit this septic discharge to new sanitary sewers.
- B. As of March 1, 2012, the Fort Wayne-Allen County Department of Health requires a permit coupled with an inspection to abandon the user's existing onsite system following their connection to the new sewers. The permit can be obtained from the FW-AC Department of Health, 200 East Berry Street, Suite 360. The homeowner is responsible for the fees assessed by the Department of Health. More information regarding this permit requirement can be obtained by contacting the Department of Health at (260) 449-7530.

5.15 Private Grinder Pump Stations

- A. Town Engineer and Huntertown Utilities shall review and approve all grinder pump stations before commencing construction. All new facilities and all abandonment of existing facilities shall comply with all permitting and ordinance requirements.
- B. Pump Station Responsibility:
 - 1. Grinder pump stations and all associated equipment installed within the utility boundaries of and connected to Huntertown Utilities are the sole responsibility of the homeowner.
 - 2. All materials required to install the pump station and connect to the Utility main shall be the responsibility of the contractor/homeowner.
- C. The developer and/or builder and/or property owner to provide to the Town Engineer information on proposed pump system and force main alignment.
- D. Pump Station Placement:
 - 1. The placement of the pump station is at the discretion of the owner. Site conditions and sound engineering judgement will determine final location.
 - 2. However, at no time will the installation of said pump systems be allowed in Utility easements or rights of way.
 - 3. Grinder pump stations shall be placed a minimum of fifty (50) feet from private water supply wells.
 - 4. Only one family dwelling or one business may hook into each grinder pump station.
- E. The lateral connection to the pump station chamber shall utilize a water tight rubber boot at the entry point of the tank.
- F. All building sewer connections shall have two check valves and one curb stop assembly on the private force main line from the grinder pump station, on the owner side of the easement/right of way.
- G. Cleanouts on the private force main are strongly encouraged.

H. Pumps:

1. All grinder pumps shall be powered by household 220V single phase power.
2. No 120V pumps will be allowed in grinder stations.
3. All pumps must be capable of macerating all materials in normal domestic sewage, including reasonable amounts of foreign objects like wood, plastic, and rubber into a fine slurry that will easily pass through the 1 1/4" discharge pipe.
4. The homeowner is responsible to specify which manufacturer or type of grinder pump is installed in a station. In the case of multiple homes in a development being installed, all pump stations will be of the same type and manufacturer.
5. The types of grinder pumps allowed are as follows:
 - a. Positive displacement pumps.
 - b. Semi-positive displacement pumps.
 - c. Centrifugal pumps, either single or two stage, depending on head conditions.

I. Mounting bases:

1. For automatic operation in a wet well, an auto-coupling assembly shall be employed for the retrieval of pumps, to eliminate the need for entering the wet well for service. This system shall consist of a permanently installed base elbow in the wet well and a removable guiding flange to be attached to the pump discharge. Both the base elbow and the guiding flange shall be made of ASTM A-48, Class 40B cast iron.
2. The guiding flange shall utilize a dual rail system with two rigid guide pipes connected to the base elbow to reliably provide a self-engaging, firm, leak-proof coupling between the pump discharge and the elbow.
3. In order to maximize reliability of this sealing, systems that utilize a single rail, or non-rigid guiding systems such as cable or line shall not be considered acceptable.
4. Sealing shall be accomplished through the use of a field-replaceable, Nitrile (Buna-N) profile gasket that is axially and evenly compressed upon contact to positively seal the pump discharge against the base elbow.
5. Sealing systems that rely on metal-to-metal contact faces are subject to leaking and blow-by and shall not be considered acceptable.

J. Electrical supply and controls:

1. All feed power shall be fed from a dedicated 30amp 240V breaker installed in the building electrical service panel.
2. All control panels will be provided from the manufacturer as part of a grinder station package.
3. The control panels and all associated components on each standard unit shall be U.L. Approved and installed per manufacturer's recommendations. All equipment associated with each unit shall meet the current requirements of all applicable Federal, State, and Local electrical codes.
4. All control panels will be provided with a generator receptacle for auxiliary power to the station.
5. All control floats or transducers shall be easily accessible from above without disturbing the pump or piping.
6. No direct bury wire shall be utilized between the home and control panel. All wire must be installed in PVC conduit, sized per the NEC requirements for the conductors utilized.

7. All stations will be installed using a minimum of 1 1/2" PVC conduit between the pump station and control panel. All level control and pump leads shall be directly pulled to the control panel. No splices shall be permitted in the pump vault.
 8. All conduit shall be sealed against sewer gasses in an appropriate manner.
 9. All conduits must enter the bottom of the disconnect box. Side and top entrances are prohibited.
 10. Property owner is responsible for ensuring that all electrical work is performed in accordance with the National Electric Code, local code, and permitting requirements.
- K. The Utility will allow basement pump systems to bring sewage up to and into the home's gravity sewer lateral. The utility will not specify a system requirement for this outside of requiring a pump designed to adequately handle sewage materials. It is the contractor/homeowner responsibility to provide an adequate system.

5.16 **Lift Stations**

- A. All proposed developments and associated sewage systems shall be connected by gravity sewer to existing Hometown sewers if good engineering practices allow. All proposed collection systems, if a gravity sewer connection is not feasible, shall be designed to minimize the need for more than one sewage pump station.
- B. The Contractor shall furnish and install automatic pumping station complete with all equipment installed in structures as shown on the Contract Drawings. Pump stations shall be as shown on the drawings and shall be complete with all concrete, mechanical, electrical, site and miscellaneous items of work shown, specified, or required for a complete and functional installation.
- C. The principal items of equipment shall include two or three submersible, non-clog pumps; valves; piping; control panel with circuit breakers and automatic pumping level controls, all required conductors and conduit; and telemetry if specified (to include re-establishing any existing telemetry). General details of construction are shown on the drawings along with pump capacities, speed, minimum motor horsepower, power characteristics, etc. Miscellaneous items necessary for a complete and functional installation are the responsibility of the Contractor.
- D. A remote telemetry SCADA system shall be provided with each lift station. Specific remote telemetry SCADA system requirements shall be coordinated with the Town on a project-specific basis.
- E. A magnetic flow meter and meter pit may be required by the Town on a project-specific basis.
- F. Pump station specifics vary greatly on a project-specific basis. The Town reserves the right to allow deviations from this specification upon review of the Utility Service Board and Superintendent of Utilities.
- G. Design Considerations
 1. Pump stations shall be designed to adequately handle the estimated flow from the proposed development without overflow with one pump in service. In addition, the structure, internal piping and valves, electrical service and wet well shall be of sufficient size to permit enlargement of the station, by only exchanging the pumps and motors, to

- the capacity required to handle contributory flows from areas adjacent to, but outside, the project location.
2. The Town zoning map and the Huntertown and Allen County Comprehensive Plans shall be used in conjunction with the Town / Engineer in determining the design capacity.
 3. Pump design shall be based on average daily flow with a peaking factor of four times that average flow. Pump starts shall not exceed 5 per hour.
 4. Unless otherwise approved, the wet well shall have a minimum of 6 ft. above the high level alarm.
- H. All pump stations shall be designed and constructed as submersible duplex or triplex pump stations, with flanged ductile iron discharge piping braced against the inside walls of the wet well and with separate valve vault and separate meter pit, if flow meter required by Town. There shall be a minimum of two pumps with discharge valve size and discharge pipe size being a minimum of 4 inches.
- I. An exterior drop shall be provided for the influent gravity lines into the wet well. Interior drops shall not be permitted without written approval from the Town on a case-by-case basis.
- J. Drain connections between valve vault / meter pit and wet well shall be provided with a drain ball check and Tide-Flex pinch valve to prevent backflow of wastewater into the valve vault.
- K. All equipment supplied and installed under this item of the specifications shall meet the requirements of the Occupational Safety & Health Act of 1970.
- L. Electrical Service
1. Electrical service size to be submitted to and approved by Town of Huntertown. Unless approved otherwise by Town, electrical service for lift stations with pumps smaller than 25 HP shall be 240 volt, three-phase, and electrical service for lift station with pumps 25 HP and larger shall be 480 volt, three-phase, if available.
 2. If three-phase power is not available, a VFD may be used to convert single-phase to three-phase power for the motor circuits only with Town approval.
- M. Standby Electrical Generator/Connection
1. The electrical system shall be provided with emergency generator back-up system.
 2. Provide automatic transfer switch to transfer between utility power and generator power. Coordinate automated generator exercising schedule with Town.
 3. Emergency generator shop drawings shall be submitted and approved by the Town Engineer. Town may specify additional requirements on a case-by-case basis.
- N. Transfer Switches
1. The Contractor shall furnish and install a transfer switch as specified by the Town on a project-specific basis.
 2. Switch shall include:
 - a. NEMA 4X Enclosure
 - b. Condensation heater
 - c. Single sets of auxiliary contacts
 - d. Signal before transfer contacts
- O. Telemetry System

1. Furnish and install a complete telemetry system which shall include antenna mountings, panels, and interfaces. All local codes relating to antenna height requirements, aircraft flight paths, and other pertinent issues must be adhered to. The system shall communicate with the Utility's SCADA system configured to coordinate with the Utility's system for remote communications.
2. Coordinate manufacturer and details with the Town of Huntertown. The Developer / Contractor is responsible to integrate with the existing Town of Huntertown SCADA system.

P. Fencing and Fenced Area

1. The pump station site shall be fenced with a six-foot-tall security fence.
 - a. Fence shall be aluminum chain link construction. There shall be three strands of barbed wire around the top (for lift stations in residential subdivisions, this requirement will be waived). The minimum diameters of gate posts shall be four inches (4"), corner posts three inches (3"), and line posts two inches (2").
 - b. As an alternative to chain link fencing, vinyl fencing may be provided for privacy. Coordinate details of vinyl fencing with Town.
 - c. There shall be a fourteen (14) foot wide entrance consisting of two seven (7) foot wide gates.
2. Submittal:
 - a. Submit shop drawings for all fasteners, fittings, posts, rails, hinges, pickets and all other material to provide complete installation to Town Engineer for approval prior to construction.
 - b. Submit proposed fence layout and dimensions for Town review.
3. Unpaved areas of the pump station shall be graded, compacted and covered with a geotextile fabric barrier per INDOT Specification 918.02 and eight (8) inches of No. 53/73 crushed stone. The barrier and crushed stone shall extend a minimum 12 inches outside of the fenced area.
4. Fencing shall enclose wet well, valve vault, meter vault as applicable, control panels, generator, and all other lift station improvements while providing sufficient space for maintenance vehicle access and maintenance staff access to all equipment per OSHA, NEC, and applicable codes.

Q. Access

1. A driveway 14 feet wide with an approach apron 20 feet wide at the street shall be constructed to the pump station.
2. The driveway shall consist of at least eight (8) inches of compacted dense graded crushed limestone base (INDOT #53) placed on compacted subgrade material, 2 inches (2") of HMA Intermediate, 19mm, Mainline, Type B, and 1-1/2 (1.5") inches of HMA Surface, 9.5mm, Mainline, Type B.

R. Lighting

1. Provide exterior site light and pole. Pole to be 20' height, on 18" diameter concrete base extending 30" above finished grade and 48" below finished grade. Light shall be situated to provide optimal lighting of wet well and valve vault. Provide LED fixture with integral photocell for automatic operation and over-ride manual on-off switch. Provide breaker in control panel. Ground pole to 10' driven ground rod in addition to separate equipment

grounding conductor run with branch circuit. Ground conductor shall be concealed and shall not be run on the outside of the pole base.

PART 6 - MATERIALS

6.1 Excavation & Backfill for Water & Wastewater

- A. Backfill and Fill; Suitable & Unsuitable Materials
 - 1. Materials acceptable for use as backfill against walls, foundations, underground ductbanks, and other structures shall be stockpiled native sandy clay or granular soils which are uniformly mixed, contain no organic matter, nor contain rocks or fragments greater than 3 inches in size, nor have greater than 40 percent passing the 200 sieve.
 - 2. Standard backfill and fill materials from off-site sources shall consist of silty or clayey sand soils that are uniformly mixed, contain no organic matter and which have a Plasticity Index less than ten. The maximum particle size of imported soils shall be 3-inches or less, if required to satisfy trenching, landscaping, or other requirements. The moisture content of the backfill and fill materials shall be within two percent (2%) of optimum per ASTM D1557.
 - 3. All materials for use as backfill and fill material shall be tested by the laboratory services, as requested by the Town / Engineer. If on-site material is unsuitable, as determined by the Town / Engineer, Special Backfill or approved off-site fill shall be used.
- B. Embedment Material for Flexible Pipes
 - 1. See Huntertown Standard Drawings.
- C. Embedment Material for Rigid Pipes
 - 1. See Huntertown Standard Drawings.
- D. Special Backfill
 - 1. Special Backfill for use beneath structures, concrete slabs and asphalt pavements (and where shown or specified below and around structures) shall be in accordance with the Indiana Department of Transportation (INDOT) Standard Specifications latest edition, Section 904. The material shall be acceptable quality, free from large or frozen lumps, wood, or other extraneous matter. Backfill for public infrastructure, laterals, and services shall be in accordance with gradation for No. 53 or No. 73 coarse aggregate in accordance with the gradation requirements of INDOT Standard Specifications latest edition, Section 904.03(e).

6.2 Lawns & Grasses

- A. Topsoil:
 - 1. Seeding / Sodding: INDOT Section 914.01
 - 2. All soil accepted as topsoil, whether obtained from on-site or off-site sources, shall comply with specified topsoil requirements.
 - 3. Provide fertile, friable, natural topsoil, surface soil, capable of sustaining vigorous plant growth; free of any admixture of subsoil, clods of hard earth, plants or roots, sticks, stones larger than 1-inch in diameter, or other extraneous material harmful to plant growth, in compliance with ASTM D 5268.
 - 4. Topsoil Source: Reuse surface soil stockpiled on-site, where possible. Verify suitability of stockpiled surface soil to produce topsoil, as specified. If not suitable amend topsoil to meet requirements approved by the Town / Engineer. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

- a. Supplement acceptable on-site soil with manufactured topsoil from off-site sources, when quantities available on-site are insufficient to complete the Work.
- B. Lawn Grass Seed:
 - 1. Lawn Grass Seed Mixture: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by INDOT 621. Provide seed of the grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, specified. Apply "Lawn Grass Seed" in all lawns and areas to be regularly mowed.
 - 2. Seed Species:
 - a. Apply "Lawn Grass Seed" at proportion by weight as follows:
 - 1) 50 percent Premium Grade Kentucky Bluegrass (2 Types)
 - 2) 50 percent perennial ryegrass (2 Types)
 - 3) 0 percent noxious weeds
 - 4) Or as approved otherwise.
 - b. Apply "General Purpose Mixture" at proportion by weight as follows:
 - 1) The general purpose mixture shall be "Seed Mixture R" in accordance with INDOT 621.06, or approved equal.
 - c. The Town may revise seed mix requirements on a project-specific basis.
- C. Turf Grass Sod:
 - 1. Comply with INDOT Standard Specifications, latest edition, Section 914.07.
 - 2. Sod shall be a variety or blend of Kentucky Bluegrass or fescue cut to a height of 2 to 3 inches, and shall be free from all primary and noxious weeds.
 - 3. Provide strongly rooted machine-cut sod, not less than 2 years old of uniform density, color and texture from a similar climate region. Provide only sod capable of vigorous growth and development when planted (viable, not dormant) and in strips no less than 16 inches wide and shall be no less than 2 feet in length. Edges of sod shall be cut to a uniform thickness of no less than 3/4-inch (excluding top growth and thatch).
- D. Fertilizers:
 - 1. Provide commercial grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen with an analysis of 12-12-12, in accordance with Indiana Department of Transportation Standard Specification Subsection 914.03.
- E. Mulches:
 - 1. Provide air-dry, clean, mildew- and certified seed and weed free, mulch. Mulch may consist of straw, excelsior mulch, wood cellulose fiber mulch, excelsior blanket, paper mat or straw mat, in accordance with Indiana Department of Transportation Standard Specification Subsection 914.05.
- F. Water:
 - 1. Provide water acceptable for lawn and meadow application and containing no material harmful to plant growth and establishment and in accordance with Indiana Department of Transportation Standard Specification Subsection 914.09 (a).

6.3 General Pipe & Utility Appurtenances Materials Requirements

- A. Quality Assurance

1. Qualifications
 - a. Manufacturer shall have a minimum of five (5) years of experience producing pipe, fittings, and appurtenances of the materials specified, and shall be able to submit documentation of at least five (5) installations in satisfactory operation for at least five (5) years.
 2. Component Supply and Compatibility:
 - a. All pipe and appurtenances of each material type shall be furnished by the same manufacturer.
 - b. Pipe Supplier shall prepare and review all Shop Drawings and other submittals for all materials furnished under this section.
 - c. Materials shall be suitable for specified conditions of service and shall be integrated into overall assembly by Pipe Supplier.
 3. Regulatory Requirements:
 - a. Drinking Water Requirements: Pipe, fittings, and appurtenances that will be in contact with potable water or water that will be treated to become potable shall comply with ANSI/NSF 61 and the Safe Drinking Water Act.
 4. Quality of materials, process of manufacture and finished pipe shall be subject to inspection by Town / Engineer.
- B. Conditions of Service
1. Pipe materials and appurtenances shall be suitable for services intended.
 2. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, and other defects. Unless otherwise shown or indicated, pipe shall be uniform in color, opacity, density, and other physical properties.
 3. Buried pipe shall be capable of withstanding external live load, including impact, equal to AASHTO H-20 loading, with cover shown or indicated in the Contract Documents.
 4. Pipe, fittings, and appurtenances in contact with potable water or water that will be treated to become potable shall be listed in NSF 61 as being suitable for contact with potable water, and shall comply with requirements of the municipal utility.
 5. Clean rework or recycled material generated by the manufacturer's own production may be used as long as the pipe or fittings produced meet all the requirements of this Section.
- C. Marking for Identification
1. Marking:
 - a. Each standard and random length of pipe in compliance with this specification shall be clearly marked with the following information that will remain legible during normal handling and storage.
 - 1) ASTM or AWWA Standard Designation.
 - 2) Pipe Size.
 - 3) Pressure/Thickness Class/Profile Number/Standard Dimension Ratio (SDR).
 - 4) All HDPE for water line piping shall have a blue stripe installed by the manufacturer during the pipe forming process. All HDPE for force main piping shall have a green stripe installed by the manufacturer during the pipe forming process. The pipe in either case shall have multiple stripes so as to be viewed from any angle along the pipe.

6.4 Polyvinyl Chloride (PVC) Piping (Gravity, Non-Pressure, Sanitary)

- A. Buried PVC Gravity Sewer Pipe (Diameter < 18 inch).
 - 1. Material (SDR 35):
 - a. Pipe shall comply with ASTM D3034.
 - b. Wall Thickness and Pipe Stiffness: Pipe stiffness shall be determined in accordance with test methods in ASTM D3034.
 - 1) Main Line & Service Laterals: SDR 35, with minimum ring stiffness of 46 psi.
 - 2) Service Laterals: SDR 35, with minimum ring stiffness of 46 psi.
 - 2. Fittings:
 - a. Gasketed fittings shall comply with ASTM D3034.
 - b. Unless otherwise shown or indicated, saddle wyes are unacceptable.
 - 3. Joints:
 - a. Provide bell and spigot joints. Bell shall consist of an integral wall section to hold securely in place (and prevent displacement during assembly of joint) elastomeric O-ring gasket.
 - b. Jointing lubricant shall be as recommended by pipe manufacturer.
 - c. Provide elastomeric gaskets complying with ASTM F477 and ASTM D3212.

6.5 Ductile Iron Pipe, Joints, and Fittings (Pressure & Non-Pressure, Water and Wastewater)

- A. Flanged pipe shall only be used in exposed conditions, such as buildings or structures. It shall not be used in a direct bury application unless noted otherwise.
- B. Flanged Pipe: Fabricate in accordance with AWWA C115.
 - 1. Pressure Rating: As specified in on Contract Drawings. If not otherwise specified, 3 inch to 12 inch diameter pipe shall be a minimum Pressure Class 350 in accordance with AWWA C150. Water main pipe with a diameter larger than 12 inch shall be a minimum Pressure Class 250 in accordance with AWWA C150.
- C. Non-Flanged Pipe: Conform to AWWA C151 for material, pressure, dimensions, tolerances, tests, markings, and other requirements.
 - 1. Pressure Class:
 - a. 3 inch diameter through 12 inch diameter shall be a minimum Pressure Class 350 in accordance with AWWA C150.
 - b. Larger than 12 inch diameter shall be a minimum Pressure Class 250 in accordance with AWWA C150.
 - 2. Special Thickness Class: As specified on the Drawings / Piping Schedules.
- D. Pipe Joints:
 - 1. Flanged Joints: Conform to AWWA C110 and AWWA C111 capable of meeting the pressure rating or special thickness class, and test pressure noted on Contract Drawings.
 - a. Gaskets: Unless otherwise specified, gaskets shall be at least 1/8 inch thick, ring or full-face as required for the pipe, of synthetic rubber compound containing not less than 50 percent by volume nitrile or neoprene, and shall be free from factice, reclaimed rubber, and other deleterious substances. Gaskets shall be suitable for the service conditions specified, specifically designed for use with ductile iron pipe

- and fittings. Higher temperature applications such as air supply lines shall utilize FKM, as required.
- b. Bolts: Comply with ANSI B18.2.1.
 - 1) Exposed, Non-Corrosive Environments: ASTM A307, Grade B, Zinc-Plated.
 - 2) Buried, Submerged, or Exposed in Corrosive Environment: ASTM A193, Grade B8M, Class 2, Heavy hex, Type 304/316 stainless steel.
 - c. Nuts: Comply with ANSI B18.2.2.
 - 1) Exposed: ASTM A563, Grade A, Heavy hex, Zinc-Plated.
 - 2) Buried or Submerged: ASTM A194, Grade B8M, Heavy hex, Type 316 stainless steel.
2. Mechanical Joints: Comply with AWWA C111 and AWWA C151, capable of meeting pressure rating or special thickness class, and test pressure specified.
 - a. Glands: Ductile iron.
 - b. Gaskets: Plain tip.
 - c. Bolts and Nuts: High strength, low alloy steel in accordance with AWWA C111. Cor-Blue or approved equal.
 3. Push-On Joints: Comply with AWWA C111 and AWWA C151, capable of meeting pressure class or special thickness class, and test pressure specified.
 - a. Gaskets: Vulcanized SBR, unless otherwise specified.
 - b. Stripes: Each plain end shall be painted with a circular stripe to provide a guide for visual check that joint is properly assembled.
 - c. Products and Manufacturers: Provide one of the following:
 - 1) Tyton or Fastite Joint by Clow Water Systems, Atlantic States Cast Iron Pipe Company, Canada Pipe Company, Ltd., McWane Cast Iron Pipe Company, Pacific States Cast Iron Pipe Company, and Griffin Pipe Products Company.
 - 2) Fastite Joint by American Cast Iron Pipe Company.
 - 3) Tyton Joint by U.S. Pipe and Foundry Company.
 - 4) Or equal.
 4. Restrained Joints: Restrained joints shall comply with AWWA C110 or AWWA C153. Restrained push-on joints shall be capable of being deflected after full assembly. Field cuts of restrained pipe are not allowed without approval of Town / Engineer.
 - a. Products and Manufacturers: Provide restrained joints for mechanical joint piping by one of the following:
 - 1) Megalug, Series 1100, by EBBA Iron Sales, Inc.
 - 2) RomaGrip, by Romac
 - 3) One-Lok, by Sigma
 - 4) Star Grip 3000 Series, by Star Pipe
 - 5) Or approved equal.
 - b. Products and Manufacturers: Provide restrained joints for push-on joint piping by one of the following:
 - 1) Super-Lock Joint Pipe, by Clow Water Systems, a division of McWane, Inc.
 - 2) Lok-Ring Joint, or Flex-Ring Joint, by American Cast-Iron Pipe Company.
 - 3) TR Flex Joint, by U.S. Pipe and Foundry Company.
 - 4) Snap-Lok, by Griffin Pipe Products Company.
 - 5) Or equal.
 5. Flanged and Push-On Joint Fittings: Comply with AWWA C110/AWWA C153 and AWWA C111.
 - a. Material: Ductile iron.

- b. Pressure rating, gaskets, bolts, and nuts shall be as specified for flanged joints. Pressure rating of fittings shall meet, but not exceed, specified pressure rating or special thickness class of the connected pipe.
 - 6. Mechanical Joint Fittings: Comply with AWWA C110/AWWA C153 and AWWA C111.
 - a. Material: Ductile iron.
 - b. Glands: Ductile iron.
 - c. Pressure rating, gaskets, bolts, and nuts shall be as specified for mechanical joints. Pressure rating of fittings shall meet, but not exceed, specified pressure rating or special thickness class of connected pipe.
- E. Cement-mortar Lining:
 - 1. Unless noted otherwise in the Contract Documents, pipe and fittings shall be lined with bituminous seal coated cement-mortar lining in accordance with AWWA C104.
- F. Specials:
 - 1. Transition Pieces:
 - a. Provide suitable transition pieces (adapters) for connecting to existing piping. Submit for approval prior to construction.
 - b. Unless otherwise shown or indicated, expose existing piping to determine material, dimensions, and other data required for transition pieces.
- G. Exterior Surface Preparation and Coatings
 - 1. Buried Pipe and Fittings:
 - a. Asphaltic Coating: Coat pipe and fittings with an asphaltic coating approximately 1 mil thick, in accordance with AWWA C151, AWWA C115, AWWA C110, and AWWA C153, as applicable.
 - 2. Fusion Bonded Epoxy Coating for Fittings
 - a. When specified, fittings shall be factory coated with 100 percent solids, thermosetting, dry powder epoxy, in conformance with AWWA C116.
 - 3. Exposed Pipe
 - a. Two coats of high build epoxy designed for corrosion protection of concrete and steel in municipal and industrial wastewater treatment facilities. Dura-Plate 6000 (NSF 61), Macropoxy 646, or approved equal. Comply with manufacturer recommended surface preparation, application procedures, application guidelines, spreading rates, drying schedules.

6.6 **PVC Pressure Pipe for Water Main or Sanitary Force Main**

- A. Polyvinyl Chloride (PVC) Piping
 - 1. Buried PVC Pressure Pipe (Diameter ≤ 12 inch):
 - a. Material:
 - 1) Pipe shall comply with one of the following, as specified on the Plans:
 - a) AWWA C900; Material per ASTM D1784, Class 12454; (water mains or force mains) or
 - b) ASTM D2241; Material per ASTM D1784, Class 12454 (water services four inches (4") in diameter or smaller, or force mains)
 - 2) Wall Thickness: DR 18 for AWWA C900 PVC or SDR 21 for ASTM D2241.

- 3) Fabricate AWWA C900 pipe with ductile iron pipe equivalent outside diameter.
 - b. Fittings:
 - 1) Provide ductile iron fittings; see ductile iron pipe specifications.
 - c. Joints:
 - 1) Provide bell and spigot joints. Bell shall consist of an integral wall section to hold securely in place (and prevent displacement during assembly of joint) elastomeric O-ring gasket.
 - 2) Jointing lubricant shall be as recommended by pipe manufacturer.
 - 3) Provide elastomeric gaskets complying with ASTM F477 and ASTM D3139.
 - 4) Glands and gaskets shall comply with outside diameter and material of pipe, per manufacturer recommendations.
- 2. Buried PVC Pressure Pipe (Diameter 14 inch to 24 inch):
 - a. Material:
 - 1) Pipe shall comply with AWWA C905.
 - 2) Material shall comply with ASTM D1784, Class 12454-B.
 - 3) Wall Thickness: SDR 18.
 - 4) Fabricate pipe with ductile iron pipe equivalent outside diameter.
 - b. Fittings:
 - 1) Provide ductile iron fittings; see ductile iron pipe specifications.
 - c. Joints:
 - 1) Provide bell and spigot joints. Bell shall consist of an integral wall section to hold securely in place (and prevent displacement during assembly of joint) elastomeric O-ring gasket.
 - 2) Jointing lubricant shall be as recommended by pipe manufacturer.
 - 3) Provide elastomeric gaskets complying with ASTM F477 and ASTM D3139.
 - 4) Glands and gaskets shall comply with outside diameter and material of pipe, per manufacturer recommendations.
- 3. Restrained Joints: Provide restrained joints where shown or indicated.
 - a. PVC push-on joint piping:
 - 1) Ford Uni-flange Series 1350/1355 as Recommended
 - 2) EBAA Megalug Series 1600
 - 3) Or approved equal.
 - b. PVC Pipe to Mechanical Joint
 - 1) EBAA Megalug Series 2000PV
 - 2) Or approved equal.

6.7 HDPE Pressure Pipe for Water Main or Sanitary Force Main

A. Quality Assurance

- 1. Manufacturer's Qualifications:
 - a. HDPE pipe and fittings manufacturers and distributors shall be listed as current members of the Plastics Pipe Institute (PPI).
 - b. Contractor shall have a minimum of five (5) years of recent experience installing HDPE pressure pipe and fittings for at least the specified pipe and fittings sizes and lengths and shall be able to submit documentation of at least five (5) installations in satisfactory operation for at least five (5) years.
 - c. Fusion operators shall have received current training & certification per PPI TN-42.

B. Conditions of Service

1. General:
 - a. Pipe shall be capable of withstanding a minimum recurring surge pressure (water hammer) flow velocity of 4 ft/sec, 55 cycles/day, and 100-year estimated fatigue life, or higher if shown in the Drawings. Occasional and fire flow velocity of 10 fps per NFPA 24.

C. HDPE Mainline Pipe

1. Dimensions:
 - 1) Pipe Dimensions: The nominal inside diameter of the pipe shall be true to the specified pipe size in accordance with AWWA C901 and/or AWWA C906 and/or ASTM F714.
 - 2) Wall thickness DR 11.
 - 3) HDPE pipe shall be DIPS.
2. The pipe shall meet the requirements of the applicable AWWA C901 and/or AWWA C906 and/or ASTM F714.
3. Pipe shall be pressure rated to meet the service pressure requirements specified by Town / Engineer.
4. Pipe material used for the manufacture of HDPE shall be high density polyethylene (HDPE) having a material designation code of PE 4710 or higher, meeting the requirements of ASTM D3350 with a minimum cell classification of PE 445574C. Pipe material shall be listed in PPI TR-4 and NSF-61 (for potable water only) and have an allowable stress (HDS) of 1000 psi at 73°F.
5. Only smooth wall HDPE will be permitted.
6. Approved manufacturers are: See list on plasticpipe.org.
7. Physical Properties
 - a. Materials used for the manufacture of polyethylene pipe and fittings shall meet the following physical property requirements:

Property	Unit	Test Procedure	Value
1. Material Designation	-	PPI/ASTM	-
2. PPI Material Listing	-	PPI TR-4	PE 4710
3. Material Classification	-	ASTM D 1248	III C 5 P34
4. Cell Classification	-	ASTM D 3350	345434C or 355434C
5. Density	g/cm3	ASTM D 1505	>0.941
6. Melt Index (E)	g/10 min	ASTM D 1238	<0.15
7. Flexural Modulus	psi	ASTM D 790	>110,000
8. Tensile Strength	psi	ASTM D 638	<160,000
9. ESCR (C)	hours	ASTM D 1693	3,000 to 3,500
10. HDB	psi	ASTM D 2837	1,600 @ 23°C
11. UV Stabilizer (C)	%carbon black	ASTM D 1603	2 to 3
12. Elastic Modulus	psi	ASTM D 638	110,000
13. Brittleness	Temp F	ASTM D 746	<-180
14. Vicat Softening	Temp F	ASTM D 1525	255
15. Thermal Expansion	in/in/ F	ASTM D 696	8 x 10E-5
16. Hardness	Shore D	ASTM D 2240	64
17. Molecular Weight Category	-	-	Extra-High

- b. Ring Stiffness Constant (RSC) values for the pipe can be directly related to the pipe's class designation. (Nominal RSC of Class 40 pipe = 40, etc.). The minimum RSC is 90 percent of the nominal.

D. HDPE Joints

1. General:
 - a. Joints shall be as specified in the Contract Documents. If not specified, pipe to pipe joints shall be butt heat fusion joints. Provide ductile iron flanged joints for exposed pipe fittings and ductile iron mechanical joints for buried pipe fittings.
2. Butt Heat Fusion Joints:
 - a. Shall be allowed for joining lengths of pipe in a straight run only.
 - b. Shall conform to ASTM F2620 and PPI TR-33.
 - c. Joint strength shall be equal to or greater than the strength of the pipe, as demonstrated by testing requirements.
3. Special Transition Pieces:
 - a. Provide suitable transition pieces (adapters) for connecting to existing piping or MJ valves.
 - b. Unless otherwise shown or indicated, expose existing piping to determine material, dimensions, and other data required for transition pieces.
 - c. All transitions shall be DIPS DR 11 fused MJ adapters by ISCO or approved equal. Follow all manufacturer recommendations.
 - d. All connection to existing pipe shall use a thrust collar.
4. Electro-fusion Couplings
 - a. When utilized, electro-fusion couplings shall contain heating coils located at the sealing surface. Use ISCO products or approved equal. Follow all manufacturer recommendations.
5. Thrust Collars
 - a. Contractor shall account for impacts of temperature expansion and contraction when installing and connecting HDPE pipe to existing systems. All connections to existing pipe shall use a thrust collar to counteract the Poisson effect. Concrete thrust collar shall be attached to the HDPE pipe by the use of electro-fusion flex restraint devices by ISCO or approved equal. Thrust collar detail shall be submitted to and approved by Town / Engineer prior to construction.

E. Fittings

1. Provide ductile iron fittings; refer to ductile iron fitting specifications.
2. Electrofusion fittings may be used in lieu of ductile iron fittings.

F. Pipe Stiffeners

1. Provide support using pipe stiffeners.
2. Use stiffeners constructed of stainless steel, per ASTM A240 Type 304.
3. The outside diameter of the stiffener must match the inside diameter of the pipe.

G. Electrofusion Saddles

1. When required by the plans in lieu of tapping saddles, provide electrofusion saddles manufactured in accordance with ASTM F-1055 and conform with the following material requirements:
 - a. Pre-Blended resin 4710 which complies with ASTM D3350.

- b. Resin must be acceptable for use with potable water and comply with NSF Standard 61.
- H. Joint Restraint: Provide restrained joints where shown or indicated.
 - 1. Proposed restraint system shall be submitted to the Town for review and approval.
 - 2. Restraint system shall be per the recommendations of the pipe manufacturer and appropriate for the fitting to pipe connection.
 - a. Mechanical Joint Fitting Restraint:
 - 1) EBAA Megalug Series 2000PV
 - 2) Or approved equal.
 - b. Push On Fitting Restraint
 - 1) EBAA Series 15PF00
 - 2) Or approved equal.
 - c. Flange Adapter & Restraint
 - 1) EBAA Megaflange Series 2100
 - 2) Or approved equal.

6.8 Water Service Piping & Fittings

- A. HDPE Water Service Pipe and Fittings
 - 1. Polyethylene compounds shall be per PE-3408 with minimum cell classification 345444C.
 - 2. HDPE tubing shall be copper tubing size, CTS, outside diameter controlled, minimum 1" diameter.
 - 3. SDR 9, 200 psi working pressure rated @ 73.4 degrees F with ability to maintain 300 psi for 1000 hours @ 73.4 degrees F.
 - 4. Meet requirements of ASTM D-2737, ASTM D-3350, NSF-14, NSF-61, AWWA C-901.
 - 5. Color: Shall be solid blue exterior tubing or black tubing with blue striping.
 - 6. Tubing shall be labeled at minimum with manufacturer, diameter, outside diameter control, working pressure rating, ASTM specifications and NSF approval.
 - 7. All HDPE shall be continuous from the water main to the curb stop and from the curb stop to the water meter.
 - 8. Stainless steel sleeves should be inserted in all pipe ends connecting to a meter or fitting. Inserts shall be:
 - a. 304 stainless steel material, seamless (not split)
 - b. Properly sized diameter for CTS, SDR 9 200 psi HDPE tubing and length that does not extend beyond the end of the compression fitting
 - c. One end flared to ensure proper seating into end of HDPE tubing
 - d. Designed for use with compression style connections.
 - 9. All connections and joints shall utilize brass mechanical compression fittings that are designed and specified for use with HDPE tubing.
 - a. Gripping band type restraint shall be used (i.e. Mueller C110 Compression Connection, Ford Quick Joint).
- B. Copper Water Service Pipe and Fittings
 - 1. Copper service line piping shall be Type K soft temper copper (ASTM B88) of the flarable type. The minimum size copper line shall be ¾". Joints shall be drawn up firmly and shall be tested before backfilling and any leakage stopped.
 - 2. All joints and fittings on copper service lines shall be brass of the compression type design.

6.9 Polyethylene Encasement

- A. Supply polyethylene in tubes or sheets.
- B. Polyethylene encasement materials shall be in accordance with AWWA C105.
- C. In addition, polyethylene encasement for use with ductile iron pipe and fitting systems shall consist of three layers of co-extruded linear low density polyethylene (LLDPE), fused into a single thickness of not less than eight mils.
- D. The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of anti-microbial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

6.10 Pipe Tracing Wire

- A. All wire utilized for tracing wire shall be designed for and approved by the manufacturer for use in buried low voltage applications and approved by the Town / Engineer.
- B. Provide - No. 10 or stronger high strength copper clad steel reinforced with HDPE insulation tracing wire rated for a minimum tensile strength of 600lbs. The following materials are acceptable:
 - 1. Soloshot Copperhead Industries, LLC
 - 2. BoreTough, Agave Wire, LTD
 - 3. Or approved equal
- C. Splice tracing wire together with the following material:
 - 1. DRYCONN Direct Bury Lug Aqua
 - 2. Agave Direct Bury lug DWTWC-003
 - 3. Or approved equal

6.11 Gate Valves

- A. Resilient-Seated gate valve, ductile-iron body, bonnet and gate; resilient seats, bronze stem and stem nut. Resilient seated gate valves are to be manufactured in accordance with AWWA C509 or AWWA C515. Valves shall be ductile iron bronze mounted. Resilient seats shall be applied in accordance with AWWA C509 or AWWA C515.
- B. Buried valves shall have mechanical joints. Valves shall open left (counterclockwise) and shall be equipped with O-ring packing and a two inch (2") operating nut and non-rising stem. Contractor shall verify direction of opening with Town / Engineer prior to ordering.
- C. Provide fusion bonded epoxy interior coating according to AWWA C550 and fusion bonded epoxy exterior coating.
- D. Valves shall be designed for a working pressure of 250 psi.
- E. Provide valve nut extension if valve is installed deeper than 60" cover.

- F. Provide with posi-cap alignment device.
- G. The following resilient seated gate valves are acceptable for use in connection with water main installation, listed by manufacturer and model number:
 - 1. American Flow Control, 2500 series
 - 2. Clow, 2639/2640 or 2638
 - 3. Kennedy, KS-FW or KS-RW
 - 4. Mueller, 2360 or 2361
 - 5. Or approved equal

6.12 **Butterfly Valves**

- A. Butterfly valves are to be manufactured in accordance with AWWA C504 with stainless steel shafts. The shaft seats, bearings, operators, body and discs shall be designed based on Class 150B.
- B. Butterfly valves shall be designed for a working pressure of 250 psi.
- C. Seating ring shall be made of rubber and located in the body or on the disc and shall be adjustable and field replaceable.
- D. Shaft shall be of the through type or stub type and shall be marked on the end to indicate the position of the valve disc with respect to the shaft.
- E. Discs shall be of corrosion-resistant alloy cast iron.
- F. Valves shall be equipped with a stainless steel stop in the body to prevent the disc from rotating through the closed position. The shaft seals shall be of the "split-V" or Chevron type. The operator shall be permanently lubricated and sealed for buried service and shall be equipped with a 2 inch square opening nut. The operator shall be constructed such that the valve will open left (counterclockwise).
- G. All valves shall be supplied with a posi-cap alignment device. Provide valve nut extension if valve is installed deeper than 60" cover.
- H. The bolts, screws, and nuts used in the assembly of the valve and exposed to the soil shall be corrosion resistant.
- I. Butterfly valves used in connection with ductile iron pipe shall be equipped with standard mechanical joint ends complete with all accessories as outlined in this chapter.
- J. The following butterfly valves are acceptable for use in connection with water main installation:
 - 1. Clow, 4500 Series
 - 2. Mueller, Lineseal XP11
 - 3. Dezurik, BAW
 - 4. Kennedy, 1450 Series
 - 5. Pratt, Triton XR-70
 - 6. Or equal

6.13 Eccentric Plug Valves

- A. Eccentric plug valves shall be non-lubricated type, have fully encapsulated plugs and shall be of eccentric construction. Valves shall be made of cast iron or semi-steel at least equal to ASTM A126, Class B. Body seats of valves 3-inch and larger shall have a welded-in overlay of not less than 90 percent pure nickel on all surfaces contacting the plug face. Stem bearings shall be of corrosion-resistant material. Port areas, except for 1-inch valves, shall be equal to at least 100% of the full pipe area. Valves 4-inch and larger shall have adjustable packing glands and shall be capable of being repacked without the bonnet or plug being removed from the valve. The valve shall be designed to withstand full operating pressure against the face of the plug without leakage. Valves shall be gear operated, unless otherwise shown or specified. Gear-operated valves with operating wheels 6 feet or more above the floor shall be provided with chains and chain wheels. One wrench shall be furnished for each size valve in each individual room or operating space in which valves are located. Non-full-port valves will not be allowed.
- B. Plug valves located underground shall have mechanical joint pipe connections at both ends.
- C. Plug valves used for air service shall have EPDM rubber rated to 250 degrees F (CRINRB =180 F).
- D. Plug valves located in vaults shall be lever operated.
- E. Valves shall be satisfactory for applications involving throttling service as well as frequent or infrequent on-off service. The valve closing member should rotate approximately 90 degrees from the full-open to full-close position and vice-versa.
- F. Valves 4 inches thru 6 inches in size shall have a two (2) inch operating nut while eight (8) inch and larger valves shall be provided with a 2 inch operating nut on the worm gear operating mechanism.
- G. Valves up to 12-inch shall have 175 psi working pressure, valves larger than 12-inch shall have 150 psi working pressure, unless otherwise noted on the Drawings.
- H. All valves shall be supplied with a posi-cap alignment device. Provide valve nut extension if valve is installed deeper than 60" cover.
- I. Valves shall be coated with fusion bonded epoxy coating on interior and exterior, 6 mils min.
- J. Plug valves shall be by Val-Matic Model 5600 Series, GA Industries ECO-Centric, Dezurik PEF Series, Pratt Ballcentric, Clow F-5400 Series, or equal.

6.14 Hydrant Assembly

- A. Fire hydrants shall conform to AWWA C502 and shall be complete with all necessary fittings and accessories. Hydrants shall conform to the Water Utility Owner standards and specifications. Hydrants shall be 5 ¼" size with 6" inlet connection. They shall have one 4 ½ inch pump connection and two 2 ½ inch hose connections.

- B. The hydrant shall open left (counterclockwise) and be of sufficient length to accommodate depth of burial of water main and for pumper nozzle height 24" minimum above grade. Contractor shall verify direction of opening with Town & Engineer prior to ordering.
- C. All hydrants shall be properly painted before shipment and after installation in accordance with AWWA C502. Color to be yellow. Contractor shall verify color with Town prior to ordering.
- D. Provide anchorage with restrained joints, and support in upright position.
- E. Hydrants shall have an auxiliary valve as detailed on fire hydrant assembly standards and according to AWWA M17.
- F. Hydrants shall be for 250 psi working pressure. The hydrant shall be such that the valve will remain closed if the upper portion of the fire hydrant is removed or broken off. The operating nut shall be pentagonal.
- G. The hose caps shall be secured to the hydrant with a chain during shipment. The chains may only be removed after the hydrant is placed into service.
- H. A drainage pit shall be provided below each hydrant, consisting of at least ½ cubic yard of compacted pervious material.
- I. The following fire hydrants are acceptable for use in connection with water main installation, listed by manufacturer and model number:
 - 1. Mueller, A-423
 - 2. Kennedy, Guardian
 - 3. Waterous Pacer WB-67-250 (American Flow Control)
 - 4. Or Approved Equal

6.15 **Curb Stops**

- A. Curb stops shall be ball type valves of extra heavy, all brass construction. The curb stops shall have a heavy or thick tee-head operator and a 90 degree rotation of the ball. Each stop shall be equipped with a curb box. Ball valves shall have Teflon coated balls and hard or synthetic rubber seat-rings.
- B. The following curb stops are acceptable for use in connection with water main installations, listed by manufacturer and model number:
 - 1. Mueller, B-25204N or B-25209N
 - 2. Ford, B22-NL or B44-NL
 - 3. McDonald, 76100 or 76100-22
 - 4. Or Approved Equal.

6.16 **Corporation Stops**

- A. Corporation stops shall be ball type valves of extra heavy, all brass construction. The corporation stops shall have a flat, thick, operating head. The corporation stop inlet threads shall be machined with standard AWWA tapered threads.

- B. The following corporation stops are acceptable for use in connection with water main installations, listed by manufacturer and model number:
 - 1. Mueller, B-2500N or B-25008N
 - 2. Ford, FB-600NL or FB-1000NL
 - 3. McDonald, 74701B or 74701B-22
 - 4. Or Approved Equal.

6.17 Valve Boxes & Curb Boxes

- A. Valve boxes shall cast iron, two (2) or three (3) piece, Buffalo-style, screw type boxes. The boxes shall be five and one-quarter inch (5¼") shaft size with a round base. The word "water" or "sewer" shall be cast on the box lid as appropriate. Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length as required for depth of burial of valve, and bottom section with base of size to fit over valve. Install valve box extension if valve is installed deeper than 60" cover. Place geotextile around valve bonnet and connections of three pieces.
- B. Curb boxes shall be cast iron two (2) piece, Buffalo-style, screw type boxes. The box shall be 2 ½" diameter with a 3' stainless steel extension rod attached to the curb stop with centering guide, brought up to final grade. The word "water" or "sewer" shall be cast on the lid as appropriate. A curb lock box shall be placed under curb stop for curb box feet to set on.

6.18 Tapping Saddles

- A. Tapping saddles shall be used for service taps of water main piping. The tapping saddles and hardware shall be ductile iron with nylon or epoxy coating with AWWA tapered threads and stainless steel straps. The tapping saddle design shall be hinged or bolted, both with a minimum strap width of two inches (2"). Three (3) piece tapping saddle design is not allowed.
- B. Tapping saddles for HDPE shall be Romac or approved equal.
- C. The saddles for PVC shall be Spears, Mueller, A.Y. McDonald, Ford, or Approved Equal.
- D. Tapping saddles must be used for the installation of a corporation stop in a tapped pipe. The tap saddle is made to a specific inner diameter to match the outer diameter of the pipe. It fully supports the pipe and is sized so that the parts when bolted together cannot be over tightened on the pipe; Manufacturer's installation instructions must be followed.

6.19 Tapping Sleeve & Valve Assembly

- A. The tapping sleeve and valve shall be suitable for wet installation without interrupting service. The tapping sleeve shall be suitable for the pipe material and size of the line being tapped.
- B. Tapping sleeves shall be manufactured of ductile iron or stainless steel. Stainless steel sleeves shall be Type 304 steel. Sleeve shall be flanged faced and drilled per ANSI B 16.1, with standard tapping flange counterbore per MSS SP-60. Tapping sleeves shall meet minimum working pressure requirements of 200 psi for twelve inch and smaller sleeves. All tapping sleeves shall include a test plug.

- C. Gasket for tapping sleeve shall completely surround pipe.
- D. Nuts and bolts shall be Type 304 stainless steel.
- E. Acceptable tapping sleeves:
 - 1. Ford FAST
 - 2. Romac SST III
 - 3. Mueller H-304
 - 4. Or approved equal
- F. The tapping valve shall be mechanical joint x tapping flange. The flanged end shall have a raised face to match counterbore in tapping sleeve outlet per MSS SP-60. Tapping valves shall also conform to the specifications as outlined for gate valves in this Specification.

6.20 Wastewater Combination Air Valve

- A. Air release valves shall be placed at all high points in the system as well as every 2000 feet if lacking a defined high point.
- B. Valve shall be capable of venting sufficient quantities of air as determined by the manufacturer's approved sizing methods, while pipelines are being filled and allowing air to re-enter while pipelines are being drained.
- C. Valves shall be manufactured and tested in accordance with American Water Works Association (AWWA) Standard C512.
- D. Combination Air Valves shall be automatic float operated valves designed to exhaust large quantities of air during the filling of a piping system and close upon liquid entry. The valve shall open during draining or if a negative pressure occurs. The valve shall also release accumulated air from a piping system while the system is in operation and under pressure. The valve shall perform the function of both Air Release and Air/Vacuum Valves and be furnished as a single body or dual body type as indicated on the plans.
 - 1. Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.
 - 2. Valve shall be Val-Matic single body 801 or 803 Series, ARI D-020 Series, or approved equal.
 - 3. Valves shall be supplied with flushing attachments to allow periodic flushing of sediment, grease, and solids. Attachments consist of an inlet isolating valve, bronze blow off and flushing valves, and a minimum of five feet of rubber hose with quick disconnects to allow connection to a clean water source.
 - 4. Valves shall be coated with fusion bonded epoxy per AWWA C550.
 - 5. Valves shall be installed in a manhole structure per the Town standard drawings.
 - 6. Valve vaults must be equipped with an exhaust pipe extending to a downward facing elbow with the opening at an elevation of eighteen (18) inches above ground, unless noted otherwise on plans.

6.21 Backflow Prevention Devices

- A. All backflow prevention devices for potable water protection must be approved and listed by the Foundation for Cross Connection Control and Hydraulic Research as published by the University of Southern California. This listing is available from USC or IDEM's Drinking Water Branch.

6.22 Sanitary Sewer Manholes

- A. Precast Concrete Manholes & Structures
 1. Precast manholes and structures shall conform to the Town Standards and Specifications. Provide cast-in-place concrete bases where shown.
 2. Except where otherwise approved by Town, precast manhole components shall consist of reinforced concrete pipe sections especially designed for manhole construction and manufactured in accordance with ASTM C 478, except as modified herein.
 3. Precast, reinforced concrete manhole bases, riser sections, flat slabs and other components shall be manufactured by wet cast methods only, using forms which will provide smooth surfaces free from irregularities, honeycombing or other imperfections.
 4. Sanitary Sewer Manholes
 - a. Provide manhole with tongue and groove joints. Seal joints with all of the following methods:
 - 1) Rubber Gasket in accordance with ASTM C443
 - a) Manufacturers: Provide rubber gasket from the following:
 - b) O-Ring Gasket, by Press-Seal Gasket Corporation.
 - c) Or approved equal.
 - 2) Preformed Flexible Joint Sealant in accord with ASTM C990 & AASHTO- M198.
 - a) Manufacturers: Provide joint sealant from the following:
 - b) EZ Stik, by Press-Seal Gasket Corporation.
 - c) Kent Seal #2, by Hamilton-Kent.
 - d) RU 106 RUB'RNEK LTM, by Henry Co.
 - e) Or approved equal.
 - 3) Butyl Rubber Backplaster-exterior
 - a) Manufacturers: Provide joint sealant from the following:
 - b) Trowelable EZ Stik #3, by Press-Seal Gasket Corporation
 - c) Or approved equal.
 - 4) Polyethylene Plastic Sheeting Film
 - a) Manufacturers: Provide joint sealant as required to protect the joint from backfill operations:
 - b) 6 mm polyethylene plastic sheeting film by Visqueen.
 - c) Or approved equal.
 5. All precast manhole components shall be of approved design and of sufficient strength to withstand the loads imposed upon them. They shall be designed for a minimum earth cover loading of 130 pounds per cubic foot, an H-20 wheel loading, and an allowance of 30 percent impact.
 6. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.
 7. The barrel of the manhole shall be constructed of various lengths of riser sections to provide the correct height with the fewest joints.

8. Except as approved by the Town, openings in the barrel of the manholes for pipe connections will not be permitted closer than one foot from the nearest joint. Special manhole base or riser sections shall be furnished as necessary to meet this requirement.
 9. A precast or cast-in-place slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover.
- B. Riser Rings
1. Riser rings shall be used for all precast and masonry manholes and structures, where required. Stacks of riser rings shall be as specified and shall be provided between the top of the cone or slab and the underside of the manhole casting for adjustment of the casting to finished grade.
 2. Twelve inches (12") of precast concrete riser rings shall be provided between the top of the cone or slab and the underside of the manhole casting for adjustment of the casting to finished grade. No more than two (2) riser rings shall be stacked together to reach the finished grade without the written approval of the Town / Engineer.
 3. Riser ring joints shall be sealed with the following method:
 - a. Preformed Flexible Joint Sealant in accordance with ASTM C990 and AASHTO-M198.
 - 1) Manufacturers: Provide joint sealant from the following:
 - a) RU 106 RUB'RNEK LTM, by Henry Co.
 - b) EZ Stik, by Press-Seal Gasket Corporation.
 - c) Kent Seal No 2, by Hamilton Kent.
 - d) Or Approved Equal.
- C. Sanitary Manhole Chimney Seal
1. In addition to the required riser ring joint seal, provide both of the following:
 - a. Butyl Rubber Backplaster-exterior
 - 1) Manufacturers: Provide joint sealant from the following:
 - a) Trowelable EZ Stik #3, by Press-Seal Gasket Corporation
 - b) or equal.
 - b. Supplemental Exterior Seal: Provide one of the following:
 - 1) External Chimney Seal, manufactured by Cretex Specialty Products.
 - 2) Wrapidseal, manufactured by CANUSA-CPS.
 - 3) Or Approved Equal.
- D. Castings
1. Materials
 - a. 24" Sanitary Casting:
 - 1) Material: ASTM A48/A48M, Class 35B.
 - 2) Products and Manufacturers: Provide one of the following:
 - a) R-1772, manufactured by Neenah Foundry Company, with "Sanitary" lettered solid lid.
 - b) 1022Z1, manufactured by East Jordan Iron Works, Inc, with 1020AHDGS "Sanitary Sewer" lettered solid lid.
 - c) Or equal.
 - b. Watertight Sanitary Casting:
 - 1) Material: ASTM A48/A48M, Class 35B.
 - 2) Products and Manufacturers: Provide one of the following:

- a) R-1772, manufactured by Neenah Foundry Company, with "Sanitary Sewer" lettered, solid, bolted lid.
 - b) 1022Z1PT, manufactured by East Jordan Iron Works, Inc, with "Sanitary Sewer" lettered, solid, bolted lid.
 - c) Or equal.
 - c. 12" Cleanout Casting:
 - 1) Material: ASTM A48/A48M, Class 35 B.
 - 2) Products and Manufacturers: Provide one of the following:
 - a) R-1976, manufactured by Neenah Foundry Company.
 - b) 1578, manufactured by East Jordan Iron Works, Inc.
 - c) Or equal.
 - 2. Fabrication, General:
 - a. The Contractor shall furnish all cast-iron manhole frames and covers conforming to the details shown on the Drawings, or as hereinbefore specified.
 - b. Castings shall be of uniform quality, free of sand holes, gas holes, shrinkage cracks, and other surface defects.
 - c. Castings shall be ground smooth and well-cleaned by shot blasting in the shop.
 - d. Design and fabricate frames and covers to prevent rocking and rattling under traffic loads that will be imposed in actual use.
 - e. Fabricate castings true to pattern so that component parts fit together.
 - f. The surface of drainage inlets shall have a casted marker that displays that it drains to waterways, as shown on Drawings.
 - g. Each casting shall be identifiable and, depending on its size, shall indicate the following: name of producing foundry, ASTM material designation, individual part number, and cast or heat date. Castings shall include all lettering shown or indicated on the Drawings.
 - h. Castings other than open grate castings are required to have a concealed pickhole.
- E. Concrete Mix
- 1. Proportioning and Design of Class "A" Concrete Mix:
 - a. Minimum compressive strength at 28 days: 4,000 psi.
 - b. Maximum water-cement ratio by weight: 0.50.
 - c. Minimum cement content: 564 pounds per cubic yard.
 - 2. Proportioning and Design of Class "B" Concrete Mix:
 - a. Minimum compressive strength at 28 days: 3,000 psi.
 - b. Maximum water-cement ratio by weight: 0.50.
 - c. Minimum cement content: 517 pounds per cubic yard.
- F. Flexible Pipe Joint at Manhole Base for Sanitary Manholes
- 1. An approved flexible joint shall be provided between each pipe entering and exiting the manhole. Pipe to structure connections shall conform to the details shown. The joint into the manhole base shall be completely watertight.
 - 2. Provide products manufactured to meet the requirements of ASTM C923.
- G. Manhole Channels
- 1. Flow Channel

- a. All invert channels through manholes and structures shall be constructed of Class "A" concrete. Channels shall be properly formed to the sizes, cross sections, grades and shapes shown or as ordered.
 - b. For all sanitary sewer manholes with equal diameter influent and effluent pipes in a straight through alignment, a minimum 0.10 foot drop between the inverts of the influent and effluent pipes shall be maintained.
 - c. Flow channels through a manhole shall be made to conform in shape, and slope to that of the connecting sewers. The channel walls shall be shaped or formed to the full height of the springline of the outlet sewer so that maintenance, inspection, and flow in the manhole are not obstructed.
2. Bench
- a. Benches shall be provided on each side of the manhole channel when the pipe diameter(s) are less than the manhole diameters.
 - b. Benches shall be built up to the heights shown, and shall be sloped no less than 1/2-inch per foot (4 percent), or as directed by the Town / Engineer and given a uniform wood float finish.
 - c. Care shall be taken to slope all benches for proper drainage to the invert channel.

H. Manhole Steps

- 1. Manholes shall not be provided with steps.

6.23 Lift Station Materials

A. General

- 1. Each station shall include pumps; wet well; valve vault; piping; valving; flow meter and meter vault (if specified); control panel enclosure; electric utility service through NEMA 4X service-entrance-rated electrical disconnect; standby generator with automatic transfer switch; control panel with automatic level controls and pump controller; alarm light and horn with a silencer; hand-off-automatic selectors for each pump; pressure gauges; pump run time meters; 4 inch male-end stainless steel cam-lock emergency pump connection with cap; and all other miscellaneous accessories, materials, and equipment required for a fully functional pump station and complete installation.
- 2. Other than piping and valving, all materials shall be of 304/316 Stainless Steel or non-metallic, with Town approval. Galvanized components are not allowed.
- 3. Provide and install removable rotatable stanchion arm with cable hoist for pump removal for pumps weighting more than 1,500 pounds.

B. Quality Assurance

- 1. The pumps shall be heavy duty, electric submersible, centrifugal non-clog units designed for handling raw, unscreened sewage and wastewater. The pumps shall be capable of operating in a liquid temperature up to 104 degrees F.
- 2. The pump, mechanical seals and motor units provided shall be from the same manufacturer.
- 3. The pumping unit manufacturer shall test each pump for mechanical and electrical correctness.
- 4. All control panels shall be designed and constructed to UL 508A standards. All control panels shall be UL 508A listed. Control panels shall be made available to the Town / Engineer during factory testing.

C. Submittals

1. Standard submittal data for lift station approval must consist of:
 - a. Product data for all equipment, piping, valves, and structures.
 - b. Shop Drawings
 - 1) Pump outline drawing.
 - 2) Station drawing for accessories.
 - 3) Electrical and controls equipment and accessories.
 - 4) Electrical and control equipment mounting frame and foundation arrangement and details showing location of control panel, electric meter base, disconnect, transfer switch, junction boxes, SCADA panels, flow meter local readout (if flow meter required by Town), and other above-grade electrical and controls equipment as applicable.
 - c. Electrical Requirements:
 - 1) Submit all electrical requirements for each piece of equipment including voltage, phase, and load data.
 - 2) Submit a drawing showing the electrical enclosure placement within the pump station. Placement must be approved by the Town / Engineer prior to installation.
 - 3) Provide interior and exterior layouts of control panels where applicable. Layouts shall be to scale and a bill of material shall be included.
 - 4) Provide interior and exterior layouts of power panels where applicable. Layouts shall be to scale and a bill of material shall be included.
 - 5) Submit information on control panel components. This includes but is not limited to: pilot lights, relays, push buttons, and timers.
 - 6) Provide wiring and interconnection diagrams for each piece of equipment. For example, submitting one diagram for all screening equipment is not acceptable. Differentiate between panel and field wiring.
 - 7) Wiring diagram illustrating conductor and conduit sizing.
 - 8) "Typical" diagrams are not acceptable. Manufacturer's standard diagrams may be submitted if they are made specific for this project by:
 - a) Showing all included options, special items, etcetera.
 - b) Unused options or features shall be crossed out or deleted.
 - c) Identify the drawing with project name, equipment name, and tag number.
 - d. Manufacturer's Certificate of compliance certifying compliance with the referenced specifications and standards.
 - e. Pump performance data and physical characteristics.
 - 1) Certified performance total dynamic head, capacity, brake horse power, efficiency, and required net positive suction head curves for each pump supplied.
 - f. Manufacturer's installation instructions.
 - g. Manufacturer's operation and maintenance material and manuals.
 - h. Certified copies of test reports.
 - i. Pump warranty Information.
 - j. Operation and Maintenance Manuals
 - k. Local Representative and Service Provider.

D. Submersible Sewage Pumps

1. Pump manufacturer shall be subject to review and approval of Town. The motors shall be of a voltage, phase, and speed as approved by the Town. Impeller configuration shall be subject to review and approval of Town.
2. In general, pumps shall be Gorman Rupp Infinity Series, or approved equal. Approval to come from the Town Engineer.
3. Pumps with 25 HP or larger motors shall use variable frequency drives (VFDs). Pumps with motors smaller than 25 HP shall use across the line starters. Notwithstanding, the Town may require or waive VFDs on a project-specific basis.
4. Pumps: Pumps shall be of the submersible type for handling raw unscreened sewage. Pump volute, motor, and seal housing shall be high quality gray cast iron. Impeller shall be either cast iron or cast bronze of a non-clog design capable of handling minimum three (3) inch sphere solids, fibrous material, heavy sludge, and other matter found in normal sewage applications. Impeller shall have pump out vanes on the back shroud of the impeller to keep pumped material away from the seal area and increase operating life. Impeller shall be either slip fit or taper fit with key to securely lock the impeller to the driving shaft. The pump volute shall be fit with a replaceable bronze wear ring to minimize wear on the impeller and help achieve longer balance operating life. All fasteners shall be of stainless steel. Alternative pump and impeller arrangements are permitted only with written approval from the Town.
5. Mating Surfaces: All mating surfaces where watertight sealing is required shall be machined and fitted with rubber O-rings.
6. Seal System: The seal chamber shall also be equipped with a seal failure sensor probe which will sense water intrusion through the lower seal. This sensor shall be connected to an alarm in the control panel to indicate lower seal failure.
7. Housing: The stator winding, rotor and bearings shall be mounted in sealed submersible type housing. The pump and motor are to be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped. The pump shall not require cooling water jackets. Motor shall be provided with heat sensing units attached to the motor windings which shall be connected to the control panel to shut down pump if overheating occurs.
8. Cables: Pump motor cable and heat sensor/seal failure sensor cable shall be suitable for submersible pump applications and this shall be indicated by a code or legend permanently embossed on the cable. Cable sizing shall conform to NEC and ICEA standards for pump motors and shall be of adequate size to allow motor voltage conversion without replacing the cable. Cables shall be of sufficient length to reach the junction box without the need of any splices.
9. Mounting Base: The pump mounting base shall include adjustable guide rail supports and a discharge connection with a standard flange. The base and the discharge piping shall be permanently mounted in place. The base plates shall be anchored in place utilizing epoxy type anchors with stainless steel studs and nuts as manufactured by HILTI Fasteners, Inc., or equal.
10. Guide Rails: A rail system shall be provided for easy removal of the pump and motor assembly for inspection and service. The system shall not require a man to enter the wet well to remove the pump and motor assembly. The guide rails shall be positioned and supported by the pump mounting base. The guide rails shall be aligned vertically and supported at the top by attachment to the access hatch frame. All mounting equipment shall be stainless steel. Guide rails shall be compatible with specified pumps.

11. Rail Guide & Lifting Chain: The pumps shall be equipped with sliding brackets or rail guides. A stainless steel lifting chain of adequate length for the basin depth shall be provided for each pump. The working load of the lifting system shall be 50% greater than the pump unit weight. Each pump shall be equipped with a permanent, stationary lifting handle with a minimum clearance of twelve (12) inches between the top of the pump and bottom of the handle.
 12. The rails and the rail guide shall function to allow the complete weight of the pumping unit to be lifted on dead center without binding and stressing the pump housing. The rail system shall function to automatically align the pumping unit to the discharge connection by a simple downward movement of the pump. No twisting or angle approach will be considered acceptable.
- E. Concrete Pump Station Structure and Details
1. Provide the precast pump station structures of the type and size as shown on the drawings.
 2. Wet well shall be provided with corrosion-resistant protective coating or antimicrobial admixture per manufacturer recommendations. Mainstay ML-72, ConmicShield by Conshield Technologies, or approved equal.
 3. Provide the following items of accessories and equipment, subject to approval by the Town.
 - a. Stainless steel lifting yokes and stainless steel chain or cable and clamps for each pump.
 - b. Stainless steel pump guide rails.
 - c. Positive type quick release discharge flange to allow pump removal without entering the station.
 - d. Ductile iron gooseneck vent with stainless steel mesh to prevent rodent and bird entry.
 - e. Stainless steel or aluminum entrance hatch with safety grate.
 - f. Piping, valves and valve vault.
 - g. Electrical and control equipment.
- F. Electrical, Control, and Control Panel Requirements
1. Enclosures
 - a. Enclosures shall be NEMA 4X stainless steel, padlockable, continuous hinge with 3-point latch. Manufactured by Hoffman, Saginaw, Rittal, or Engineer approved equal.
 - b. Provide inner swing-out door with access to circuit breaker operators, duplex GFI receptacle, pump controller, indicator lights, selector switches, and elapsed time meters. Back panel shall mount circuit breakers, fuses, transformer(s), relays, ground lugs, and terminal blocks.
 - c. Include reference sheet in an archival quality acid-free sheet protector. It shall list initial pump set points, float elevation set points, and wet well elevations. Include level controller 'zero' elevation. All elevations to be based on USGS NAVD1988 Datum. The interior of the enclosure shall be provided with properly sized industrial grade corrosion inhibitors.
 - d. The enclosure shall be provided with thermostatically controlled, properly sized condensate heater. The heater shall be mounted on the lower portion of the

enclosure internal panel and shall be powered from a dedicated 15A circuit breaker.

- e. Furnish a door limit switch actuated panel LED light.
 - f. Include a door intrusion alarm.
 - g. Integrate a red 30mm oil and watertight alarm light on the exterior top side of the enclosure. Provide alarm horn with external push button silencer on side of enclosure.
 - h. Wire duct shall be installed as a wire way. Wire way shall be min 4" (100mm) in height and be filled to max 50% capacity. Install all wiring within the enclosure plastic wiring ducts. Separate DC and AC signals with separate wire ducts or routing.
 - i. To provide separation and protection from classified spaces, cable entry into the enclosure originating from the wet well shall require air gap between conduit and exterior junction box with terminal strips prior to cable entry into enclosure. See Standard Details.
 - j. Terminate all wiring at terminal blocks. Splices are not permitted.
 - k. Provide adequately sized uninterruptable power supply (UPS) in control panel. UPS shall be din-rail mounted, designed to operate in temperatures down to -14° F, manufactured by Phoenix Contact or Engineer approved equal.
2. Electrical and Control Panel Mounting
- a. Panels, junction boxes, meter base, transfer switches, and other above-grade elements shall be mounted on an aluminum dual pedestal framed system or shall be ground-mounted freestanding with bottom of control panel a minimum of 18 inches above grade. Wood frame is not permitted. All aluminum in contact with concrete shall have a bitumastic coating for protection against corrosion.
 - b. If rear-mounted, panels shall be mounted to aluminum back plate or unistrut supported by stainless steel or aluminum frame.
 - c. Applicant is responsible for engineering of appropriate structural frame and foundations. Pier foundations shall be minimum twenty-four-inch diameter reinforced cast-in-place concrete extending a minimum of four feet (4') below grade, unless approved otherwise.
 - d. Concrete pad (6" minimum thickness) shall surround panels and provide 18" minimum working area in front of each control and electrical panel.
3. Power
- a. The incoming control panel power wiring shall be terminated at distribution lugs and shall be provided with voltage surge arresters to protect all equipment mounted within the enclosure from switching surges and lightning induced surges.
 - 1) Locate surge arresters in such a manner as to facilitate inspection and future replacement of damaged units. Comply with UL 1449 and ANSI C62.41 Standards.
 - b. Power within the panel shall be distributed through thermal magnetic circuit breakers, which shall be accessible from the front of the swing-out panel without opening the swing-out panel. Provide the following:
 - 1) Size, voltage and configuration shall be per NEC requirements.
 - 2) Minimum rating: 10kAIC (Amperes Interrupting Capacity).
 - 3) Separate incoming terminals for control power, pressure transducer power supply, and telemetry RTU.
 - c. Provide a transformer to obtain 120 Volts AC power.

- 1) Transformer shall be high efficiency type, with 105 deg C temperature class, extra regulation, and low losses.
- 2) Size transformer to feed all 120 Volts AC within the enclosure +20%. Minimum size of the transformer shall be 1.0 KVA.
- d. Distribute 120 Volt AC power through single pole, circuit breakers as shown on the single line diagram, which shall have minimum interrupting rating of 10 kAIC. Provide a circuit breaker for each of the following items:
 - 1) Control power.
 - 2) Panel light.
 - 3) Thermostatically controlled enclosure heater described above.
 - 4) Convenience GFI receptacle.
 - 5) Site light.
 - 6) Generator block heater.
 - 7) Generator battery charger.
 - 8) Additional as specified on single line diagram.
- e. Install a duplex convenience receptacle, which shall be accessible from the front of the swing out panel. Receptacle shall be 15 Ampere, GFI (Ground Fault Interrupting) type.
- f. Provide each pump starter with the following:
 - 1) A minimum of one set of normally open starter auxiliary contacts.
 - 2) One set of normally open auxiliary overload alarm contacts.
 - 3) Provide for each pump starter circuit breaker tripped auxiliary contact.
- g. For each pump provide the following
 - 1) Motor thermal switch
 - 2) Seal failure sensor
- h. Provide terminal blocks, which shall be grouped together, for remote control and monitoring wiring.
- i. Provide all electromechanical relays as necessary to achieve the intended operation as described.
- j. Manufacturers shall be as listed below. Products of other manufacturers assembled to provide all specified functions, including reliability equal to or exceeding that of the manufacturers listed above may be submitted for approval.
 - 1) Circuit breakers and motor circuit protectors shall be Square D or Eaton.
 - 2) Pilot and control devices shall be as manufactured by Allen-Bradley, or Square D.
4. Submersible Pump Station Controls
 - a. Pump operation shall be completely automated.
 - 1) Provide a submersible continuous level sensor (transducer) for primary control with backup low level shut-off, high level lead pump alarm float, and high-high level lag pump run float control.
 - a) Backup float control low level shall be set below low level shut-off of transducer.
 - b) Backup float control high level shall be set above alarm level of transducer.
 - c) Low level backup float shall not disable hand operation of pump to drain wet well.
 - 2) Provide mounting brackets, cables, and other items as required.

- 3) Cables shall be of sufficient length to reach the junction box without the need of any splices.
 - 4) Start and stop one pump on rise or fall of water level.
 - 5) Start both pumps in the event the water continues to rise with one pump running.
 - 6) Automatically alternate the pumps in the lead position or each 24 hours, whichever occurs first. Lead pump selector shall be provided on inside swing-out door of control panel.
 - 7) Provide time delay relay to prevent motors from starting simultaneously.
 - 8) Automatically start the second pump if the lead pump should fail for any reason.
 - 9) Light exterior alarm light (flashing), sound alarm horn, and signal remote alarm device via auxiliary alarm contact in case of high-water level in the wet well.
 - 10) Light exterior alarm light (flashing), sound alarm horn, and signal remote alarm device via auxiliary alarm contact in case of low water level in the wet well.
 - 11) Light pilot indicator on inner swing-out door of enclosure, light exterior alarm light (solid), and signal remote alarm device via auxiliary alarm contact in case of a pump failure, overtemperature, or VFD failure signal.
- b. Pressure Transducer
- 1) The transducer shall indicate the level of liquid by continuously measuring hydrostatic pressure via its sensing element.
 - 2) Shall have a 3.5" flush diaphragm to prevent clogging of the sensing area.
 - 3) Shall be approved for intrinsically safe operation in hazardous locations as designated by Class I, Div 1, Groups A, B, C & D and Class II, Groups E, F & G. when used with an approved barrier.
 - 4) Operating temperatures: -20° to +180° F
 - 5) Diaphragm seal shall be 316L SS construction with 4.5" OD and 3.5" sensing area. Impervious to submersion in wastewater and have high resistance to corrosive and gaseous industrial atmosphere.
 - 6) Linear, isolated 4-20 mADC signal for remote reporting to connected device.
 - 7) Accuracy of system: +/- 1% of full scale at any point in calibrated range.
 - 8) Mounting shall be by stainless steel support cable and mounting bracket.
 - 9) Transducer shall be mounted within 12" of bottom of station, provided with weight to prevent floatation, and restrained sufficiently to protect from movement due to proximity to pumps, incoming flows, or other potential sources of motion.
 - 10) Transducer shall be hung from dedicated cable hanger separate from float cable hanger.
- c. Pump Controller
- 1) Microprocessor based, intelligent pump controller with pre-configured pump control logic and fault handling. Pump Control and Monitoring Equipment shall be Mercoind Series MPC Jr pump controller.
 - 2) Controller shall provide programmable level differential for on/off control of one or two pumps, valves, or other devices through two SPDT relays; additional programmable alarm contacts with front alarm light indication;

- selectable pump alternation; integral 24 VDC power supply for transmitter; and user-selectable security lockout of programming and / or set points.
- 3) Inputs: 4 (or 0) to 20 mA DC or 2 (or 0) to 10 VDC selectable.
 - 4) Input Impedance: Current = 10 ohms; Voltage = 5 K ohms.
 - 5) Output Ratings:
 - a) Control Relays: SPDT, rated 10A @ 240 VAC res., ¼ hp @ 120 VAC, 1/3 hp @ 240 VAC
 - b) Alarm Relays: SPST, 3A @ 240 VAC res., 1/10 HP @ 120 VAC;
 - c) Others: 15 VDC @ 20 mA for output one and output two.
 - 6) Control Type: On/off, reverse (pump out) or direct (pump in) acting.
 - 7) Power Requirements: 100 to 240 VAC nominal, +10% - 15%, 50 to 400 Hz, single phase, 132 to 240 VDC nominal, +10% - 15%.
 - 8) Power Consumption: 7.5 VA maximum.
 - 9) Accuracy: +/- 0.25% of span, +/- least significant digit.
 - 10) Display: Two 4-digit, 7 segment 0.56" high LEDs.
 - 11) Display Resolution: 1 count.
 - 12) Memory Backup: Nonvolatile memory (no batteries required).
 - 13) Serial Communications: Optional RS-232 or RS-485 with Modbus protocol.
 - 14) Ambient Operating Temperature / RH: 14 to 131 deg F / 0 to 90% up to 104 deg F non-condensing, 10 to 50% at 131 deg F non-condensing.
 - 15) Front Panel Rating: Meets US Type 4X (IP66).
 - 16) Loop Power Supply (Isolated): 24 VDC @ 50 mA, regulated.
 - 17) Agency Approvals: CE, cUL, UL.
- d. Other Controls Devices
- 1) The following control functions/devices shall be industrial grade oil tight and watertight types. Pilot lights shall be LED. Provide the following controls, which shall be visible from the front of the swing-out panel, with the enclosure door opened:
 - a) Pump mode for each pump, (Hand/Off/Auto) – 22.5mm operator.
 - b) Pump fault reset.
 - c) Level alarm reset.
 - d) A red "FLOAT HIGH LEVEL" pilot light.
 - e) A red "FLOAT LOW LEVEL" pilot light.
 - f) A red "TRANSDUCER HIGH LEVEL" pilot light.
 - g) A red "TRANSDUCER LOW LEVEL" pilot light.
 - h) A red "FLOAT BACKUP ENABLED" pilot light.
 - i) A blue "SEAL FAIL" pilot light for each pump.
 - j) A red "OVERTEMP" pilot light for each pump.
 - k) A green motor "RUN" pilot light for each pump.
 - l) A "VFD FAIL" pilot light for each pump if VFDs provided.
 - m) A non-resettable elapsed time meter for each pump.
 - n) A non-resettable elapsed time meter for when both pumps operate simultaneously.
 - o) Alarm test switch, labeled "On-Off-Test" for both the audible and visual exterior alarms.
- e. The control circuit shall be connected through the heat sensing switches in the pump and shall disconnect the control circuit in case of a high temperature

condition on the pump motor. A HP rated contactor shall be provided for each pump.

5. Variable Frequency Drives

- a. When VFDs are provided, drives shall be installed inside main control panel.
- b. For stations equipped with VFDs, provide closed loop air conditioner with filtered air louvers to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the enclosure. Air conditioner shall have a minimum capacity of 4,000 BTU. Housing shall be constructed of corrosion resistant materials.
- c. If VFDs provided for pump control (not for phase conversion), pump speed shall be controlled by wet well level in Auto mode. In Hand mode, pump speed shall be controlled by rheostat mounted in Control Panel.
- d. VFDs shall be Rockwell Automation PowerFlex 753 AC drive.

G. Standby Electrical Generator

1. Generators shall be sized for the lift station loads, including all pumps running.
2. Generators shall be wired to provide three-phase power. If the lift station is single phase power as approved by the Town, the generator shall be wired to provide both single-phase and three-phase power in the event three-phase power can be provided in the future.
3. Generator shall be supplied by **natural gas**, unless otherwise approved by the Town. Natural gas line installation shall comply with applicable codes and natural gas utility requirements, including spacing from generator and other improvements such as fencing and control panels. Natural gas service line and electrical / controls conduits shall enter generator from below the slab and shall not be permitted to run exposed above grade over the slab.
4. Generators shall include:
 - a. Rain cap on exhaust pipe.
 - b. Engine block heater which shall be powered from a dedicated circuit breaker in the pump control panel.
 - c. 10A battery charger which shall be powered from a dedicated circuit breaker in the pump control panel.
 - d. Main line circuit breaker.
 - e. Sound-attenuated, weather-proof enclosure.
5. The following generators are acceptable for use, listed by manufacturer:
 - a. Generac
 - b. Cummins
 - c. Or approved equal.

H. Transfer Switches

1. The Contractor shall furnish and install a transfer switch as specified by the Town on a project-specific basis.
2. Switch shall include:
 - a. NEMA 4X Enclosure
 - b. Condensation heater
 - c. Single sets of auxiliary contacts for each ATS position
 - d. Signal before transfer contacts

I. Telemetry System

1. Furnish and install a complete telemetry system which shall include antenna mountings, panels, and interfaces. All local codes relating to antenna height requirements, aircraft flight paths, and other pertinent issues must be adhered to. The system shall communicate with the Utility's SCADA system configured to coordinate with the Utility's system for remote communications.
2. Propagation study for radio signals shall be provided by telemetry manufacturer or authorized representative prior Town approval of plans.
3. Coordinate manufacturer and details with the Town of Huntertown. The Developer / Contractor is responsible to integrate with the existing Town of Huntertown SCADA system.
4. Telemetry system shall be installed by manufacturer's factory trained and authorized electrician.
5. Telemetry system shall monitor
 - a. pump run,
 - b. pump fail,
 - c. seal fail,
 - d. thermal fail,
 - e. high level,
 - f. low level,
 - g. transducer high level,
 - h. transducer low level,
 - i. transducer level,
 - j. generator run,
 - k. generator fault,
 - l. ATS in normal,
 - m. ATS in emergency,
 - n. magmeter flow rate (if meter required),
 - o. magmeter flow totalization (pulse output from flow device if meter required),
 - p. VFD speed reference monitoring (if VFD required),
 - q. any other parameters requested by Town on case-by-case basis.
6. The manufacturer shall provide the services of an authorized factory representative to inspect the installation, make any necessary adjustments, and place the equipment into operation. The manufacturer's representative shall instruct the operating personnel in the operation and maintenance of the equipment. The manufacturer's representative shall note any deficiencies on the startup report and inform the appropriate party at the time of start up to remedy the deficiency or make the necessary repairs or adjustments as needed.
7. The manufacturer or his representative shall allow time for site check outs and commissioning of the RTU at a time that is convenient to both parties. As a minimum this work will consist of:
 - a. Verifying communication between RTU and Software
 - b. Verifying all I/O at each site
 - c. Adjusting all scales for analog inputs at each device
 - d. Verifying output action and scale (analog only) if present
8. The manufacturer / vendor shall make available to the Town a general training session conducted either onsite or remotely via Zoom, Microsoft Teams, or similar program. Training items to be included as a minimum:

- a. RTU installation
 - 1) Proper wiring
 - 2) Programming
 - b. Troubleshooting an existing system
 - 1) Removal of nuisance alarms
 - c. Software programming
 - 1) Adding / removing RTU sites
 - 2) Adding / removing operators
 - 3) Creating / adjusting notification groups
 - 4) Adding / adjusting / removing I/O from RTU site(s)
 - 5) Adding / adjusting alarm paging and set points
 - d. Report generation / configuration
- 9. Telemetry RTU shall be mounted in separate NEMA 3R or NEMA 4X panel adjacent to the control panel.
- J. Magnetic Flow Meter (When Required)
 - 1. Flowmeter system accuracy shall be $\pm 0.5\%$ of flow rate over 10:1 turndown minimum. Repeatability shall be $\pm 0.1\%$ and response time programmable from 1 sec to 100 sec.
 - 2. Flow element shall be installed per Town standard details in meter pit downstream of valve vault.
 - 3. Remote exterior rated local readout panel with sunscreen to be installed adjacent to control panel.
 - 4. Flowmeter shall provide pulse output for total flow data transfer to telemetry RTU.
 - 5. Manufacturer shall be Siemens, Endress & Hauser, Krohne, or approved equal.
- K. Submersible Pump Station Piping and Valves
 - 1. Furnish complete station piping, valve pit, check valves and plug valves.
 - 2. The discharge pipe and fittings shall be ductile iron Class 350. Inside pipe and fittings shall be flanged. Bell end pipes or fittings with mechanical joints shall be provided at or near the outside face of the station well. Piping shall be supported independent of the sewage flanges.
 - 3. All plug valves shall be per the Materials specifications.
 - 4. All check valves shall be iron body, bronze mounted, with outside lever and weight, to operate without excessive loss of head. Valves shall be rated for 150 psi differential pressure. Covers shall be bolted and ends flanged. Check valves shall be of the size specified on the plans, shall be swing type check valves as manufactured by Clow, M & H, or approved equal. The valve shall permit flow in only one direction, close tightly when the discharge pressure exceeds the inlet pressure, and shall close without a slam or hammering action. All internal parts, including the disc seat, shall be easily replaced in the field without removing the valve from the pipeline. Valves shall be coated with fusion bonded epoxy coating on interior and exterior, 10 mils min.
 - 5. Guide rails and all interior miscellaneous metals, including bolts, shall be stainless steel.
 - 6. Piping and valves shall be provided with protective coatings per these standards.

PART 7 - SPECIFICATIONS OF CONSTRUCTION

7.1 Scope of the Work

- A. The Contractor shall furnish all labor, materials, necessary tools, equipment, all utility and transportation services and construct all mains and appurtenances complete and ready for continuous operation, including all pipe, manholes, cleanouts, valves, hydrants, fittings, curbs, curb and gutter, sidewalks, pump stations, pavement removal, pavement replacement, new pavement, site restoration, the protection of all existing structures and utilities, and all other items as required by the permitted Contract Documents.

7.2 Utilities for Construction Purposes

- A. The Contractor shall furnish all utilities for construction purposes. Any expenses related to temporary water or power connections shall be paid by the Contractor. Connections shall be made in accordance to Local, State, and Federal Codes.
- B. Construction Water Usage
 1. Construction water connections shall be temporary, to be broken when not in use and are to be made only with the permission of the Town.
 2. Contractors shall not use water from any home or business fixture unless the meter has been set. Once the meter has been set the holder of the building permit is subject to a one-time minimum monthly water usage charge.
 3. For penalties or fees associated with construction water usage refer to Chapter 51.13 of the Huntertown Code of Municipal Ordinances.
 4. An occupancy permit shall not be issued until all outstanding charges are paid.
 5. Hydrants: Contractors may use water from fire hydrants as long as the hydrant has been furnished with a meter, and the Town notified so that the meter can be read before and after use.
- C. The Town will provide water for the first sequence of flushing, disinfection, and pressure testing. Water required due to failed hydrostatic or disinfection tests will be charged to the Owner / Builder / Developer. Contractor(s) shall provide means to convey water for hydrostatic testing into piping being tested. Contractor(s) shall provide water for other types of testing required.

7.3 Material Furnished by the Contractor

- A. The Contractor shall be responsible for all material furnished by him and shall replace at his own expense all such material found defective in manufacture or damaged in handling after delivery by the manufacturer. Installed material discovered to be defective shall be removed and replaced with acceptable material at no additional cost to the Town. The Contractor shall be responsible for the safe storage of material furnished by him or to him, accepted by him, and intended for the work, until the material has been incorporated in the completed project. The interior of all pipe, fittings and accessories shall be kept free from dirt or foreign matter at all times.
- B. Changes Caused by Material Purchased by the Contractor: The Contractor shall make any and all necessary changes in construction and piping to install materials approved for installation.

7.4 Material Furnished by the Town

- A. The Contractor's responsibility for any material furnished by the Town shall begin at the point of delivery thereof to the Contractor. Material already on the site shall become the Contractor's responsibility.
- B. The Contractor shall examine all material furnished by the Town at the time and place of delivery to him and shall reject all defective material. Material furnished by the Town that becomes damaged after acceptance by the Contractor shall be replaced by the Contractor at no expense to the Town.

7.5 Disposition of Defective Material

- A. All material found during the progress of the work to have cracks, flaws or other defects will be rejected by the Town. All defective materials shall be promptly removed from the site of the work by the Contractor.

7.6 Material Verification

- A. The Town / Engineer Representative shall have access to material delivery tickets to allow for compliance verification with the specifications.

7.7 Disposal of Waste and Water

- A. During and following the completion of all work, the Contractor shall dispose of all waste, water and debris in a legal manner satisfactory to the Town.

7.8 Erosion Control

- A. Contractor shall provide and maintain methods, equipment, and temporary construction as required to control dust, erosion, and sediment at the Site and adjacent areas. Maintain controls until site is stabilized and controls no longer required by permit. Upon completion of Work, remove erosion and sediment controls and restore the Site to specified condition. If condition is not specified, restore Site to preconstruction condition. Comply with Indiana Department of Environmental Management Rule 5 regulations, with the requirements of the Allen County Municipal Separate Storm Sewer System (MS4), and with any project applicable Stormwater Pollution Prevention Plan (SWPPP).

7.9 Excavation & Backfill for Water & Wastewater

- A. Excavation
 1. All earth excavation shall be open cut from the surface, except where otherwise shown on the drawings. Excavation shall be interpreted to mean clearing the site; pavement removal where required; excavation of the material encountered in the proposed grade of the conduit; furnishing and placing all sheeting, trenching, trimming and bracing; supporting of structures above and below ground; removal and disposal of water; repairing damage to structures, conduits, and utilities encountered; backfilling; compaction; temporary surfacing of roadways; disposal of surplus materials; providing

barricades; temporary lighting; and restoration of the site. During the progress of excavation, care shall be exercised to reserve sufficient material for filling and backfilling.

B. Utility Trench Excavation

1. The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures and utilities, both known and unknown, may be determined, and he shall be held responsible for the repair of such when broken or otherwise damaged. The trench shall be excavated to a point below the bottom of proposed pipe to allow placement of bedding per these Specifications.
2. Open trenches shall be properly protected and guarded by the Contractor in such a manner as to prevent accidents, casualties, or damage of any nature whatsoever to persons, vehicles and abutting property.
3. The trench shall be excavated so that the pipe can be laid to the alignment and grade required. The trench shall be so braced and drained that the workmen may work therein safely and efficiently. It is essential that the discharge of any trench dewatering pumps be conducted to natural drainage channels, storm drains or storm sewers.
4. The Contractor shall thoroughly familiarize himself with and implement OSHA Rules and Regulations relating to the Construction Industry, with specific attention being given to the sections devoted to trench construction.

C. Exploratory Excavation

1. Location of Existing Underground Facilities:
 - a. Locations of existing Underground Facilities shown on the Drawings should be considered approximate.
 - b. Determine the true location of existing Underground Facilities to which connections are to be made, crossed, and that could be disturbed, and determine location of Underground Facilities that could be disturbed during excavation and backfilling operations, or that may be affected by the Work.
2. The Contractor will be required to excavate and locate existing underground improvements in advance of proceeding with the excavation for the conduit or carry the excavation sufficiently in advance of pipe laying operations that changes in line and grade may be accommodated in order to avoid such existing underground facilities. The cost of all exploratory excavation shall be the responsibility of the Contractor.
3. On the basis of the information obtained from the exploratory excavation, the Town / Engineer may order certain changes in line or grade of the conduit. In any case, changes in the new conduit, or in existing improvements, shall be made only with approval of the Town / Engineer.

D. Pipe Clearance in Rock

1. Ledge rock, boulders and large stone shall be removed to provide a clearance of at least six (6) inches below and on each side of all pipe and appurtenances. Pipe bedding shall be utilized around the pipe within these clearance areas.
2. The specified minimum clearances are the minimum clearance distances which will be permitted between any part of the pipe and appurtenances being laid, and any part, projection or point of such rock, boulder or stone.

E. Utility Trench Unstable Soil

1. In areas where unstable soil is encountered below the bottom of the pipe, the Contractor shall notify the Town / Engineer Representative. The length and depth to which unstable soil is to be excavated shall be as determined by the Town / Engineer Representative and no such material shall be excavated unless and until so ordered by the Town / Engineer Representative. All unstable soil shall be completely removed from the site of the work.
 2. In cases where over-excavation for the replacement of unacceptable soil materials is required, the excavation shall be backfilled to the required subgrade with special backfill material and thoroughly compacted as specified.
- F. Width of Trench
1. The width of trench shall be the minimum which will permit the pipe to be laid safely and jointed properly and the backfill to be placed and compacted as specified and as recommended by the pipe manufacturer and the Town / Engineer.
- G. Sheet piling, Bracing, and Shoring
1. Where required to properly protect the construction work, adjacent property, work or workmen, sheet piling, bracing and shoring shall be provided by the Contractor.
- H. Sheet piling Left in Place
1. Sheet piling, bracing and shoring shall not be left in place after completion of the work except as required by written order of the Town. Where required to protect the work, adjacent structures or property, sheet piling, bracing and shoring shall be left in place, but shall be cut or left not less than two feet below the established surface grade.
- I. Removal of Water
1. The Contractor shall provide and maintain during construction, adequate equipment to properly remove and dispose of all water entering the trench or other part of the work where conduits are being placed. In water bearing strata, well points or under drain material may be required to effect a dry trench or pit. No pipe shall be laid in water or when, in the opinion of the Town / Engineer Representative trench conditions are unsuitable.
- J. Piling of Excavated Material
1. In general, material excavated from trenches will not be allowed to be piled on adjacent walks and driveways. The amount of Public Street which may be occupied by the construction work at any time shall be subject to the requirements of the use of the street by the public and approval by the Town. Piling of material outside of right-of-way or easement lines will not be allowed without the written permission of the property owner.
- K. Disposal of Excavated Materials
1. All suitable excavated material shall be used in backfilling over the pipe and appurtenances or distributed otherwise in lawn areas to the design grades. All excess / unsuitable excavated material shall be removed by the Contractor and disposed of in a timely, legal, and appropriate manner. The Contractor shall be responsible for securing disposal site(s), as well as all grading or reseeding required at same.
 2. For all offsite stockpiles and disposal of excavated materials, Contractor is responsible for the Indiana Rule 5 Erosion Control Permit as applicable and implementation of erosion control.

- L. Blasting
 - 1. Blasting and explosives will not be permitted.
- M. Backfilling
 - 1. All trenches and excavations shall be backfilled to at least the original surface of the ground or pavement subgrade with allowances made for subsequent settlement. Backfill material shall be deposited in the trench in lifts for its full width simultaneously. Care shall be exercised to work the embedment material completely around the pipe and backfill material completely around appurtenances, filling all voids. Compaction of the backfill shall be provided to the extent that undue settlement of the backfill does not occur. For nonpavement areas, the backfill shall be placed in lifts to the original grade level. For pavement areas and areas within the loading influence of the pavement, special backfill shall be placed in lifts and compacted per these specifications.
- N. Backfilling in Freezing Weather
 - 1. Backfilling shall not be completed in freezing weather except by permission of the Town / Engineer Representative. No backfilling shall be made with frozen material, nor shall backfilling be made when the material in the trench is already frozen.
- O. Backfill and Fill; Suitable & Unsuitable Materials
 - 1. See "Materials".
- P. Embedment Material for Flexible Pipes
 - 1. See "Materials".
- Q. Embedment Material for Rigid Pipes
 - 1. See "Materials".
- R. Special Backfill
 - 1. See "Materials".
- S. Compaction
 - 1. Compaction will be required of all embedment material. The Contractor shall maintain on the job site with each crew, a copy of the manufacturer's recommendations with respect to pipe embedment material and compaction.
 - 2. With respect to special backfill material, the Contractor shall place the material in lifts and compact each lift per the following table.
 - 3. Material shall be within plus or minus two percent (2%) of optimum moisture content. The Contractor shall submit to the Town written documentation of proof of compaction. Provide mechanical compaction for cohesive material and vibratory compaction for granular materials, unless otherwise approved by the Town / Engineer. Jetting, flooding, puddling, or vibroflotation may not be used without written consent of the Town / Engineer. Noncohesive soils shall be compacted with vibrating roller or equivalent; cohesive soils shall be compacted with sheeps-foot roller, pneumatic tamping, or approved equivalent, unless otherwise indicated. Granular bedding for structures shall have each lift thoroughly compacted and seated with the subgrade. Compaction methods and procedures shall be subject to approval of the Town / Engineer. Unless otherwise indicated or approved by the Town / Engineer, place fills in the loose lift thicknesses indicated hereafter and compact to a dry density not less than the specified percentage

of maximum dry density, determined by the Modified Proctor Test, ASTM D1557, unless otherwise noted.

Usage	Percent Compaction	Lift Thickness
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Subgrade and Subbase Fill:

Below Pavements, Walkways	95	8
Below Footings or Structural Slabs	98	6
Lawn Areas	90	8
Fill Adjacent to (Or Behind) Vertical Walls	95	8
Special Backfill (Pipes & Structures)	95	6
Trench Backfill Above Pipe (Lawn Areas)	90	8
Manhole / Drainage Structure Backfill (Lawn Areas)	90	8
Granular Pipe Embedment Material	90	6

T. Compaction Testing During Construction

1. Quality Control Testing During Construction: Contractor's independent testing service shall inspect and approve subgrades and fill layers before construction Work is performed thereon. All associated costs for density testing as specified by the Town shall be at the expense of the Contractor.
2. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.
3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
4. Tests of subgrades and fill layers shall be taken as follows:
 - a. The frequency of Contractor confirmation tests shall be not less than as follows: Each test location for trenches shall include tests for each layer, type, or class of backfill from bedding to finish grade.
 - 1) Trenches for Underground Facilities:
 - a) In open fields: Two locations every 1,000 linear feet.
 - b) Along dirt or gravel roads or off traveled Right-of-Way: Two locations every 500 linear feet.
 - c) Crossing paved roads: Two locations along each crossing.
 - d) Under pavement cuts or within two feet of pavement edges: One location every 400 linear feet.
 - 2) For Structural Backfill: On 30-foot intervals on all sides of the structure for every compacted lift, but no less than one per lift on each side of the structure for structures less than 60 feet long on a side.
 - 3) In Embankment or Fill: One per 1,000 square feet on every compacted lift.
 - 4) Base Material: One per 1,000 square feet on every compacted lift.

- 5) Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least 1 test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Town / Engineer.
 - b. Copies of the test reports shall be submitted promptly to the Town / Engineer. Contractor tests shall be performed by a soils testing laboratory acceptable to the Town / Engineer.
- U. Construction in Highway Rights of Way
 1. All construction within the road right-of-way shall be carried out in complete accordance with the requirements of the respective highway authority: Town, County, or INDOT.
- V. Special Highway and Railroad Crossings
 1. Special construction procedures will be required at those locations as shown on the drawings. When required, special construction procedures shall consist of boring a casing pipe for installation of a carrier pipe. The casing pipe lengths, size, thickness and location shall be as shown on the drawings and on the permits.
- W. Directional Drilling (Pipe Sizes Greater than 2")
 1. General
 - a. The pilot hole and reamed hole shall be drilled so as to provide straight sections and uniform transitions from straight to long radius curve sections. The pipeline profile shall contain no high points except as noted on the drawings. The drill path shall be monitored by using a pothole machine and electronic package. The minimum required cover on water mains and sewage force mains shall be five (5) feet. At no time shall any bore contain voids. All directional drilling shall be stopped immediately if any surface deformation is detected in the road right-of-way.
 2. Equipment Requirements:
 - a. The Contractor shall ensure that appropriate equipment is provided to facilitate the installation. Equipment shall be matched to the size of pipe being installed and shall have appropriate torque and thrust/pullback capacity for the diameter and length of the intended drilling sections. The Contractor will ensure that the drill rod can meet the bend radius required for the proposed installation.
 3. Drilling Fluids:
 - a. In order to minimize friction and prevent collapse of the bore hole, introduce a soil stabilizing agent (drilling fluid) into the annular bore space from the trailing end of the drill bit. The rotation of the bit in the soil wetted by the drilling fluid creates a slurry. The slurry acts to stabilize the surrounding soil and prevent collapse of the bore hole as well as provides lubrication.
 - b. Select or design drilling fluids for the site specific soil and ground water conditions.
 - c. A mixture of bentonite clay or other approved slurry and potable water with a minimum pH of 6.0 shall be used as the cutting and soil stabilization fluid. The viscosity shall be varied to best fit the soil conditions encountered. Water shall be clean and fresh. No other chemicals or polymer surfactant are to be used in the drilling fluid without the written consent of the Engineer and after a determination

is made that the chemicals to be added are not harmful or corrosive to the facility and are environmentally safe.

- d. The Contractor shall identify the source of fresh water for mixing the drilling mud. The Contractor shall be responsible for approvals and permits required for such sources as streams, rivers, ponds, or fire hydrants. Any water source other than potable water may require a pH Test.
- e. Ensure that all drilling fluids are disposed of or recycled in a manner acceptable to the appropriate local, state, or federal regulatory agencies. When drilling in suspected contaminated ground, the drilling fluid shall be tested for contamination and disposed of appropriately. Any excess material shall be removed upon completion of the bore.

4. Installation

a. General

- 1) Contractor shall install the pipelines by means of horizontal directional drilling as shown, specified and as recommended by the manufacturer.
- 2) Contractor shall be responsible for his means and methods of directional drilling construction and shall ensure the safety of the work, the Contractor's employees, the public, and adjacent property, whether public or private.
- 3) Contractor shall anticipate that portions of the drilled excavation will be below the groundwater table.
- 4) Contractor shall comply with all local, state, and federal laws, rules, and regulations at all times to prevent pollution of the air, ground, and water.
- 5) If there is a conflict between manufacturer's recommendations and the Drawings or Specifications, request instructions from Engineer before proceeding.
- 6) The pipe shall be installed in the location and to the line and grade designated on the drawings.
- 7) The timing of all boring processes is critical. Install a product into a bore hole within the same day that the pre-bore is completed to ensure necessary support exists.
- 8) Provide for testing and cleanup as soon as practicable, so these operations do not lag far behind pipe installation. Perform preliminary cleanup and grading operations immediately after backfilling.
- 9) All surfaces shall be finish graded to original contours and ground cover.
- 10) Excavated material, which is not removed from the immediate work site, shall be stockpiled so as to cause as little inconvenience to the property owners as possible. Driveways and street crossings must be kept clear.
- 11) Carry out excavation for entry, exit, recovery pits, slurry sump pits, or any other excavation.
- 12) Confine free flowing (escaping) slurry or drilling fluids at the ground surface during pull back or drilling. Accomplish this by creating sump areas or vacuum operations to prevent damage or hazardous conditions in surrounding areas. Sump pits are required to contain drilling fluids if vacuum devices are not operated throughout the drilling operation.
- 13) Ensure adequate removal of soil cuttings and stability of the bore hole by monitoring the drilling fluids such as the pumping rate, pressures, viscosity and density during the pilot bore, back reaming and pipe installation. Relief holes can be used as necessary to relieve excess pressure down hole. To

minimize heaving during pull back, the pull back rate is determined in order to maximize the removal of soil cuttings without building excess down hole pressure. Contain excess drilling fluids at entry and exit points until they are recycled or removed from the site or vacuumed during drilling operations. Ensure that entry and exit pits are of sufficient size to contain the expected return of drilling fluids and soil cuttings.

- 14) After completing installation of the product the work site shall be restored. The work site shall be cleaned of all excess slurry left on the ground. Removal and final disposition of excess slurry or spoils as the product is introduced shall be the responsibility of the Contractor.
 - 15) Excavated areas shall be restored in accordance with the Contract Documents. The cost of restoring damaged pavement, curb, sidewalk, driveways, lawns, storm drains, landscape, and other facilities is borne by the Contractor.
 - 16) Contractor shall take responsibility for any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid (frac-out), or the directional drilling operation, at no cost to the Owner. All restoration shall be per the Town's standards.
 - 17) If an existing marked (or otherwise known) utility is damaged, stop bore immediately and repair at no cost to the Town.
 - 18) If underground utilities and/or structures not shown on the Drawings are encountered, notify the Town and do not proceed until instructions are obtained.
 - 19) Notify the Town if springs or running water are encountered.
 - 20) Provide maintenance of traffic in accordance with the municipal street department, county highway department, or state department of transportation and these Specifications as applicable. Comply with the Manual of Uniform Traffic Control Devices when the former are silent.
5. Utility Verification (Potholing)
- a. Contractor shall conduct prior to the start of construction the verification of all underground utilities (potholing) that may conflict with construction.
 - b. Potholing results shall be presented to the Town on a full set of drawings showing accurate locations of utilities. Information marked on the plans should include horizontal tie downs as well as depths related to USGS elevation.
 - c. Alignment of the proposed utility (horizontal and vertical) may be adjusted in the field upon review of potholing results by the Town.
 - d. All potholes are to be protected and marked so as to not cause injury.
6. Locating and Protecting Sanitary Sewer Laterals
- a. Sanitary sewer laterals are considered "private" and are not part of the public sewer system and begin at the inside face of the public sewer.
 - b. It shall be the Contractor's responsibility to pothole and verify the location of the underground utility (sanitary sewer lateral) that may be in conflict with the water main construction.
 - c. It shall be the Contractor's responsibility to protect sanitary sewer laterals during all construction activities.
 - d. Any and all costs associated with locating, protecting, and repairing sanitary sewer laterals shall be considered incidental to the project cost and the responsibility of the Contractor.

7. Drilling Operations
 - a. Directional drilling/boring shall use techniques of creating or directing a borehole along a predetermined path to a specified target location. This must involve use of mechanical and hydraulic deviation equipment to change the boring course and must use instrumentation to monitor the location and orientation of the boring head assembly along a predetermined course.
 - b. Drilling must be accomplished with fluid assisted mechanical cutting. The spoils must be transported from the job site and be properly disposed. Under NO circumstances will the drilling spoils be permitted to be disposed into waterways, sanitary, storm, or any other public or private drainage system.
 - c. Steering shall be accomplished by the installation of an offset section of drill stem that causes the cutterhead to turn eccentrically about its centerline when it is rotating. When steering adjustments are required, the cutterhead offset section is rotated toward the desired direction of travel and the drill stem is advanced forward without rotation.
8. Locating and Tracking
 - a. The Contractor shall at all times provide and maintain instrumentation that will accurately locate the pilot bore/hole and measure drilling fluid flow and pressure.
 - b. The Contractor shall describe the method of locating and tracking the drill head during the pilot bore. The accepted methods of tracking directional bores are walkover, wire line, and wire line with surface grid verification, or any other system as approved by the Engineer. The locating and tracking system shall be capable of ensuring that the proposed installation is installed as intended. The locating and tracking system shall provide information on:
 - 1) Clock and pitch information
 - 2) Depth.
 - 3) Transmitter temperature.
 - 4) Battery status.
 - 5) Position (x,y).
 - 6) Azimuth, where direct overhead readings (walkover) are not possible (i.e. subaqueous or limited access transportation facility.)
 - 7) Alignment readings or plot points shall be taken and recorded such that elevations from the top of and offset dimensions from the center of the product to a permanent fixed feature are provided. Provide elevations and dimensions at all bore alignment corrections (vertical and horizontal) with a minimum distance between points of fifty (50) feet. Provide a sufficient number of elevations and offset distances to accurately plot the vertical and horizontal alignment of the installed product. Before commencement of a directional drilling operation, proper calibration of the equipment (if required) shall be undertaken.
 - c. Contractor shall grant Town access to all data and readout pertaining to the position of the bore head and fluid pressures and flows. No information pertaining to the position or inclination of the pilot bores shall be withheld from the Town.
 - d. Install all facilities such that their location can be readily determined by electronic designation after installation. Tracer wire complying with Town standards as set forth in this specification shall be provided with each directionally drilled pipe.
 - e. Test conductors for continuity. Conductors shall be installed to ground level at each hydrant and valve box.

9. Ream and Pullback

- a. After an initial bore has been completed, a reamer will be installed at the termination/exit pit and the pipe will be pulled back to the starting/entry pit.
- b. Reaming operations shall be conducted to enlarge the pilot after acceptance of the pilot bore. The number and size of such reaming operations shall be conducted at the discretion of the Contractor. However, the Contractor shall minimize potential damage from soil displacement / settlement by limiting the ratio of the bore hole to the product size. The size of the back reamer bit or pilot bit, if no back remaining is required, will be limited relative to the product diameter to be installed as follows:

Maximum Pilot or Back-Reamer Bit Diameter When Rotated 360 Degrees	
Nominal Inside Pipe Diameter Inches [mm]	Bit Diameter Inches [mm]
2 [50]	4 [100]
3 [75]	6 [150]
4 [100]	8 [200]
6 [150]	10 [250]
8 [200]	12 [300]
10 [250]	14 [350]
12 [300] and greater	Maximum Product OD plus 6 [150]

- c. The maximum allowable pull exerted on the HDPE pipelines shall be measured continuously and limited to the maximum allowed by the pipe manufacturer so that the pipe or joints are not over stressed.
- d. A swivel shall be used to connect the pipeline to the drill pipe to prevent torsional stresses from occurring in the pipe.
- e. The lead end of the pipe shall be closed during the pullback operation.
- f. The pipelines shall be adequately supported by rollers and side booms and monitored during installations so as to prevent over stressing or buckling during the pullback operation.
- g. Support/Rollers shall be spaced at a maximum of 60 feet on centers, and the rollers to be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback.

10. Drilling Failure

- a. If conditions warrant removal of any materials installed in a failed bore path, it will be at no cost to the Owner. Promptly fill all voids by injecting all taken out of service products that have any annular space with excavatable flowable fill.
- b. No payment will be made for failed bore paths, injection of flowable fill, products taken out of service or incomplete installations.

11. Work Affecting Existing Piping

- a. Location of Existing Piping
 - 1) Locations of existing piping shown should be considered approximate.
 - 2) Contractor shall determine the true location of existing piping to which connections are to be made, and location of other facilities which could be disturbed during earthwork operations, or which may be affected by Contractor's Work in any way.
- b. Taking Existing Pipelines Out of Service
 - 1) Do not take pipelines out of service unless approved by Engineer.

- 2) Notify Engineer, in writing, at least 48 hours prior to taking pipeline out of service.
12. Quality Control
 - a. A representative of the Contractor must be in control of the operation at all times. The representative must have a thorough knowledge of the equipment and the procedures to be performed, and must be present at the job site during the installation.
 - b. The Town must be notified forty-eight (48) hours in advance of starting work. The installation shall not begin until the Town's representative is present at the job site and agrees that proper preparations have been made.

7.10 Pipe & Fittings for Wastewater

- A. General Requirements
 1. The Contractor shall furnish and install, complete and ready for continuous operation, all new water, sanitary sewer, and appurtenances as shown on the drawings and/or herein specified. The Contractor shall furnish and follow the manufacturer's recommendations and requirements for the installation and use of the selected pipe, fittings and special appurtenances.
 2. A complete installation shall include materials, labor, all special features, appurtenances, supports, transitions between different types of pipe and structural modifications for the type of pipe furnished.
 3. Contractor shall be responsible for verification of pipe loading during construction. Pipe design is based on final installation depth and required cover.
- B. Replacement of Existing Pipes and Appurtenances
 1. Unless shown or noted otherwise on the drawings, all existing sewer lines, water lines, drainage tile, culverts, or other pipe conduits or appurtenances that are disturbed by construction shall be repaired or replaced with the same type and size as encountered. The cost of all such repair or replacement shall be the Contractor's responsibility.
 2. The location of all repaired lines shall be furnished to the Town / Engineer Representative as part of the As-Built Record Drawings. The information provided shall indicate the size, depth and material of the line as well as the size and material utilized in making the repair.

7.11 Polyethylene Encasement

- A. When specified, provide polyethylene encasement for ductile iron piping to prevent contact between pipe and surrounding bedding material and backfill.
- B. Lumps of clay, mud, cinders etc. on the pipe surface shall be removed prior to installation of the polyethylene encasement.
- C. Polyethylene film shall be fitted to the contour of the pipe creating a snug, but not tight, encasement with the minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as, bell-spigot interfaces, bolted joints or fittings and to prevent damage to the polyethylene caused by backfilling operations.
- D. Overlaps and ends shall be secured with adhesive tape or plastic tie straps.

- E. Installations below the water table tube-form polyethylene should be used with both ends thoroughly sealed with adhesive tape or plastic tie straps at the joint overlaps.
- F. Circumferential wraps of tape shall be placed at 2 foot intervals along the barrel of the pipe.
- G. Provide polyethylene wrap for fire hydrant leads and valves if specified in Contract Documents.

7.12 Pipe Tracing Wire

- A. Installation
 - 1. Tracing wire shall be laid directly over the pipe and attached to the pipe at regular intervals not to exceed ten (10) feet.
 - 2. Attach the tracer wire to the pipe using plastic “zip” strapping or metal wire.
 - 3. The following technique shall be used to splice wires together:
 - a. Use direct bury lug and strip the wire to 5/8”.
 - b. Place one stripped conductor into the lug.
 - c. Tighten the set screw till it comes in contact with the solid conductor.
 - d. Note the location of screwdriver and continue tightening the set screw $\frac{3}{4}$ turn for # 10 solid copper wire.
 - e. Repeat the steps for the adjacent side.
 - f. Remove sealant cover and discard. Close housing, aligning conductors until housing lid is fully latched.
 - 4. For valves, the wire shall be brought up the outside of the valve or curb box riser or cleanout. Construct an opening in the lip of the valve box or curb box to allow the top of the tracer wire to be stored inside the box. Ensure that the opening is sized adequate so the cover will fit snug onto the box, once the tracer wire is installed. The wire should be installed with an excess length of 4-6 inches that is to be folded down in the valve box.
 - 5. For cleanouts, the wire shall be brought up the outside of the cleanout. Wrap a minimum of 12” of wire around the outside of the cleanout within four inches of grade. No tracing wire should be drawn up inside or terminated inside a cleanout.
 - 6. For hydrants, install tracing wire in the hydrant shut off valve box in accordance with the installation requirements for valves listed above.
 - 7. All water service lines shall be installed with tracer wire to the water meter valve in the house as well as to the top of the curb box.
 - 8. Successful completion of conductivity test to be completed by the Contractor and in the presence of the Town / Engineer. Successful completion of the test will be required prior to acceptance of water main.

7.13 Pipe Installation for Water and Wastewater

- A. General
 - 1. Install piping as shown, specified, and as recommended by pipe and fittings manufacturer.
 - 2. In event of conflict between manufacturer’s recommendations and the Contract Documents, request interpretation from Town / Engineer before proceeding.
 - 3. Town / Engineer will observe excavations and bedding prior to laying pipe by Contractor. Notify Town / Engineer in advance of excavating, bedding, pipe laying, and backfilling operations.

4. Comply with NFPA 24 for "Outside Protection", where applicable to water piping systems used for fire protection.
 5. The Town of Huntertown shall be the only party allowed to operate Huntertown's water valves and hydrants.
- B. Cleaning Pipe and Fittings
1. All lumps, blisters, and excess coatings shall be removed from the bell and spigot end of each pipe.
- C. Separation of Sewers from Potable Water Piping or Potable Water Structures
1. Horizontal Separation:
 - a. Existing and proposed potable water mains and service lines, and sanitary, combined, and storm sewers shall be separated horizontally by clear distance of at least ten feet.
 - b. If local conditions preclude the specified clear horizontal separation, installation will be allowed if potable water main is in separate trench or on undistributed earth shelf on one side of sewer and with bottom of potable water main at least 18 inches above top of sewer.
 - c. No water main should be located within 8 feet of a sanitary or storm sewer manhole as measured from the outside edge of the water main to the outside edge of the structure.
 - d. Exception:
 - 1) Where it is not possible to provide minimum horizontal separation described above, construct sewer pipe or pressure pipe complying with public water supply design standards of authority having jurisdiction. Hydrostatically test newly installed pressure piping to a minimum complying with public water supply design standards of authority having jurisdiction. Hydrostatically test water main and sewer as specified in this Section prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.
 - 2) Alternatively, the water main or the sewer line may be encased in a watertight carrier pipe which extends 10 feet on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of the materials approved by the Town for water main construction.
 2. Vertical Separation:
 - a. Provide minimum vertical distance of 18 inches between outside of potable water main and outside of sewer when sewer crosses potable water main.
 - b. Center a section of potable water main pipe at least 17.5 feet long over sewer so that sewer joints are equidistant from potable water main joints.
 - c. Provide adequate structural support where potable water main crosses under sewer. At minimum, provide compacted select backfill for ten feet on each side of crossing.
 - d. Exceptions:
 - 1) Where it is not possible to provide minimum vertical separation described above, construct sewer pipe or pressure pipe complying with public water supply design standards of authority having jurisdiction. Hydrostatically test water main and sewer as specified in this Section, prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.

- 2) Encase either potable water main or sewer in watertight carrier pipe extending ten feet on each side of crossing, measured perpendicular to potable water main, with a watertight carrier pipe of the materials approved by the Town for water main construction.
 - e. Where a water main crosses under a sewer, the main shall use 22.5 degree elbows to minimize the length of water main installed in excess of five feet (5') of cover.
 3. Separation of Sewer Mains from Potable Water Structures:
 - a. Maintain sanitary setbacks from water supply wells and other water supply sources and structures per the requirements of 327 IAC 8-3.4-9.
- D. Plugs (Bulkheads)
1. Temporarily plug installed pipe as directed by Town at end of each day of work or other interruption of pipe installation to prevent entry of animals, liquids, and persons into pipe, and entrance or insertion of deleterious materials into pipe. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
 2. Install standard plugs in bells at dead ends, tees, and crosses. Cap spigot and plain ends.
 3. Fully secure and block plugs, caps, and bulkheads installed for testing to withstand specified test pressure.
 4. Where plugging is required for phasing of the Work or subsequent connection of piping, install watertight, permanent type plugs, caps, or bulkhead acceptable to Town / Engineer.
- E. Bedding Pipe
1. Bed pipe as specified herein and in accordance with the Town standard drawings.
 2. Excavate trenches below bottom of pipe by amount shown and indicated in the Town standard drawings and permitted Contract Documents. Remove loose and unsuitable material from bottom of trench.
 3. Carefully and thoroughly compact pipe bedding with hand held pneumatic compactors.
 4. Bedding to be shaped to provide continuous bearing support to pipe for full length. Bedding to be shaped to receive bell and maintain bearing support on remainder of pipe.
 5. Do not lay pipe until Town / Engineer approves bedding condition.
 6. Do not bring pipe into position until preceding length of pipe has been bedded and secured in its final position.
- F. Alignment
1. Install pipe accurately to line and grade shown and indicated in the Contract Documents, unless otherwise approved by Town / Engineer.
 2. Slope piping uniformly as shown on the Drawings.
 3. For gravity pipe installations, maintain reference line and grade with laser equipment daily for adjustment and accuracy. Correct deficiencies in equipment, reference line and reference grade. Take precautions to prevent deflections in reference line and grade.
 4. Contractor shall install sewer pipe in compliance with slope requirements shown on the Drawings.
 5. Contractor shall test every section of installed gravity sewer pipe for compliance with design slope. All gravity sanitary sewer pipe shall be installed using a laser and target system through the pipe. A ground surface laser and target system will be permitted for use when installing force main pipe that requires alignment and grade. The use of a laser

system does not preclude the use of differential leveling instruments for determining the exact elevation of the installed pipe.

G. Laying Pipe

1. Conform to manufacturer's instructions and requirements of standards and manuals listed below, as applicable:
 - a. Ductile Iron Pipe: ANSI/AWWA C600, ANSI/AWWA C105, AWWA M41.
 - b. Thermoplastic Pipe: ASTM D2321, ASTM D2774, ANSI/AWWA C605, AWWA M23, AWWA M45, AWWA M55, ASTM F645.
 - c. Sanitary and Storm Sewers: ASCE 37.
2. Each piece shall be opposite or near the place where it is to be laid in the trench. Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe and fittings shall be carefully lowered into the trench, piece by piece, by means of a crane, rope or other suitable tools or equipment, in such a manner so as to prevent damage to main materials and to protective coatings and lining. Under no circumstances shall main materials be dropped or dumped into the trench.
3. Slope piping uniformly between elevations shown.
4. No pipe lengths shorter than 6 ft are permitted without written approval of the Town / Engineer.
5. Do not lay pipe in water. Maintain dry trench conditions until jointing and backfilling are complete. Keep clean and protect interiors of pipe, fittings, valves, and appurtenances.
6. Place bell and spigot-type pipe so that bells face the direction of laying, unless otherwise approved by Town / Engineer.
7. Deflections at joints shall not exceed 75 percent of amount allowed by pipe manufacturer, unless otherwise approved by Town / Engineer.
8. Carefully examine pipe, fittings, valves, and specials for cracks, damage, and other defects while suspended above trench before installation. Immediately remove defective materials from the Site and replace with acceptable products.
9. Inspect interior of all pipe, fittings, valves, and specials and completely remove all dirt, gravel, sand, debris, and other foreign material from pipe interior and joint recesses before pipe and appurtenances are moved into excavation. Bell and spigot-type mating surfaces shall be thoroughly cleaned and dried immediately before pipe is laid.
10. Field cut pipe, where required, with machine approved by manufacturer for cutting the type of pipe being installed. Make cuts carefully, without damage to pipe, coating or lining, and with smooth end at right angles to axis of pipe. Cut ends on push-on joint type pipe shall be tapered and sharp edges filed off smooth. Do not flame-cut pipe. Breaking of the pipe with any type of hammer will not be permitted.
11. Do not place blocking under pipe, unless specifically approved by Town / Engineer for special conditions.
12. Touch up protective coatings in manner satisfactory to Town / Engineer prior to backfilling.
13. Notify Town / Engineer in advance of backfilling operations.
14. On steep slopes, take measures acceptable to Town / Engineer to prevent movement of pipe during installation.
15. Thrust Restraint: Where required by specifications or shown on permitted Contract Documents, provide thrust restraint.

16. Exercise care to avoid flotation when installing pipe in cast-in-place concrete, and in locations with high groundwater. The Contractor shall take all precautions necessary to prevent flotation of the pipe due to water coming into the trench. Any damage from flotation or water entering the trench shall be corrected by removing that section which becomes damaged and repairing or replacing it.

H. Joining Pipe

1. All pipe joints shall be made up in strict accordance with the pipe manufacturer's recommendations. Joints not tight shall be disassembled, thoroughly cleaned, and remade. Under no conditions shall bolted joints be made tight by overstressing the bolts, or tightening the bolts beyond the manufacturer's recommended range of torque. The Contractor shall provide and have available for the use of the Town / Engineer Representative on the job at all times, properly calibrated indicating torque wrenches to fit all joint bolts being used. Joints found to have bolts tightened above the manufacturer's recommended maximum torque shall be disassembled, cleaned, and properly remade as directed by the Town.
2. Slip joints and other rubber gaskets type pipe joints shall be installed in strict accordance with the manufacturer's recommendations. Lubricants other than those recommended by the pipe manufacturer shall not be used. Joints found to be not tight or with the plain end not sufficiently inserted into the socket shall be disassembled, thoroughly cleaned and properly installed. The plain end shall not be inserted beyond the manufacturer recommendations into the receiving end.

I. Backfilling

1. Conform to applicable requirements of the Excavation & Backfill Specifications.
2. Place backfill as Work progresses.

J. Transitions from One Type of Pipe to Another

1. Provide necessary adapters, specials, and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

K. Thrust Restraint

1. Provide thrust restraint on piping systems where shown or indicated in the Contract Documents.
2. Thrust restraint may be accomplished by using restrained pipe joints. Harnessing buried pipe or use of thrust blocks is permitted only if approved by Town / Engineer in writing. Thrust restraints shall be designed for axial thrust exerted by test pressure specified on Contract Drawings, or 150 psi for water mains or 100 psi for force mains if not listed on Drawings.
3. Restrained Pipe Joints:
 - a. Pipe joints shall be restrained by means suitable for the type of pipe being installed.
 - 1) Ductile Iron, Push-on Joints and Mechanical Joints: Restrain with proprietary restrained joint system; or other suitable joint restraint system, subject to the approval of Town / Engineer.
 - 2) Thermoplastic and HDPE Joints: Where bell and spigot-type or other non-restrained joints are utilized, provide proprietary restrained joint system; or other suitable joint restraint system, subject to the approval of Town / Engineer.

4. Project Engineer shall submit for approval a joint restraint length schedule for each diameter and material of piping utilized on the project and requiring restraint. See standard drawings for further detail.
- L. Work Affecting Existing Piping
1. Operation of existing valves shall be by Town only.
 2. Taking Existing Pipelines and Underground Facilities Out of Service:
 - a. Do not take pipelines or Underground Facilities out of service unless specifically listed in the Contract Documents or approved by Town / Engineer.
 - b. Notify Town / Engineer in writing prior to taking pipeline or Underground Facilities out of service.
 - c. Shutdown notification shall be provided twenty-four (24) hours in advance of the shutdown in accordance with the General Conditions and Contract Documents. Notice to affected occupants, Fire Department, Owner, and Town / Engineer is required.
 - d. Shutdown not to exceed four (4) hours. Stand-by service to be provided as required.
 3. Work on Existing Pipelines or Underground Facilities:
 - a. Cut or tap piping or Underground Facilities as shown or required with machines specifically designed for cutting or tapping pipelines or Underground Facilities, as applicable.
 - b. Prevent contamination of existing facilities. Install temporary plugs to prevent entry of mud, dirt, water, and debris into pipe.
 4. Salvage all hydrants, valve boxes, & curb boxes removed and deliver to Town unless noted otherwise by the Town. Remove with caution to avoid damage to hydrant or box.
- M. Records
1. Record Documentation:
 - a. Maintain accurate and up-to-date record documents showing modifications made in the field, in accordance with approved submittals, and other Contract modifications relative to buried piping Work. Submittal shall show actual location of all piping Work and appurtenances at same scale as the Drawings.
 - b. Show piping with elevations referenced to Project datum and dimensions from permanent structures. For each horizontal bend in piping, include dimensions to at least three permanent structures, when possible. For straight runs of piping provide offset dimensions as required to document piping location.
 - c. Include profile drawings with buried piping record documents when the Contract Documents include piping profile drawings.
 - d. The Contractor shall keep accurate and complete records of the actual location of all fittings, existing pipes, repair of existing utilities or tiles, tap locations into the main and the depths of the service laterals at the point of termination of the laterals.
 - 1) Said records shall be turned over to the Town at the completion of the project. Each sewer and water fitting, structure, tap location, or valve box shall be referenced to three permanent monuments. All water service tap lines shall be measured from the building corners on the property served.
 - e. As-built drawings shall be submitted on a hard paper format and in an electronic format compatible with AutoCAD.

- 1) All as-built wye and connection locations shall be as shown on a set of as-built drawings by the Contractor and also typewritten on a separate page with the owner's name and address.

N. Special Installation Instructions

1. In recognition of the fact that there are currently many different pipe materials available from many different manufacturers, the Contractor will be required to obtain from the pipe manufacturer his published recommendations for installation of his pipe, and nothing in these specifications shall preclude compliance by the Contractor with the manufacturer's recommendations. Contractor responsible to notify Engineer of conflict between manufacturer's recommendations and applicable ASTM / AWWA standards.

7.14 **Water & Wastewater Appurtenances Installation**

A. General:

1. Install water and sewer appurtenances as shown, specified, and as recommended by the manufacture.
2. In the event of conflict between manufacturer's recommendations and the Contract Documents, request interpretation from Engineer before proceeding.
3. Location of service connections and insertion valves indicated are approximate. Final location will be established during construction by the Town.
4. Do not install water service connections until new mains have been successfully tested, disinfected, and placed in service.
5. Prior to ordering tapping sleeve assembly, expose existing main and verify circumference of existing pipe.
6. Prior to ordering insertion valve and sleeve assembly, expose existing main at point of installation and verify circumference, actual caliper diameter and roundness of existing pipe. In addition, identify the exterior condition of the pipe with respect to pitting, scaling, electrolysis, or other defects which would affect manufacturing dimensions or exact location of the insertion.
7. The Town of Huntertown shall be the only party allowed to operate Huntertown's water valves and hydrants.

B. Fire Hydrants

1. Install hydrants as shown and indicated in these Standards & Specifications and the permitted Contract Documents.
2. Provide suitable adapters when hydrants and piping have different joint types.
3. Provide thrust restraint at all hydrants located at pipeline terminations.
4. Set hydrants plumb and to grade of curb, street, alley, highway, or right-of-way with pumper nozzle toward middle line of street, highway, or right-of-way.
5. Set hydrant on crushed stone or well tamped gravel; provide loose stone or gravel fill up to drainage port.
6. When Town / Engineer deems it necessary to set a fire hydrant at a greater depth of bury as a result of changing hydrant location from that shown, adjust elevation by furnishing and installing the fire hydrant manufacturer's standard barrel and stem extensions.

C. Valves

1. Install valves, valve boxes, and curb boxes as shown and indicated in these Standards & Specifications and the permitted Contract Documents.
2. Provide suitable adapters when valves and piping have different joint types.
3. Provide thrust restraint at all valves located at pipeline terminations.
4. Set valves plumb and on solid bearing.
5. Install insertion valves and sleeves using personnel skilled and experienced in the use of the valve insertion machinery and accessory equipment of the type, design and size corresponding to each valve size installed. Remove section of severed water main and present to Town as proof of satisfactory execution of the operation. Town may retain coupon for further analysis or testing to evaluate the condition of existing water main.

D. Tapping Sleeve & Valve

1. Contractor shall perform the tapping of the existing main according to the manufacturer's specifications.
2. The Contractor shall excavate an area of sufficient size and depth, conforming to OSHA requirements, to accommodate the operations of tapping the existing line and setting the valve.
3. Assemble, align, and fit tapping sleeve and tapping valve to main using personnel skilled and experienced in making of pressure taps. In the event of mismatch of purchased materials, make necessary arrangements with manufacturer for factory refit. Any field refit will require written manufacturer and Town approval. Remove section of severed water main through tapping valve and present to Town as proof of satisfactory execution of the operation. Town may retain coupon for further analysis or testing to evaluate the condition of existing water main.
4. The Contractor shall furnish and install a valve box with the necessary extensions, backfill and compact the excavated area.
5. The Contractor shall perform a 150 psi hydrostatic pressure test, or a different pressure as required by the Town / Engineer, on the tapping sleeve and valve prior to tapping the existing water main. *Lower test pressures for air testing will be permitted only when approved in writing by the Town / Engineer.* This pressure test will be performed using the test plug provided with the tapping sleeve.

E. Valve Boxes & Curb Boxes

1. Center and plumb valve and curb box over valve; set box cover flush with finished grade.

F. Small Water Service Connections ($\frac{3}{4}$ -Inch Thru 2-Inch)

1. Ensure service connection has a minimum cover of 4 feet 6 inches (4'-6").
2. Buried Piping Identification Tracing for Service Connections.
 - a. Install tracing wire for service connections in accordance with Town Standards & Specifications.
 - b. Ensure connectivity is maintained between the mainline tracer wire and the service connection tracer wire.
 - c. All tracing wire splices and connections shall be made using a direct bury waterproof connection device, intended for use with low voltage tracing wire.
 - d. When connecting tracing wire from the mainline to a copper service line secure the connection with 2 plastic hose clamps and wrap the connection in waterproof tape.
3. For existing service connections, intercept or extend as shown or noted to connect to new water mains.

4. For existing service connection pipe to be abandoned, close the exposed end by crimping.
 5. For existing service connections to be abandoned on existing water mains to remain in service, dig up (expose) and turn off the existing corporation stop at the connection to the existing main.
- G. Large Water Service Connections (3 Inch and Larger)
1. Minimum cover for services shall be per the pipe installation specifications.
 2. Service Connections on New Mainline
 - a. Install tee compatible with the mainline material.
 - b. Install a standard gate valve and valve box.
 3. Service Connections on Mainlines In Service
 - a. Install tapping sleeve compatible with the mainline material.
 - b. Install a tapping valve and standard valve box.
- H. Connections and Insertions into Existing Mains
1. Existing mains into which valves are to be inserted cannot be shut down or taken out of service. The entire operation of installing the valves shall be accomplished below 100 psig at the point of installation.
 2. Connect new mains to existing mains using proper fittings and in a manner acceptable to Town / Engineer.
 3. Expose existing mains at connection points prior to making connections with reasonable time available to determine elevation, verify type of pipe, confirm outside diameter of pipe, identify type of existing restraints, and order correct materials for connection.
 4. No cut-ins or connections to existing mains shall be made unless written approval is obtained from the Town / Engineer.
 5. Plan all connecting work to reduce number of shutoffs.
 6. Two days prior to shutting valves on existing lines, notify all affected property owners, local official in charge of the water works system, and Town / Engineer of such shutoff.
 7. Keep shutoff time to a minimum and do at off-peak hours.
 8. A representative of Town shall operate existing valves. Contractor shall not operate existing valves.
 9. Town and Engineer assume no responsibility for any delay occasioned by special requirements or conditions which must be met in making connections.
 10. Take extreme care in making connections to prevent contamination of existing mains.
 11. Before making cut-ins or connections to existing mains, wash all fittings, valves, and pipe with clean water, and then disinfect by washing with a chlorine solution having a residual chlorine strength of not less than 50 ppm. Follow all IDEM requirements for disinfection.
 12. Plugs removed from existing mains that are not damaged may be reused within the Project, and those remaining after completion of construction shall remain the property of Town.
 13. Contractor responsible for all bypass pumping required for connection.
- I. Water Meter Boxes
1. Install assemblies as shown or noted and with meter pit cover at grade level; comply with component manufacturer's instructions.
 2. Install water meter couplers level and plumb.
 3. Do not install meter pits in street, parking lots, driveways, or any area where vehicular traffic may occur.

- J. Connections to Meter Assemblies, Backflow Prevention Assemblies, Valves, and Hydrants
 - 1. Install meters, backflow prevention, valves and hydrants as shown and indicated in the Contract Documents.
 - 2. Provide suitable adapters when meter assemblies, backflow prevention assemblies, valves or hydrants and piping have different joint types.
 - 3. Provide thrust restraint at all meter assemblies, backflow prevention assemblies, hydrants, and at valves.
- K. Backflow Prevention Devices
 - 1. Install backflow valves in accordance with manufacturer's recommendations.
- L. Cleanouts
 - 1. Install piping so cleanouts open in direction of flow in sewer pipe. Set cleanout frames and covers as shown on the site drawings.
- M. Tap Connections
 - 1. Connect to existing sewer main according to the conditions of the sewer tapping permit.

7.15 Painting of Buried Valves and Appurtenances

- A. Exterior steel, cast-iron, and ductile iron surfaces, except machined or bearing surfaces of buried valves and appurtenances and except those surfaces coated with fusion bonded epoxy, shall be painted in manufacturer's shop with two coats of asphalt varnish conforming to FS TT-C 494.

7.16 Sanitary Manholes & Structures

- A. General
 - 1. Manholes and structures shall conform in shape, size, dimensions, material, and other respects to the details shown or as directed by Town / Engineer.
 - 2. Cast-iron frames, grates and covers shall be the standard frame and grate or cover unless otherwise approved by Town and shall be as specified.
 - 3. Concrete for cast-in-place manholes and structures and for inverts in precast and masonry manholes and structures shall be Class "A" and shall conform to the requirements specified hereinafter.
 - 4. All manholes and structures shall be precast construction, unless otherwise approved by Town.
 - 5. Inverts shall be as shown and shall conform accurately to the size and elevation of the adjoining pipes.
- B. Existing Conditions
 - 1. Avoid damage to the existing system. Existing manholes, catch basins, and sewers damaged by the Contractor shall be repaired to the satisfaction of the Town at no additional cost.
- C. Poured-in-Place Manhole Bases
 - 1. Poured-in-place bases shall be utilized only with written permission of the Town.
 - 2. Poured-in-place bases shall be placed on suitable foundations, as shown in details, after the pipes are laid.
 - 3. They shall be cast using class "A" concrete.

4. They shall be cast monolithically to an elevation at least 7 inches above the top of the highest pipe entering the manhole, except where a drop connection is to be installed.
 5. Base, walls and bottom shall be at least of the thickness shown and reinforced to withstand the loads to be expected.
- D. Manhole Base Installation
1. Precast bases shall be set on a 6" min. crushed stone or crushed gravel foundation as shown and detailed. Precast bases shall be set at the proper grade and carefully leveled and aligned.
- E. Precast Manhole Sections Installation
1. Install sections, joints and gaskets in accordance with these specifications and the manufacturer's recommendations.
 2. Lifting holes, if used in manhole components, shall be repaired using a conical precast concrete plug, properly sealed into place using non-shrink cement or epoxy grout. The repair shall be clean and neat to ensure water tightness.
- F. Drop Connections
1. Drop connections for sanitary sewer manholes and structures shall be constructed where shown or directed by the Town / Engineer and shall conform to the design and details shown.
 2. Concrete for pipe encasement shall be Class "A". Concrete shall be bonded to manhole in the manner shown or otherwise approved by Town / Engineer. Drop connection pipe encasement shall begin six (6) inches above the drop connection and continue to the bottom of the manhole.
 3. An interior drop connection will be allowed in a manhole or wet well, provided it does not conflict with personnel or equipment access, or pump removal.
- G. Stubs for Future Connections
1. When installing pipe stubs for future pipeline, installation of all stubs shall be properly restrained to prevent any movement. Where pipe stubs, sleeves or couplings for future connections are shown or directed by the Town / Engineer, Contractor shall provide all materials and labor in order to complete the Work.
- H. Grading at Manholes & Structures
1. Backfill shall be carried up evenly on all sides of the structures to prevent overturning forces.
 2. All sanitary sewer manholes and structures in unpaved areas shall be built, as shown or directed by the Town / Engineer, to an elevation graded to drain away from the manhole. Fill shall be placed around manholes to the level of the upper rim of the manhole frame, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground, unless otherwise shown or directed by the Town / Engineer. The slope shall be seeded and maintained until a satisfactory growth of grass is obtained.
 3. Manholes and structures in paved areas shall be constructed to meet the final surface grade. Manholes and structures shall not project above finished roadway pavements to prevent damage from snowplows.
- I. Manhole Watertightness

1. All manholes and structures shall be free of visible leakage. Each manhole shall be tested for leaks and inspected, and all leaks shall be repaired in a manner subject to Town / Engineer approval. Note that sanitary sewer manholes shall be vacuum tested per these Specifications.

J. Casting Installation

1. Comply with casting manufacturer's printed instructions and the Contract Documents. Install casting in accordance with requirements of manufacturer of product on which casting will be installed.
2. Set castings accurately to required location, alignment, and elevation, plumb, level, true and free of rack, measured from established lines and levels. Where applicable, brace temporarily or anchor temporarily in formwork.
3. In Paved and Unpaved Streets and Alleys:
 - a. Where work is in paved streets or areas which have been brought to grade, twelve inches (12") of riser rings shall be provided between the top of the cone or slab and the underside of the manhole casting for adjustment of the casting to finished street grade. The top of the manhole casting shall be flush with the finished grade, unless otherwise directed by the Town / Engineer.
4. Within Cultivated and Non-Cultivated Areas:
 - a. Where work is in cultivated areas, the top of the manhole casting shall be exposed one foot (1') and in non-cultivated areas the casting shall be flush with the finished grade, unless otherwise directed by the Town / Engineer. Marking post shall be provided per Standard Drawings for all manholes within cultivated areas.

K. Connections to Existing Manholes & Sewers

1. Connections at existing manholes shall be made in a manner to prevent damaging the structure and shall be made watertight where the connection is made. Openings shall be core drilled and rubber boots shall be installed.

L. Cleaning

1. All new manholes shall be thoroughly cleaned of all silt, debris, and foreign matter of any kind, prior to final inspection.

7.17 Lift Stations

A. Installation

1. All equipment shall be installed in accordance with these specifications, construction drawings and the manufacturer's printed instructions.
2. Inspect all equipment and appurtenances prior to installation of the Work. Promptly remove damaged or unsuitable products from the job site. Replace damaged or unsuitable products with new, undamaged and suitable products.
3. All electrical work shall be done by a qualified licensed electrician and shall conform to the National Electric Code.

B. Testing

1. Each pump shall be fully tested in accordance with manufacturer's written instructions. Certified copies of the test results shall be furnished with each pumping unit. Record the test voltage and amperage measurements.

C. Manufacturer's Supervision

1. The Contractor shall include in his bid price the services of a factory trained representative, of the pump manufacturing company, for two separate days at the lift station to perform initial start-up of the pumping station and demonstrate satisfactory performance of each piece of equipment and instruct operating personnel in the operation and maintenance of the equipment.

D. Electrical Service

1. The Contractor shall be responsible for all construction and operational costs imposed by the electric utility to provide electric service to the pump station, from the initiation of construction until substantial completion (acceptance) by the Town of Huntertown.

E. Warranty

1. Unless approved otherwise by the Town in writing, the pump manufacturer shall warrant the pumps being supplied to the Town against defects in workmanship and materials for a period of two years under normal use, operation, and service. The warranty shall be in published form and apply to all units. Warranty costs shall include all shipping costs.

7.18 Testing & Sterilization for Water & Wastewater

A. General

1. General Testing Requirements

- a. All testing shall be in accordance with IDEM, INDOT or other recognized standards and regulations.
- b. Notify Town / Engineer and authorities having jurisdiction in writing at least 48 hours in advance of testing. All testing to be witnessed by a Town Employee or representative.
- c. Do not install more than 1,000 feet of pipe without being tested, unless approved by Town.
- d. Prepare and submit schedules and procedures to Town for testing. Submit the schedule at least seven days prior to any testing.
- e. Remove or protect pipeline-mounted devices that could be damaged by testing.
- f. Provide all apparatus and services required for testing, including:
 - 1) Test risers and associated connections to the main, test pumps, compressors, hoses, calibrated gauges, meters, test containers, valves, fittings, and temporary pumping systems required to maintain Town's operations. The Town reserves the option to furnish the gauges and metering devices for the tests. Pressure gauges used for testing shall have no greater than 5 psi increment markings or shall be as directed by the Town for the satisfactory evaluation of the required testing.
 - 2) Temporary bulkheads, bracing, blocking, and thrust restraints.
- g. Provide air if an air test is required, power if pumping is required, and gases if gases are required.
- h. Demonstrate that all valves in the test section are opened as appropriate for the test.
- i. Unless otherwise specified, Town will provide water required for hydrostatic testing and disinfection except for water required due to a failed test. Contractor

shall provide means to convey water for hydrostatic testing into piping being tested. Contractor shall provide water for other types of testing required.

- j. Do not place water into the newly installed pipe until the Town is on the project site and gives the Contractor approval. Any valve opening to place potable water into the newly installed pipe shall be done by the Town.
- k. All leaks, broken or cracked pipe, valves, etc. which are identified by testing shall be repaired. Any sections of main which do not meet test acceptance criteria shall be repaired or replaced. Retest after repair at no additional cost.
- l. Where necessary due to absence of valves or structures, testing shall include existing piping systems that connect with new piping system. Test existing pipe to nearest valve or structure. Piping not installed by Contractor and that fails the test shall be repaired upon authorization of Town. Unless otherwise included in the Work, repair of existing piping or underground facilities will be paid as extra Work.
- m. Test to confirm connectivity of tracer wire.
- n. Copies of all test reports are required, or test shall be considered to have failed.

B. Gravity Pipe Deflection & Leakage Testing

- 1. Deflection Test:
 - a. A deflection test shall be performed on each flexible pipe following the elapse of thirty (30) days after the placement of the final backfill.
 - b. No pipe shall exceed a deflection of five percent (5%) or greater.
 - c. The diameter of the rigid ball or mandrel used for a deflection test shall be no less than ninety-five percent (95%) of the base inside diameter of the pipe to be tested dependent on what is specified in the corresponding ASTM standard. The test shall not be performed with the aid of a mechanical pulling device.
- 2. Leakage Test: All gravity sanitary sewers shall be tested per one of the following tests:
 - a. A hydrostatic test shall be performed with a minimum of two (2) feet of positive head. The rate of exfiltration or infiltration shall not exceed two hundred (200) gallons per inch of pipe diameter per linear mile per day.
 - b. Air test plastic pipe according to ASTM F1417: "Standard Test Method for Installation Acceptance of plastic gravity sewer lines using Low-Pressure Air".
- 3. Any piping that is damaged shall be removed and re-installed before approval.
- 4. An infiltration test is required only when specified by the Contract Documents.
 - a. The Contractor shall furnish all weirs, bulkheads, catchments, and other appurtenances as required for performing the test.
 - b. Procedure for Infiltration Testing: After the new main line pipe has been installed and the new house service laterals connected in a reach of conduit between two manholes, this reach of sanitary sewer may be tested for infiltration. This testing shall be performed through the use of a bulkhead in the upstream manhole and a calibrated sharp-edged weir installed at the downstream manhole. The infiltration flow from the reach undergoing testing shall be measured over a sufficiently long period of time to establish the rate of infiltration but in no case shall the test duration be less than two (2) hours. Where the reach being tested was installed through ground that required dewatering, the infiltration test shall not be performed until a sufficient period of time has elapsed after the dewatering equipment has been removed to permit the ground water table to return to its natural level, as agreed by the Town.

- c. Allowable Infiltration: The total quantity of infiltration into the system from ground water during wet weather or from water from creeks, rivers, springs or other sources shall not exceed two hundred gallons per inch diameter of sewer, per mile, per twenty-four (24) hours (0.00263 gallon per inch diameter, per 100 feet, per minute).

C. Vacuum Testing

1. Manholes

- a. Perform vacuum test on all manholes according to ASTM C1244 prior to backfill.
- b. All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.
- c. Following set-up of test apparatus per manufacturer's recommendations, draw vacuum of ten inches of mercury on manhole being tested. The time shall be measured for the vacuum to drop to nine inches mercury.
- d. Start test upon reaching specified test vacuum. Test duration shall be in accordance with ASTM C1244.
 - 1) Minimum test times for various manhole diameters shall conform to the following table per ASTM C1244 or be 1 minute; whichever is longer:

Depth (ft)	Diameter, in.												
	48	54	60	66	72	78	84	90	96	102	108	114	120
Time, in seconds													
<4													
6													
8													
10											63	67	71
12								62	67	71	76	81	85
14					62	67	72	78	83	89	94	100	
16				65	73	79	86	93	100	107	114	121	128
18			65	72	81	88	95	103	111	119	126	135	142
20		64	72	79	89	97	105	114	122	131	139	148	156
22		64	78	87	97	106	114	124	133	143	152	161	170
24	64	75	85	94	105	114	124	134	144	155	164	175	185
26	69	81	91	101	113	123	133	145	155	167	177	188	199
28	74	87	98	108	121	132	143	155	166	178	189	202	213
30													

- e. Record vacuum drop at end of test. If vacuum drop is greater than one inch of mercury, manhole fails the test and shall be repaired and retested. If vacuum drop is less than 1 inch of mercury, manhole passes the test.

D. Hydrostatic Testing

1. General:

- a. All newly installed water and sanitary force mains must be pressure and leak tested prior to final acceptance.

2. Preparation

- a. Pipeline shall be laid and backfilled.
- b. Valves shall be properly located, operable, and plumb and at correct elevation.
- c. Lines shall be properly vented to eliminate entrapped air.
- d. Prior to testing, ensure adequate thrust protection is in place and joints are properly installed.

- e. Prior to testing ensure that the line is clean and free of dirt and debris.
 - f. For PVC and thermoplastic pipe, follow preparation and procedures described in Section 7 of ANSI/AWWA Standard C605. Test pressure & duration shall be 150 psi for 2 hours for water mains & 100 psi for 2 hours for force mains, unless noted otherwise.
 - g. For ductile iron piping, follow preparation & procedures described in AWWA C600. Test pressure shall be as specified and duration shall be for 2 hours.
 - h. For HDPE pipe, follow preparation and procedures described in ASTM F2164. Test duration, including time to pressurize, time for initial expansion, time at test pressure, and time to depressurize shall not exceed 8 hours. If re-testing of a test section or pipeline is required, at least 8 hours shall elapse between tests. HDPE pipe test pressure and duration shall be 150 psi for 4-hour expansion period and 140 psi for the 1-hour test.
3. Test Procedure:
- a. Fill pipeline slowly to minimize air entrapment and surge pressures. Fill rate shall not exceed one foot of pipe length per second in pipe being tested.
 - b. Expel air from pipe as required by venting through air release valves, blow-offs, or special taps at high points in line. Obtain approval of Town / Engineer prior to tapping pipe for expelling air.
 - c. During the test, examine all exposed pipe, fittings, valves and appurtenances for leakage. Make repairs to eliminate visible leakage.
 - d. For DIP and PVC Pressure Pipe
 - 1) Add fluid as required to pressurize line to required test pressure. Maintain test pressure for a stabilization period of ten minutes before beginning test.
 - 2) Timed test period shall not begin until after pipe has been filled, exposed to required wetting period, air has been expelled, and pressure stabilized.
 - 3) Timed Test Period: After stabilization period, maintain test pressure for at least two hours. During timed testing period, add fluid as required to maintain pressure within five psig of required test pressure.
 - 4) Pump from test container to maintain test pressure. Measure volume of water pumped from test container and record on test report. Record pressure at test pump at 15 minute intervals for duration of test.
 - e. For HDPE Pressure Pipe
 - 1) After filling pipeline, gradually pressurize pipe to test pressure and maintain required test pressure for four hours for pipe to expand. During expansion, add fluid to maintain required test pressure. Begin timed test period after expansion period and other requirements are met.
 - 2) Timed test period shall not begin until after pipe has been filled, exposed to required wetting period, air has been expelled, and pressure stabilized.
 - 3) Timed Test Period: After four hour expansion phase, reduce test pressure by ten psig and do not add liquid. Test pressure shall then remain steady for one hour, indicating no leakage.
 - 4) If no visible leakage is observed and pressure remains within 5% of the original test pressure for one hour, a passing test is indicated.
4. Makeup Water Allowances:
- a. The allowable makeup water allowance is the maximum amount of water that is added into a pipeline undergoing hydrostatic pressure testing. The allowable leakage rates for the various pipe materials and joints are listed below.

- b. No Makeup Water: Pipe with flanged, welded, fused, threaded, soldered, or brazed joints.
- c. Makeup Water shall be less than the allowable amounts specified in AWWA C600 for ductile iron pipe or AWWA C605 for PVC pipe, and less than that determined by the following formula:

$$L = \frac{S \cdot D \cdot (\text{Square Root of } P)}{148,000}$$

L = allowable leakage, gallons per hour
 S = length of pipe tested, feet
 D = nominal diameter of pipe, inches
 P = average test pressure during leakage test, psi

- d. Observed leaks shall be repaired regardless of leakage measurements.
- e. Any damaged or defective pipes, fittings, valves, or joints should be repaired and the pressure test repeated until satisfactory results are obtained, at no additional cost to the Town.

E. Cleaning and Disinfection for Potable Water Piping

1. Cleaning, General: Clean pipe systems as follows:
 - a. For piping that requires disinfection and has not been kept clean during storage or installation, swab each section individually before installation with five percent sodium hypochlorite solution.
 - b. Thoroughly clean all piping, including flushing with water, in manner approved by Town / Engineer, prior to placing in service. Flushing may occur prior to or after pressure testing, but prior to disinfection. Following disinfection, flush chlorine solution and sodium hypochlorite out of piping with water.
 - c. Flushing operation shall maintain a minimum velocity of 2.5 ft/sec in main. Taps and openings shall be provided by the Contractor as necessary to achieve minimum velocity.
 - d. The Contractor shall submit a method and schedule for flushing to the Town / Engineer.
2. Disinfection:
 - a. Disinfect all potable and finished water piping.
 - b. Disinfect following pressure tests and prior to connection to existing water main.
 - c. Suggested procedure for accomplishing complete and satisfactory disinfection is specified below. Other procedures may be considered for acceptance by Town / Engineer.
 - 1) Prior to disinfection, clean piping as specified and flush thoroughly per AWWA C651.
 - 2) For disinfection, conform to procedures described in ANSI/AWWA C651. Use continuous feed method of disinfecting, unless alternative method is acceptable to Town / Engineer. Chlorine tabs are not permitted unless approved by the Town / Engineer in writing.
 - d. Chlorine, testing, disinfection, work and all necessary equipment shall be provided by Contractor. Chlorine gas is not permitted on the jobsite.

- e. Chlorine concentration in water entering the piping shall be between 50 and 100 ppm, such that minimum residual concentration of at least 25 mg/L shall remain in the pipe after 24 hours.
- f. Disinfect piping and all related components. Repeat as necessary to complete disinfection.
- g. Operate all valves during disinfection.
- h. Bacteriologic tests shall be performed by Contractor. Certified test laboratory report must be provided to the Town.
 - 1) Two consecutive safe bacteriological samples shall be taken 24 hours apart before placing the water line into service. Samples shall be collected for every 1,200 feet of new main, plus samples from each branch and the end of the line. If excessive quantities of debris, or trench water, has entered the main, samples shall then be taken at approximately 200-foot intervals. Samples should never be collected from hoses or fire hydrants. A suggested sampling tap is a corporation stop with copper goose neck assembly. The goose neck assembly shall be removed after use as directed by the Town.
 - 2) Disinfection record:
 - a) Type and form of disinfectant used.
 - b) Date and time of disinfectant injection; start and time of completion.
 - c) Test locations.
 - d) Date and time of flushing start and completion.
 - 3) Bacteriological report record:
 - a) Date issued, project name, and testing lab information.
 - b) Time and date of water sample collection.
 - c) Name of person collecting samples.
 - d) Test locations.
 - e) Coliform bacteria test results for each outlet tested.
 - f) Certification that water confirms, or fails to conform, to bacterial standards.
 - g) Bacteriologist's signature and authority.
- i. After required retention period,
 - 1) Properly dispose of chlorinated water in accordance with Laws and Regulations, including 327 IAC 8-3.2-18.
 - 2) Only flush chlorinated water to the Sanitary Sewer if written permission obtained from Town.
 - 3) Do not discharge chlorinated water to storm sewers, ditches, or overland.
 - 4) If water has been properly dechlorinated, flushing to the Storm Sewer is acceptable.
 - 5) No flushing during a rain event.
- j. If first bacteriologic sample fails, one more is allowed at Contractor's expense. If the second sample fails, another flush must take place. If the second sample fails, the disinfection process shall be repeated. Contractor must remain on site for the entire disinfection process until the pipe passes.

7.19 **Electrical**

A. **Scope**

1. The electrical work to be executed shall include all material, transportation, labor, tools, and equipment to complete and leave ready for operation a complete electrical system as called for in these specifications and/or on the accompanying drawing.
- B. General Requirements
1. Perform all work in accordance with the latest edition of the National Electric Code. Nothing contained in these specifications should be interpreted as conflicting with the Code.
 2. Conduit shall be sized appropriately for cables according to National Electric Code requirements. All conduits shall be PVC-coated rigid steel, except incoming utility power shall be in conduit meeting electric utility requirements. All PVC-coated rigid conduit shall be by Rob Roy Industries with no approved equals. All PVC-coated rigid fittings shall be by Rob Roy Industries with no approved equals. Contractor shall use the appropriate installation tools for PVC-coated rigid conduit to avoid excessive damage to the PVC coating.
 3. All electrical work shall comply with NEC and NFPA space classifications. Electrical components not meeting code-required separations from classified spaces shall be rated for classified spaces. All materials and equipment installed shall be new and undeteriorated and of a quality not less than the minimum specified. Materials for which examination service is provided shall bear the Underwriters label.
 4. All workmanship shall be in accordance with the best practices of the trade. Electrical work shall be installed by journeymen electricians under the direct supervision of a competent foreman. At no time shall electrical work be installed by apprentice electricians or laborers without the immediate on-the-job supervision of a journeyman electrician.
 5. Wiring layouts when shown on Drawings are schematic and the exact locations shall be determined by structural and other conditions. This shall not be construed to mean that the design of the system may be changed. It refers only to the exact locations of conduits and equipment to fit into the work and the coordination of conduits and other equipment with piping and equipment included under other divisions of the specifications.
 6. Furnish and install all necessary hangers, supports, straps, pull boxes and fittings not indicated on the drawings but which are required for a complete and properly installed system. All exposed hardware shall be stainless steel.
 7. Consult all contract drawings which may affect the location of any equipment, conduit or wiring and make minor adjustments in location to secure coordination.
 8. Other than minor adjustments all modifications shall be submitted to the Town / Engineer for approval before proceeding with the work.
- C. The Contractor shall at all times be fully informed of the progress of the general construction, and shall install all work that is concealed and built into the work in place in sufficient time to insure proper location without delays to the work of the other trades. Properly attend the electrical work during the progress of construction to prevent misalignments of and damages to the electrical work.
- D. Grounding
1. Grounding shall be in strict accordance with the requirements of the National Electric Code.
 2. Only approved grounding clamps shall be used for attachment of grounding conductors.

3. Grounding conductors exposed to mechanical injury shall be installed in schedule 40 PVC conduit.
- E. Shop Drawings
1. Prior to the commencement of work the Contractor shall submit to the Town, for approval, drawings relating to the arrangement of work and shop drawings of all equipment and apparatus.
 2. The drawings as submitted shall bear the stamp of approval of the Contractor as evidence that the drawings have been checked and considered satisfactory to the Contractor. Drawings submitted which include variations from the requirements of the contract specifications, or plans shall include specific mention of such variations in order that, if acceptable, action may be taken for adjustment.
 3. The Town's review and approval of the Contractor's drawings or equipment details do not relieve the Contractor of responsibility for errors, omissions, deviation from specified requirements and incidental work required for proper operation, equipment failure and space requirements.
- F. Inspection, Tests, Permits and Fees
1. After completion of the work, furnish to the Town a certificate of inspection and approval from the inspecting agency having jurisdiction for all electrical work.
 2. Immediately correct all work which is found unacceptable by the Town. Work shall be considered unacceptable when it is contrary to the plans and/or specifications and/or the National Electric Code and/or accepted standards of good workmanship.
 3. Demonstrate by tests, at the request of the Town, the compliance of the installation with these specifications, the drawings, the National Electric Code and the accepted standards of good workmanship. These tests shall include operation of equipment, continuity of the conduit system and grounding resistance. All labor and testing equipment for the performance of these tests shall be furnished by the Contractor.
- G. Electrical Service
1. The general details of the electrical services are shown on the drawings. The Contractor shall arrange for modifications or changes to the required electrical service with the electric company serving the station.
- H. Underground Electrical Line Identification Tape
1. During trench backfilling for exterior underground power, signal and communications lines, provide detectable underground warning tape. Warning tape shall be aluminum core encased with polyethylene, 6" width, red in color. Text shall read "CAUTION: BURIED ELECTRICAL LINE BELOW" or "CAUTION: BURIED COMMUNICATIONS LINE BELOW" depending on the general type of underground line below. Install continuous warning tape 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceed 16" overall.
- I. Service-Entrance Equipment
1. Provide service-entrance equipment and accessories, which are UL listed and labeled and marked 'Suitable For Use As Service Entrance Equipment' of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as

required for complete installation, and as herein specified. Contractor is to verify with the Electric Utility, the necessary service entrance equipment, installation procedures, each entity's responsibility.

J. Wiring Methods

1. All wiring shall be installed in conduit or raceway. All conduit installed exposed to (10) feet elevation above grade shall be PVC-coated rigid steel. Galvanized conduit is not permitted. All conduit installed underground shall be polyvinyl chloride heavy wall conduit approved for direct burial with all joints cemented together using couplings and fittings as recommended by the manufacturer. All conduit installed underground shall be installed with top of conduit at a minimum of thirty inches below final grade.

7.20 **Site Restoration**

- A. The Contractor shall restore all sidewalks, property monumentation, curbing, gutters, drives, fences, poles, topsoil, grass, trees, landscaping, or other property and surface structures removed or disturbed as a part of the work to a condition equal to that before the work began, unless noted otherwise.
- B. Restoration Materials: See Materials specification for seed mixture requirements.
 1. Contractor to restore unpaved areas with "Lawn Grass Seed" for all mowed areas.
 2. Unmowed areas shall be restored using "General Purpose Mixture".
 3. Turf grass sod shall be utilized when required by the Town on a case-by-case basis. Examples of potential areas requiring sod are swales and other concentrated flow areas.
 4. The Town may revise seed mix requirements on a project-specific basis.
- C. Grading and Seeding
 1. The Contractor shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install all lawns and grasses.
 2. Review installation procedures under other sections and coordinate the installation of items that must be installed with, or before, lawns and grasses. If applicable, notify other Contractors in advance of the planting of lawns and grasses to provide them with sufficient time for the installation of items that must be installed with, or before, lawns and grasses.
 3. The project site disturbed by construction shall be rough graded to a uniform and level grade prior to fine grading and seeding. All surplus or borrowed material necessary for completion of the fine grading shall be placed by the Contractor. All areas to receive seeding shall be shaped, trimmed, raked uniform smooth, free from clods, rocks and other deleterious matter.
 4. Quality Assurance
 - a. Source Quality Control:
 - 1) Provide topsoil that is of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, rocks, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips, or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and perennial wood seeds, and shall not contain objectionable plant material.

- 2) Provide sod procured from areas having growing conditions similar to location of Site.
 - 3) Machine-cut sod into rectangular sections, exercising care to retain the native soil on the roots of the sod, during stripping, transportation and planting.
 - 4) Cut and move sod only when soil moisture conditions are such that favorable results can be expected.
 - 5) Rectangular sections of sod may vary in length but shall be equal in width and of a size that permits the sod to be lifted and rolled without breaking.
 - 6) Seed that has been stored at temperatures, or under conditions not recommended by the seed Supplier, or has become wet, moldy, or otherwise damaged, shall not be acceptable.
5. Project Conditions
- a. Environmental Requirements:
 - 1) Proceed with and complete lawn and grass planting as rapidly as portions of the Site become available, working within the seasonal limitations for each type of lawn and grass planting required.
 - 2) Proceed with planting only when current and forecasted weather conditions are favorable to successful planting and establishment of lawns and grasses.
 - a) Do not spread seed when wind velocity exceeds five miles per hour.
 - b) Do not plant when drought, or excessive moisture, or other unsatisfactory conditions prevail.
 - 3) Begin maintenance immediately after each area is planted and continue until acceptable growth is established.
 - 4) Herbicides, chemicals and insecticides shall not be used on areas bordering wetlands.
 - b. Scheduling:
 - 1) Plant during one of the following periods:
 - a) Spring Planting: April 1 to June 15.
 - b) Fall Planting: September 1 to October 30.
 - c) During other periods, the time of planting shall be determined by the Town / Engineer.
 - c. Water & irrigate lawn and grass plantings as required to obtain adequate establishment of lawns and grasses.
6. Examination
- a. Contractor shall examine the areas and conditions under which lawn and grass Work is to be performed, and notify Town / Engineer, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Town / Engineer.
7. Preparation
- a. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - b. Provide erosion-control measures to prevent erosion or displacement of seeded soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
 - c. Confirm that subgrade is at proper elevations and that no further earthwork is required to bring the subgrade to proper elevations. Provide subgrade elevations that slope parallel to finished grade and towards subsurface drains shown.

- d. Remove all construction debris, trash, rubble, and all extraneous materials from subgrade. In the event that fuels, oils, concrete washout, or other material harmful to plant growth or germination have been spilled into the subgrade, excavate the subgrade sufficiently to remove all such harmful materials and fill with approved fill, compacted to the required subgrade compaction level. Removed materials to be disposed of in a legal manner.
8. Fine Grading
- a. Reset and realign curb boxes and meter boxes to ensure proper alignment and plumbness upon fine grading.
 - b. Immediately prior to dumping and spreading topsoil, clean subgrade of all stones greater than 1 inch and all other extraneous matter. Remove all such material from Site.
 - c. Notify Town / Engineer that subgrade has been cleaned, and obtain approval prior to spreading topsoil.
 - d. Do not attempt to spread excessively wet, muddy or frozen topsoil. Do not spread topsoil more than five days before seeding or planting.
 - e. Spread topsoil to a minimum depth of three (3) inches but not less than required to meet finish grades after light rolling and natural settlement.
 - f. The area to be seeded shall be made smooth and uniform and shall conform to the finished grade and cross section shown on the Drawings or as directed by the Town / Engineer.
 - g. Incorporate fertilizers, after spreading Topsoil, as specified, and at a rate of:
 - 1) Fertilizer: 18 pounds per 1,000 square feet.
9. Conventional Seeding
- a. General: Maintain grade stakes until removal is mutually agreed upon by all parties concerned.
 - b. Rake or harrow all seedbeds immediately prior to seeding to produce a rough, grooved surface, no deeper than 1 inch. Seed only when seedbed is in a friable condition and not muddy or hard.
 - c. Sow seed using a spreader or seeding machine.
 - d. Distribute seed evenly over entire area by sowing equal quantity in two directions at right angles to each other.
 - e. Sow lawn grass seed mixture at the rate of not less than 5 pounds for every 1,000 square feet.
 - f. All seeded areas shall be thoroughly mulched by a method approved by the Town / Engineer. Mulching material shall be applied uniformly in a continuous blanket at a rate of 92 pounds per 1,000 square feet. Mulch shall be punched into the soil so that it is partially covered. The punching operation shall be performed longitudinally with a mulch tiller. Care shall be exercised to obtain a reasonably even distribution of mulch incorporated into the soil.
 - g. Using a uniform fine spray, irrigate lawn and grass plantings as required to obtain adequate establishment of lawns and grasses.
 - h. Reseed areas that remain without mulch for longer than 3 days.
 - i. Take precautions to prevent damage or staining of construction or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
 - j. Prevent foot or vehicular traffic, or the movement of equipment, over the mulched areas. Reseed areas damaged as a result of such activity.
10. Sodding Lawns

- a. Prepare, lay, and water sod per the requirements of INDOT Standard Specifications, latest edition, Section 621.
 - b. Do not lay sod on ground that is frozen, dust dry or that has not been uniformly prepared, as specified. Do not lay dormant sod.
 - 1) Lay sod within 24 hours of harvesting.
 - c. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod.
 - d. Place sod strips in straight lines parallel to one another.
 - e. Lay sod across angle of slopes exceeding one on three.
 - f. Anchor sod on slopes exceeding one on three and steeper, and in ditches with grade steeper than one percent. Space anchors as recommended by sod Supplier, but not less than two anchors for each sod strip to prevent slippage. Use the following anchor dimensions:
 - g. Wood Peg Anchors: 1/2 inch x 3/4 inch x 12 inch minimum.
 - h. T-shaped Wire Pins: Machine bent from 8 gauge low carbon steel with a minimum of an 8 inch leg, a 4 inch head, and a 1 inch secondary drive.
 - i. Immediately upon completion of a section of sodding, tamp, roll lightly and water to ensure contact with subgrade and elimination of air pockets.
 - j. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.
 - k. Immediately after planting, water sod thoroughly with a fine spray. Water sufficiently to ensure penetration of moisture to bottom of prepared topsoil layer; not just to bottom of sod blanket.
11. Reconditioning Existing Lawns and Grass Areas
- a. Recondition existing lawn damaged by Contractor's operations, including areas used for storage of materials or equipment and areas damaged by movement of vehicles. Recondition existing lawn and grass areas where minor regrading is required.
 - b. Provide fertilizer, seed or sod and soil amendments, as specified for new lawns and grass areas, and as required to provide satisfactorily reconditioned lawns and grass areas. Provide new topsoil as required to fill low spots and meet new finish grades.
 - c. Till stripped, bare, and compacted areas thoroughly to a depth of 12 inches.
 - d. Remove diseased or unsatisfactory lawn and grass areas; do not bury into soil. Remove topsoil containing extraneous materials resulting from Contractor's operations including oil drippings, stone, gravel and other construction materials.
 - e. In areas approved by Town / Engineer, where substantial lawns and grass areas remain (but are thin), mow, dethatch, core aerate and rake. Fill low spots, remove humps, cultivate soil, fertilize, and seed. Remove weeds before seeding or if extensive, apply selective chemical weed killers, as required. Apply seedbed mulch, if required, to maintain moist condition.
 - f. Water newly planted areas and keep moist until new lawns are established, as specified.
12. Acceptance Criteria for Lawns and Grass Areas
- a. Lawn and grass Work will be considered acceptable when:
 - 1) Areas Seeded with "Lawn Grass Seed" Mixture: When a healthy, uniform, close stand of grass has been established, free of weeds and surface

- irregularities, with coverage exceeding 90 percent over any 10 square feet and bare spots not exceeding 5 inches by 5 inches.
 - 2) Areas Seeded with "General Purpose" Mixture: When a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 20 square feet and bare spots not exceeding 12 inches by 12 inches.
 - 3) Areas Sodded with "Turf Grass Sod": When a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.
- 13. Cleanup and Protection
 - a. Promptly remove soil and debris, created by lawn and grass Work, from paved areas. Clean wheels of vehicles before leaving Site to avoid tracking soil and topsoil onto roads, walks, or other paved areas.
 - b. Erect barricades and warning signs as required protecting newly planted areas from traffic. Maintain barricades throughout extended service period and remove when service period ends. Treat, repair or replace damaged lawns and meadows.
- 14. Inspection & Acceptance
 - a. The Contractor shall replace or repair any areas damaged by erosion or which fail to grow or take root within one (1) year of the date of final acceptance of the work.
 - b. Where lawns and grass areas do not comply with specified acceptance criteria, reestablish lawns and grasses and continue extended service period until lawns and grasses comply with criteria for acceptance.

7.21 Maintenance of Traffic

- A. Traffic Control shall be in accordance with the Indiana State Department of Transportation Specifications (latest edition), Section 800, Allen County Highway Department standards, and OSHA regulations.
- B. The Contractor shall cooperate with the Huntertown street department and Allen County Highway Department to maintain traffic and shall submit a Maintenance of Traffic plan to the Town and to the Highway Department for review and approval fifteen (15) days prior to construction.
- C. The Contractor shall notify and arrange with the municipal police, fire and EMS departments and the School Corporation before closing any street. Where it is necessary to maintain one-way traffic, the Contractor shall provide necessary watchmen, flagmen, and proper barricades to insure safety. The Contractor shall notify the Town of Huntertown forty-eight (48) business hours in advance of any closures or restrictions on the Town of Huntertown streets.
- D. Full Lane Closures
 - 1. No full lane closures will be allowed on State Roads.
 - 2. The Contractor may, with the approval of the authority having jurisdiction, close local roads for minimum periods of time with proper notice to the Town or County Highway Department as applicable, local occupants of all premises, police and fire protection authorities, and other public authorities as applicable. The Contractor shall schedule this work so that this time is at a minimum and shall, whenever possible, make suitable provisions for access by local residents, businesses, school buses, police and fire

emergency vehicles and mail delivery vehicles. The Contractor shall keep fire hydrants and other public utility valves accessible at all times.

3. The Contractor shall submit traffic control plans to the Town or the County Highway Department if required.
4. The Contractor shall furnish, erect, and maintain barricades, suitable and sufficient red lights and other lights or reflecting material as may be required for the protection of any local traffic permitted on the roadway.
5. The Contractor shall furnish, erect, and maintain advanced warning signs to direct traffic away from closed sections and detour marking signs on temporary routes, except where same may be furnished by the State or County Highway Departments.
6. All road crossings where the Contractor is permitted to open cut the trench, the crossing shall be completed, cleaned up, temporary pavement in place, and open to traffic within twenty-four (24) hours from the time the road is closed to through traffic, unless specific approval is received from the authority having jurisdiction, for a longer period.

E. Single Lane Closures

1. No single lane closures will be allowed on State Roads.
2. The Contractor may, with the approval of the authority having jurisdiction, close a single lane on local roads. The Contractor shall submit traffic control plans to the Town or the County Highway Department for review and approval.
3. The Contractor shall furnish, erect, and maintain lights, signs, barricades, temporary guardrails and other traffic control devices, watchmen and flagmen as may be necessary to maintain safe traffic conditions.
4. Whenever it is necessary to divert traffic from its normal channel into another channel, such diversion shall be clearly marked by cones, drums, barricades or temporary guardrail. If markers are left in place at night, pot flares or other suitable lights shall be maintained.

7.22 Manufacturer's Service Representative

- A. The Contractor shall provide the services of qualified and technically trained representative(s) of the manufacturer(s) of the principal items of equipment, as necessary to supervise the installation of the equipment, supervise the start-up, and instruct the operation personnel in the operation and maintenance of the equipment. These services shall be provided as part of the work under the applicable contract items and no extra payment will be made by the Owner for any such services in connection with the installation, start-up, operation, and maintenance instructions relating to the equipment.

7.23 Adjustment and Operation of Systems

- A. Prior to time of final inspection, the Contractor shall carefully adjust and place in operation all parts of the equipment, systems and electrical facilities, installed by him when any work included in this contract is completed. The Contractor shall also assist in the adjustment of equipment and systems furnished by the Owner and installed by the Contractor. All automatic controls and safety devices shall be adjusted, all air and water flow shall be balanced and adjusted, and all valves shall be properly set. The Contractor shall perform all other necessary operations to make the equipment, systems and electrical facilities fully operable. Where

required, all equipment shall be oiled and greased and all oilers and grease cups shall be left filled.

- B. Upon completion of this work, the Contractor shall notify the Engineer that all equipment, systems and electrical facilities are ready for final tests and inspection and shall cooperate with the Owner's representative in charge in conducting the tests and inspection.
- C. At the time of final inspection, the Contractor shall be represented by a person of authority. Major subcontractors also shall be represented. Each shall demonstrate that his work fully complies with the purpose and intent of the plans and specifications. All labor, all services, and all instruments or tools necessary for such demonstration and tests shall be provided by the Contractor.

7.24 Cleanup

- A. The Contractor shall maintain the site of work, in a neat and clean condition at all times and shall not allow surplus construction materials, tools, rubbish, excess soil and other foreign matter to accumulate in a nuisance fashion and/or hazardous or unsightly manner. The timely disposition or disposal from the site of any such item shall be the complete responsibility of the Contractor. The Contractor shall follow the requirements of IDEM Rule 5 at all times.
- B. Final acceptance will not be made until after all cleanup, site work including restoration of all fences, lawns, landscaping, mailboxes, curbs, drives, poles, signs, sidewalks, property monument replacement, pavement replacement, repair work and all other miscellaneous items disturbed during construction have been completed to a condition equal to that before construction began, and to the satisfaction of the Town and/or any other public body that may have jurisdiction.

7.25 Guarantee

- A. All materials, labor, equipment, miscellaneous accessories and their installation shall be guaranteed to be free from all defects for a period of one year from the date of acceptance and/or continuous use by the Town, or of equipment "startup", unless a longer period is specified elsewhere in these Standards and Specifications. Any defects found during this one (1) year period shall be repaired or replaced at no cost to the Town and any such defect that has been repaired or replaced shall thenceforth be guaranteed for an additional twelve (12) months from the date of such repair or replacement.
- B. The Contractor shall assume complete responsibility for the guarantee of all facets of construction and is hereby cautioned that individual manufacturer's guarantees of equipment or other appurtenances will not be recognized unless they exceed the requirements of the previous paragraph.
- C. The required lubrication, start-up and adjustment of equipment and other appurtenances shall be performed at the appropriate time by or under the direct supervision of the Contractor and the manufacturer's representative with all equipment and appurtenances left in proper working order for use by the Town.

- D. The Contractor shall be responsible for assembling from each manufacturer of equipment supplied on the project, shop drawings, specifications, and operations and maintenance (O&M) instructions into one or more manuals and furnish the Town with three (3) hard copies plus one (1) PDF copy of each manual.

STANDARD DRAWINGS

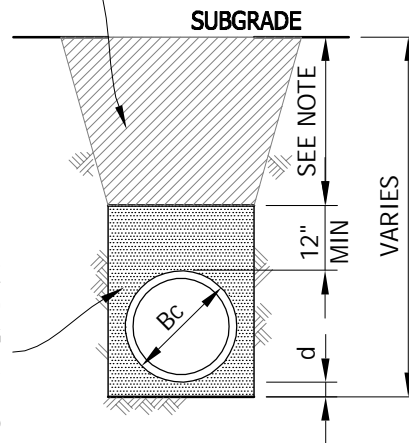
TOWN OF HUNTERTOWN
ALLEN COUNTY, INDIANA
STANDARDS AND SPECIFICATIONS

BEDDING SPECIFICATIONS

- FOR ROCK OR OTHER NON-COMPRESSIBLE MATERIAL, THE TRENCH SHALL BE OVER EXCAVATED TO PROVIDE A MINIMUM OF 6" MINIMUM CLEARANCE TO THE PIPE AND REFILLED WITH BEDDING MATERIAL.

DEPTH OF BEDDING MATERIAL BELOW PIPE	
D	d(Min.)
LESS THAN 36"	4"
36" & LARGER	Bc / 8

BACKFILL
(SEE BELOW)



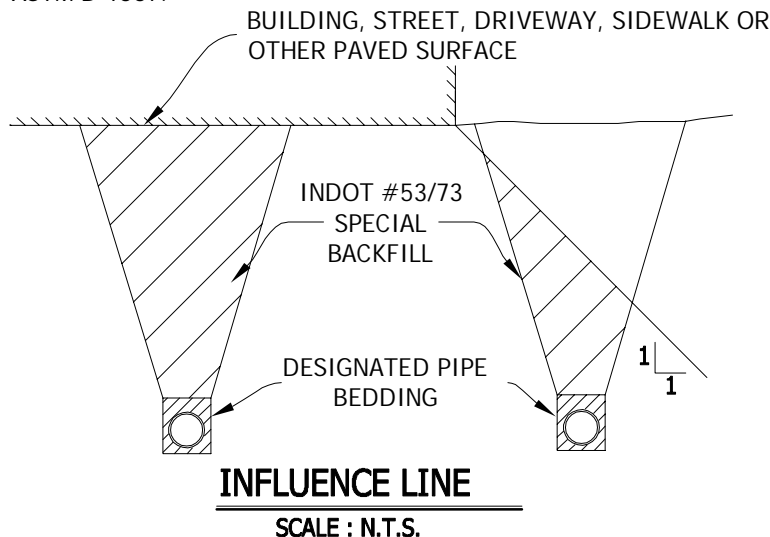
LEGEND

Bc = OUTSIDE DIA. OF PIPE
D = INSIDE DIA. OF PIPE
d = BEDDING MATERIAL BELOW PIPE BELL

FLEXIBLE PIPE: COMPACTED CRUSHED STONE
INDOT #5, #8 BELOW SPRINGLINE AND
COMPACTED GRANULAR BEDDING
INDOT #5, #8, #9 ABOVE SPRINGLINE
RIGID PIPE: COMPACTED GRANULAR
MATERIAL INDOT #5, #8, #9

BACKFILL SPECIFICATIONS

- BACKFILL UNDER PAVED AREAS SHALL BE INDOT #53/#73. INFLUENCE ZONE SHALL EXTEND AT A 1:1 SLOPE FROM ABOVE ITEM. COMPACTION SHALL MEET OR EXCEED 95% OF MAXIMUM DRY UNIT WEIGHT ACCORDING TO ASTM D 1557.
- BACKFILL WITHIN LAWN AREAS AND OUT OF THE INFLUENCE OF: BUILDING STRUCTURES, AND PAVED AREAS, SHALL BE STANDARD BACKFILL. STANDARD BACKFILL SHALL BE FREE OF: ROCK AND GRAVEL LARGER THAN 3" IN ANY DIMENSION, DEBRIS, WASTE, FROZEN MATERIALS, VEGETATION, AND OTHER DELETERIOUS MATERIAL ACCORDING TO ASTM D 2487. COMPACTION SHALL MEET OR EXCEED 90% OF MAXIMUM DRY UNIT WEIGHT ACCORDING TO ASTM D 1557.



NOTES:

- DETAIL APPLIES TO WATER AND WASTEWATER INSTALLATIONS. SEE ALLEN COUNTY STANDARDS FOR STORMWATER.
- MINIMUM COVER - GRAVITY SANITARY MAINS 4'; WATER & FORCE MAINS 5'.
- FLEXIBLE PIPE - PVC, HDPE, DIP, & CMP ARE CONSIDERED FLEXIBLE PIPES.
- RIGID PIPE - RCP IS CONSIDERED RIGID PIPE.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

BF-01

PIPE TRENCH DETAIL
(PUBLIC INFRASTRUCTURE)

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

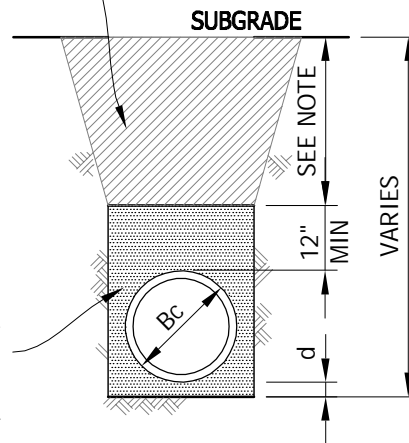
SCALE: NONE

BEDDING SPECIFICATIONS

- FOR ROCK OR OTHER NON-COMPRESSIBLE MATERIAL, THE TRENCH SHALL BE OVER EXCAVATED TO PROVIDE A MINIMUM OF 6" MINIMUM CLEARANCE TO THE PIPE AND REFILLED WITH BEDDING MATERIAL.

DEPTH OF BEDDING MATERIAL BELOW PIPE	
D	d(Min.)
LESS THAN 36"	4"
36" & LARGER	Bc / 8

BACKFILL
(SEE BELOW)



LEGEND

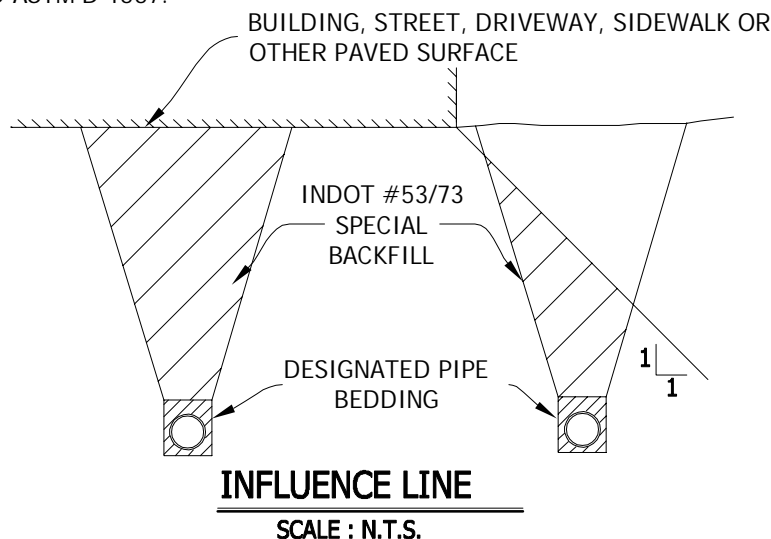
Bc = OUTSIDE DIA. OF PIPE
D = INSIDE DIA. OF PIPE
d = BEDDING MATERIAL BELOW PIPE BELL

WATER SERVICE: COMPACTED SAND OR PEA GRAVEL

SEWER LATERAL: COMPACTED GRANULAR MATERIAL INDOT #5, #8, #9, OR PEA GRAVEL

BACKFILL SPECIFICATIONS

- BACKFILL UNDER PAVED AREAS SHALL BE INDOT #73. INFLUENCE ZONE SHALL EXTEND AT A 1:1 SLOPE FROM ABOVE ITEM. COMPACTION SHALL MEET OR EXCEED 95% OF MAXIMUM DRY UNIT WEIGHT ACCORDING TO ASTM D 1557.
- BACKFILL WITHIN LAWN AREAS AND OUT OF THE INFLUENCE OF: BUILDING STRUCTURES, AND PAVED AREAS, SHALL BE STANDARD BACKFILL. STANDARD BACKFILL SHALL BE FREE OF: ROCK AND GRAVEL LARGER THAN 3" IN ANY DIMENSION, DEBRIS, WASTE, FROZEN MATERIALS, VEGETATION, AND OTHER DELETERIOUS MATERIAL ACCORDING TO ASTM D 2487. COMPACTION SHALL MEET OR EXCEED 90% OF MAXIMUM DRY UNIT WEIGHT ACCORDING TO ASTM D 1557.



NOTES:

- MINIMUM COVER - SANITARY LATERALS 3'; FORCE MAINS 5'; WATER SERVICES SMALLER THAN 2" DIAMETER 4'-6", WATER SERVICES 2" AND LARGER DIAMETER 5'-0".



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

BF-02

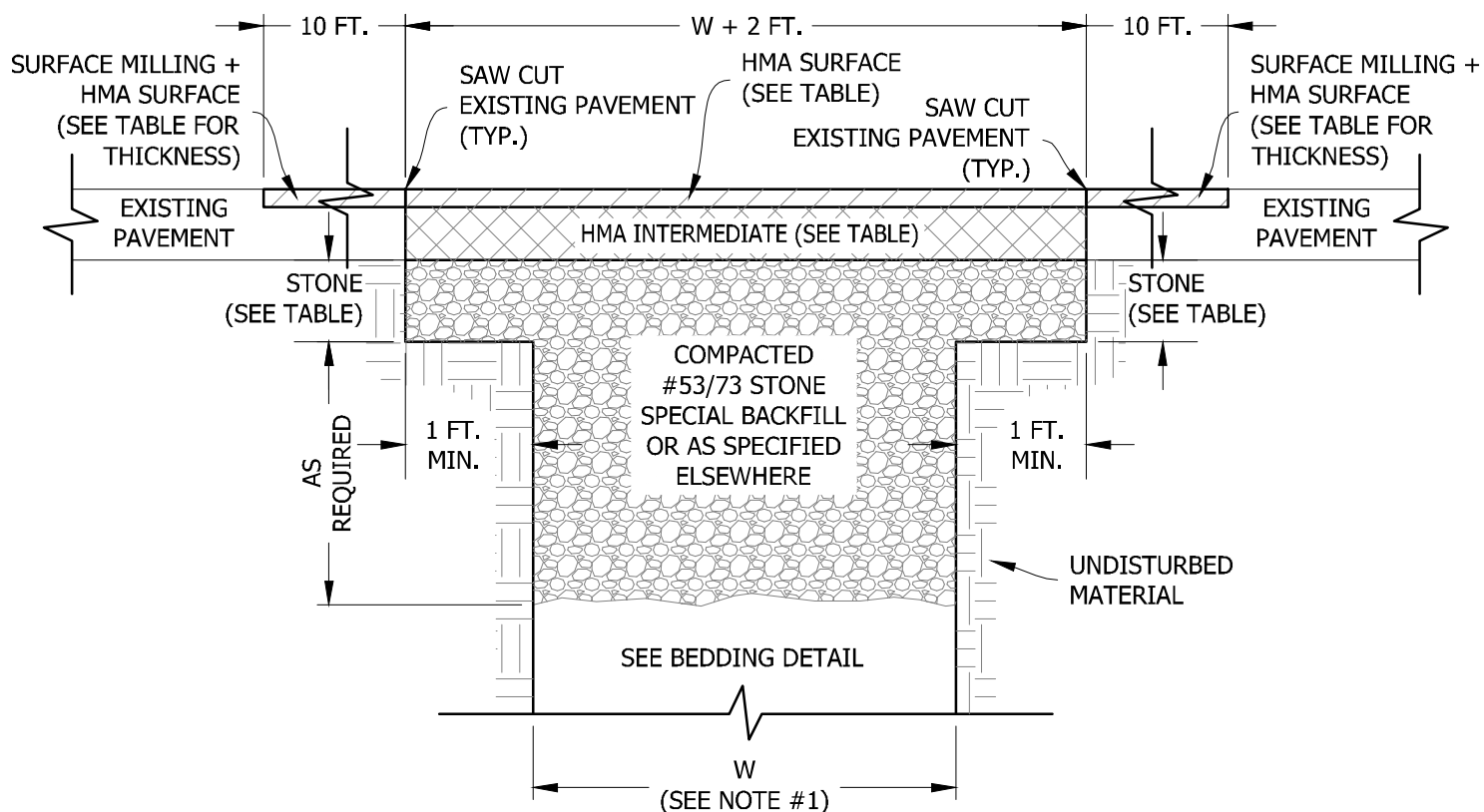
PIPE TRENCH DETAIL
(SERVICES & LATERALS)

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

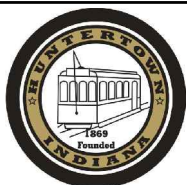
SCALE: _____ NONE



ROADWAY TYPE	DIMENSIONS ³			HMA TYPE
	SURFACE	INTERMEDIATE	STONE	
ARTERIAL	2"	4"	16"	C
LOCAL/RESIDENTIAL/COLLECTOR	1.5"	2.5"	14"	B

NOTES:

1. WIDTH OF TRENCH (W) SHALL EQUAL OUTSIDE DIAMETER OF PIPE + 30 INCHES.
2. NEW SURFACE SHALL BE SLOPED TO MATCH EXISTING PAVEMENT.
3. DEPTH AS SHOWN OR MATCH EXISTING, WHICHEVER IS GREATER.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STR-01

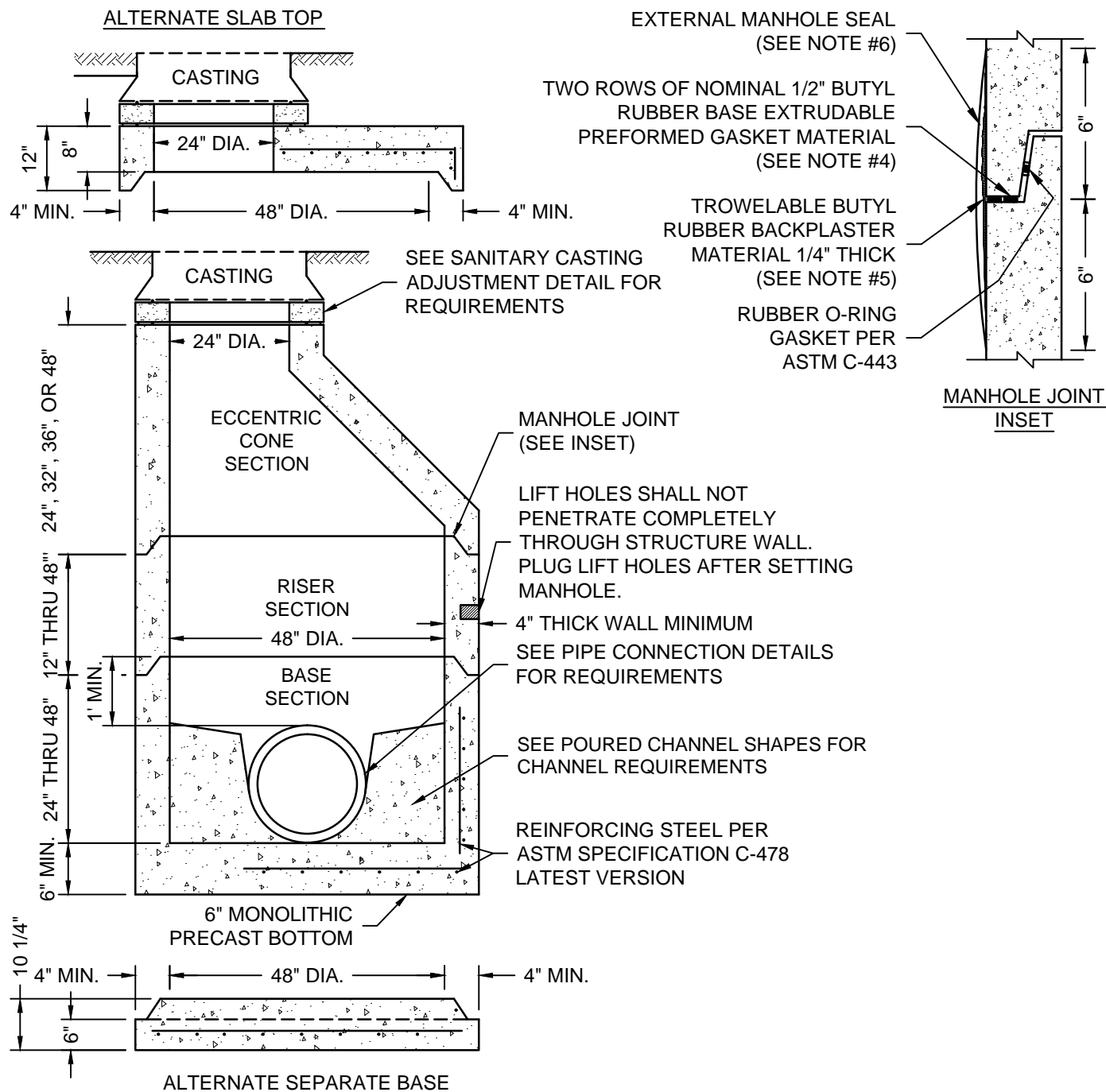
ASPHALT ROADWAY PATCH

STANDARD DRAWINGS

APPROVED: 6/6/22

REVISED: _____

SCALE: _____ NONE



NOTES:

1. CAST IN PLACE BASE ONLY PERMITTED WITH WRITTEN APPROVAL OF TOWN.
2. THE BASE SHALL BE PLACED ON COMPACTED FRACTURED FACE STONE, 6" MINIMUM.
3. THE INSIDE WALL DISTANCE BETWEEN OPENINGS SHALL BE A MINIMUM OF 6".
4. USE RU 106 RUB'RNEK LTM AS MANUFACTURED BY HENRY CO., KENT-SEAL NO. 2 AS MANUFACTURED BY HAMILTON-KENT OR EZ-STICK BUTYL-RUBBER-BASED PREFORMED FLEXIBLE SEALANT AS MANUFACTURED BY PRESS-SEAL.
5. APPLY TROWELABLE BUTYL RUBBER BACK PLASTER MATERIAL 1/4" THICK (WHEN DRY) FROM 6" ABOVE TO 6" BELOW JOINTS. USE TROWELABLE EZ-STICK #3, AS MANUFACTURED BY PRESS-SEAL GASKET CORP.
6. EXTERNAL MANHOLE JOINT SEAL SHALL CONSIST OF A SHEET OF PLASTIC VISQUEEN.



TOWN OF HUNTERTOWN

15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

SAN-01

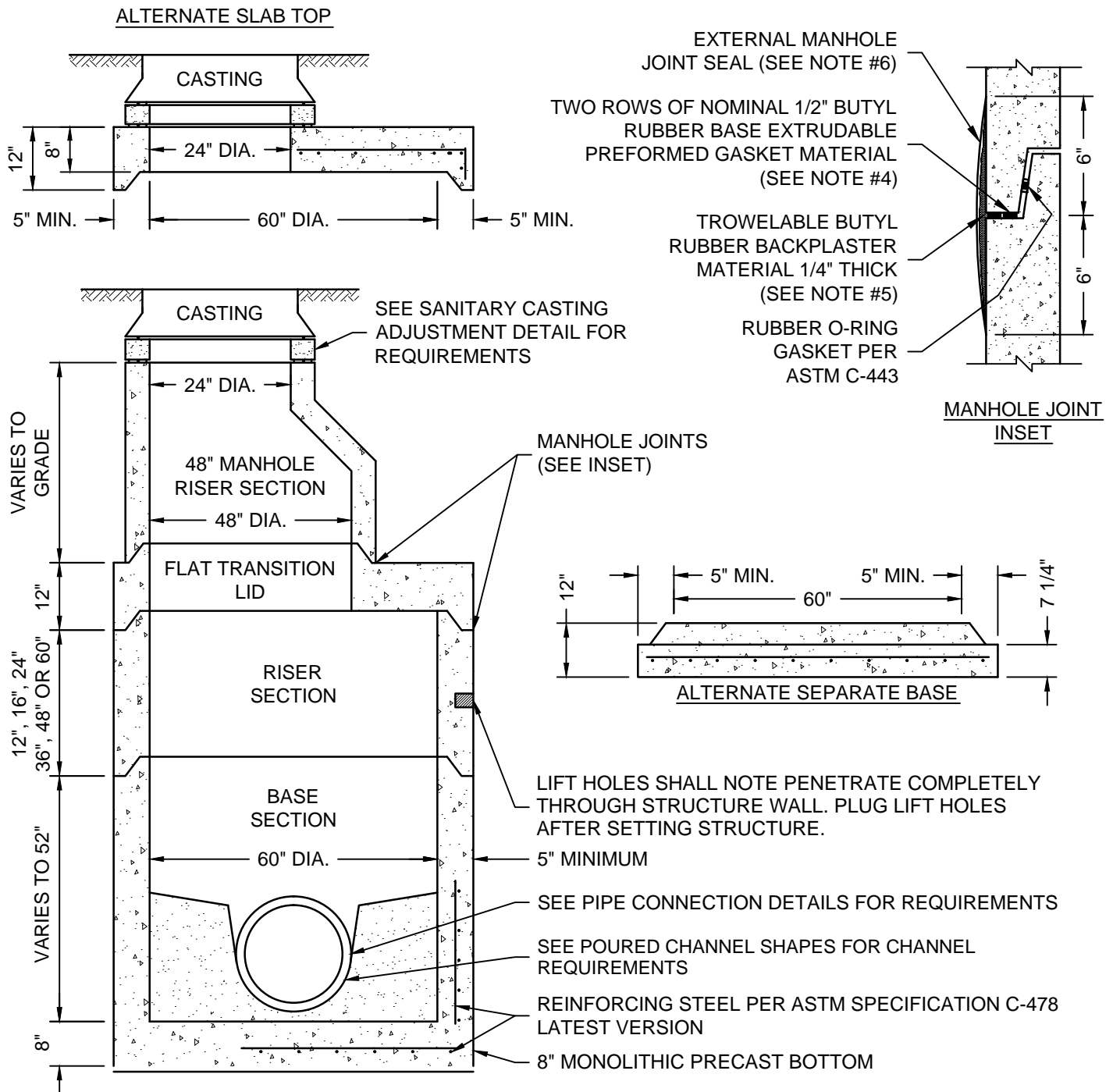
48" SANITARY MANHOLE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTES:

1. CAST IN PLACE BASE ONLY PERMITTED WITH WRITTEN APPROVAL OF TOWN.
2. THE BASE SHALL BE PLACED ON COMPACTED FRACTURED FACE STONE, 6" MINIMUM.
3. THE INSIDE WALL DISTANCE BETWEEN OPENINGS SHALL BE A MINIMUM OF 6".
4. USE RU 106 RUB'NEK LTM AS MANUFACTURED BY HENRY CO., KENT-SEAL NO. 2 AS MANUFACTURED BY HAMILTON-KENT OR EZ-STICK BUTYL-RUBBER-BASED PREFORMED FLEXIBLE SEALANT AS MANUFACTURED BY PRESS-SEAL.
5. APPLY TROWELABLE BUTYL RUBBER BACK PLASTER MATERIAL 1/4" THICK (WHEN DRY) FROM 6" ABOVE TO 6" BELOW JOINTS. USE TROWELABLE EZ-STICK #3, AS MANUFACTURED BY PRESS-SEAL GASKET CORP.
6. EXTERNAL MANHOLE JOINT SEAL SHALL CONSIST OF A SHEET OF PLASTIC VISQUEEN.



TOWN OF HUNTERTOWN

15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

SAN-02

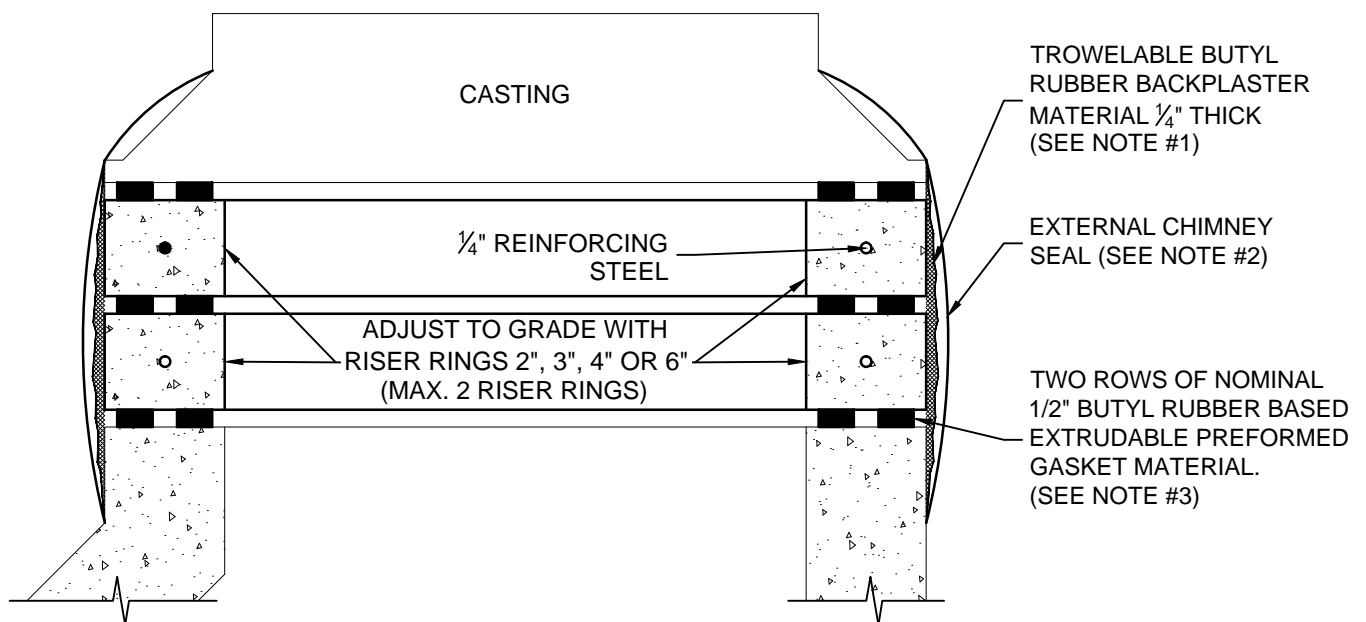
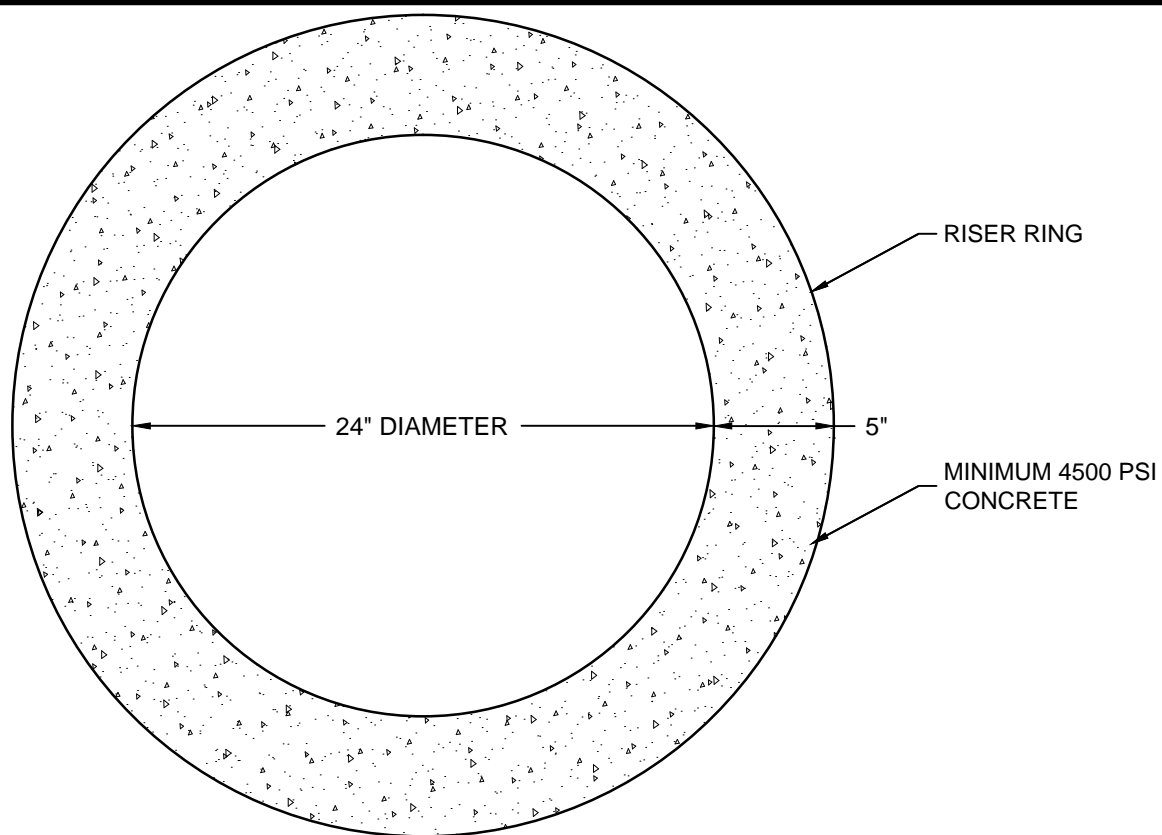
60" SANITARY MANHOLE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTES:

1. APPLY TROWELABLE BUTYL RUBBER BACKPLASTER MATERIAL 1/4" THICK (WHEN DRY) OVER RISER RINGS FROM 6" ABOVE TO 6" BELOW RISER RING JOINTS. USE TROWELABLE EZ-STICK #3, AS MANUFACTURED BY PRESS-SEAL GASKET CORP.
2. EXTERNAL CHIMNEY SEAL SHALL CONSIST OF A HEAT- SHRINKING WRAP- AROUND SLEEVE (WRAPIDSEAL AS MANUFACTURED BY CANUSA) OR EXTERNAL CHIMNEY SEAL (AS MANUFACTURED BY CRETEX).
3. USE RU 106 RUB'RNEK LTM AS MANUFACTURED BY HENRY CO., KENT-SEAL NO. 2 AS MANUFACTURED BY HAMILTON-KENT OR EZ-STICK BUTYL-RUBBER-BASED PREFORMED FLEXIBLE SEALANT AS MANUFACTURED BY PRESS-SEAL.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

SAN-03

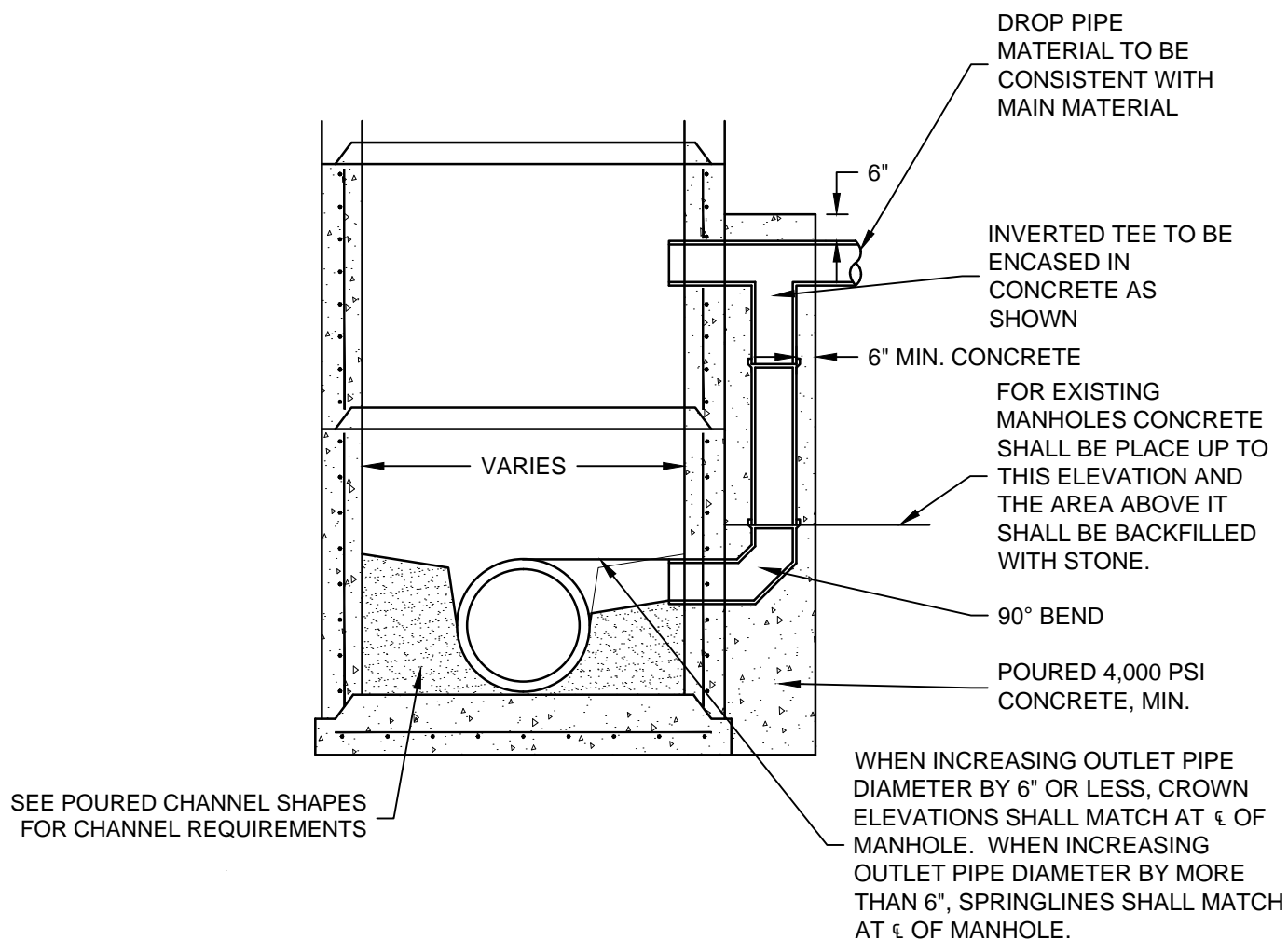
SANITARY CASTING ADJUSTMENT

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTES:

1. DROP PIPE SHALL BE A MINIMUM OF 8" FOR 8" TO 12" DIAMETER MAINLINE PIPE AND 12" DROP PIPE FOR ALL LARGER MAINLINE PIPES UNLESS OTHERWISE SPECIFIED.
2. GENERAL CONSTRUCTION REQUIREMENTS SAME AS STANDARD 48" MANHOLE.



TOWN OF HUNTERTOWN
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SAN-04

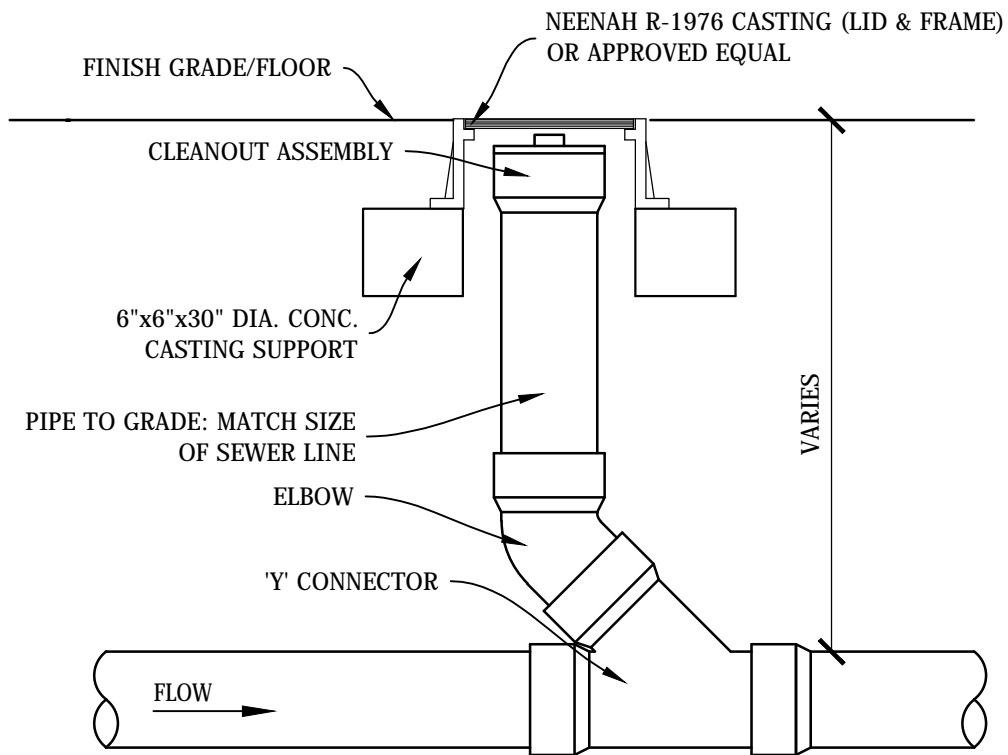
**OUTSIDE DROP
CONNECTION FOR MANHOLES**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

SAN-05

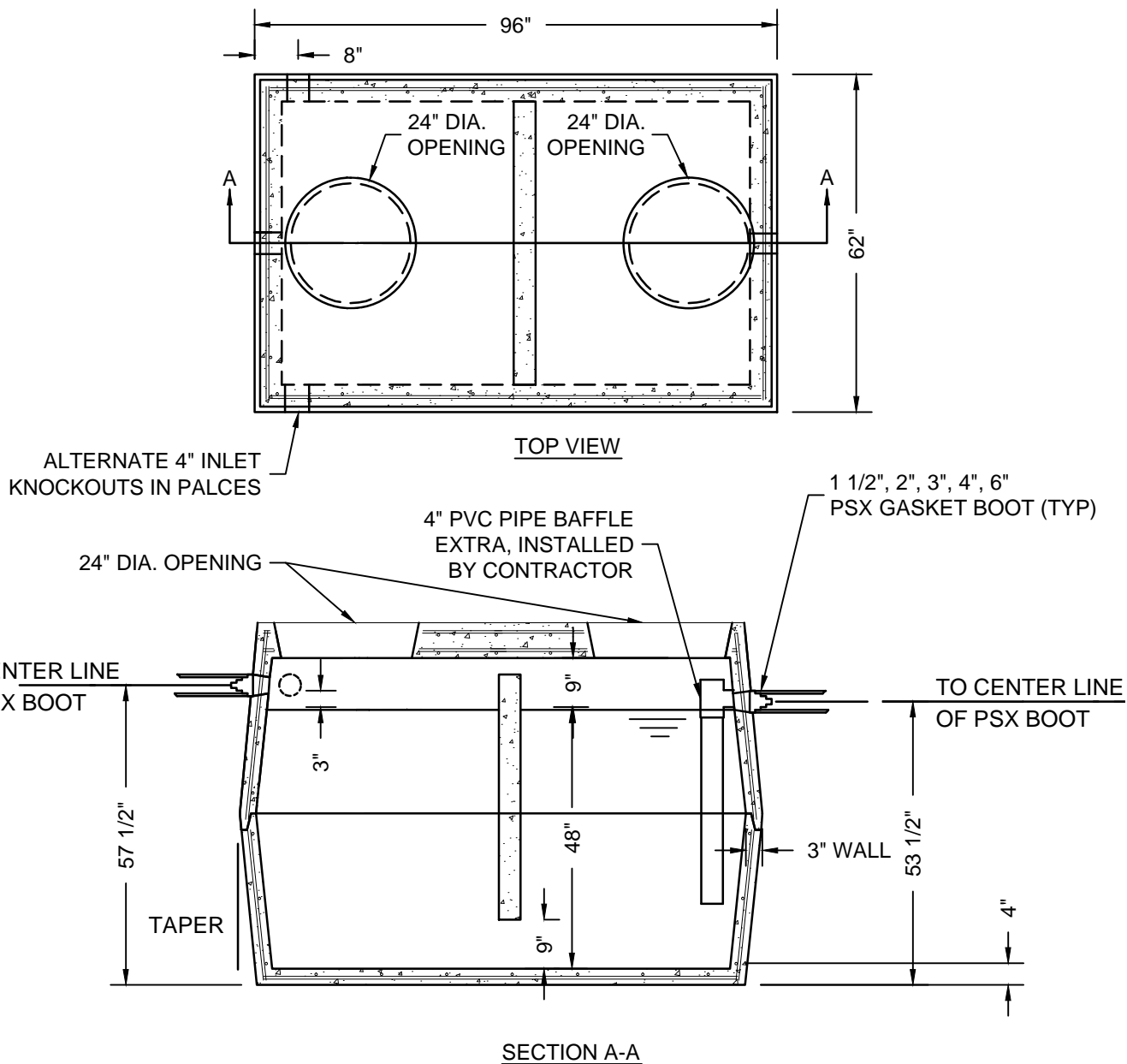
**GRAVITY
SEWER CLEANOUT**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. OPTIONAL TANK RISERS SHOULD BE ORDERED TO GRADE.
2. MINIMUM 4500 PSI AT 28 DAYS CONCRETE.
3. REINFORCING BARS SHALL CONFORM TO ASTM A-615 GRADE 60 STEEL.
4. ALL REINFORCING BARS SHALL BE CUT AND FORMED TO THE DIMENSIONAL TOLERANCES SPECIFIED IN ACI-315 OR ACI-318 EXCEPT WHERE NOTED ON DRAWINGS.
5. ALL BARS SHALL BE BENT COLD. BARS WITH KINKS AND BENDS NOT INDICATED SHALL NOT BE USED. HEATING AND REBENDING OF BARS IS NOT PERMITTED.
6. REINFORCING STEEL SHALL BE #4 REBAR AT 12" O.C. BOTH WAYS TIED TO 6X6 10/10 WELDED WIRE MESH. TOP OF GREASE TRAP TO HAVE DOUBLE LAYER OF STEEL.
7. EARTH COVER: 2'-0" MINIMUM UP TO 5'-0" MAXIMUM. SIZE PAD ACCORDING TO AMOUNT OF EARTH COVER.
8. DESIGN FOR TRAFFIC LOADING.



TOWN OF HUNTERTOWN
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SAN-06

**1000 GALLON
GREASE INTERCEPTOR**

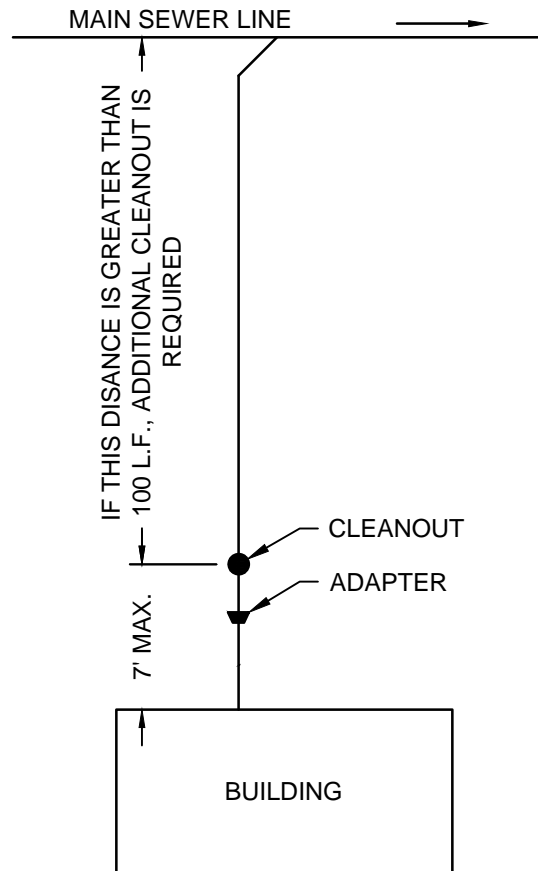
STANDARD DRAWINGS

APPROVED: 2/4/19

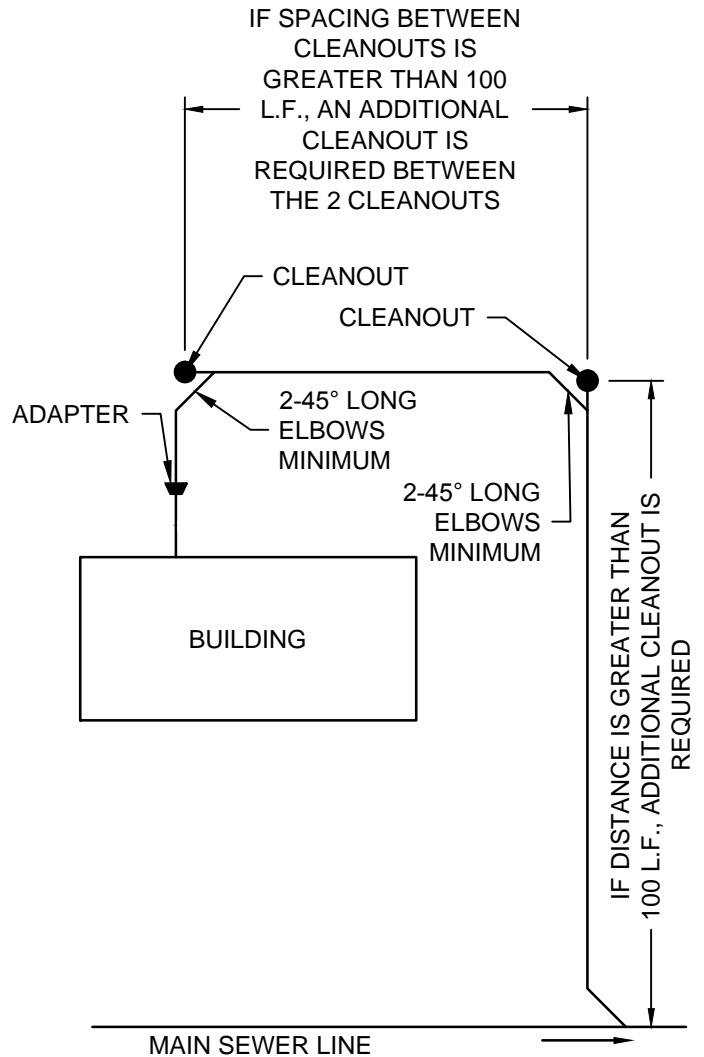
REVISED:

SCALE:

NONE



STRAIGHT CONNECTION



AROUND THE BUILDING CONNECTION

NOTES:

1. MAXIMUM DISTANCE BETWEEN THE EXTERIOR WALL AND THE CLEANOUT WYE SHALL BE 7'.
2. NO 90° ELBOW IS PERMITTED IN BUILDING SEWER. TWO 45° LONG ELBOWS MUST BE USED.
3. MINIMUM SLOPE OF BUILDING SEWER SHALL BE 2% (1/4" PER FOOT).
4. MINIMUM SIZE FOR BUILDING SEWER SHALL BE 6" IN DIAMETER.
5. BUILDING SEWER LINE SHALL BE INSPECTED AND APPROVED BEFORE EXCAVATION IS BACKFILLED.
6. NO CLEANOUT CAN BE INSTALLED IN A ROAD OR ALLEY RIGHT-OF-WAY OR IN A DEDICATED EASEMENT UNLESS OTHERWISE APPROVED BY THE GOVERNING AGENCY OR DEPARTMENT.



TOWN OF HUNTERTOWN
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SAN-07

**SANITARY SEWER LATERAL
PLAN VIEW**

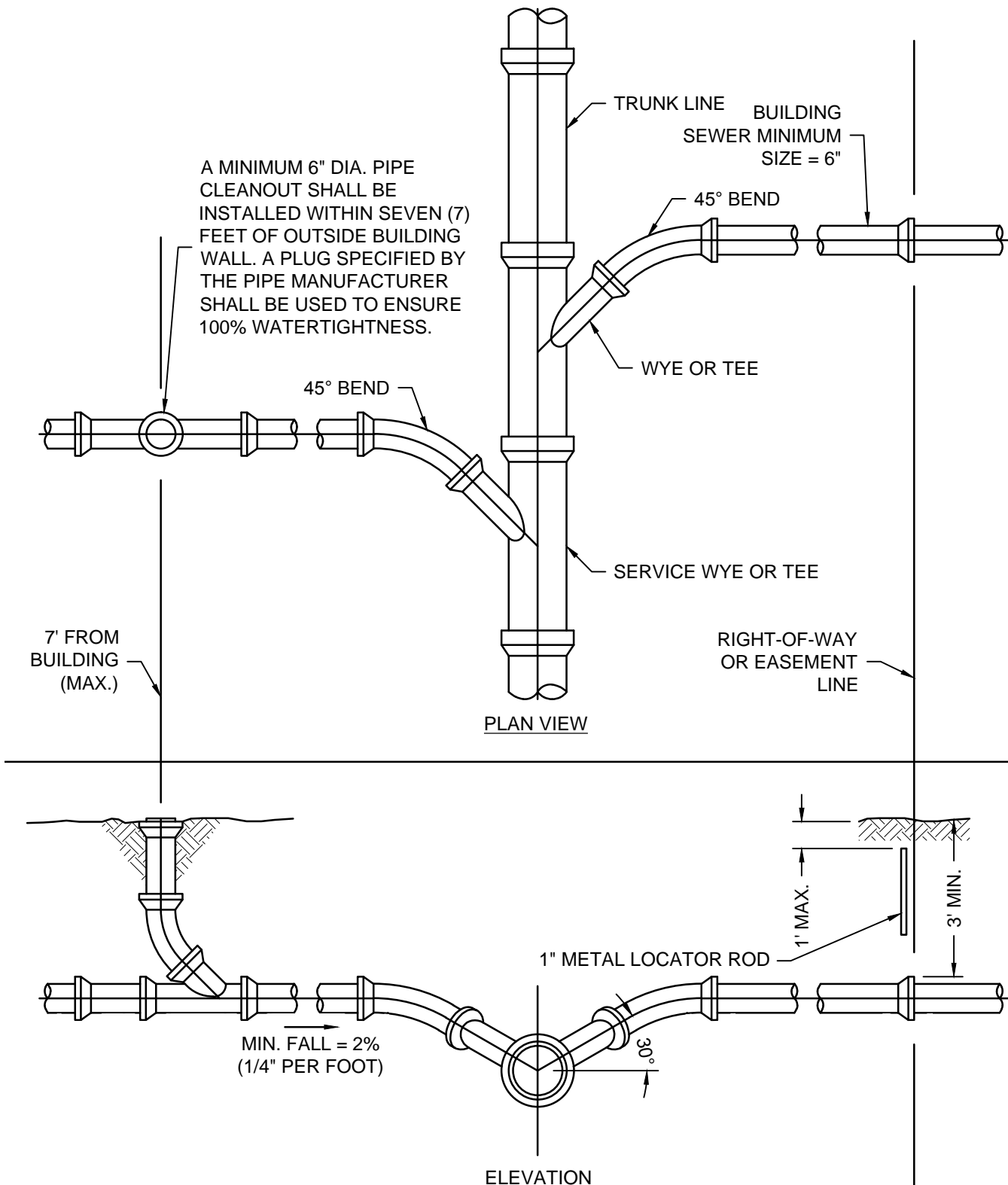
STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE

LESS THAN 15' DEEP



NOTES:

1. COMPACTION OF GRANULAR BACKFILL IS CRITICAL UNDER WYE AND BEND.
2. PROVIDE TRACER WIRE ON LATERALS PER SPECIFICATIONS.
3. PROVIDE WOOD STAKE EXTENDING 24" ABOVE GRADE AT SAME LOCATION AS METAL LOCATOR ROD.



TOWN OF HUNTERTOWN
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SAN-08

**SANITARY LATERAL
SHALLOW SERVICE CONNECTION**

STANDARD DRAWINGS

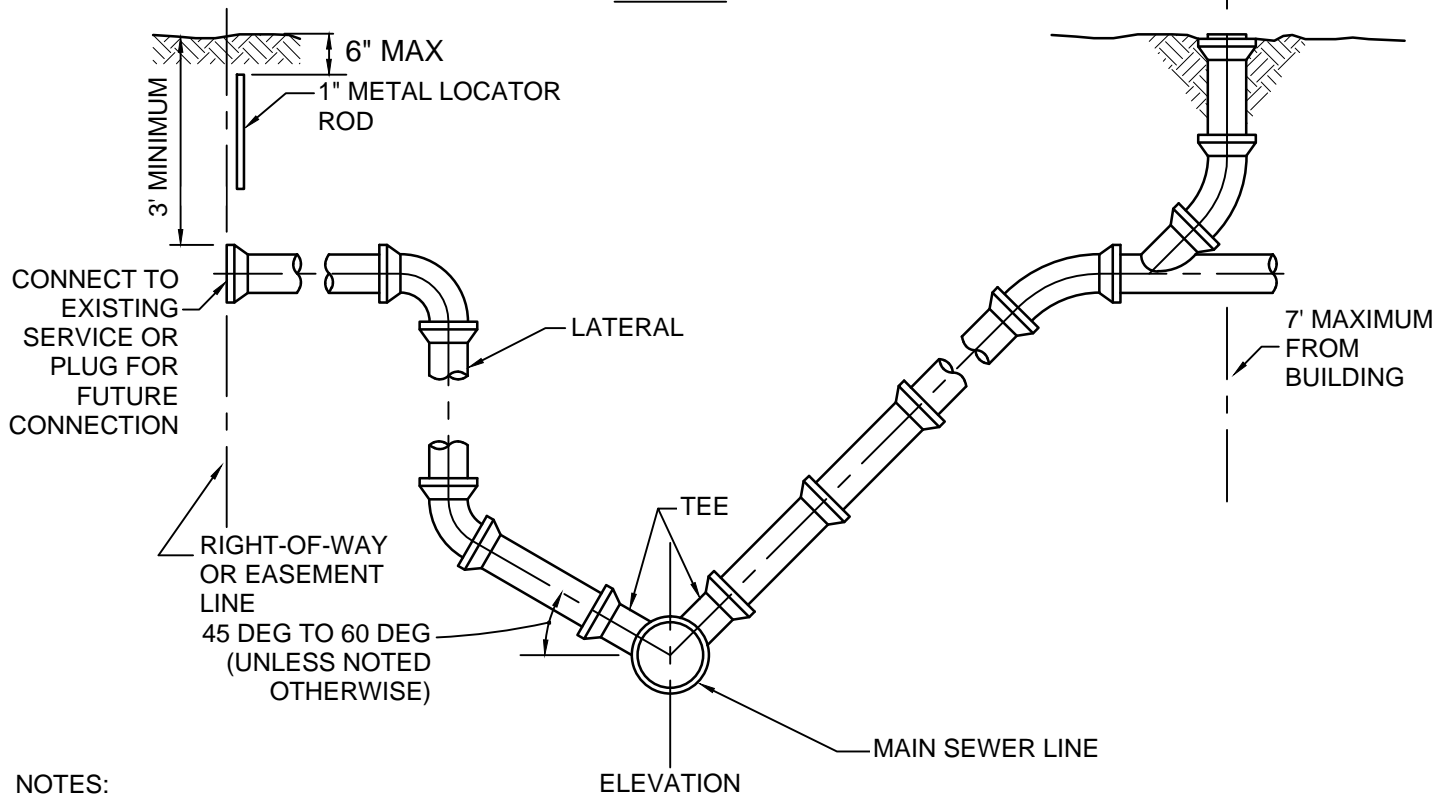
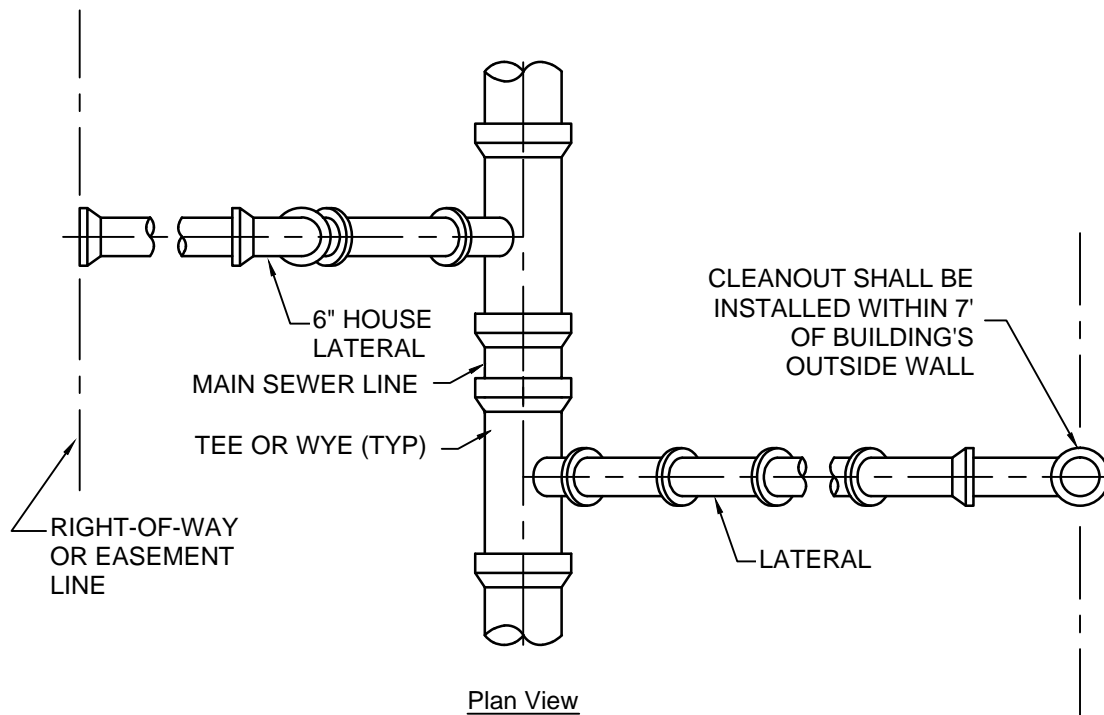
APPROVED: 2/4/19

REVISED:

SCALE:

NONE

15' DEEP AND OVER



NOTES:

1. MINIMUM LATERAL SLOPE: 1/4" PER FOOT.
2. PROVIDE TRACER WIRE ON LATERAL PER SPECIFICATIONS.
3. PROVIDE WOOD STAKE EXTENDING 24" ABOVE GRADE AT SAME LOCATION AS METAL LOCATOR ROD.



TOWN OF HUNTERTOWN
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SAN-09

SANITARY LATERAL
DEEP SERVICE CONNECTION

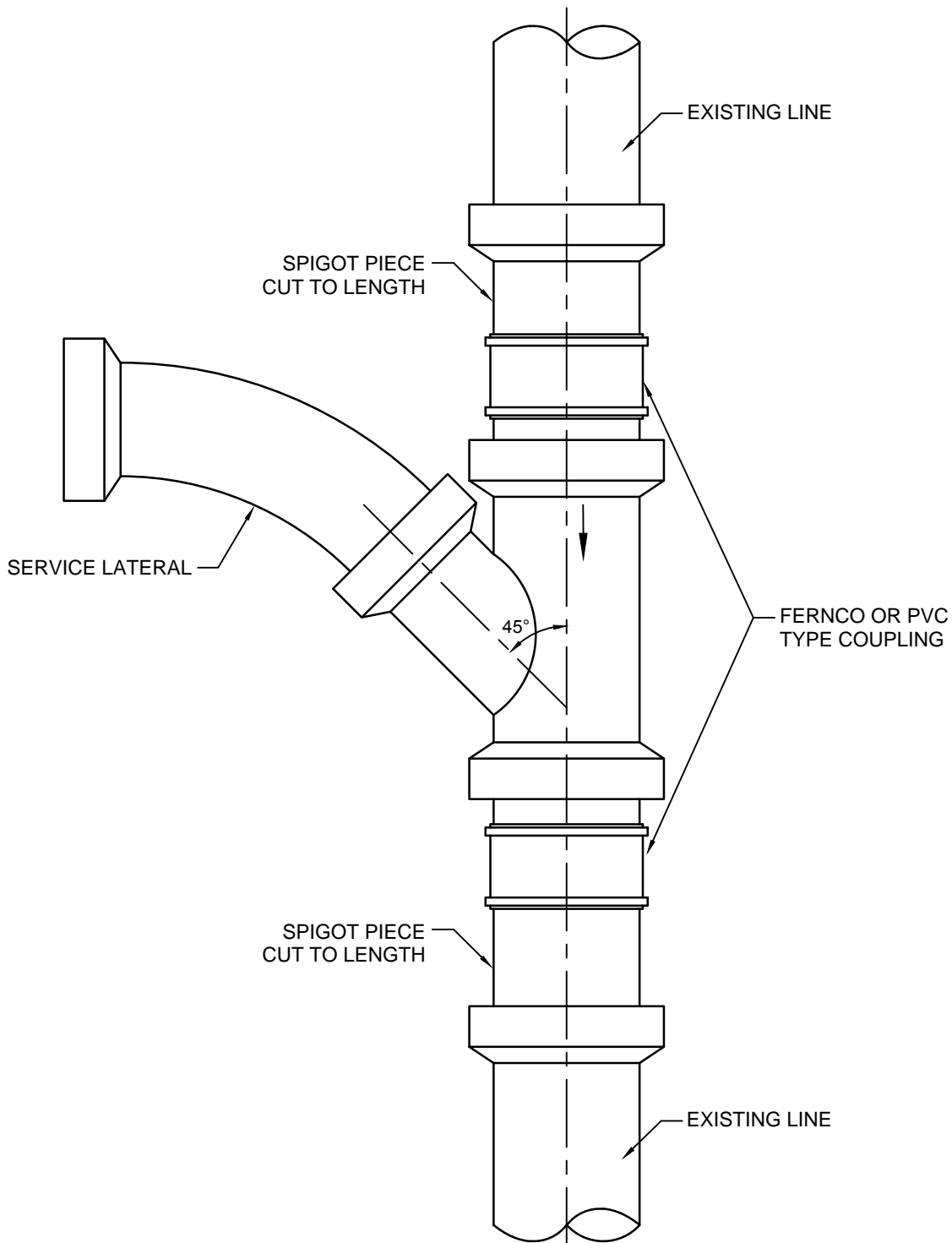
STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE

PIPES LESS THAN 15"



NOTES:

1. MANUFACTURED WYES OR TEES SHALL BE USED FOR ALL MAINLINE PIPE LESS THAN 15" IN DIAMETER.
2. BYPASS PUMPING BY CONTRACTOR AS REQUIRED WITH TOWN APPROVAL.



TOWN OF HUNTERTOWN
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SAN-10

CUT-IN LATERAL CONNECTION

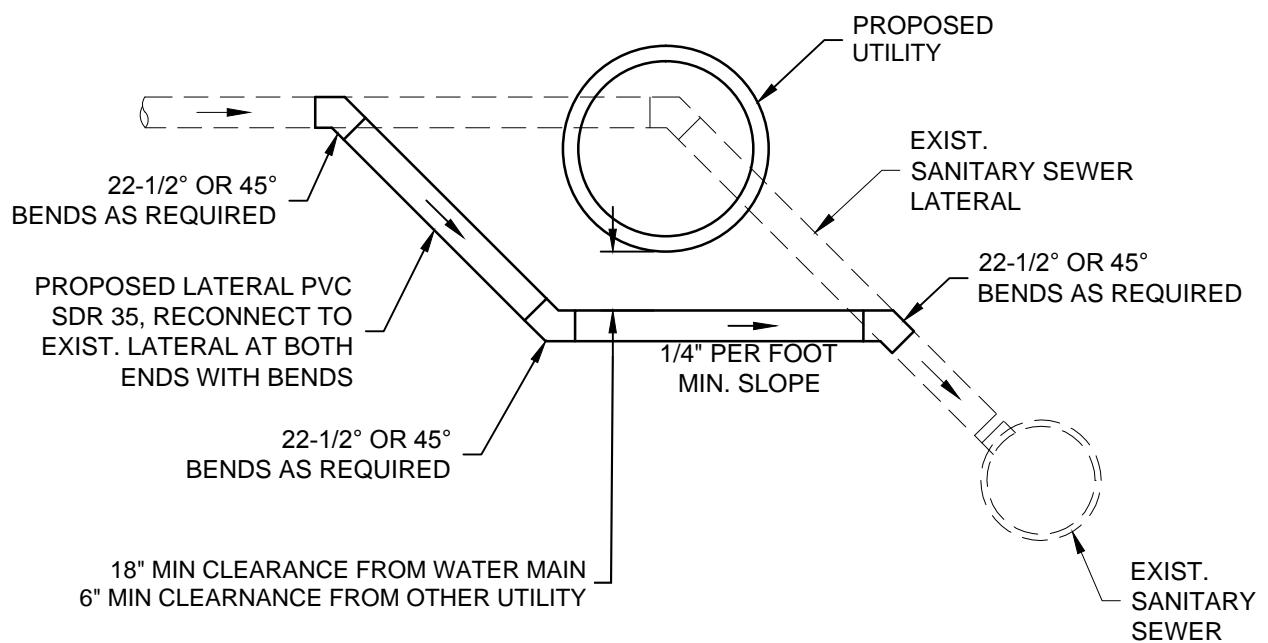
STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE:

NONE



NOTES:

1. PROVIDE TRACER WIRE ON LATERAL PER SPECIFICATIONS.



TOWN OF HUNTERTOWN
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HUNTERTOWN, IN 46748

SAN-11

SANITARY LATERAL LOWERING

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE



STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: 2/7/22

SCALE: NONE

TOWN OF HONTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

SAN-12

LIFT STATION PLAN

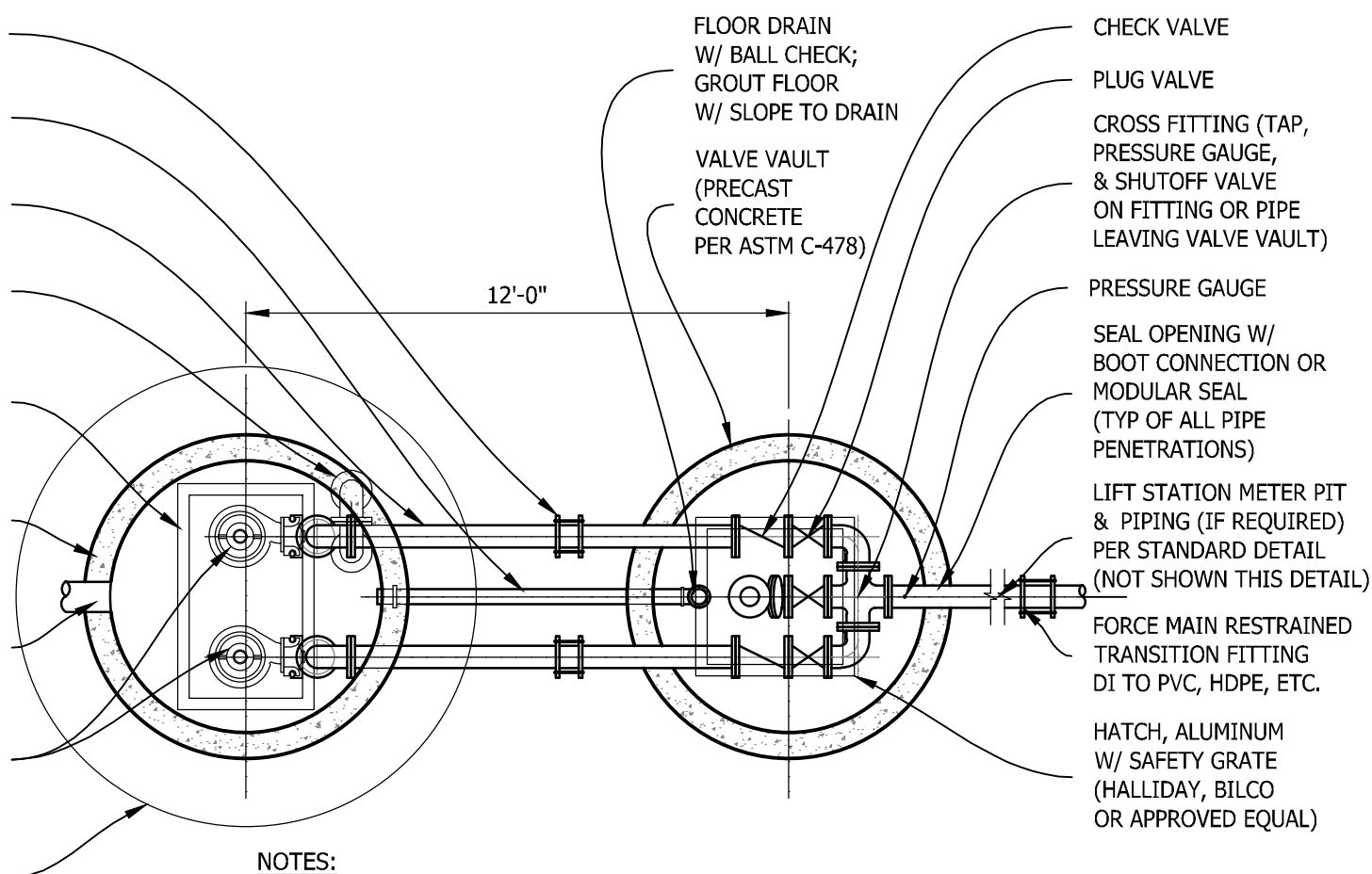
RESTRAINED
FLEXIBLE COUPLING
DRAIN LINE, D.I. OR PVC
MIN SLOPE 2%
(3" DIA. MIN)
FORCE MAIN,
DUCTILE IRON
RESTRAINED JOINTS
D.I. GOOSE NECK VENT
W/ S.S. SCREEN
HATCH, ALUMINUM
W/ SAFETY GRATE
(HALLIDAY, BILCO
OR APPROVED EQUAL)
WET WELL
(PRECAST CONCRETE
PER ASTM C-478)
INFLUENT LINE
(INVERT \geq
ALARM ELEVATION)
W/ EXTERIOR DROP
SUBMERSIBLE NON-CLOG
WASTEWATER PUMP
(SEE SPECS)
CONCRETE
ANTI-FLOATATION
EXTENSIONS
AS REQUIRED

OTHER REQUIRED ITEMS:

1. FENCING & GATES
2. ACCESS DRIVEWAY
3. ON SITE GENERATOR & PAD
4. REMOTE TELEMETRY SCADA

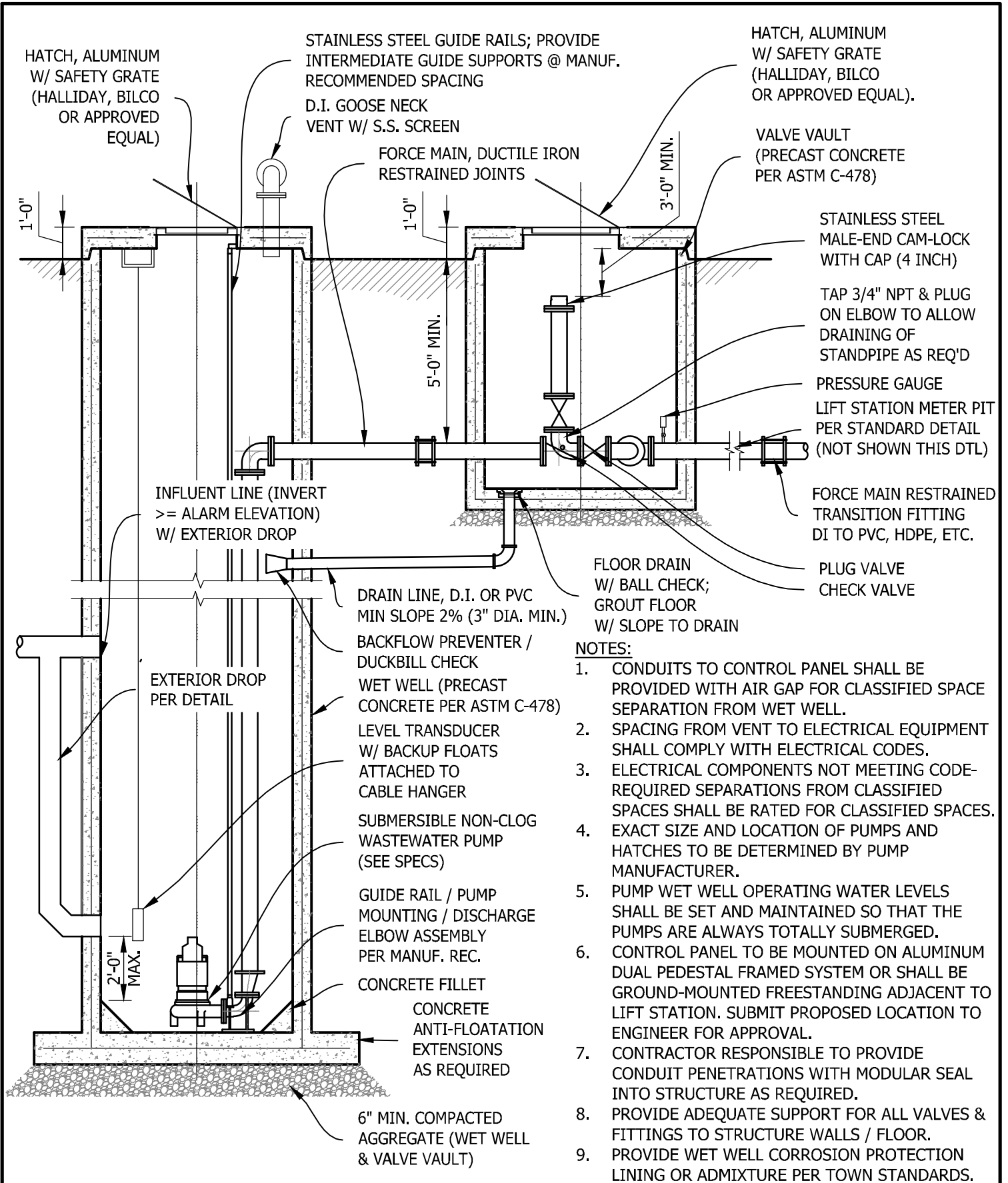
OPTIONAL ITEMS WHICH TOWN MAY REQUIRE:

1. FLOW METER, PIT, & PIPING
2. CHEMICAL TANK
3. CORROSION PROTECTION COATING



NOTES:

1. ALL ELECTRICAL LINES TO BE IN PVC COATED RIGID STEEL CONDUIT.
2. MAINTAIN DRAINAGE AROUND SITE AND MINIMUM 2.0% SLOPE ON ACCESS DRIVE.
3. MAINTAIN TWENTY-FOUR IN (24") MIN BETWEEN ALL STRUCTURES, SLABS, & FENCING. ENSURE CODE-REQUIRED CLEARANCES IN FRONT OF AND AROUND ELECTRICAL AND CONTROL PANELS.
4. ALL PIPING, STRUCTURE EXCAVATION, & TRENCHES SHALL BE BACKFILLED WITH A MATERIAL APPROVED BY THE TOWN AND COMPACTED PER TOWN SPECIFICATIONS.
5. INSTALL LIFT OUT RAIL SYSTEMS, VALVES, CONTROLS, ACCESS COVER(S) AND ALL OTHER APPURTENANCES TO MAKE A COMPLETE SYSTEM. LIFT OUT RAIL SYSTEM COMPONENTS AND UPPER GUIDE BRACKETS TO BE STAINLESS STEEL.
6. INSTALL CHECK VALVES AND ISOLATION VALVES.
7. DUCTILE IRON PIPE SHALL CONFORM TO SPECIFICATIONS.
8. INSTALL ALL TRANSDUCERS/FLOATS, POWER CONNECTIONS, AND MISCELLANEOUS FITTINGS WITHIN THE PUMP CHAMBER. FLOAT SWITCHES TO BE NON-MERCURY TYPE.
9. PROVIDE STAINLESS STEEL LIFTING CHAINS & GUIDE RAILS FOR EACH PUMP.
10. CONTROL PANEL SHALL MEET REQUIREMENTS OF TOWN STANDARDS AND SPECIFICATIONS, INCLUDING SEAL FAILURE AND OVERTEMP DETECTION, VISUAL & AUDIO ALARM, HOUR METERS, PUMP CONTROLLER WITH ALTERNATION, ETC. PROVIDE GENERATOR HOOKUP AND TRANSFER SWITCH. CONTRACTOR TO SUBMIT WIRING DIAGRAM FOR APPROVAL PRIOR TO CONSTRUCTION.



TOWN OF HUNTERTOWN
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SAN-13

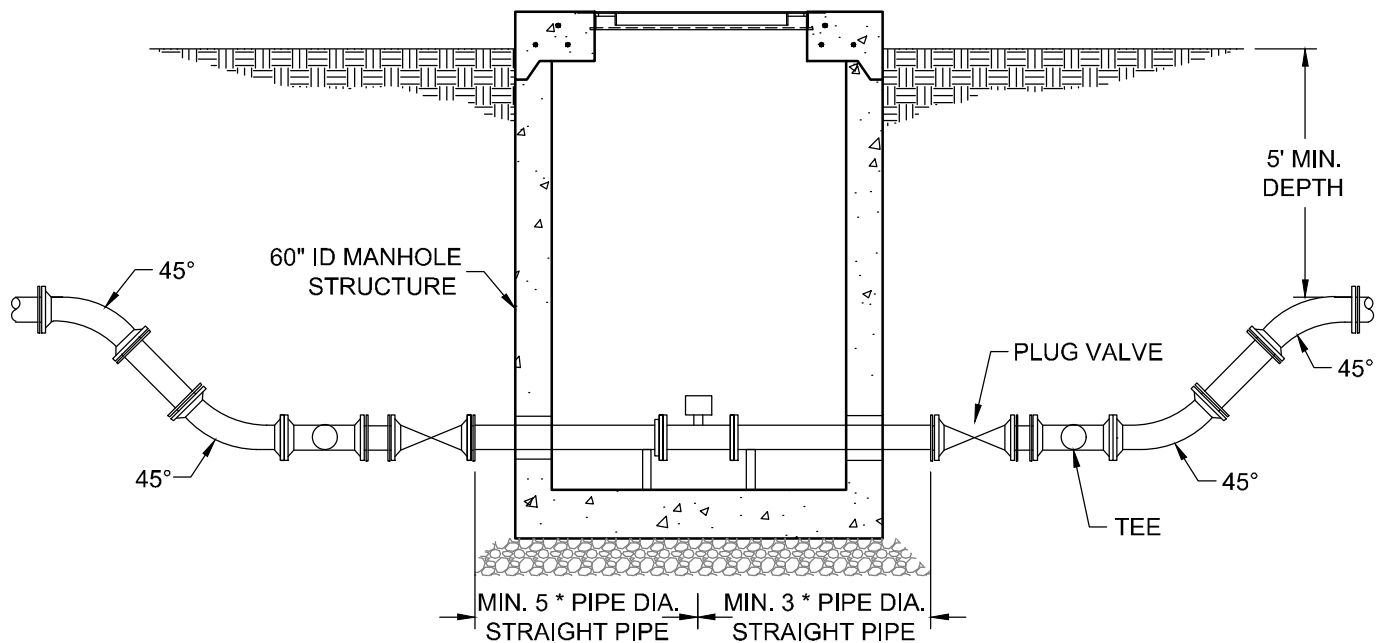
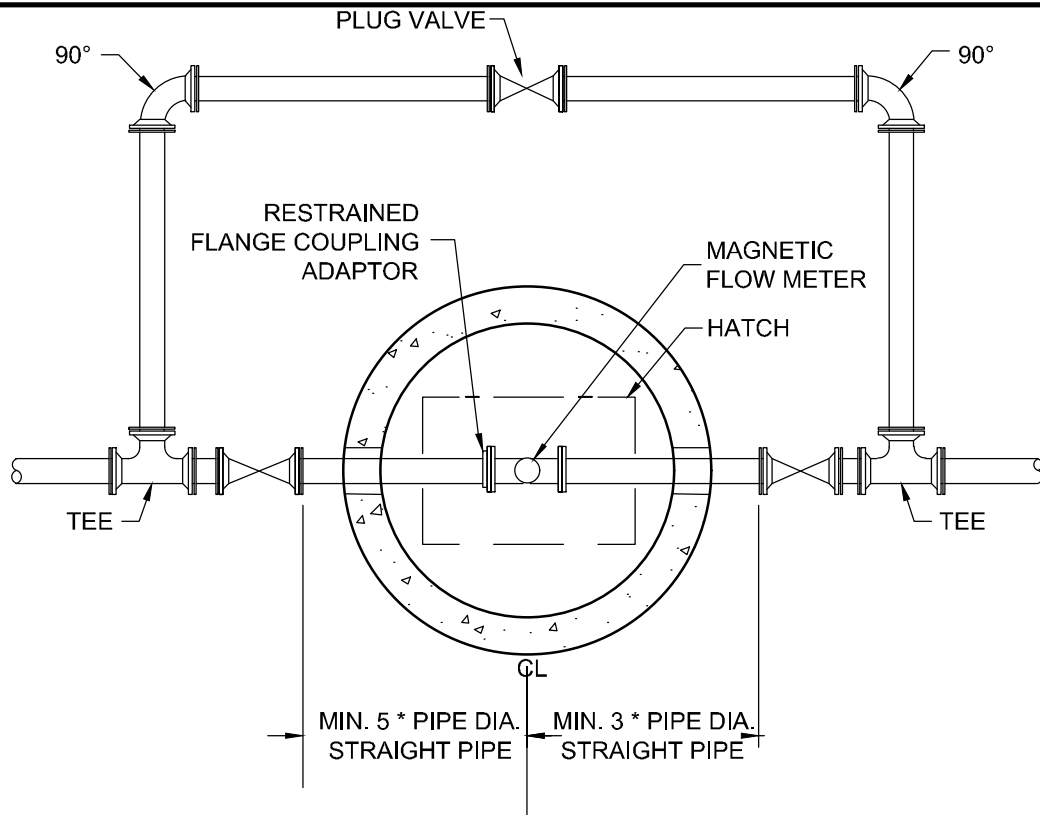
LIFT STATION SECTION

STANDARD DRAWINGS

APPROVED: _____

REVISED: 8/7/2023

SCALE: NONE



METER PIT SECTION VIEW

NOTES:

1. ALL VALVES, PIPE, AND FITTINGS TO BE DUCTILE IRON.
2. ALL VALVES, VALVE BOXES, PIPE, JOINTS, AND FITTINGS TO CONFORM TO THE SPECIFICATIONS.
3. TOWN MAY WAIVE REQUIREMENT FOR 45 DEGREE ELBOWS UPSTREAM & DOWNSTREAM OF METER.
4. PROVIDE ADEQUATE SUPPORT FOR ALL VALVES / FITTINGS TO STRUCTURE WALLS / FLOOR.
5. PROVIDE FLOOR DRAIN WITH BALL CHECK AND 3" DIAMETER MIN. DRAIN LINE TO CONNECT WITH VALVE VAULT DRAIN LINE.



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SAN-14

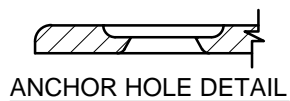
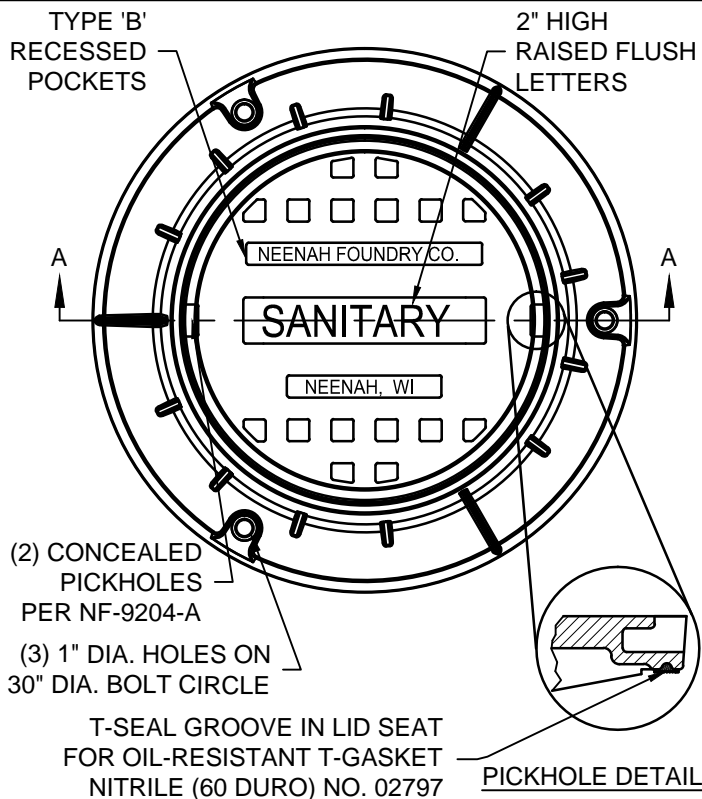
LIFT STATION METER PIT

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: 2/7/22

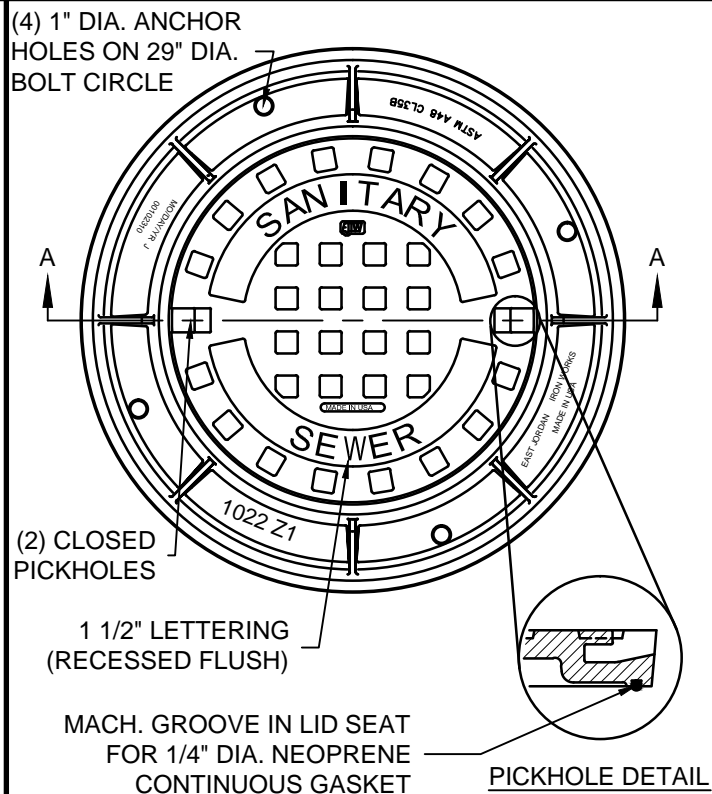
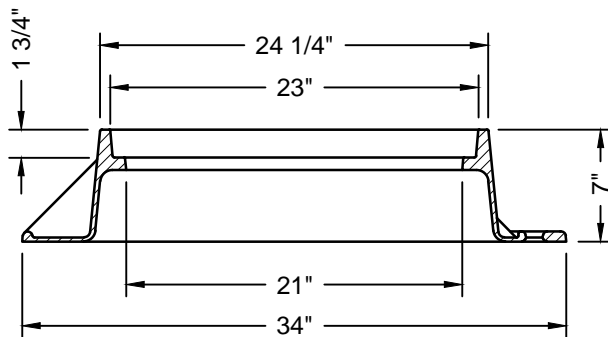
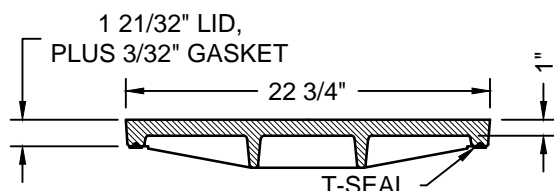
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NOTES:

1. ASTM A48-83 CLASS NO. 35
2. ALL BEARING SURFACES TO BE MACHINED

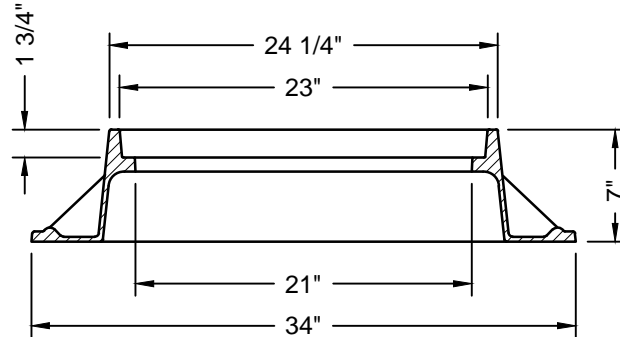
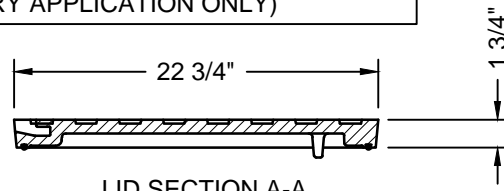
FRAME AND SOLID LID
NEENAH R-1772 W/"SANITARY" LETTERED,
SOLID LID (SANITARY APPLICATION ONLY)



NOTES:

1. ASTM A48-83 CLASS NO. 35
2. ALL BEARING SURFACES TO BE MACHINED

FRAME AND SOLID LID
EAST JORDAN 1022Z1 W/1020AHDGS
"SANITARY SEWER" LETTERED, SOLID LID
(SANITARY APPLICATION ONLY)



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STANDARD DRAWINGS

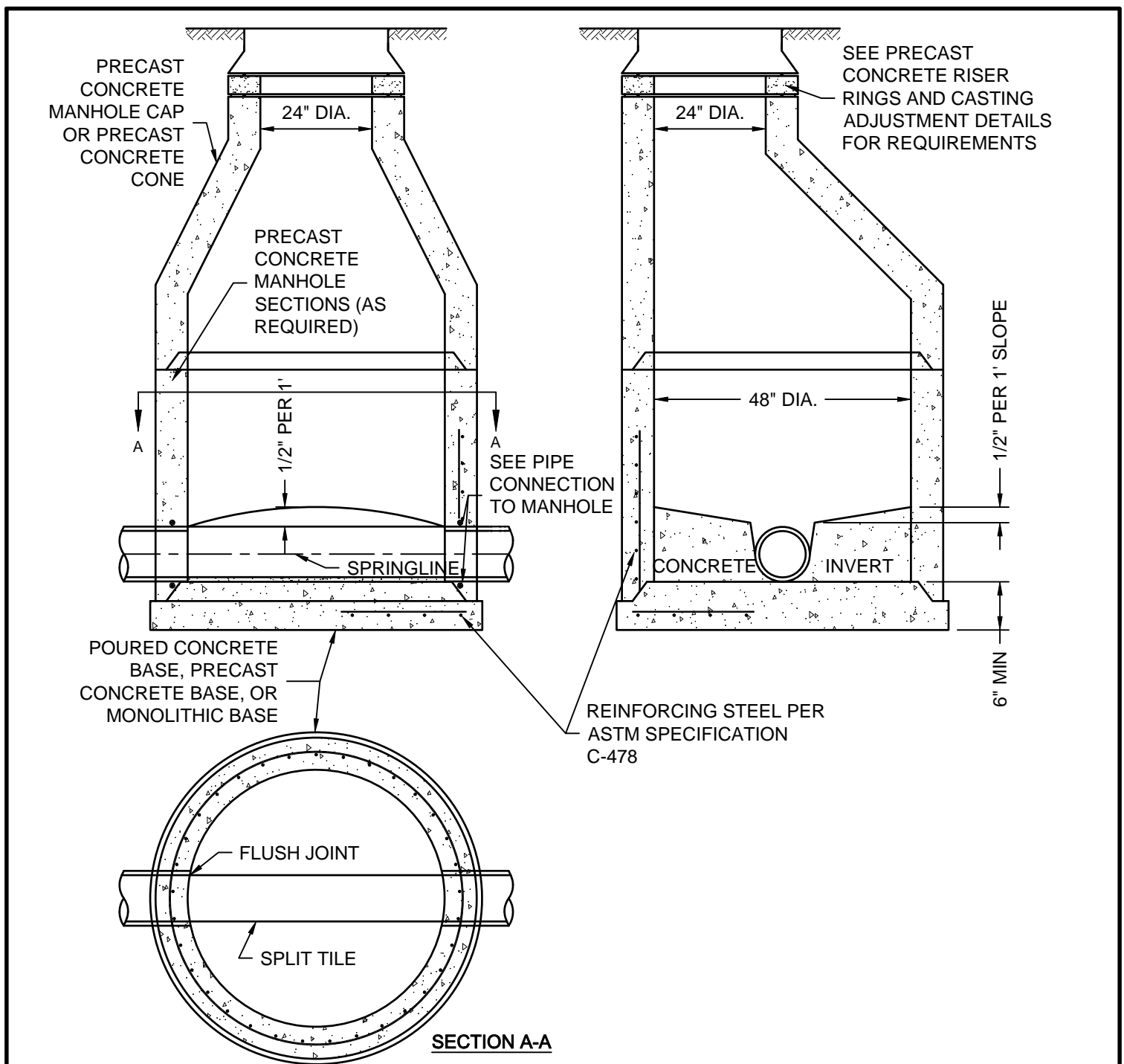
SAN-15

APPROVED: 2/4/19

24" SANITARY CASTING

REVISED:

SCALE: NONE



NOTES:

1. MAXIMUM FLOW LIMIT FOR A NON- METERED CONTROL MANHOLE IS 50,000 G.P.D.

GENERAL CONSTRUCTION REQUIREMENTS:

1. ALL PRECAST MANHOLES TO BE CONSTRUCTED PER ASTM C- 478.
2. PIPE SHALL BE LAID STRAIGHT THROUGH WITH SPLIT TILE OR BROKEN OUT INSIDE TO SMOOTH FINISH.
3. SHOP DRAWINGS SHALL BE APPROVED PRIOR TO CONSTRUCTION.
4. ALL INSIDE JOINTS OF MANHOLE COMPONENTS SHALL BE SMOOTHED WITH MORTAR.
5. MINIMUM DIAMETER OF THROUGH PIPE SHALL BE 6".
6. MANHOLE CONSTRUCTION SHALL COMPLY WITH 48" SANITARY MANHOLE DETAIL.



TOWN OF HUNTERTOWN
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SAN-16

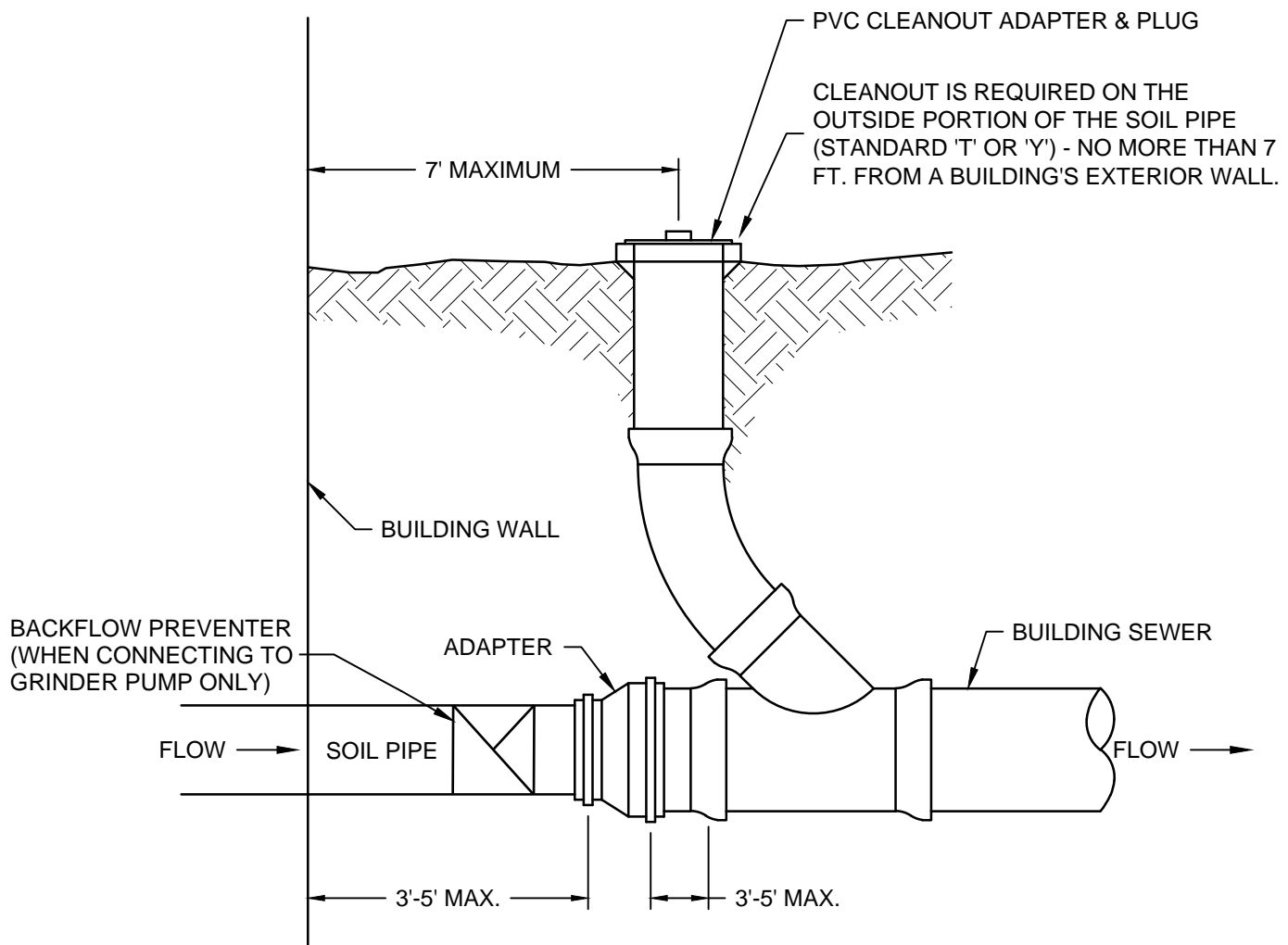
CONTROL MANHOLE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
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SAN-17

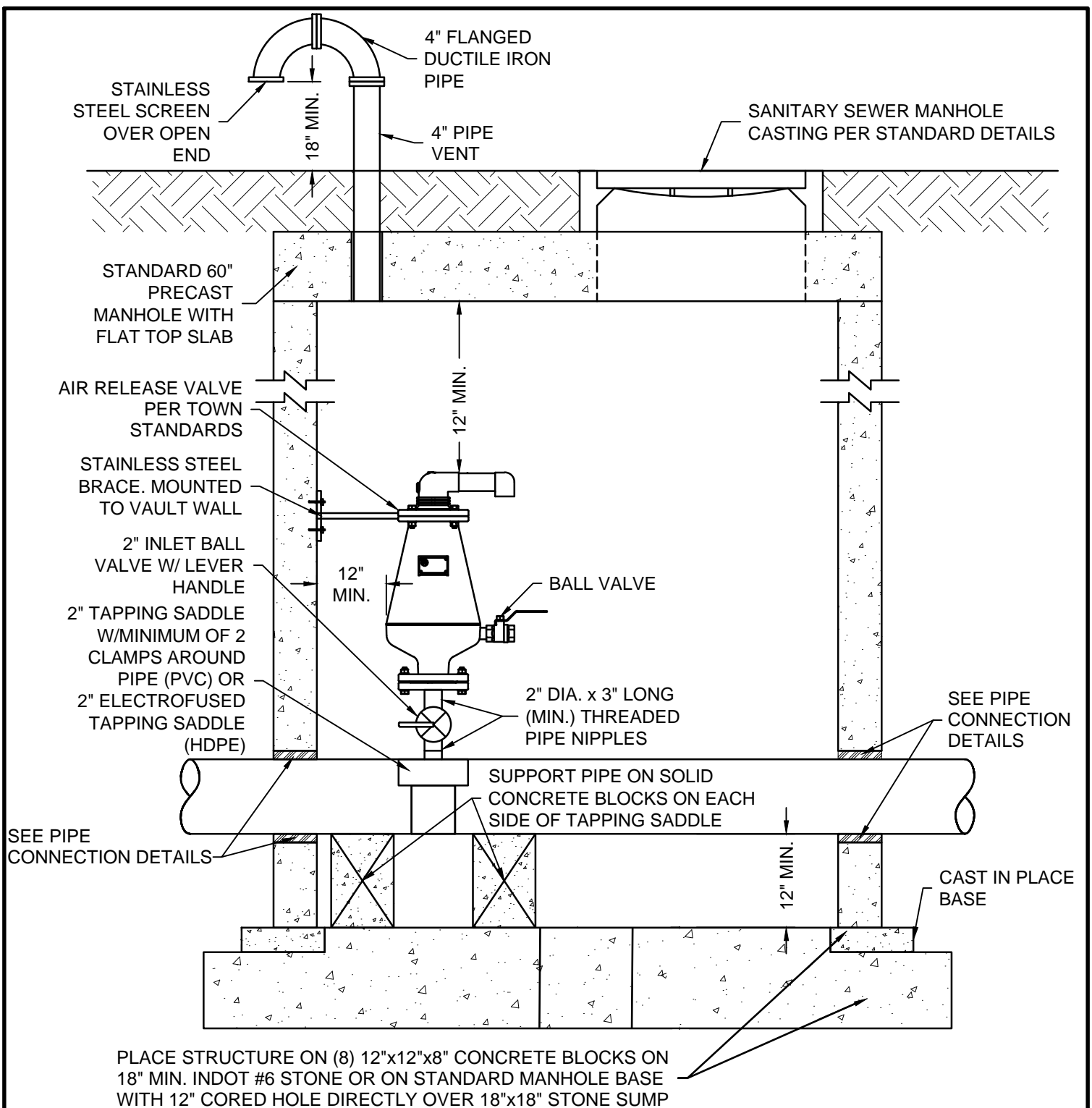
BUILDING ADAPTER & CLEANOUT

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE



NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR BRACING VALVE TO PREVENT ANY TYPE OF MOVEMENT.
2. CONTRACTOR SHALL INSTALL COMBINATION VALVE OFFSET FROM CENTER OF STRUCTURE AND ON OPPOSITE SIDE OF MANHOLE ACCESS TO PROVIDE UNIMPEDED ACCESS TO STRUCTURE.
3. WEIGHT OF COMBINATION VALVE SHALL NOT BE SUPPORTED BY THE FORCE MAIN PIPE.
4. PROJECT ENGINEER SHALL PROVIDE VALVE MODEL AND SIZE.
5. MINIMUM CLEARANCE OF STRUCTURE SHALL BE 6 FT. FROM TOP OF STONE BASE TO STRUCTURE CEILING.
6. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONTROLLING MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES FOR CONSTRUCTION AND IS THEREFORE RESPONSIBLE FOR CONTROLLING THE QUALITY OF WORK.



TOWN OF HUNTERTOWN

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SAN-18

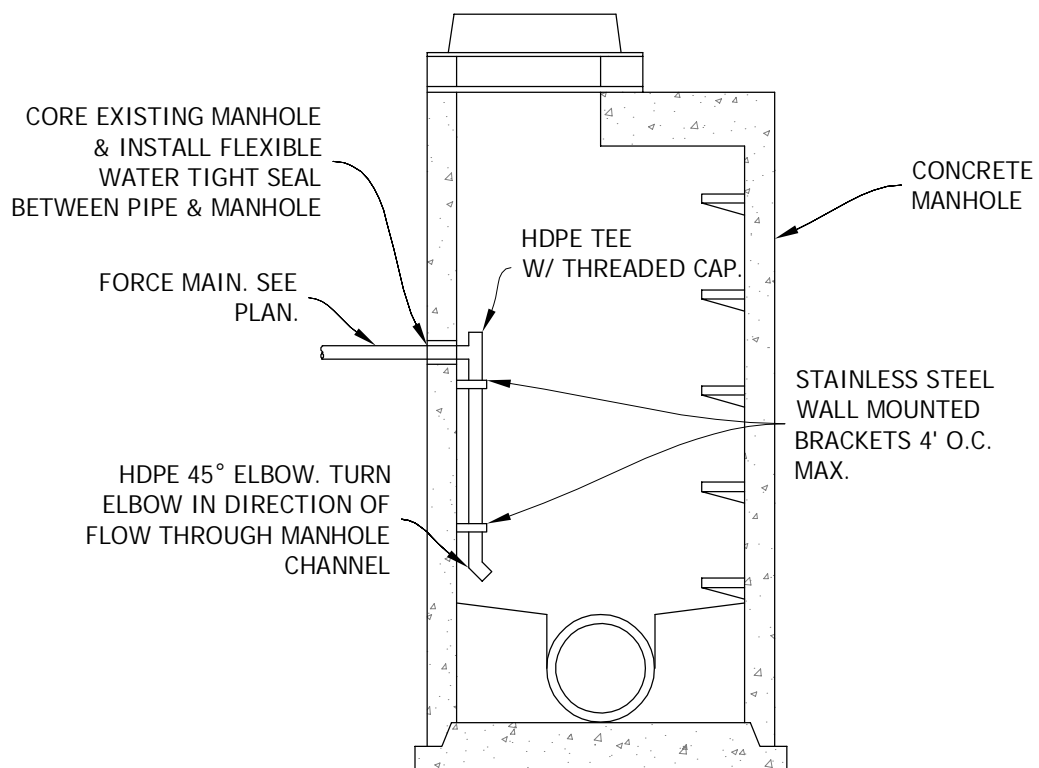
AIR RELEASE STRUCTURE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
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SAN-19

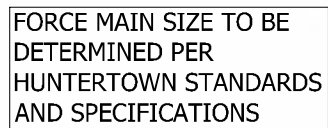
FORCE MAIN DISCHARGE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

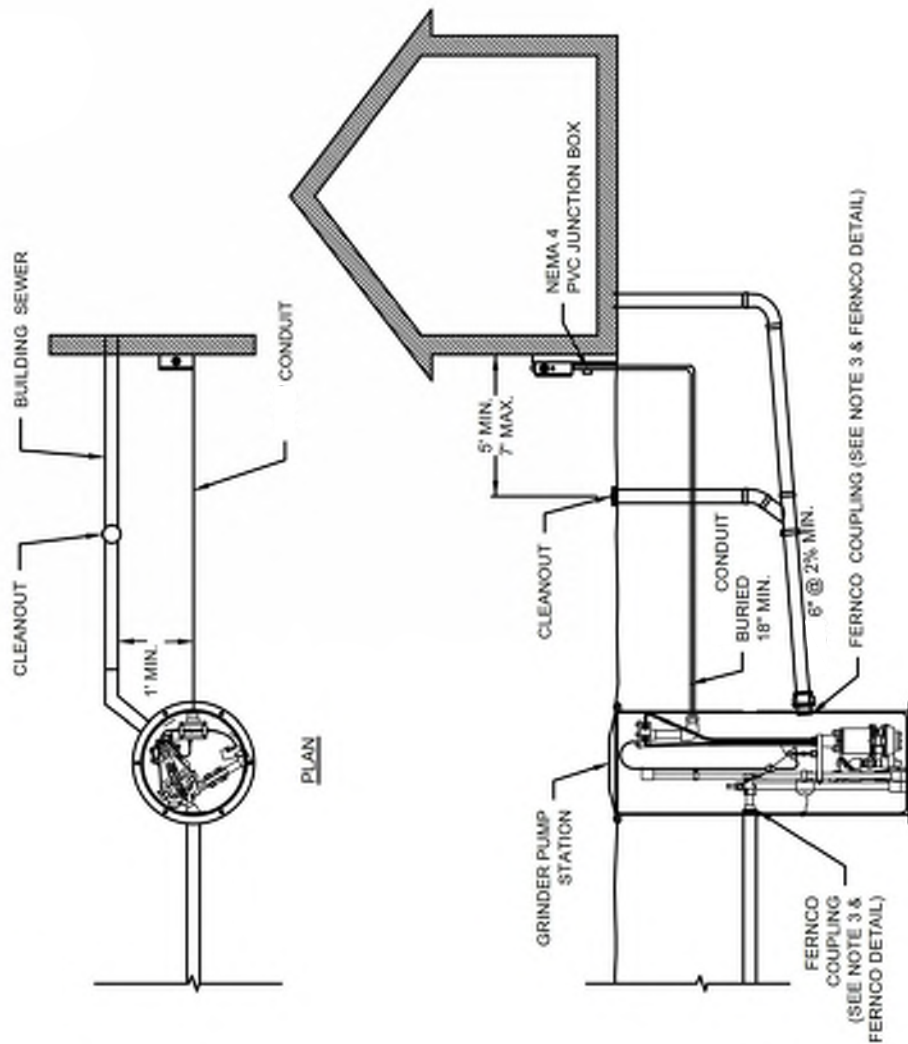
SCALE: _____ NONE



1. FOR PRIVATE FORCE MAIN LINES ONLY. 2" FORCE MAIN
2. INSTALL CASTING SO LID IS FLUSH TO FINAL GRADE
3. ALL CONNECTIONS SHALL BE MADE BY BUTT FUSION
4. IF CLEANOUT IS PLACED NEAR THE RIGHT OF WAY, WYE TO BE POINTED TOWARD THE HOME.
3. IF CLEANOUT IS PLACED NEAR THE HOME, WYE TO BE POINTED TOWARD THE RIGHT OF WAY.
4. USE OF CLEANOUT IS STRONGLY RECOMMENDED.

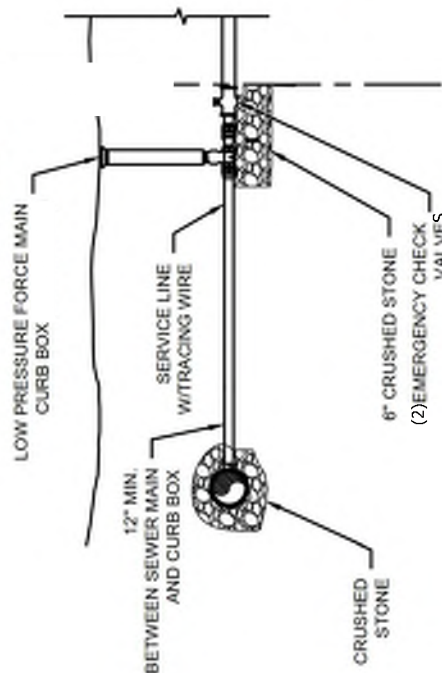
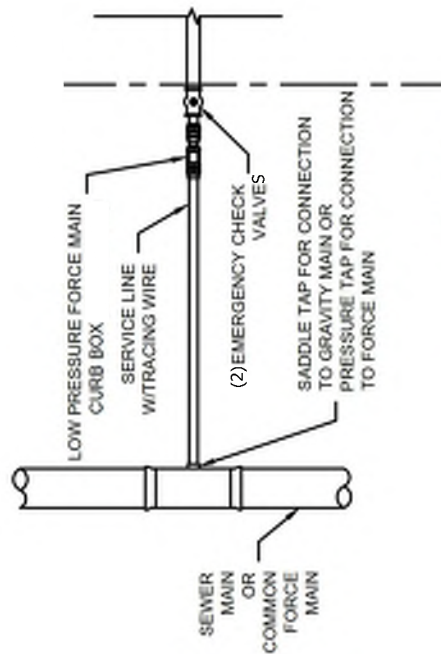
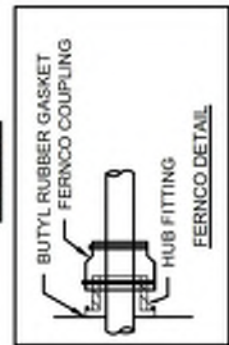


SCALE: NONE



- NOTE:**
1. LOW PRESSURE FORCE MAIN CURB BOX AND EMERGENCY CHECK VALVE SHALL BE INSTALLED NEAR THE PROPERTY LINE/RIGHT-OF-WAY OR EASEMENT LINE CLOSEST TO THE PROPERTY BEING SERVED.
 2. ELECTRIC CONDUIT SHOULD NOT BE WITHIN 1 FOOT OF SEWER LINE EXCEPT TO CROSS.
 3. CONTRACTOR SHALL INSTALL FERNOCO WHEN CONNECTING PIPE TO GRINDER STATION.

ELEVATION



PROPERTY LINE/RIGHT-OF-WAY
OR EASEMENT LINE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
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STANDARD DRAWINGS

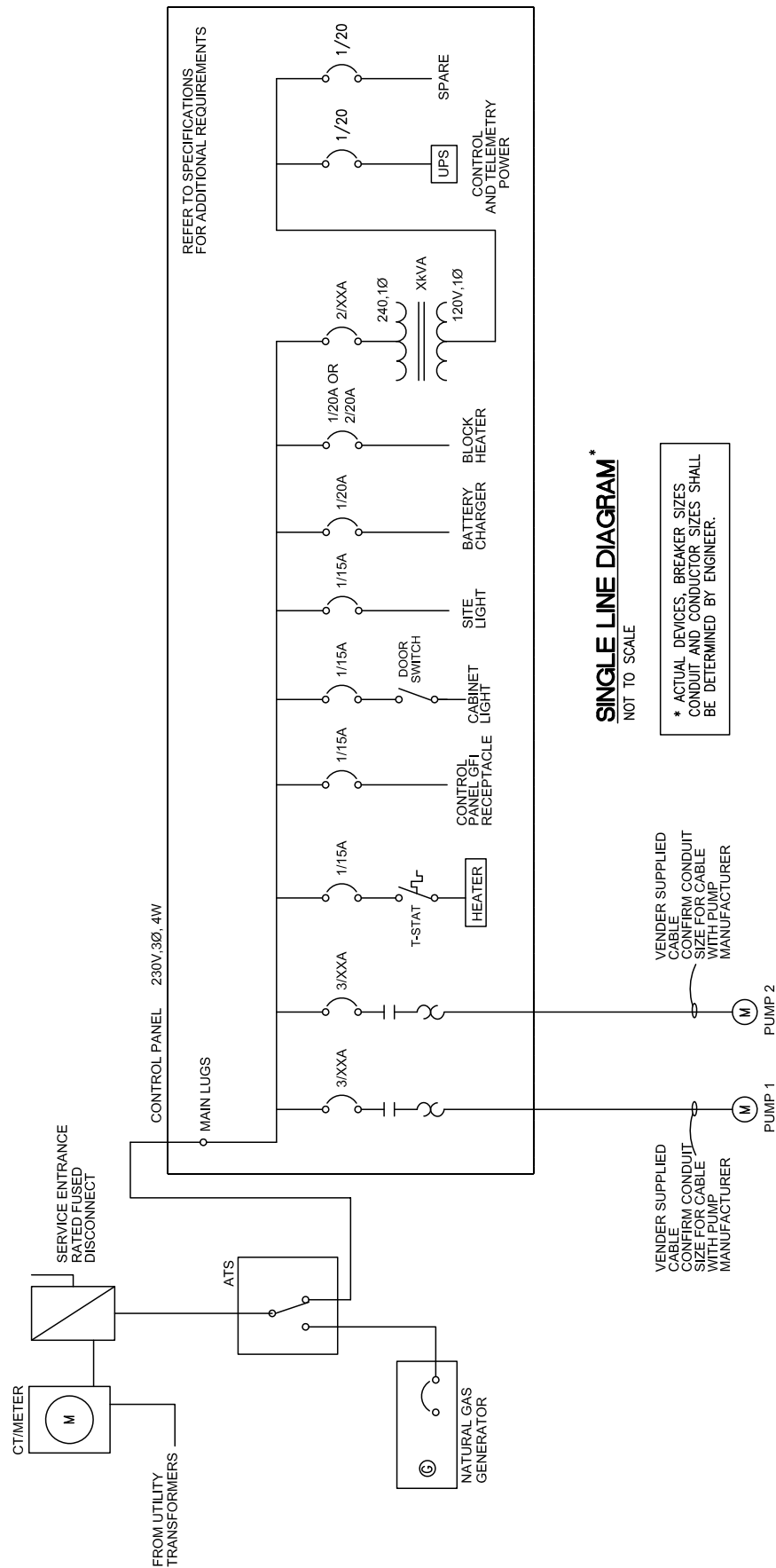
SAN-21

APPROVED: 2/4/19

**LOW PRESSURE FORCE MAIN
CLEANOUT INLINE**

REVISED:

SCALE: NONE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STANDARD DRAWINGS

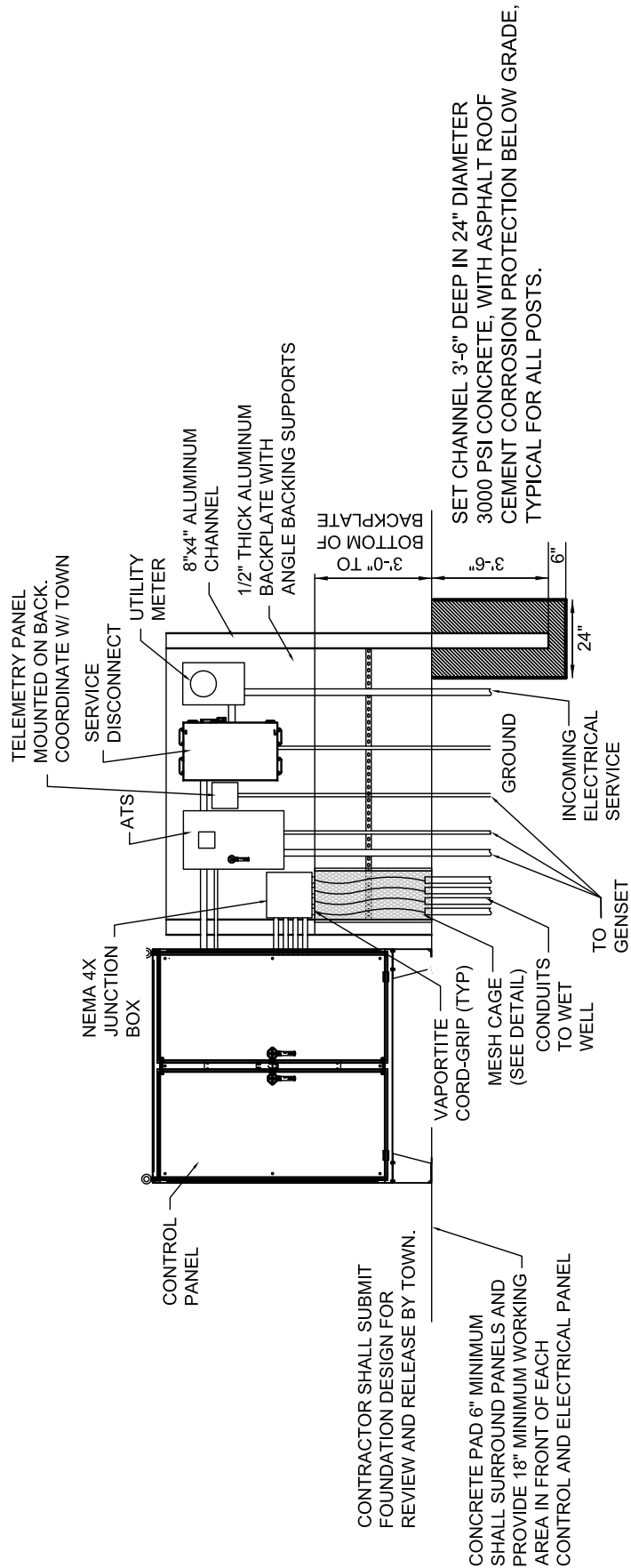
SAN-22

APPROVED: 2/7/22

**LIFT STATION ELECTRICAL
SINGLE LINE DIAGRAM**

REVISED:

SCALE: NONE



ELECTRICAL PANEL MOUNTING DETAILS

NOT TO SCALE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
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STANDARD DRAWINGS

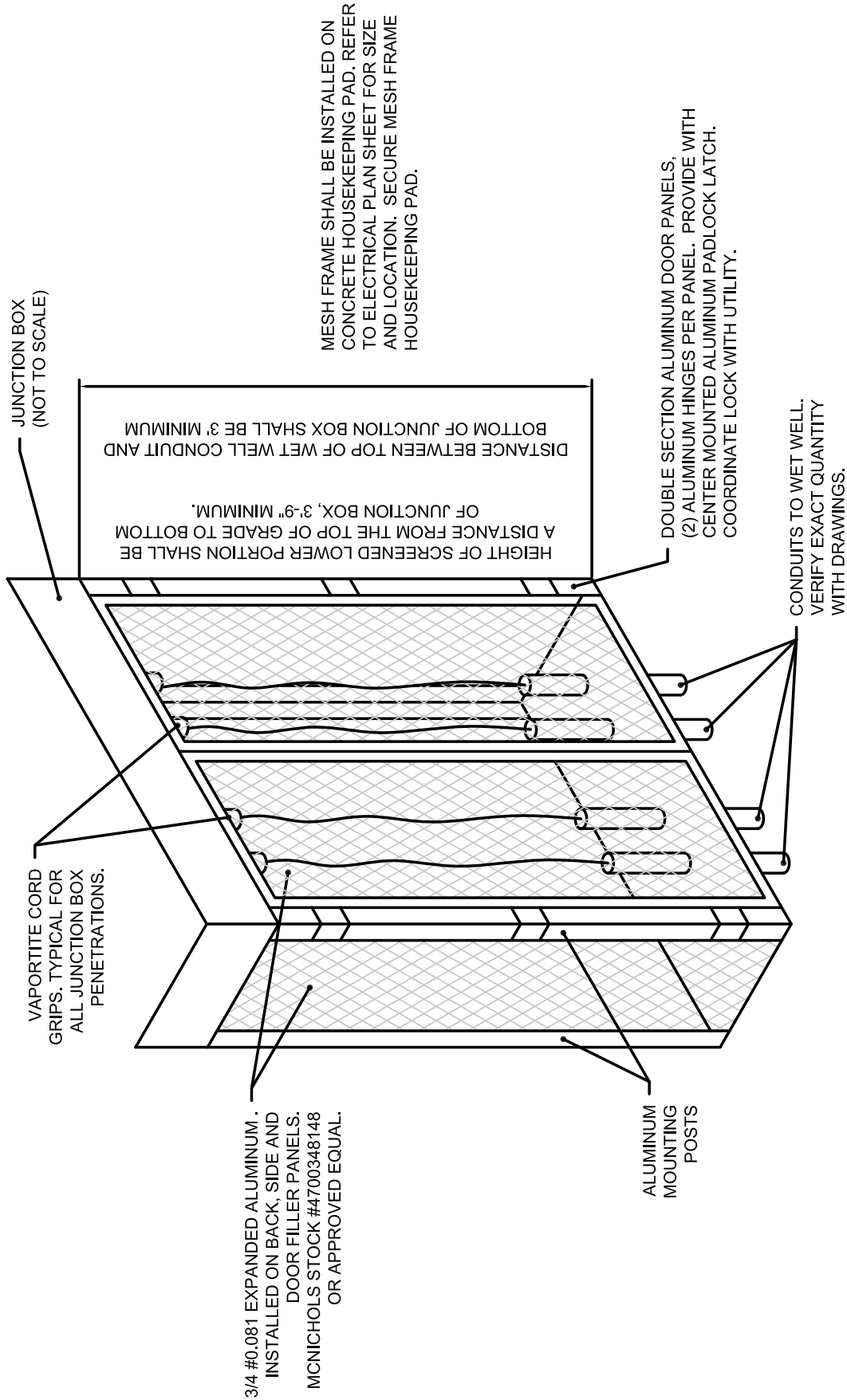
SAN-23

APPROVED: 2/7/22

LIFT STATION PANEL MOUNTING

REVISED:

SCALE: NONE



MESH FRAME DETAIL
NOT TO SCALE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STANDARD DRAWINGS

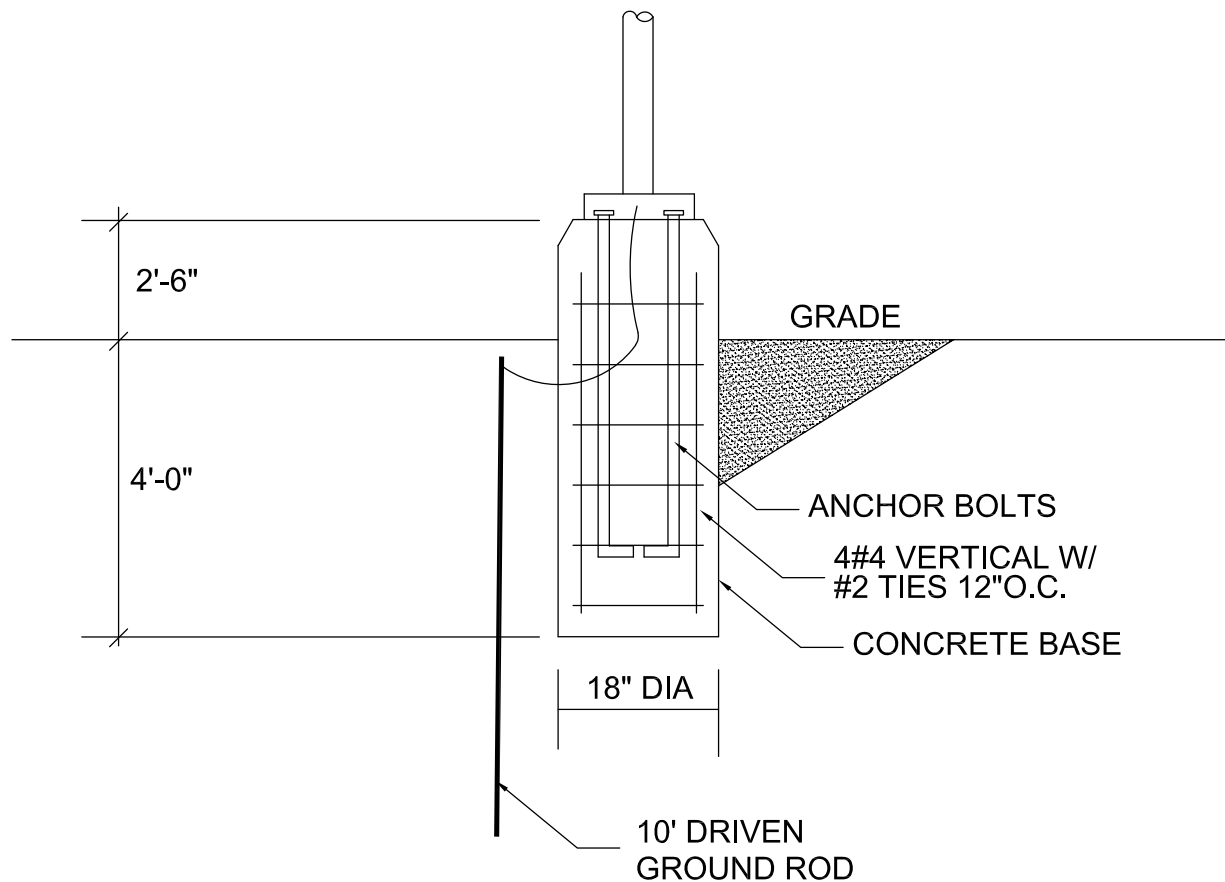
SAN-24

APPROVED: 2/7/22

LIFT STATION MESH FRAME

REVISED: _____

SCALE: NONE



POLE BASE DETAIL

NOT TO SCALE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

SAN-25

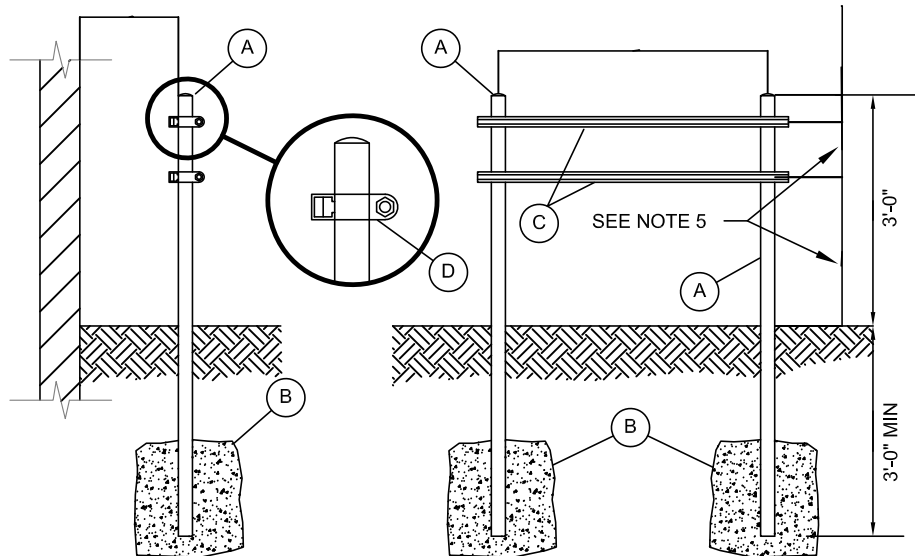
POLE BASE DETAIL

STANDARD DRAWINGS

APPROVED: 2/7/22

REVISED: _____

SCALE: NONE



ITEM	QUANTITY	DESCRIPTION
A	2	GALVANIZED STEEL PIPE (12 FEET), SEE NOTE 3
B	-	CONCRETE
C	AS REQ'D	UNISTRUT CHANNEL - 1 5/8"x3/16"
D	4	2" STD. UNISTRUT PIPE CLAMP

NOTES:

1. USE FREESTANDING SUPPORT WHERE BUILDING WALL WILL NOT SUPPORT THE METER INSTALLATION.
2. GAS UTILITY RESERVES THE RIGHT TO REFUSE TO CONNECT A GAS SERVICE TO AN IMPROPERLY INSTALLED METER SUPPORT.
3. CONTRACTOR TO PROVIDE AND INSTALL ITEMS "A" AND "B". **FENCE POSTS ARE NOT ACCEPTABLE.**
 - FOR 11 M TO 16 M ROTARY METERS - USE TWO 3-INCH ID (INTERNAL DIAMETER) GALVANIZED STEEL PIPE (SCHEDULE 40) A MINIMUM OF 11 FEET LONG.
 - A 6" (OR LARGER) AUGER IS RECOMMENDED FOR THE POSTHOLES. THE STEEL PIPES MUST BE PLUMB.
4. THIS METER PEDESTAL CAN ALSO ACCOMMODATE THE FOLLOWING SIZES: MULTIPLE 175 RMs, 250 METRIS AND 425, 800, 1000 AND UP TO 11 M COMPACT ROTARY METERS. 36" BETWEEN POSTS WILL ACCOMMODATE MULTIPLES OF UP TO THREE 250 RMM METRIS METERS. UP TO A 60" SPAN IS ACCEPTABLE FOR MULTIPLES OF GREATER THAN THREE 250 RMM METRIS METERS.
5. HEIGHT IS FIELD ADJUSTABLE BASED ON SELECTED METER STAND.
6. CONTRACTOR TO OBTAIN APPROVAL OF PROPOSED GAS METER INSTALLATION PRIOR TO CONSTRUCTING METER SUPPORTS.

FREE STANDING GAS METER SUPPORT DETAIL

NOT TO SCALE



TOWN OF HUNTERTOWN
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HUNTERTOWN, IN 46748

SAN-26

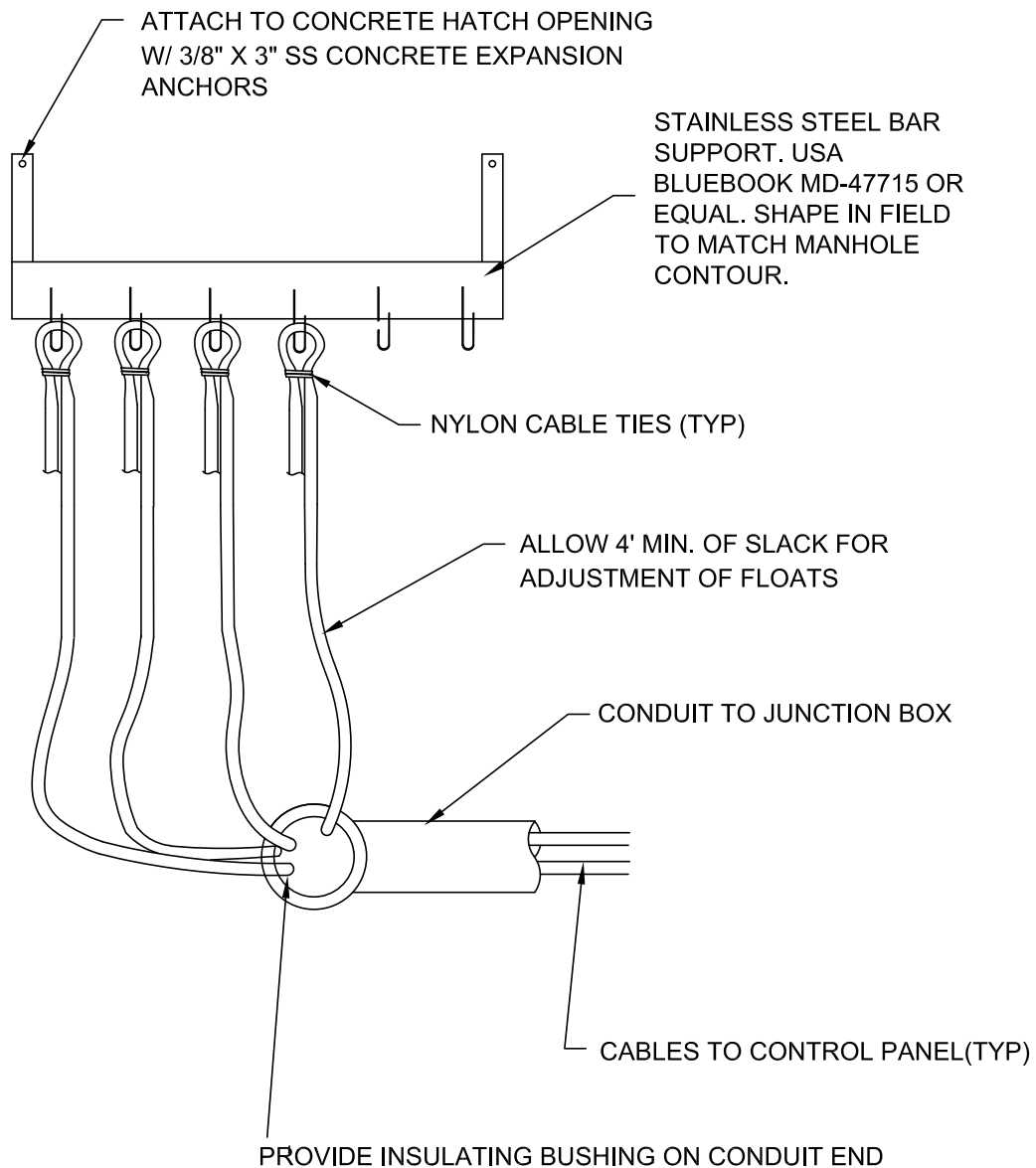
**FREE STANDING GAS METER
SUPPORT DETAIL**

STANDARD DRAWINGS

APPROVED: 2/7/22

REVISED:

SCALE: NONE



LEVEL CONTROL MOUNTING DETAIL

NOT TO SCALE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

SAN-27

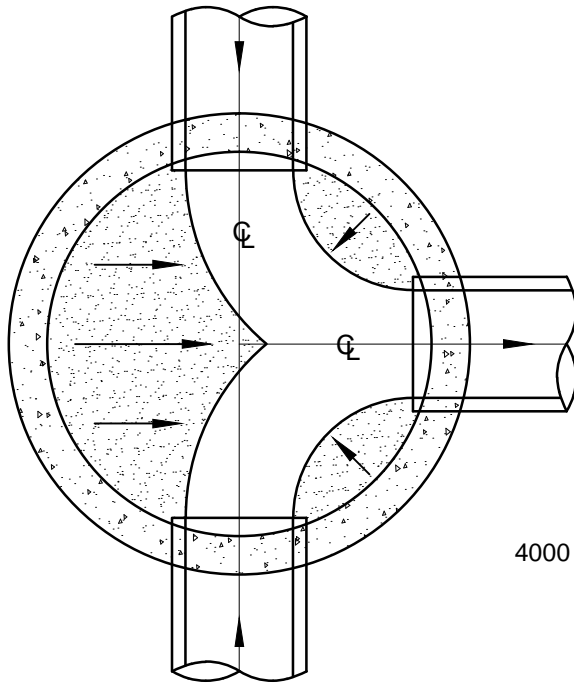
LEVEL CONTROL MOUNTING

STANDARD DRAWINGS

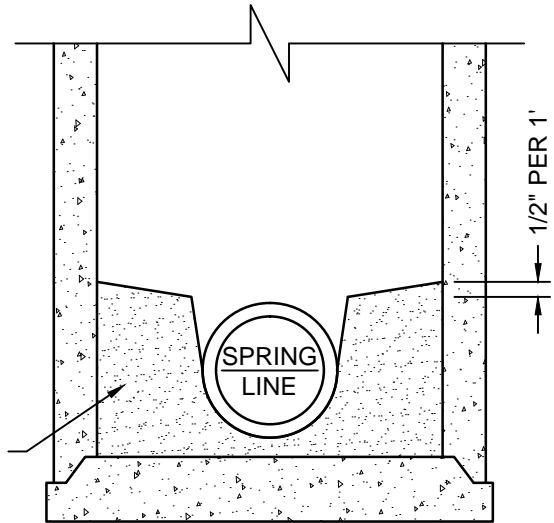
APPROVED: 2/7/22

REVISED:

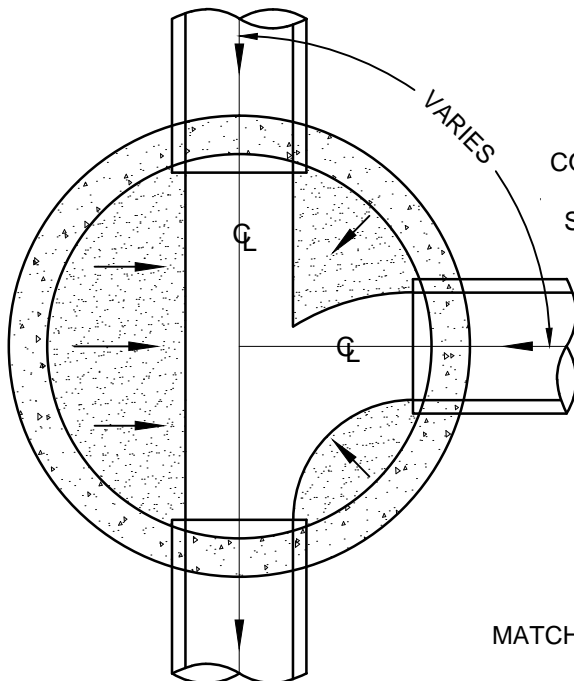
SCALE: NONE



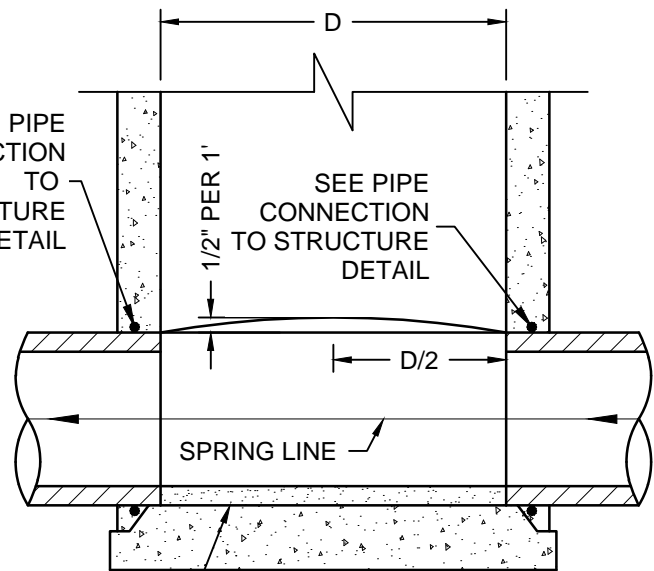
4000 PSI, MINIMUM
CONCRETE



DROP, END, OR STEP-UP MANHOLE



SEE PIPE
CONNECTION
TO
STRUCTURE
DETAIL



MATCH EXISTING GRADE
OF OUTLET PIPE



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STC-01

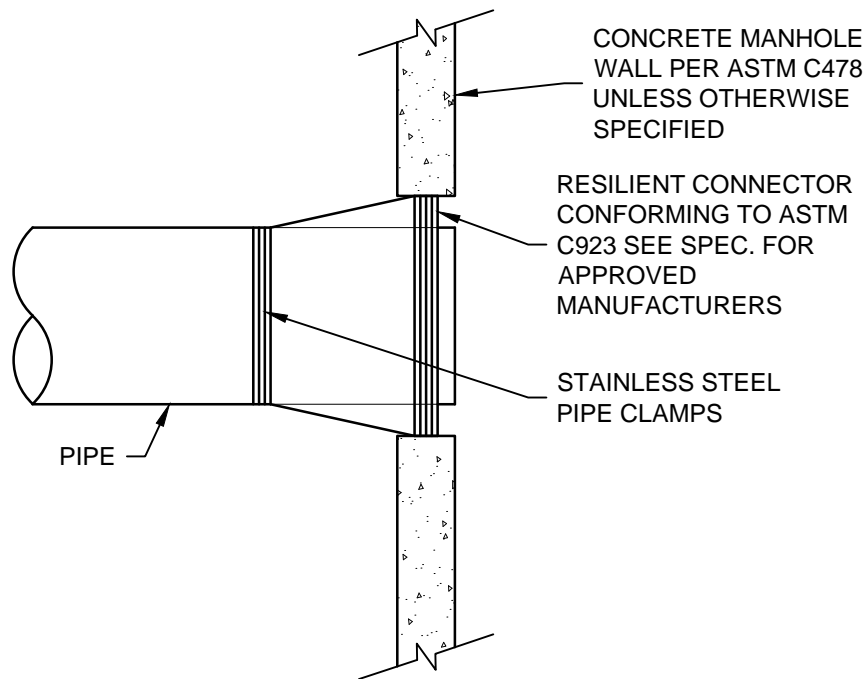
POURED CHANNEL SHAPES

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



BOOT TYPE

CAUTION:

1. WHEN INSTALLING PIPE STUBS FOR FUTURE PIPELINE, INSTALLATION OF ALL STUBS SHOULD BE PROPERLY RESTRAINED TO PREVENT ANY MOVEMENT.
2. TYPICAL APPLICATION IS FOR PIPES 36" IN DIAMETER OR SMALLER.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STC-02

**BOOTED PIPE CONNECTION
TO STRUCTURE**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE

RATCHETING COMPRESSION
CONNECTOR PER ASTM
C923 SEE SPEC. FOR
APPROVED
MANUFACTURERS

DO
NOT
MORTAR

DO NOT MORTAR
TOP 1/2 OF PIPE

MORTAR ONLY 1/2 OF
PIPE WHEN INSTALLING
INVERT

FIELD INSTALLED
INVERT

COMPRESSION
TYPE CAST IN
PLACE

NOTES:

1. WHEN INSTALLING PIPE STUBS FOR FUTURE PIPELINE, INSTALLATION OF ALL STUBS SHOULD BE PROPERLY RETAINED TO PREVENT ANY MOVEMENT.
2. TYPICAL APPLICATION IS FOR PIPES LARGER THAN 36".



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STC-03

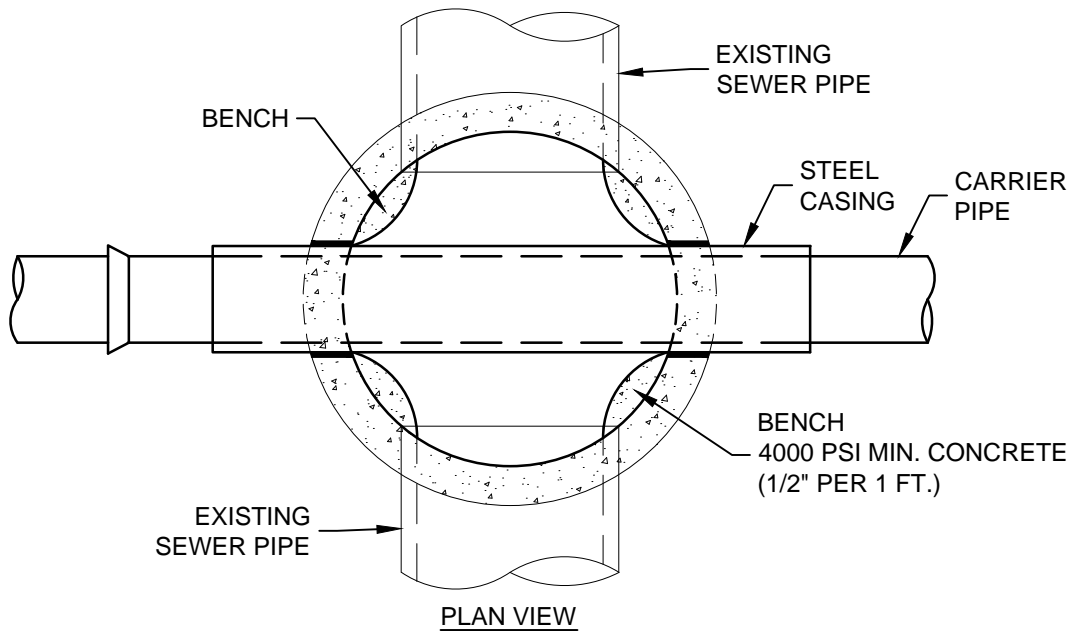
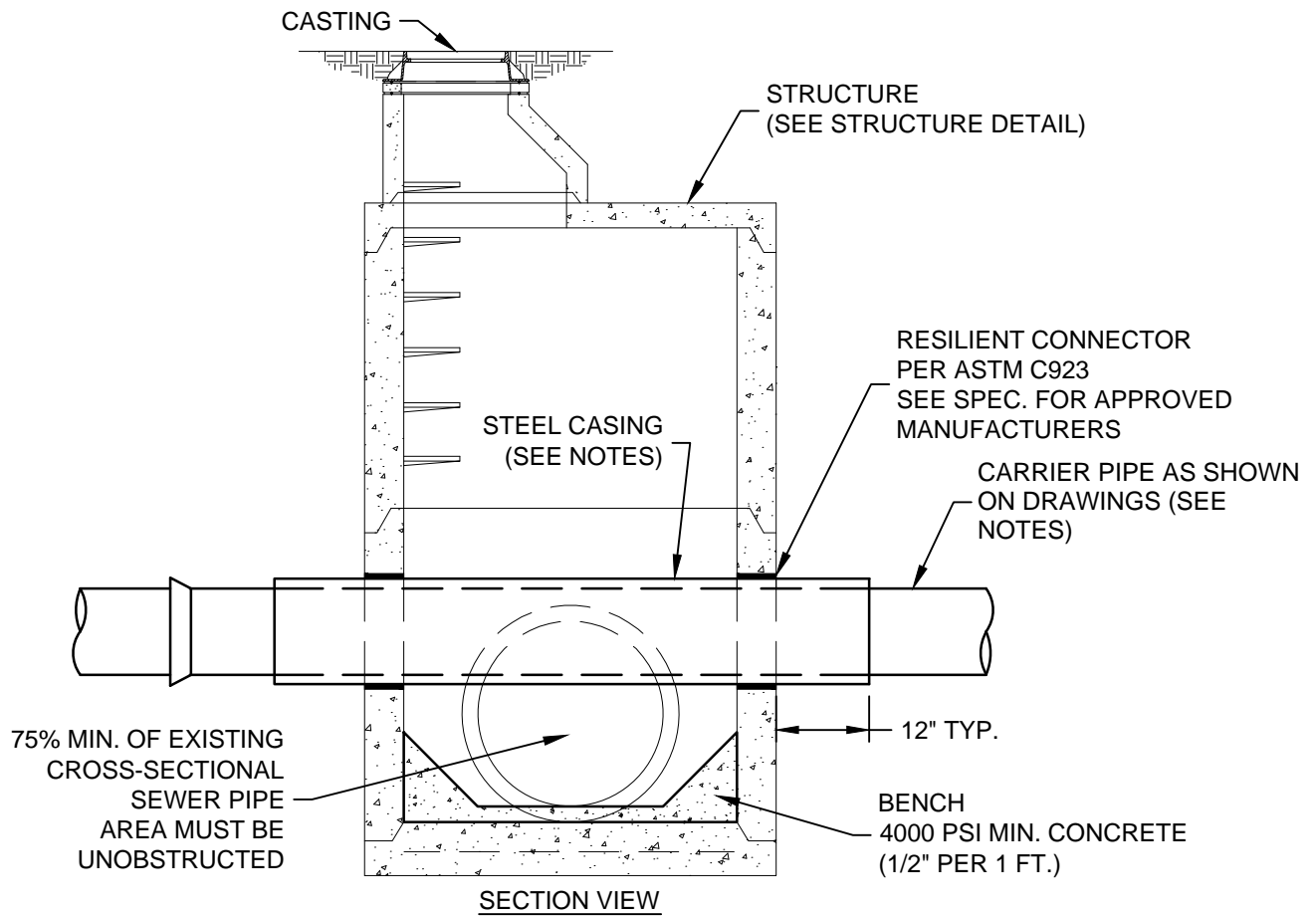
COMPRESSION PIPE CONNECTION
TO STRUCTURE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. STEEL CASING REQUIRED ON A CASE BY CASE BASIS PER OWNER / ENGINEER.
2. DUCTILE IRON PIPE SHALL BE USED FOR CROSSING PIPE IF CASING IS NOT USED.
3. CASING SPACERS SHALL BE USED WITH STEEL CASING. REFER TO CASING SPACERS DETAIL.
4. IT IS PREFERRED TO HAVE THE SANITARY SEWER PIPE RUN THROUGH THE MANHOLE (AS CARRIER PIPE) WHEN POSSIBLE.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STC-04

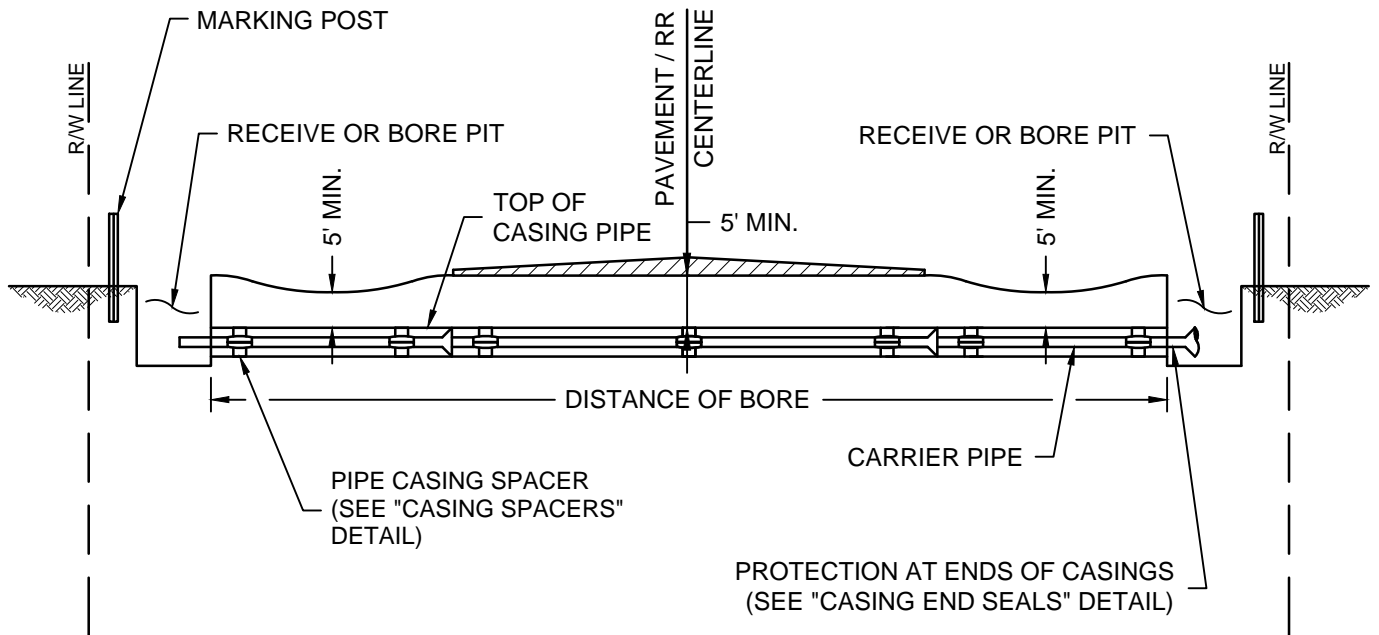
CONFLICT STRUCTURE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE



NOTES:

1. JOINTS MAY REQUIRE RESTRAINT WITHIN CASING IF SPECIFIED.
2. TRACING WIRE TO BE INSTALLED THROUGH ALL CASED BORINGS.
3. STEEL PIPE CASING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A283, GRADE B, C, OR D. ALL JOINTS SHALL BE WELDED. INTERIOR JOINTS SHALL BE GROUND TO A SMOOTH FINISH. ALL WELDING SHALL BE PERFORMED IN ACCORDANCE WITH AWWA C206, "AWWA STANDARD FOR FIELD WELDING OF STEEL WATER PIPE." COATING FOR STEEL CASING NOT REQUIRED.
4. STEEL PIPE CASING SHALL BE INSTALLED SYMMETRICAL ABOUT PIPE CENTERLINE (TYP). PIPE CASING SHALL BE LAID TRUE TO LINE AND GRADE WITH NO BENDS OR CHANGES IN GRADE FOR THE FULL LENGTH OF THE CASING.
5. CASING ONLY TO BE FILLED WITH SAND OR GROUT WITH APPROVAL BY OWNER / ENGINEER.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
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STC-05

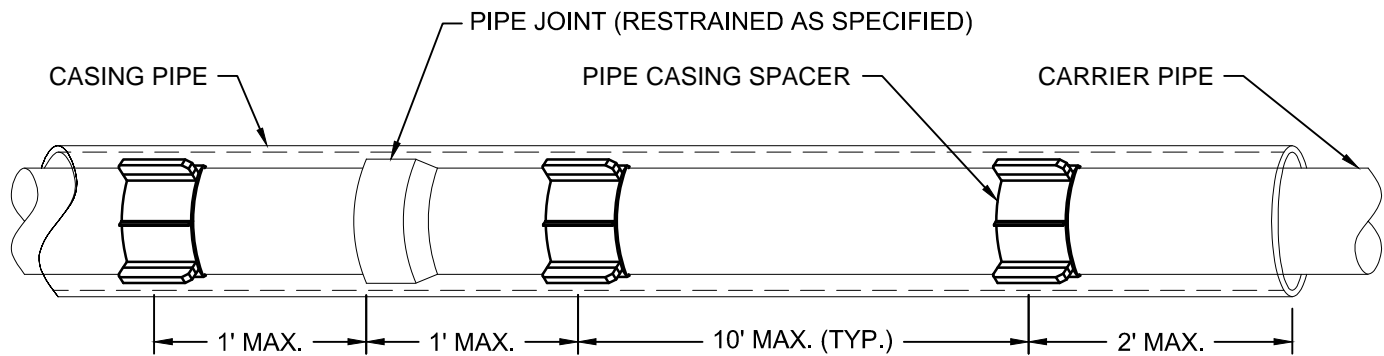
**TYPICAL JACKED & BORED
CASING PIPE**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE

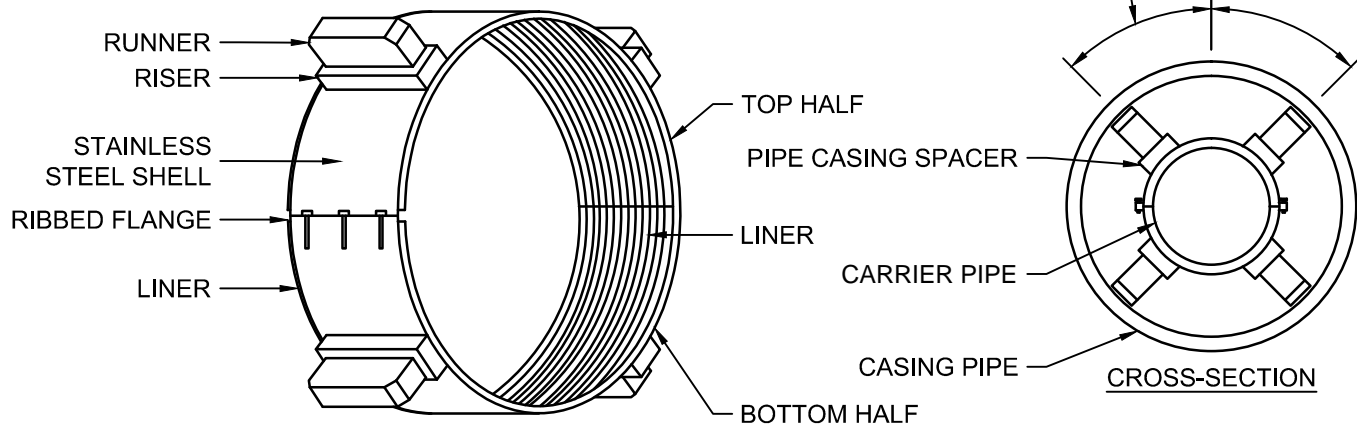


CARRIER PIPE		
PIPE SIZE	CASING O.D.*	THICKNESS **
6"	16"	1/4"
8"	18"	1/4"
10"	20"	5/16"
12"	24"	3/8"
16"	30"	1/2"
18"	30"	1/2"
20"	36"	1/2"
24"	42"	1/2"

* PROJECT ENGINEER RESPONSIBLE TO CONFIRM APPROPRIATE CLEARANCES FOR FLANGES / BELLS; SUBJECT TO TOWN REVIEW.

** PROJECT ENGINEER RESPONSIBLE TO COORDINATE WITH INDOT / RAILROAD / AUTHORITY HAVING JURISDICTION; SUBJECT TO TOWN REVIEW.

ANGLES TO BE CONSTANT AROUND ENTIRE CIRCUMFERENCE OF THE PIPE. NUMBER OF SPACERS PER MANUFACTURER'S SPECIFICATIONS



NOTES:

1. CASING SPACERS SHALL BE CCS SERIES BY CASCADE WATERWORKS MFG. ALTERNATE CASING SPACERS MAY BE USED WITH PRIOR APPROVAL FROM OWNER / ENGINEER.
2. TOWN APPROVED CASING SPACERS AND END SEALS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. USE A "CENTERED" CONFIGURATION AND PROVIDE THE MANUFACTURER WITH THE FOLLOWING INFORMATION: CARRIER PIPE O.D., CASING PIPE I.D., AND CASING LENGTH.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STC-06

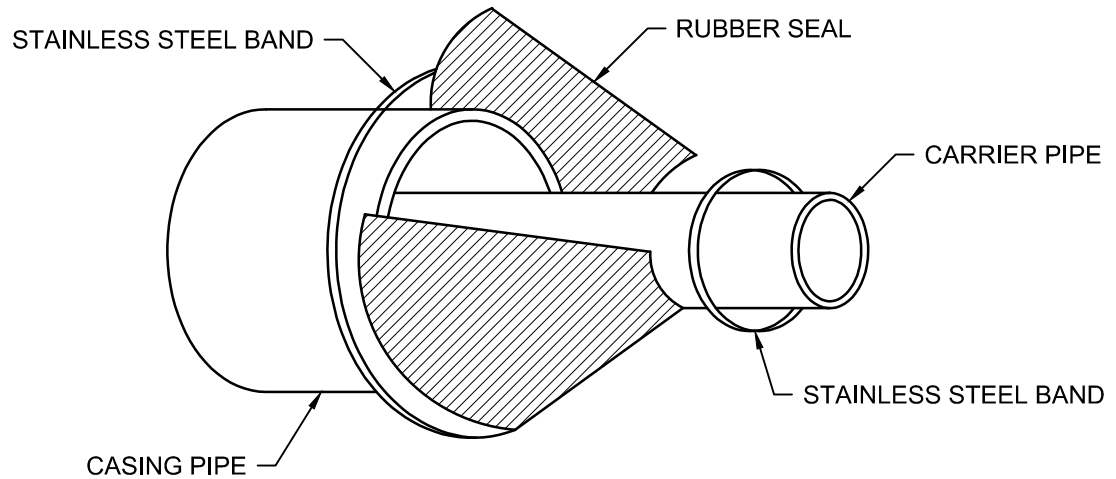
CASING SPACERS

STANDARD DRAWINGS

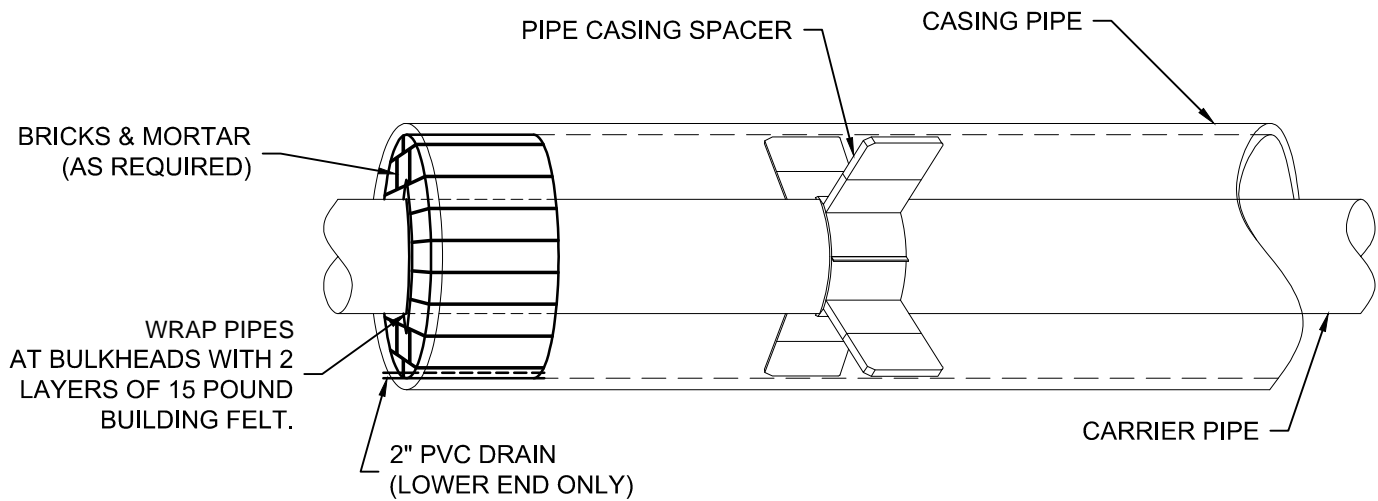
APPROVED: 2/4/19

REVISED:

SCALE: NONE



RUBBER END SEAL (3" DIAMETER AND SMALLER CARRIER PIPE)



BRICK AND MORTAR END SEAL (4" DIAMETER AND LARGER CARRIER PIPE)



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STC-07

CASING END SEALS

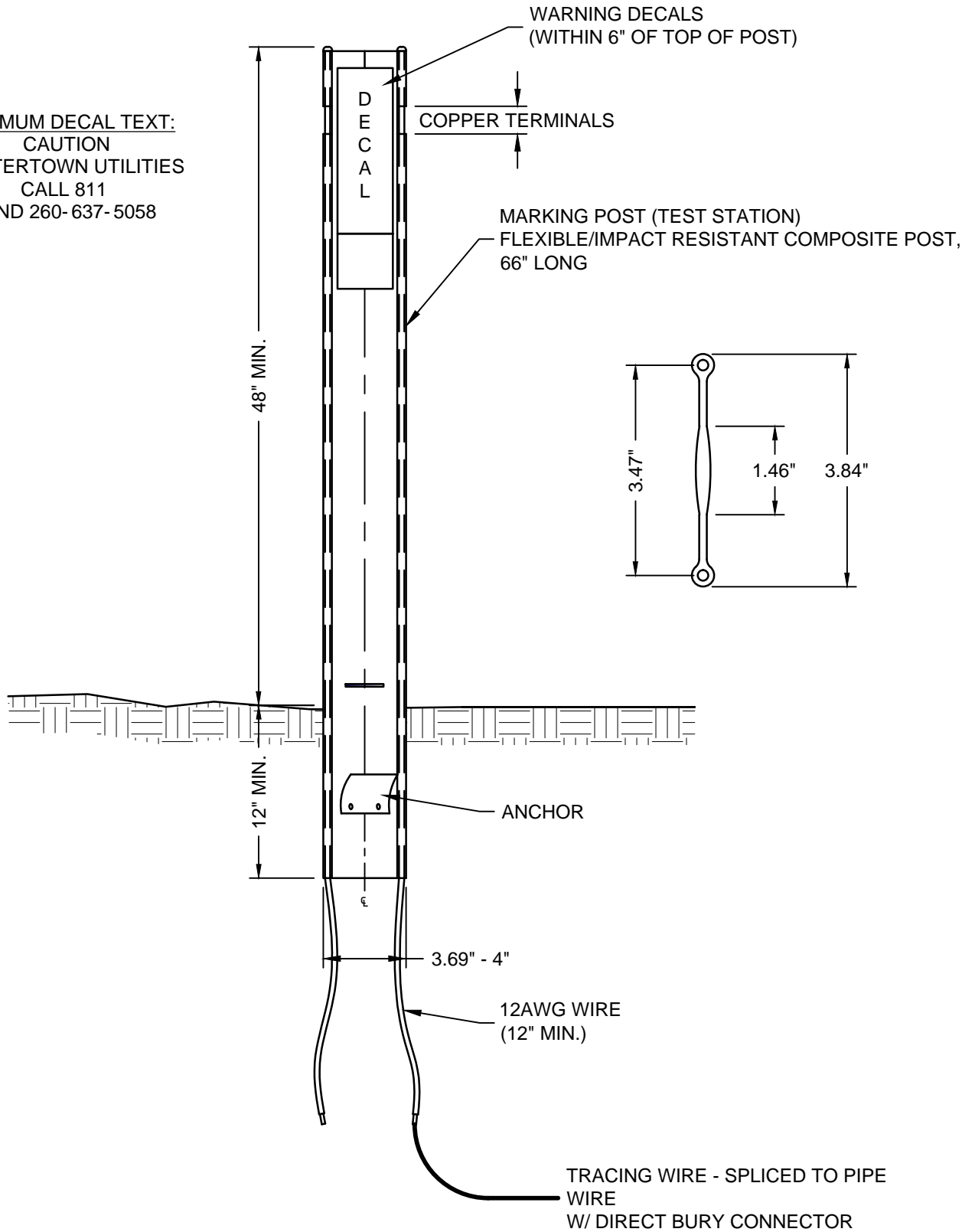
STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE

MINIMUM DECAL TEXT:
CAUTION
HUNTERTOWN UTILITIES
CALL 811
AND 260- 637- 5058



NOTES:

1. MARKING POST REQUIRED AT THE ENDS OF ALL CASING BORES.
2. MARKING POST REQUIRED AT ALL AIR RELEASE STRUCTURES, SYSTEM ISOLATION VALVES, FLUSHING CONNECTIONS, AND EVERY 1000' IN UNDEVELOPED AREAS.
3. MARKING POSTS MAY BE REQUIRED ELSEWHERE AT THE DISCRETION OF THE TOWN.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

STC-08

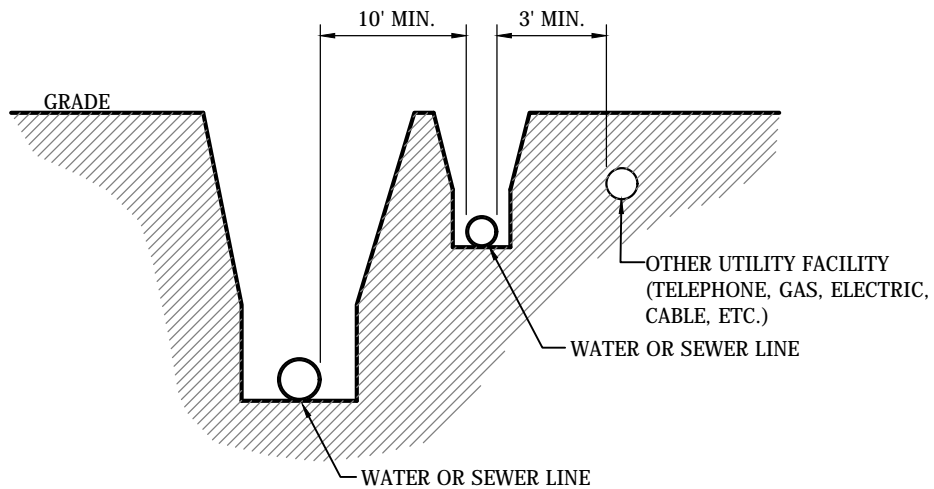
MARKING POST

STANDARD DRAWINGS

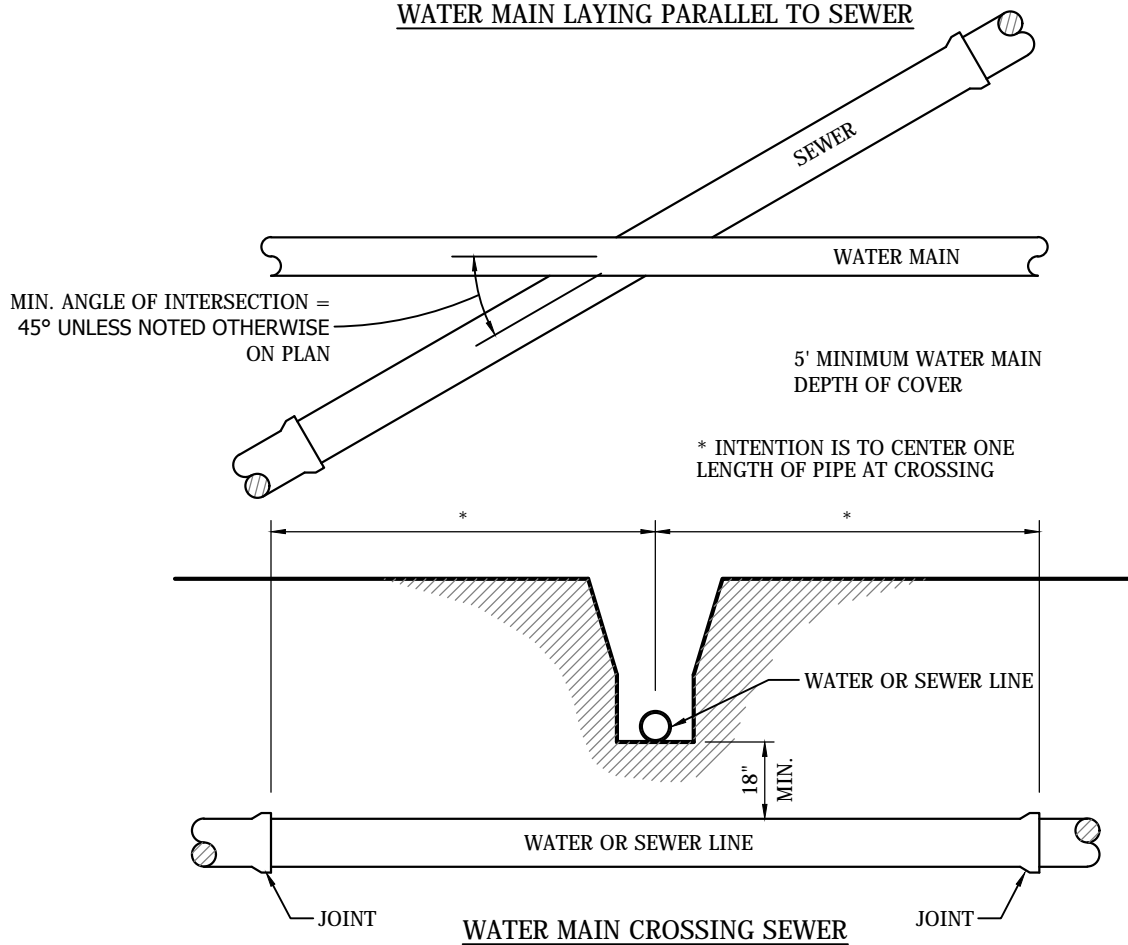
APPROVED: 2/4/19

REVISED: _____

SCALE: NONE



WATER MAIN LAYING PARALLEL TO SEWER



NOTES:

1. WATER MAIN SHALL NOT BE LOCATED IN THE SAME TRENCH AS SANITARY SEWERS.
2. SEPARATION OF 3FT. HORIZONTAL WITH ANY UTILITY REQUIRED.
3. 5' MINIMUM DEPTH OF COVER ON WATER MAIN.
4. PREFERENCE IS FOR THE WATER MAIN TO BE LOCATED ABOVE ALL SEWERS.



TOWN OF HUNTERTOWN
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HUNTERTOWN, IN 46748

WAT-01

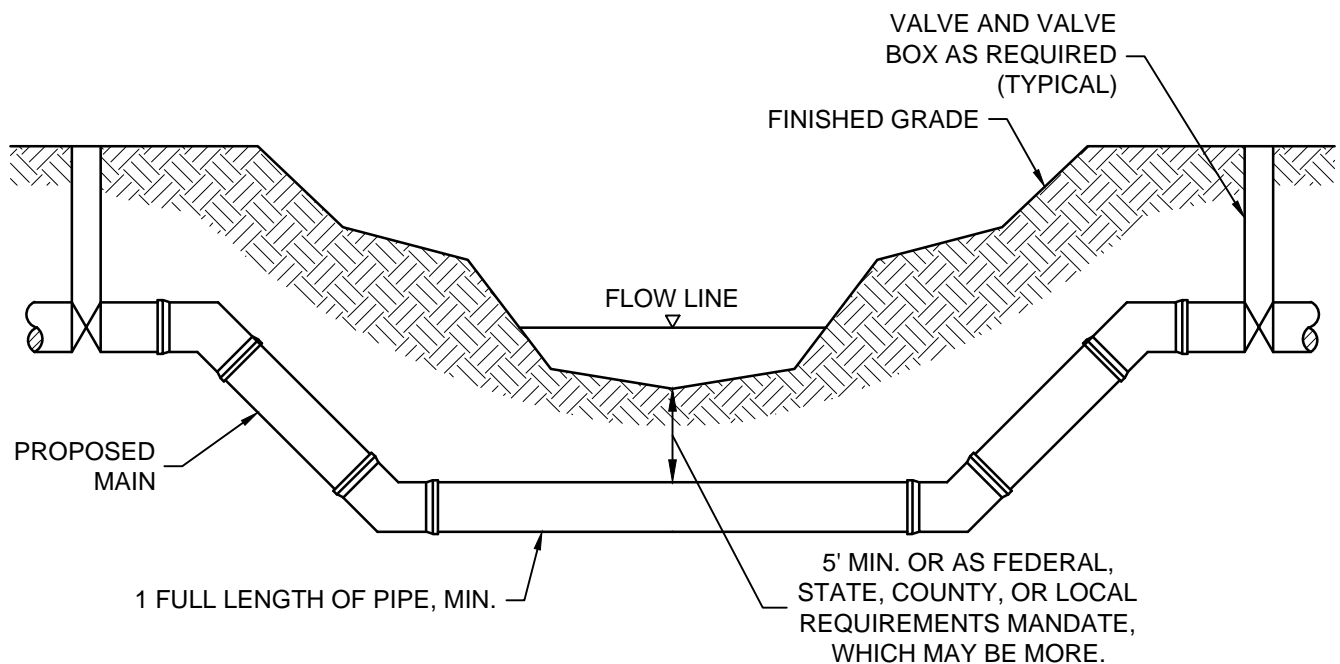
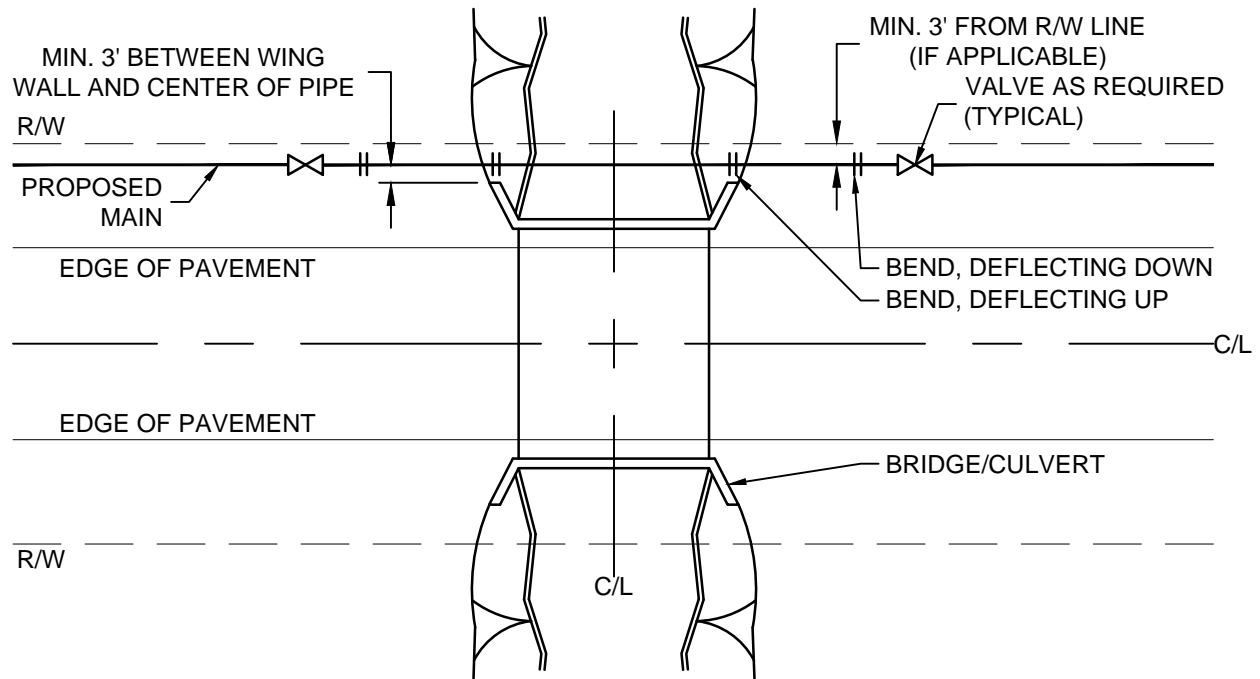
**SEWER & WATER
MAIN SEPARATION**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTES:

1. EXCAVATION WITHIN STREAM BED TO BE BACKFILLED WITH APPROVED MATERIALS AND COMPACTED. RESTRAIN PER PROJECT PLANS.
2. FOR MAINS 12" AND LARGER, 22 1/2 DEGREE BENDS SHALL BE USED.
3. RIPRAP ENTIRE WIDTH OF TRENCH + 12" EACH SIDE FROM TOP OF BANK TO TOP OF BANK. PROVIDE 18" REVETMENT RIPRAP, 24" CLASS I RIPRAP, OR 30" CLASS II RIPRAP OVER GEOTEXTILES AS REQUIRED BY PERMITTING AGENCY.
4. HDPE PIPE MAY BE DEFLECTED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS IN LIEU OF PROVIDING ELBOWS.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-02

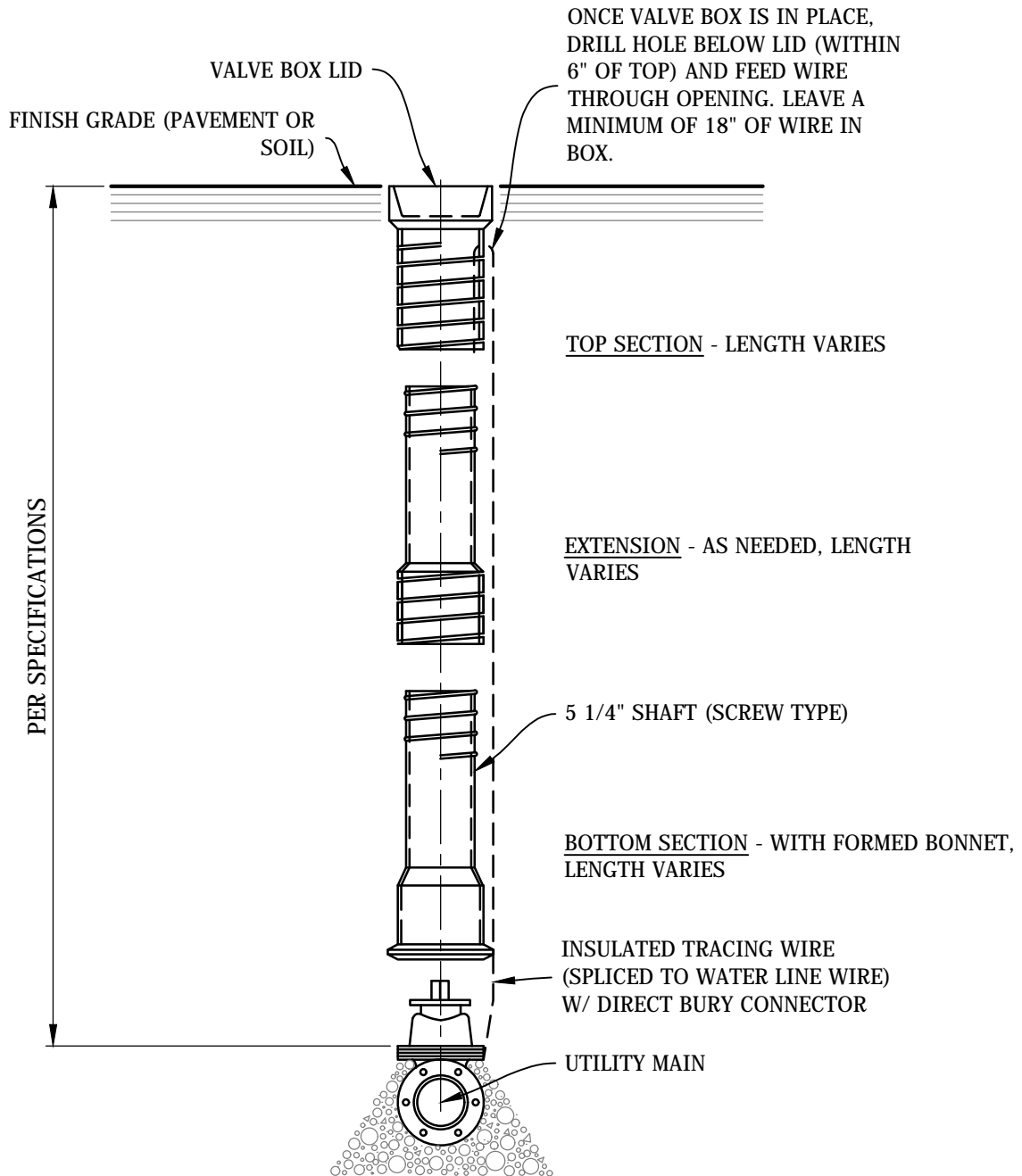
TYPICAL CHANNEL CROSSING

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTES:

1. ALL VALVE BOXES SHALL BE CAST IRON, BUFFALO SCREW STYLE WITH THE WORD "WATER" OR "SEWER" CAST IN THE LID AS APPROPRIATE.
2. VALVE BOX SHALL BE TWO OR THREE PIECE TYPE WITH A ROUND BASE AND 5 1/4" SHAFT SIZE.
3. PROVIDE POSI-CAP ALIGNMENT DEVICE PER SPECIFICATIONS.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-03

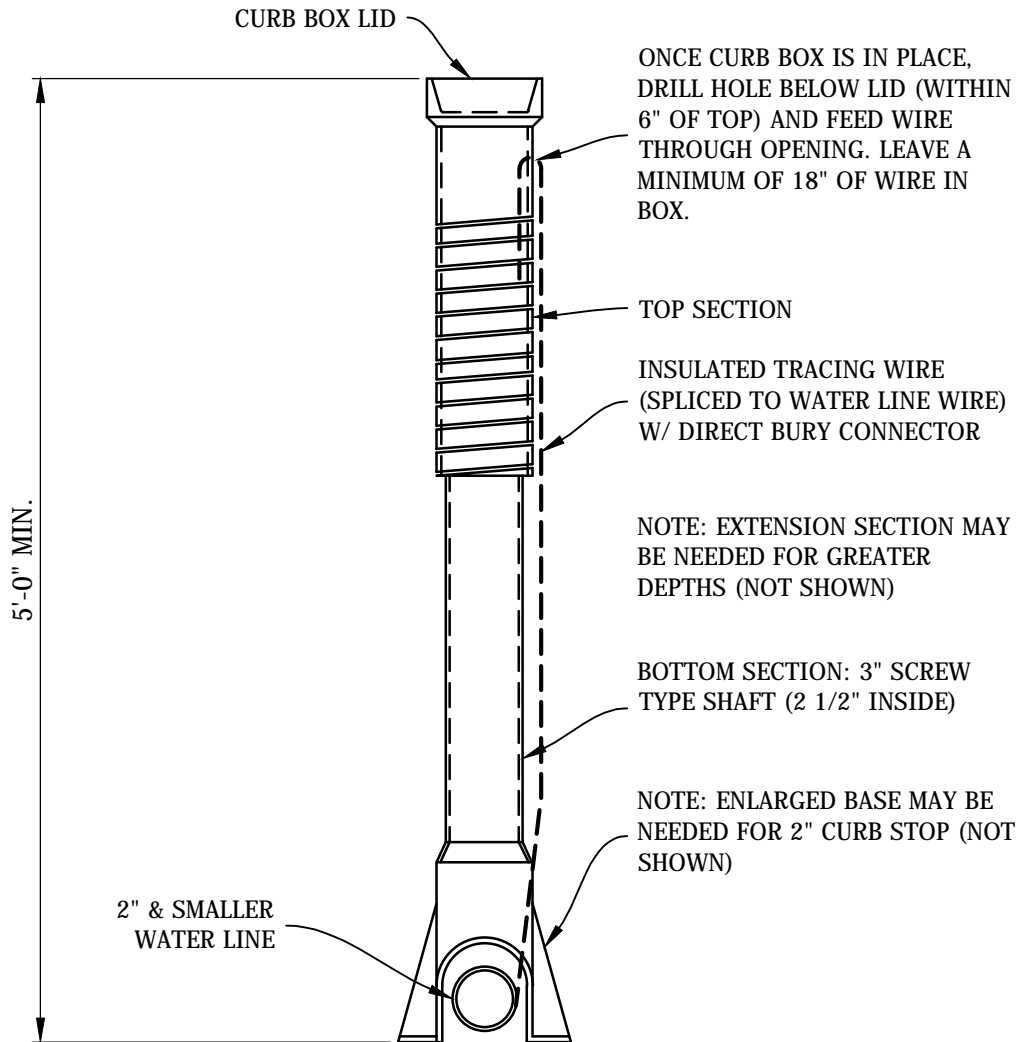
VALVE BOX

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTES:

1. ALL CURB BOXES SHALL BE CAST IRON, BUFFALO SCREW STYLE WITH THE WORD "WATER" OR "SEWER" CAST IN THE LID AS APPROPRIATE.
2. CURB BOX SHALL BE TWO PIECE TYPE WITH A 3" SHAFT SIZE (2 1/2" INSIDE).
3. THE LID SHALL BE HELD IN PLACE BY A STANDARD BRASS PENTAGON HEAD SCREW.
4. CURB BOX SHALL BE FURNISHED WITH A 3' STAINLESS STEEL EXTENSION ROD ATTACHED TO THE CURB STOP WITH CENTERING GUIDE, BROUGHT UP TO FINAL GRADE.
5. A CURB LOCK BOX SHALL BE PLACED UNDER CURB STOP FOR CURB BOX FEET TO SET ON.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-04

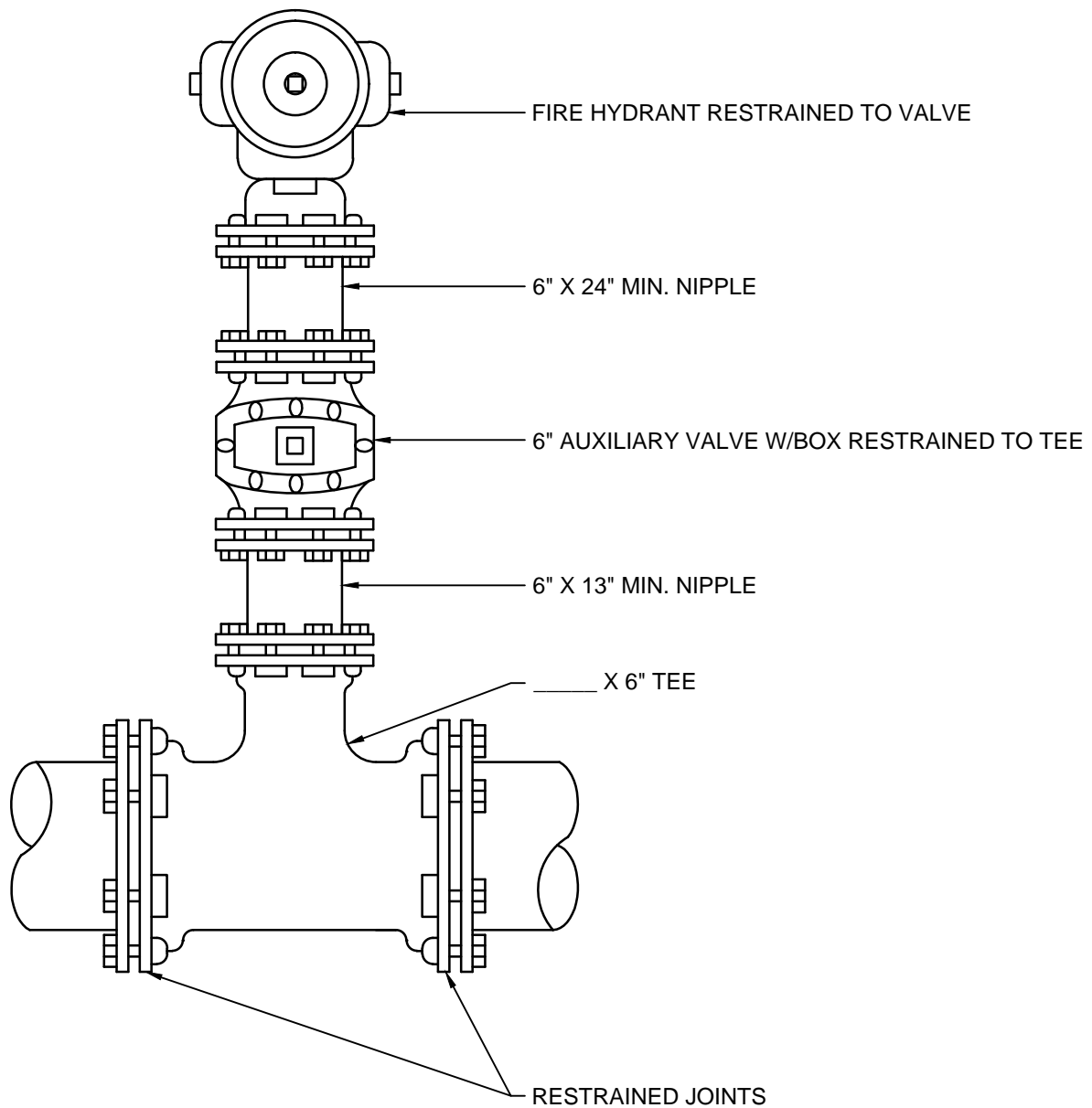
CURB BOX

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. THIS ARRANGEMENT CAN BE USED ON ALL SIZES OF MAINS.
2. FIRE HYDRANTS SHALL BE INSTALLED PER "STANDARD FIRE HYDRANT SETTING" DETAIL.
3. ALL PIPING FROM TEE TO HYDRANT SHALL BE RESTRAINED.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-05

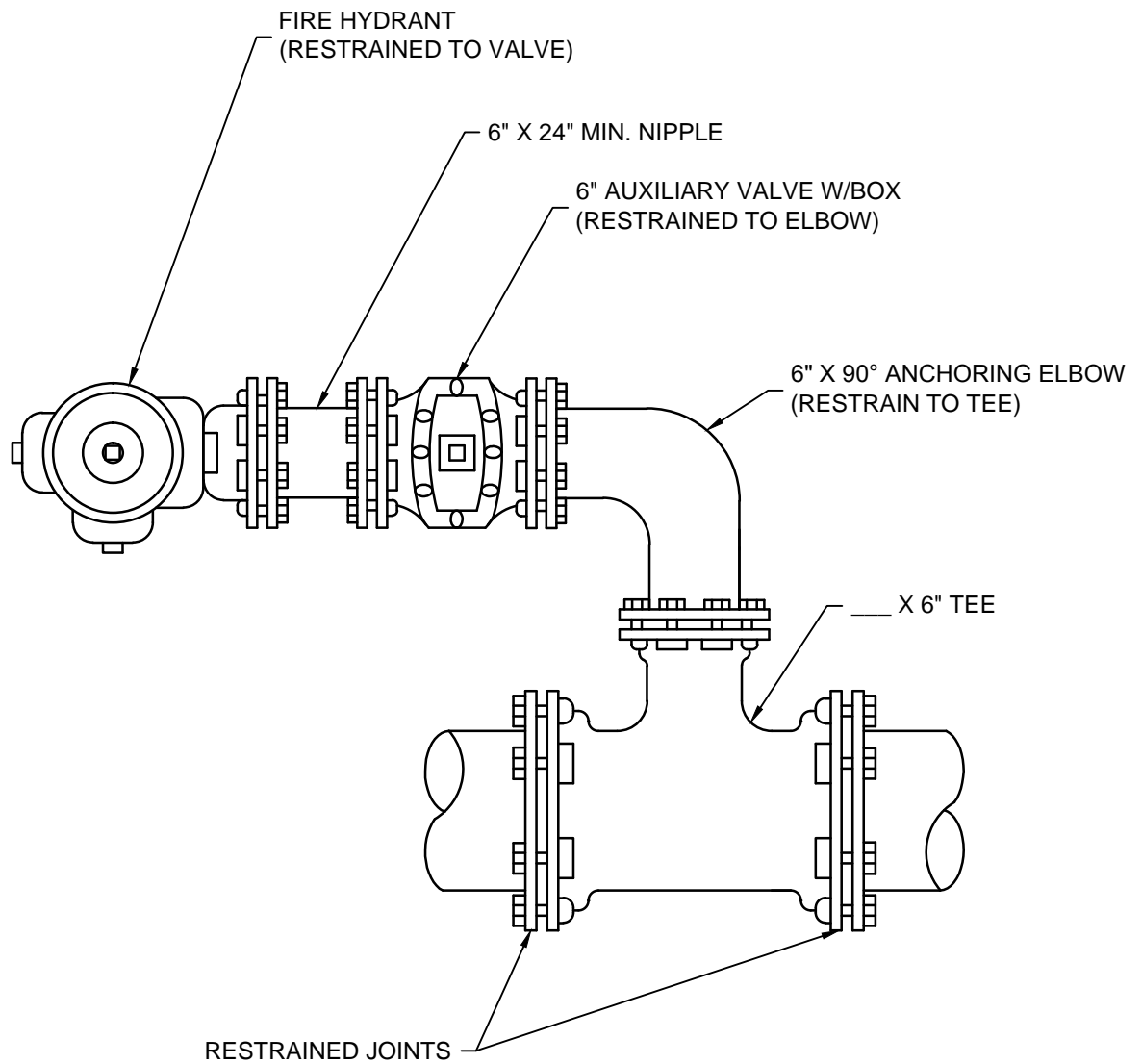
**HYDRANT ASSEMBLY
TYPE I**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. THIS ARRANGEMENT CAN BE USED ON ALL SIZES OF MAINS.
2. FIRE HYDRANTS SHALL BE INSTALLED PER "STANDARD FIRE HYDRANT SETTING" DETAIL.
3. ALL PIPING FROM TEE TO HYDRANT SHALL BE RESTRAINED.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-06

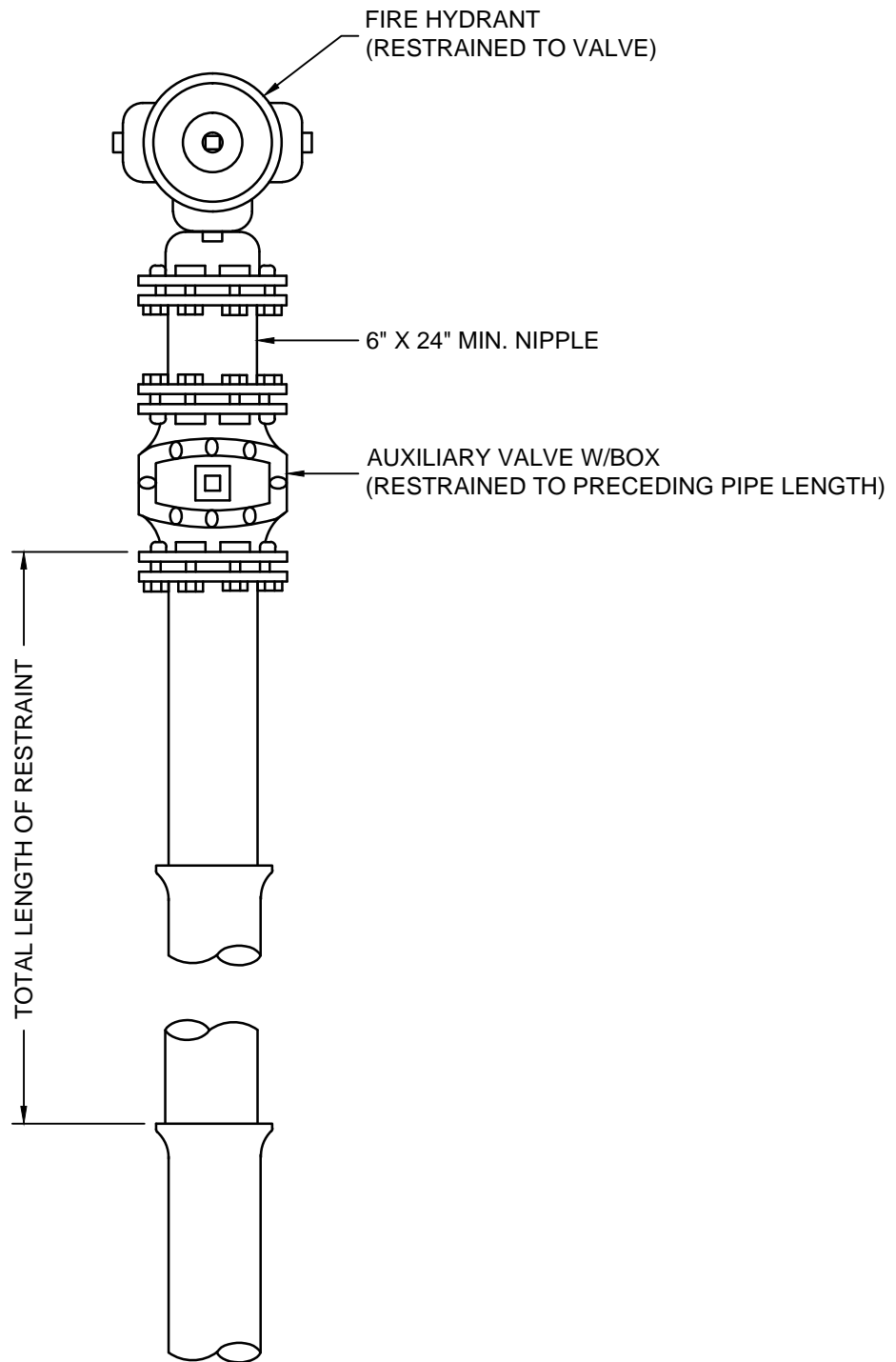
**HYDRANT ASSEMBLY
TYPE III**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. ASSUME CONDITION TO BE A DEAD END FOR DETERMINING THE LENGTH OF RESTRAINED JOINTS.
2. FIRE HYDRANTS SHALL BE INSTALLED PER "STANDARD FIRE HYDRANT SETTING" DETAIL.
3. ALL PIPING FROM VALVE TO HYDRANT SHALL BE RESTRAINED.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-07

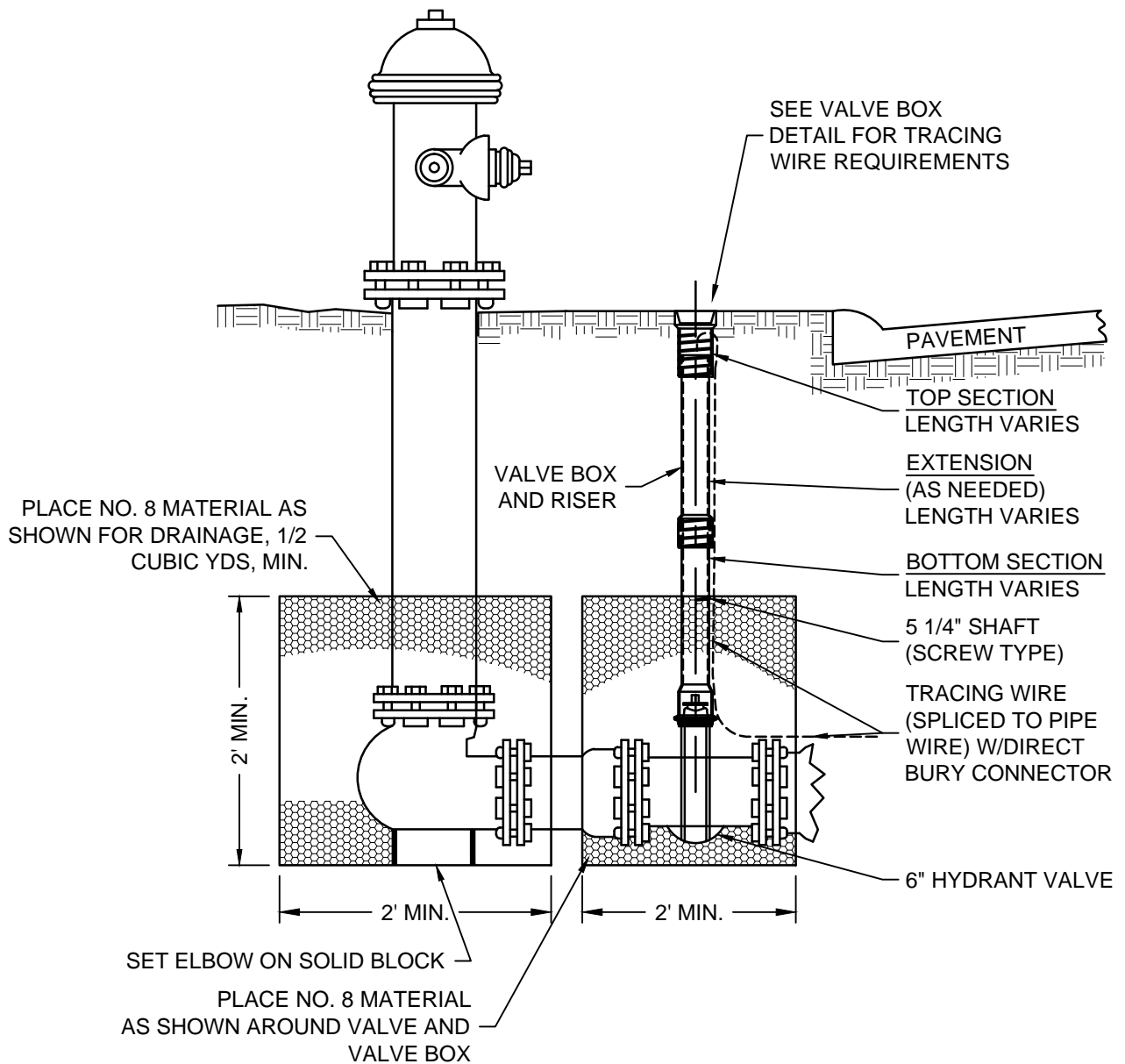
**HYDRANT ASSEMBLY
TYPE V**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. ALL HYDRANTS MUST BE RESTRAINED TO THE HYDRANT TEE.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-08

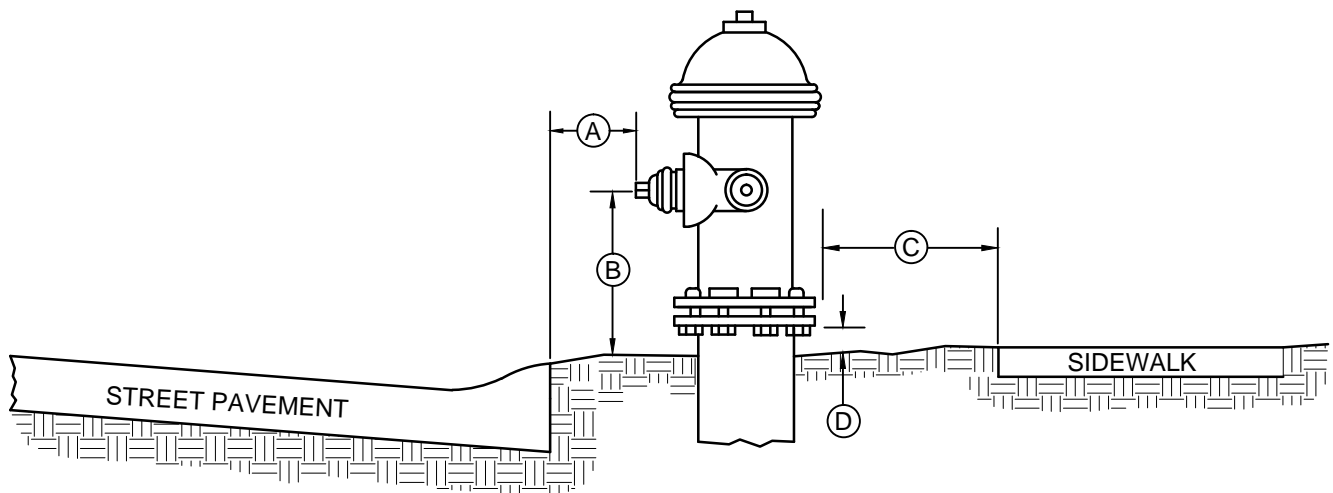
**STANDARD
FIRE HYDRANT SETTING**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



- (A) CURB: PUMPER NOZZLE MIN. 12", MAX 42" FROM BACK OF CURB & POINTED TOWARDS CURB.
NO CURB: PUMPER NOZZLE MIN. 4' FROM EDGE OF PAVEMENT & POINTED TOWARDS PAVEMENT.
- (B) PUMPER NOZZLE MIN. 24" ABOVE GROUND LINE.
- (C) NO PART OF HYDRANT LESS THAN 6" FROM SIDEWALK.
- (D) MIN. 4", MAX. 8" ABOVE GRADE TO FLANGE OR GROUND LINE MARK ON HYDRANT.

NOTES:

1. WHERE FIRE HYDRANTS MUST BE LOCATED IN A PAVED AREA, A MINIMUM OF 5' X 5' CONCRETE BLOCK-OUT WITH EXPANSION JOINTS ON ALL SIDES SHALL BE PROVIDED.
2. PUMPER NOZZLE SHALL FACE THE STREET.
3. FIRE HYDRANTS SHALL BE INSTALLED PER "STANDARD FIRE HYDRANT SETTING" DETAIL.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-09

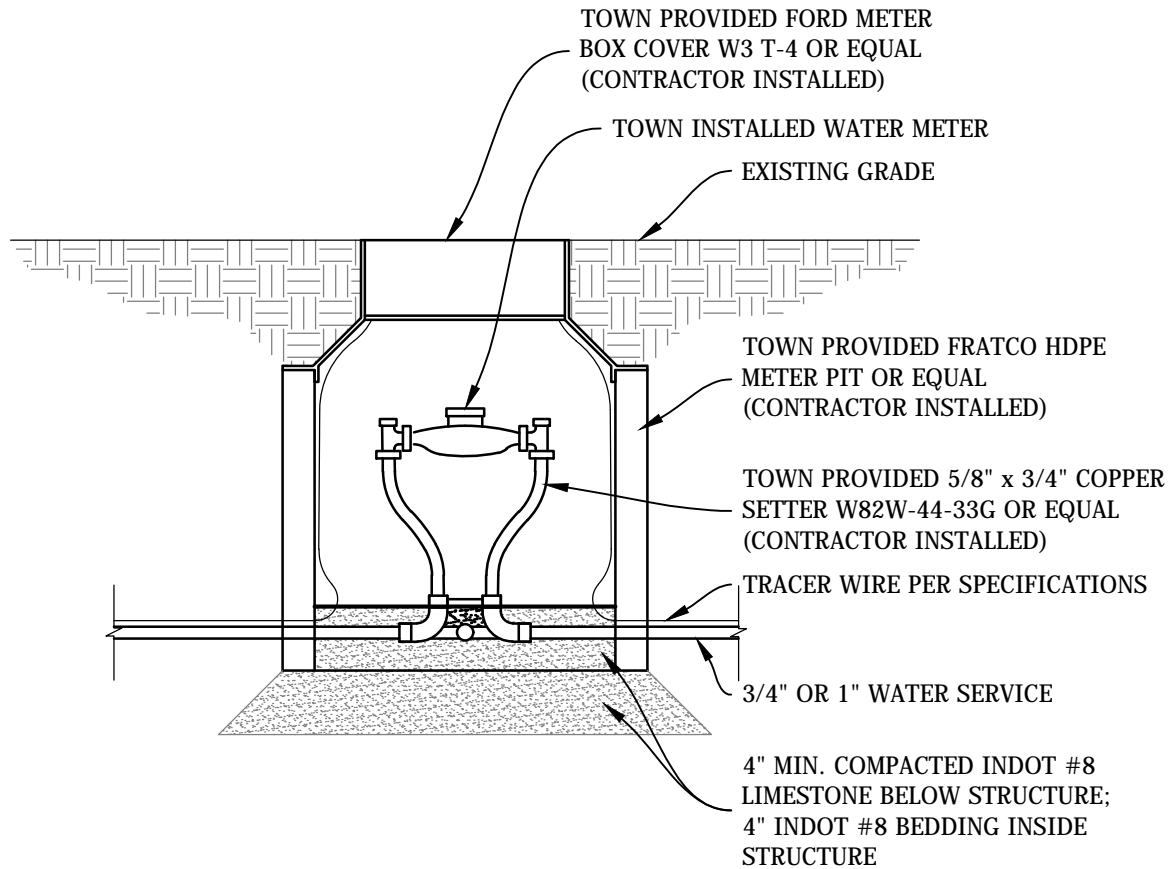
**GENERAL LOCATION
OF FIRE HYDRANT**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. REMOVAL OF EXISTING METER PIT INCLUDED IN WORK. CONTRACTOR TO COORDINATE WITH TOWN FOR REMOVAL OF EXISTING METER.
2. TOWN TO PROVIDE METER PIT, SETTER, AND LID FOR INSTALLATION BY CONTRACTOR.
3. TOWN TO PROVIDE AND INSTALL METER.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-10

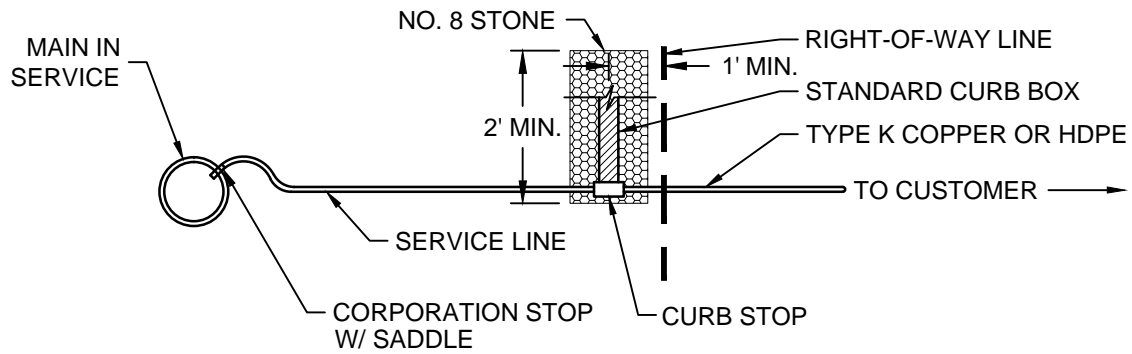
WATER METER PIT

STANDARD DRAWINGS

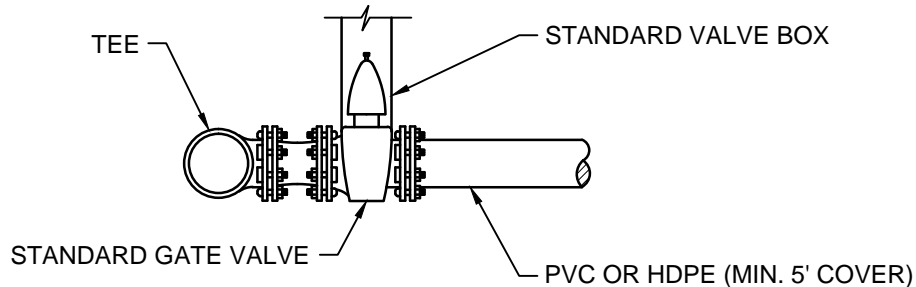
APPROVED: 2/4/19

REVISED:

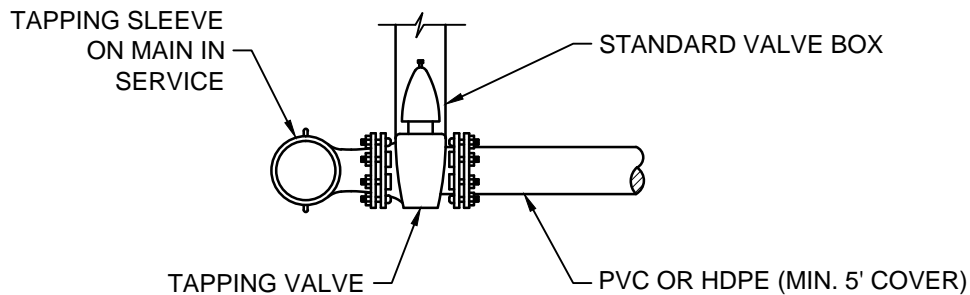
SCALE: NONE



SMALL SERVICE INSTALLATION
3/4" THRU 2" (MIN. 4'-6" COVER)



LARGE SERVICE INSTALLATION WITH NEW WATER MAIN INSTALLATION
4" & LARGER



LARGE SERVICE INSTALLATION ON EXISTING WATER MAIN IN SERVICE
4" & LARGER

NOTES:

1. CONTRACTOR SHALL BORE SMALL DIAMETER SERVICE LINES BELOW PAVEMENT WHERE INDICATED ON CONTRACT DOCUMENTS.
2. PROVIDE TRACER WIRE ON SERVICE. CONNECT TO WATER MAIN TRACER AND BRING UP IN CURB / VALVE BOX PER REQUIREMENTS OF PLANS AND SPECIFICATIONS.
3. CORPORATION STOP SHALL MATCH SIZE OF SERVICE LINE.
4. DO NOT PLACE CURB BOX / METER BOX IN DRIVEWAY / SIDEWALK.



TOWN OF HUNTERTOWN
 15617 LIMA ROAD - P.O. BOX 95
 HUNTERTOWN, IN 46748

WAT-11

WATER SERVICE INSTALLATIONS

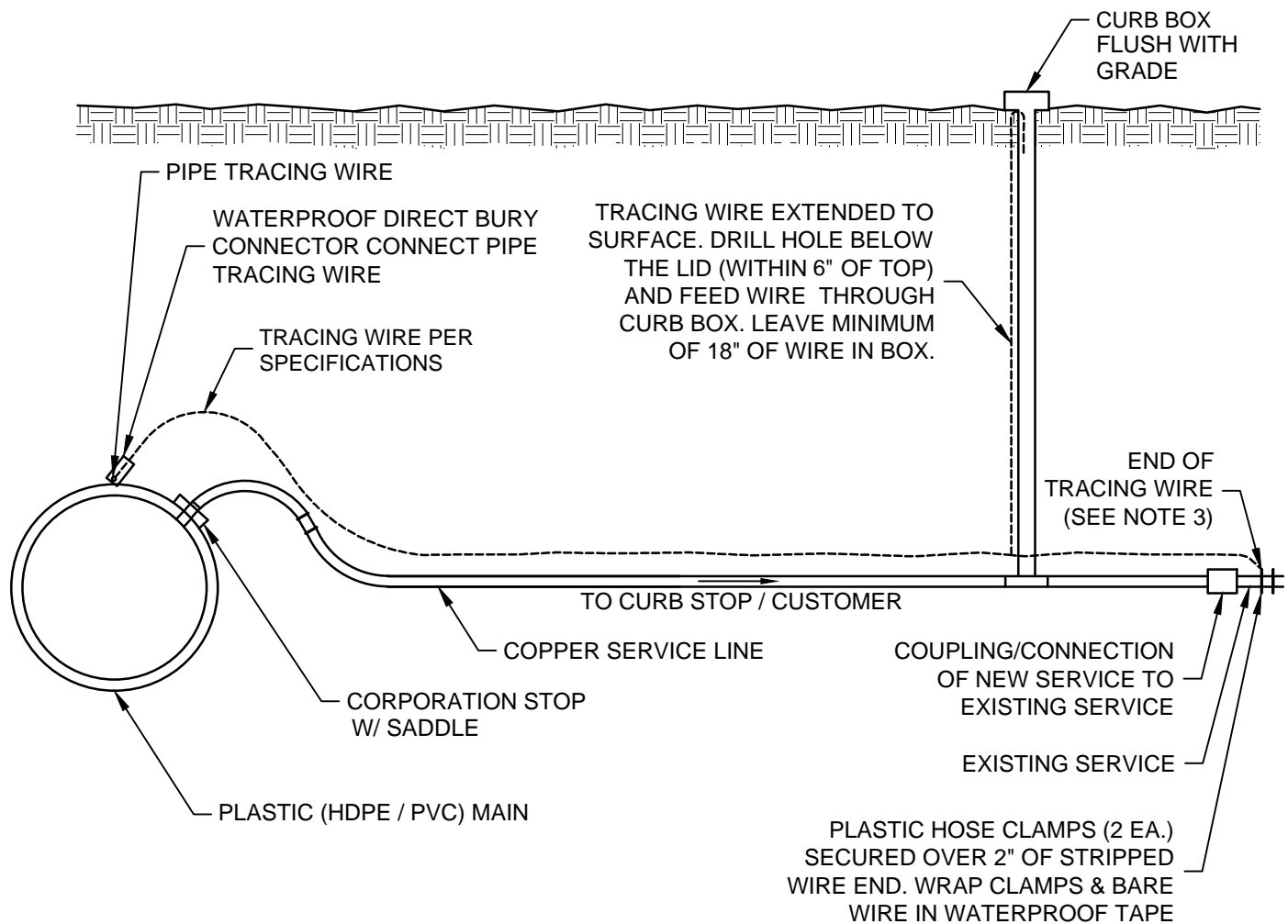
STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE

INTENDED USE: FOR WATER MAIN REPLACEMENT PROJECTS, WHERE EXISTING SERVICE IS COPPER



SMALL SERVICE - TRACING WIRE CONNECTION
($\frac{3}{4}$ " THRU 2" COPPER TUBING)

NOTES:

1. ALL TRACING WIRE SPLICES AND CONNECTIONS SHALL BE MADE USING A DIRECT BURY WATERPROOF CONNECTION DEVICE DESIGNED FOR USE WITH LOW VOLTAGE TRACING WIRE.
2. PLASTIC HOSE CLAMPS (NON METALLIC ONLY) SHALL BE USED TO ENSURE CONDUCTIVITY IS MAINTAINED BETWEEN COPPER TRACING WIRE AND COPPER SERVICE TUBING.
3. IF CONNECTING TO EXISTING COPPER/LEAD SERVICE TRACING WIRE SHALL END AT THE EXISTING COPPER/LEAD SERVICE.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-12

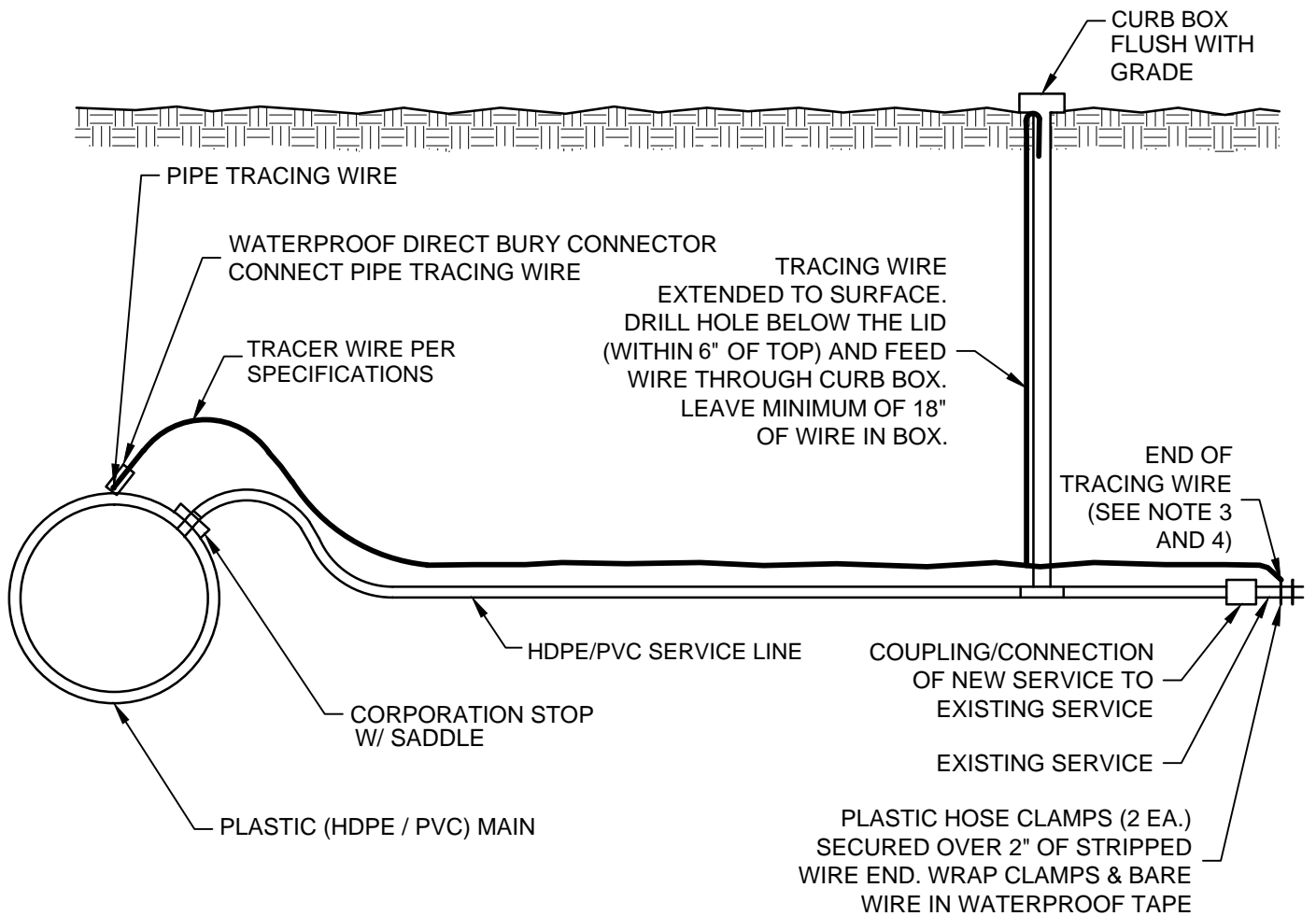
COPPER WATER SERVICE
TRACER WIRE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



SMALL SERVICE - TRACING WIRE CONNECTION
(1" THRU 2")

NOTES:

1. ALL TRACING WIRE SPLICES AND CONNECTIONS SHALL BE MADE USING A DIRECT BURY (EX. COPPERHEAD) WATERPROOF CONNECTION DEVICE DESIGNED FOR USE WITH LOW VOLTAGE TRACING WIRE.
2. PLASTIC HOSE CLAMPS (NON METALLIC ONLY) SHALL BE USED TO ENSURE CONDUCTIVITY IS MAINTAINED BETWEEN COPPER TRACING WIRE AND HDPE SERVICE TUBING.
3. IF CONNECTING TO EXISTING COPPER/LEAD SERVICE TRACING WIRE SHALL END AT THE EXISTING COPPER/LEAD SERVICE.
4. TRACING WIRE SHALL BE EXTENDED TO WATER METER FOR CONNECTION TO NEW OR EXISTING HDPE SERVICE.
5. FOR PROPERTIES THAT DO NOT HAVE AN EXISTING SERVICE, EXTEND TRACING WIRE FROM THE NEW WATER MAIN INTO THE CURB BOX AT AN APPROPRIATE LENGTH TO ALLOW FOR FUTURE SERVICE CONNECTION.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-13

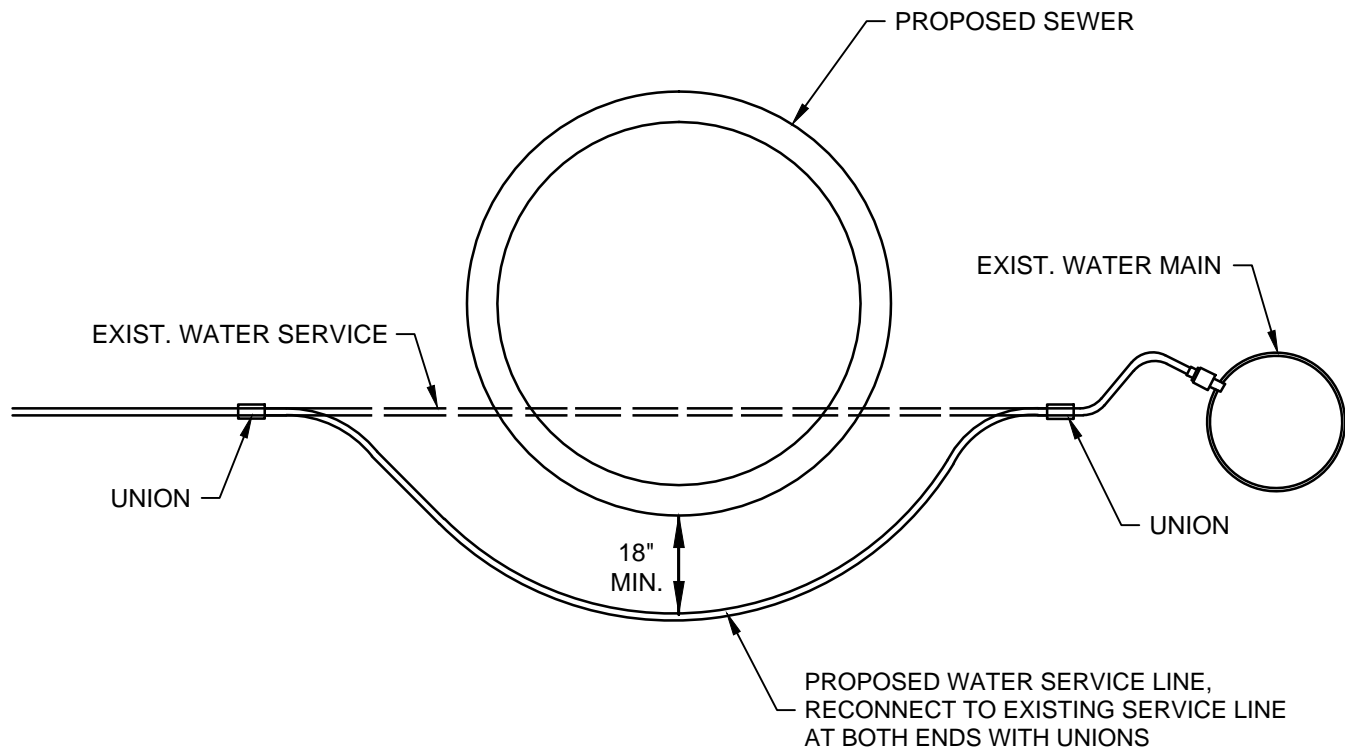
HDPE/PVC WATER SERVICE
TRACER WIRE

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTE:
ALL RECONNECTIONS ENCOUNTERING LEAD CORPORATION STOPS SHALL BE REPLACED PER SPECIFICATIONS.



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
HUNTERTOWN, IN 46748

WAT-14

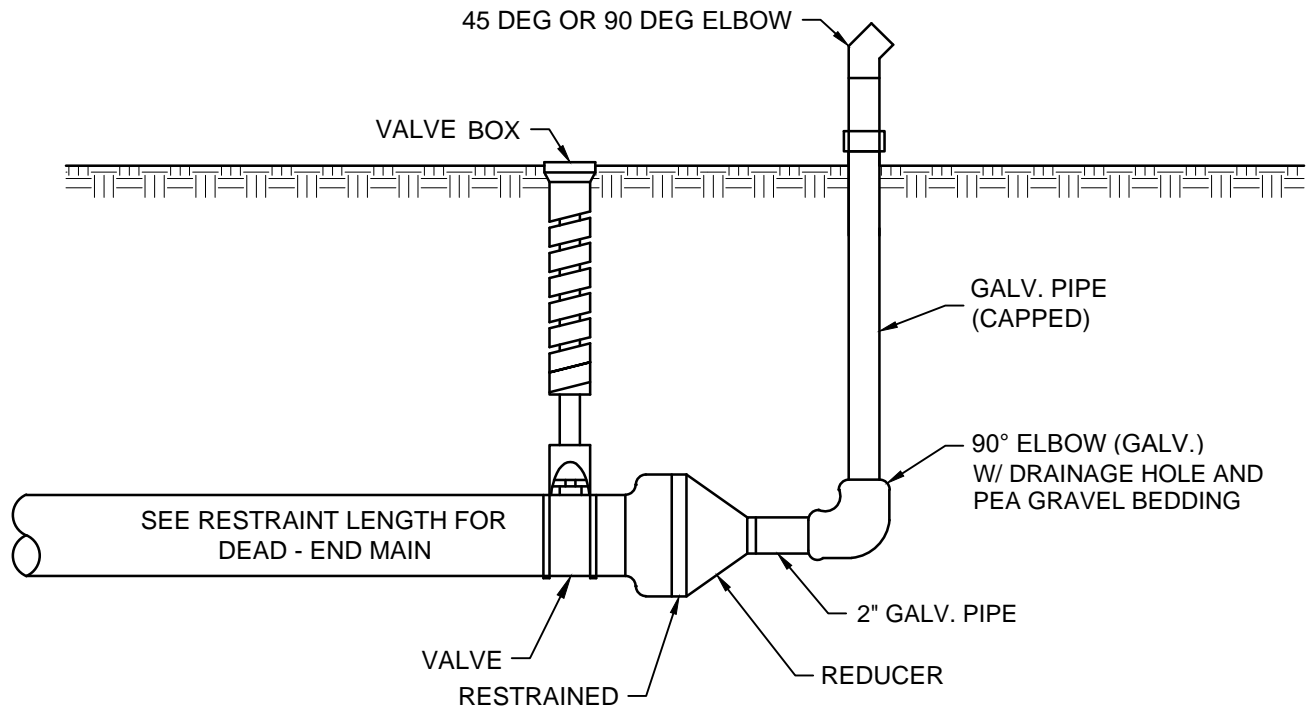
WATER SERVICE RECONNECTION

STANDARD DRAWINGS

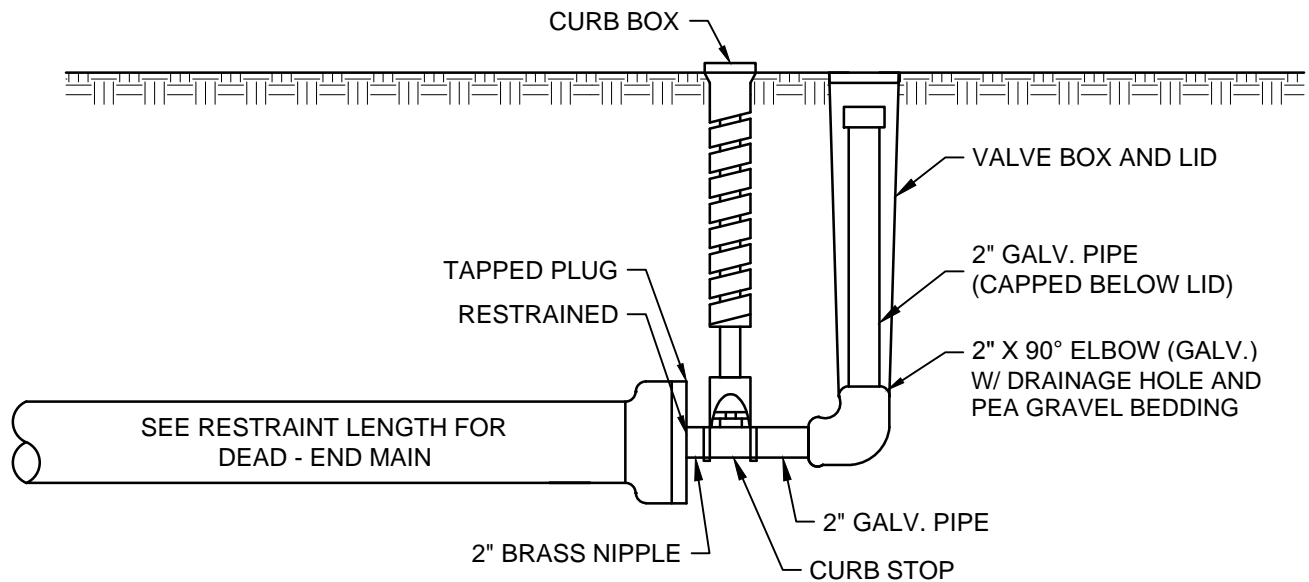
APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



TEMPORARY CONSTRUCTION BLOWOFF ASSEMBLY INSTALLATION



PERMANENT BLOW-OFF ASSEMBLY INSTALLATION

NOTES:

1. ALL MATERIALS FURNISHED BY CONTRACTOR AND INSTALLED BY CONTRACTOR, UNLESS OTHERWISE SPECIFIED.



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WAT-15

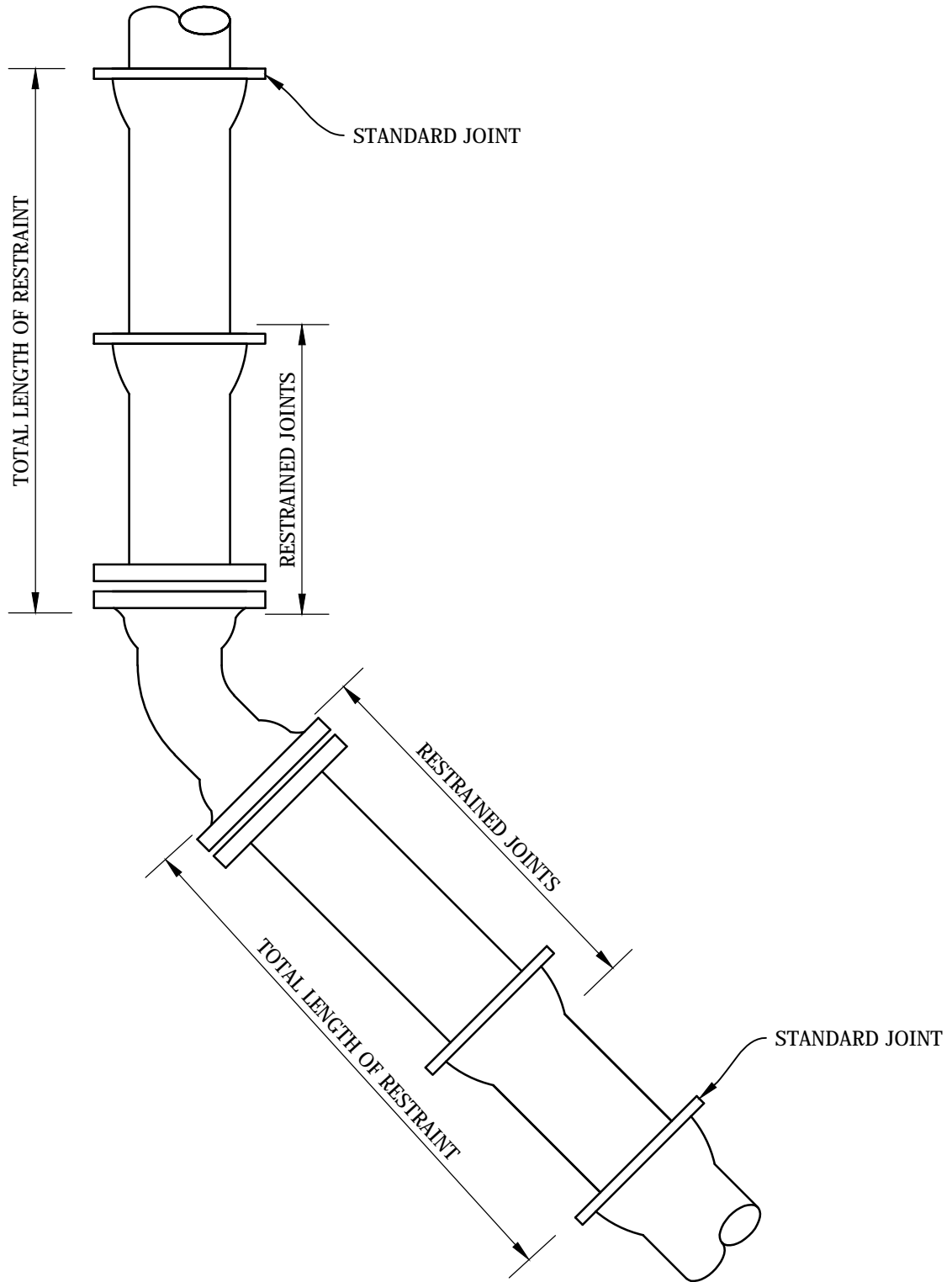
BLOW-OFF INSTALLATIONS

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTE:

1. SEE SPECIFICATIONS FOR REQUIRED RESTRAINT LENGTHS



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WAT-16

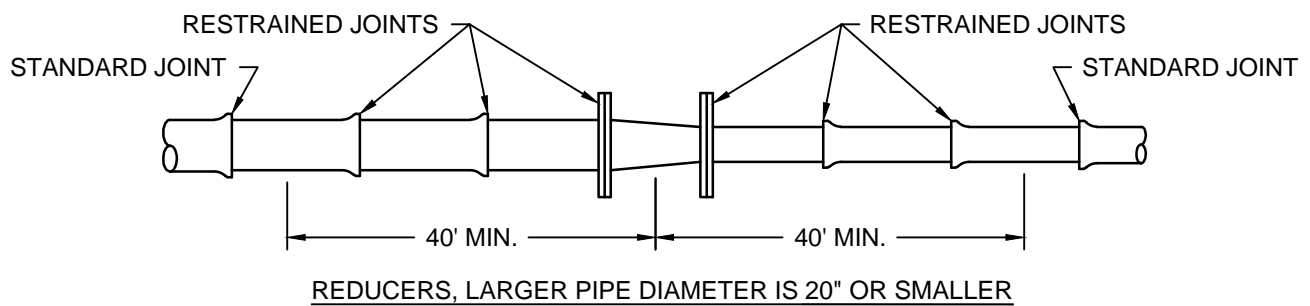
RESTRAINT OF ELBOWS

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE



NOTES:

1. ASSUMPTIONS (PROJECT ENGINEER RESPONSIBLE TO VERIFY ALL ASSUMPTIONS & ADJUST LENGTHS ACCORDINGLY)
 - 1.1 BASED ON REDUCTION OF ONE PIPE SIZE
 - 1.2 BASED ON 150 PSI DESIGN / TEST PRESSURE
 - 1.3 SAFETY FACTOR 1.5
 - 1.4 TYPE 3 LAYING CONDITION
 - 1.5 5' COVER
 - 1.6 SOIL / BACKFILL CONDITIONS = CLAY 2
2. IF FITTINGS ARE IN CLOSE PROXIMITY TO EACH OTHER AND THE RESTRAINT LENGTHS OVERLAP, REFER TO THE DIPRA DESIGN MANUAL FOR RESTRAINED LENGTH CALCULATIONS FOR ENCROACHMENT APPLICATIONS.



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WAT-17

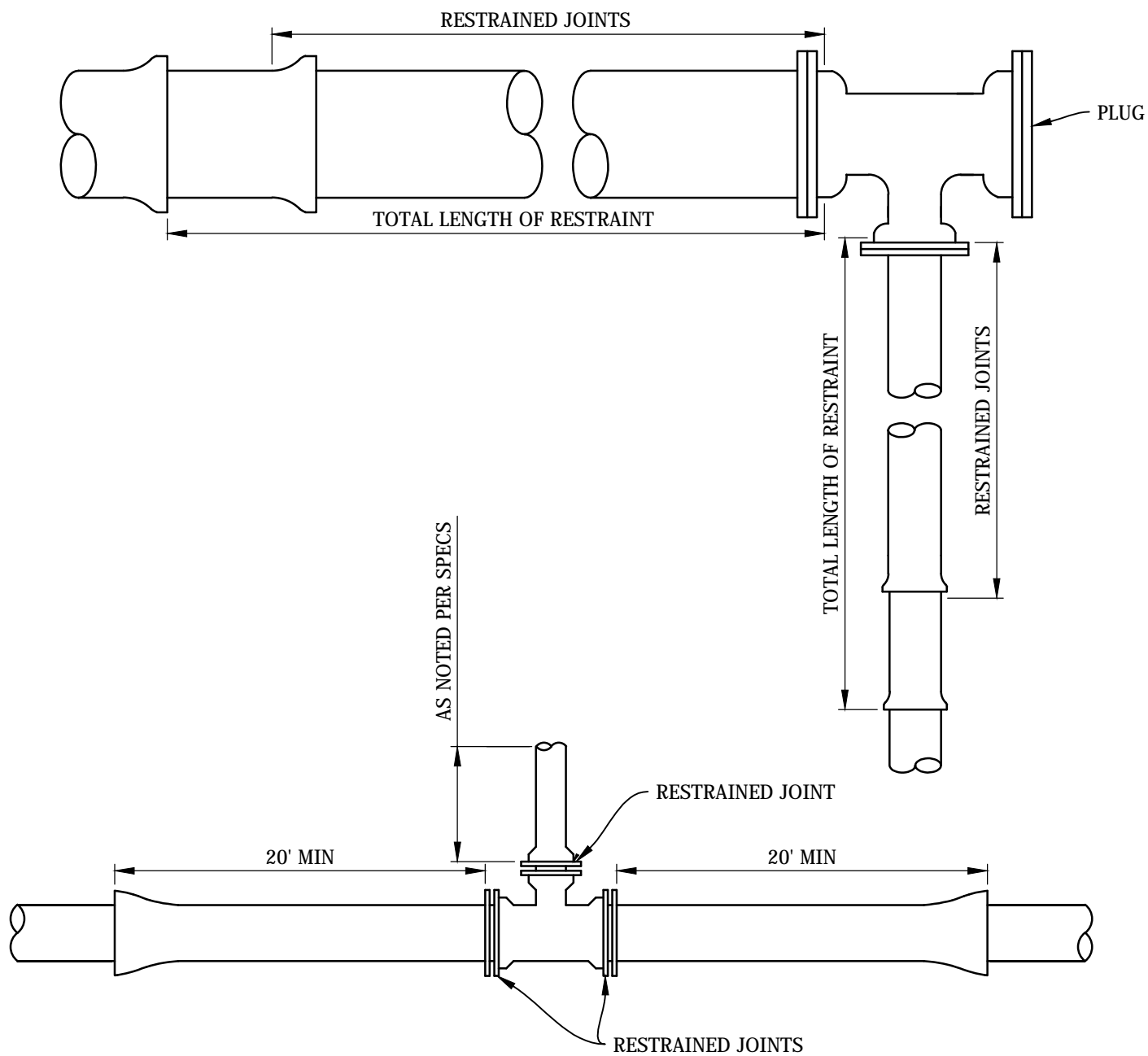
RESTRAINT OF REDUCERS

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTE:

1. SEE SPECIFICATIONS FOR REQUIRED RESTRAINT LENGTHS



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WAT-18

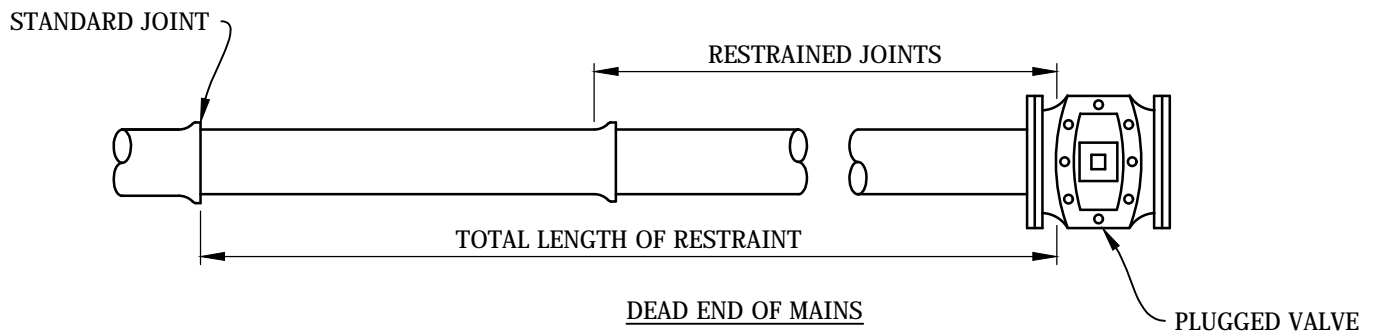
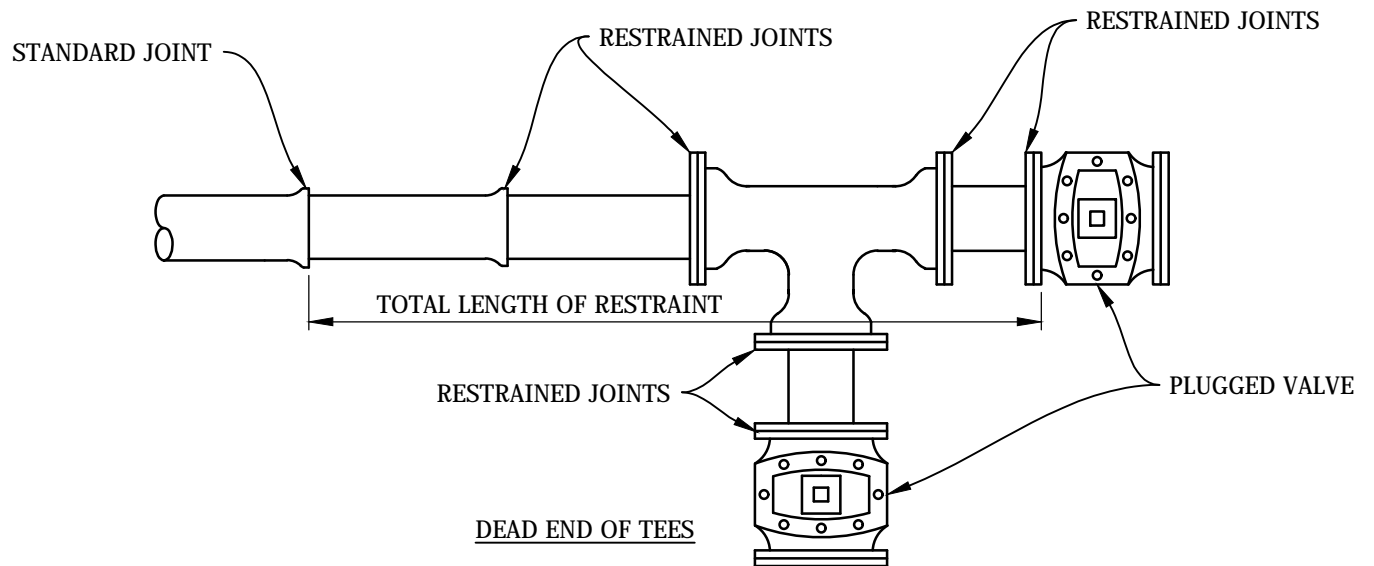
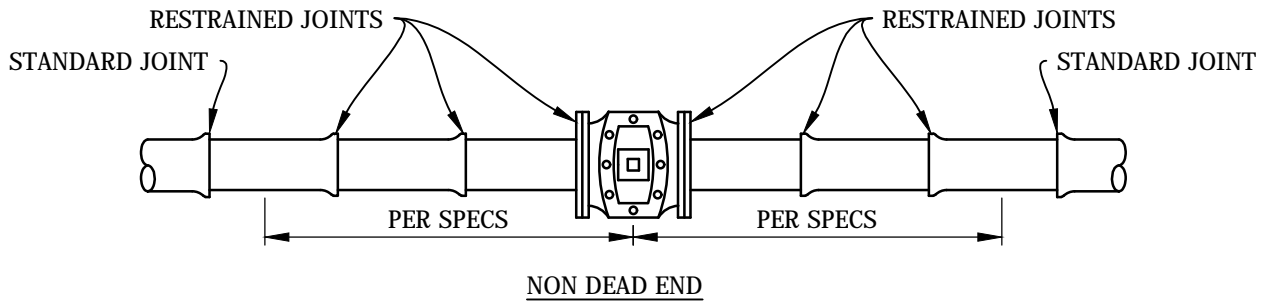
RESTRAINT OF TEES

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTE:

1. SEE SPECIFICATIONS FOR REQUIRED RESTRAINT LENGTHS



TOWN OF HUNTERTOWN
15617 LIMA ROAD - P.O. BOX 95
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WAT-19

RESTRAINT OF VALVES

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE

NON-POLYWRAPPED DIP THRUST RESTRAINT CALCULATIONS								
PIPE DIA.	HORIZONTAL BENDS AND VERTICAL UP BENDS				VERTICAL DOWN BENDS		DEAD ENDS	PIPE DIA.
	11.25°	22.5°	45°	90°	22.5°	45°		
4"	1	3	6	15	5	11	27	4"
6"	2	4	9	21	8	16	39	6"
8"	3	5	11	27	10	21	51	8"
10"	3	7	14	33	12	26	62	10"
12"	4	8	16	40	15	31	74	12"
16"	5	10	21	52	19	41	98	16"
20"	6	13	26	64	24	50	122	20"
24"	7	15	31	76	29	60	145	24"
30"	9	19	39	93	36	75	180	30"
36"	11	22	46	110	43	89	215	36"

TEE BRANCH RESTRAINT (ASSUMED RESTRAINT OF "RUN" PIPE IS 20FT EACH SIDE OF TEE)											
TEE BRANCH DIAMETER											
TEE RUN DIA.	4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	TEE RUN DIA.
4"	0										4"
6"	0	0									6"
8"	0	0	0								8"
10"	0	0	0	5							10"
12"	0	0	0	0	11						12"
16"	0	0	0	0	3	22					16"
20"	0	0	0	0	0	16	34				20"
24"	0	0	0	0	0	9	28	45			24"
30"	0	0	0	0	0	0	21	39	62		30"

NOTES:

1. ASSUMPTIONS:

- 1.1 NON- POLYWRAPPED DUCTILE IRON PIPE
- 1.2 DESIGN / TEST PRESSURE = 150 PSI
- 1.3 SAFETY FACTOR = 1.5 (RECOMMENDED BY DIPRA)
- 1.4 TYPE 3 LAYING CONDITION (RECOMMENDED BY DIPRA)
- 1.5 5' COVER
- 1.6 SOIL / BACKFILL CONDITIONS = CLAY 2 (ADJUST TO BE REPRESENTATIVE OF ACTUAL FIELD CONDITIONS)
2. CALCULATED RESTRAINT LENGTHS ARE FOR EACH SIDE OF THE FITTING. ALL FITTINGS SHALL BE RESTRAINED THE CALCULATED LENGTH AT A MINIMUM.
3. IF FITTINGS ARE IN CLOSE PROXIMITY AND RESTRAINT LENGTHS OVERLAP, REFER TO DIPRA DESIGN MANUAL FOR RESTRAINED LENGTH CALCULATIONS FOR ENCROACHMENT APPLICATIONS.

PROJECT ENGINEER RESPONSIBLE TO VERIFY ALL ASSUMPTIONS & ADJUST LENGTHS ACCORDINGLY. PROJECT ENGINEER SHALL SUBMIT FOR APPROVAL A JOINT RESTRAINT LENGTH SCHEDULE FOR EACH DIAMETER AND MATERIAL OF PIPING UTILIZED ON THE PROJECT AND REQUIRING RESTRAINT. RESTRAINT LENGTHS SHALL BE BASED ON APPROVED CALCULATION METHODOLOGY BY DIPRA, EBAA IRON'S JOINT RESTRAINT LENGTH CALCULATOR, OR APPROVED EQUAL.



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WAT-20

**NON-POLYWRAPPED D.I. THRUST
RESTRAINT CALCULATIONS**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE

POLYWRAPPED DUCTILE IRON THRUST RESTRAINT CALCULATIONS								
PIPE DIA.	HORIZONTAL BENDS AND VERTICAL UP BENDS				VERTICAL DOWN BENDS		DEAD ENDS	PIPE DIA.
	11.25°	22.5°	45°	90°	22.5°	45°		
4"	2	3	7	17	8	16	39	4"
6"	2	5	10	25	11	23	55	6"
8"	3	6	13	33	14	30	73	8"
10"	4	8	16	40	18	37	89	10"
12"	5	9	20	47	21	44	106	12"
16"	6	12	23	62	28	58	140	16"
20"	7	15	31	76	35	72	174	20"
24"	9	18	37	90	41	86	207	24"
30"	11	22	46	110	51	107	257	30"
36"	13	26	54	131	61	127	308	36"

TEE BRANCH RESTRAINT (ASSUMED RESTRAINT OF "RUN" PIPE IS 20' EACH SIDE OF TEE)											
TEE BRANCH DIAMETER											
TEE RUN DIA.	4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	TEE RUN DIA.
4"	0										4"
6"	0	0									6"
8"	0	0	0								8"
10"	0	0	0	7							10"
12"	0	0	0	0	16						12"
16"	0	0	0	0	4	32					16"
20"	0	0	0	0	0	23	48				20"
24"	0	0	0	0	0	14	41	65			24"
30"	0	0	0	0	0	0	30	55	89		30"
36"	0	0	0	0	0	0	18	46	81	113	36"

NOTES:

- ASSUMPTIONS:
 - POLYWRAPPED DUCTILE IRON PIPE
 - DESIGN / TEST PRESSURE = 150 PSI
 - SAFETY FACTOR = 1.5 (RECOMMENDED BY DIPRA)
 - TYPE 3 LAYING CONDITION (RECOMMENDED BY DIPRA)
 - 5' COVER
 - SOIL / BACKFILL CONDITIONS = CLAY 2 (ADJUST TO BE REPRESENTATIVE OF ACTUAL FIELD CONDITIONS)
- CALCULATED RESTRAINT LENGTHS ARE FOR EACH SIDE OF THE FITTING. ALL FITTINGS SHALL BE RESTRAINED THE CALCULATED LENGTH AT A MINIMUM.
- IF FITTINGS ARE IN CLOSE PROXIMITY AND RESTRAINT LENGTHS OVERLAP, REFER TO DIPRA DESIGN MANUAL FOR RESTRAINED LENGTH CALCULATIONS FOR ENCROACHMENT APPLICATIONS.

PROJECT ENGINEER RESPONSIBLE TO VERIFY ALL ASSUMPTIONS & ADJUST LENGTHS ACCORDINGLY. PROJECT ENGINEER SHALL SUBMIT FOR APPROVAL A JOINT RESTRAINT LENGTH SCHEDULE FOR EACH DIAMETER AND MATERIAL OF PIPING UTILIZED ON THE PROJECT AND REQUIRING RESTRAINT. RESTRAINT LENGTHS SHALL BE BASED ON APPROVED CALCULATION METHODOLOGY BY DIPRA, EBAA IRON'S JOINT RESTRAINT LENGTH CALCULATOR, OR APPROVED EQUAL.



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WAT-21

**POLYWRAPPED DIP THRUST
RESTRAINT CALCULATIONS**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE

PVC NON-ENCROACHING THRUST RESTRAINT CALCULATIONS								
PIPE DIA.	HORIZONTAL BENDS AND VERTICAL UP BENDS				VERTICAL DOWN BENDS		DEAD ENDS	PIPE DIA.
	11.25°	22.5°	45°	90°	22.5°	45°		
4"	1	3	5	13	7	15	25	4"
6"	2	4	8	19	10	22	35	6"
8"	2	5	10	24	13	28	47	8"
10"	3	6	12	29	16	34	56	10"
12"	3	7	14	35	19	40	67	12"
16"	4	9	19	45	25	53	87	16"
20"	5	11	23	55	31	65	107	20"
24"	6	13	27	65	37	76	127	24"
30"	8	16	32	78	45	93	156	30"
36"	9	18	38	92	53	110	185	36"

TEE BRANCH RESTRAINT (ASSUMED RESTRAINT OF "RUN" PIPE IS 20' EACH SIDE OF TEE)											
TEE BRANCH DIAMETER											
TEE RUN DIA.	4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	TEE RUN DIA.
4"	0										4"
6"	0	0									6"
8"	0	0	0								8"
10"	0	0	0	0							10"
12"	0	0	0	0	0						12"
16"	0	0	0	0	0	13					16"
20"	0	0	0	0	0	0	33				20"
24"	0	0	0	0	0	0	17	52			24"
30"	0	0	0	0	0	0	0	33	81		30"
36"	0	0	0	0	0	0	0	14	65	110	36"

NOTES:

1. ASSUMPTIONS:

- 1.1 PVC PIPE
- 1.2 DESIGN / TEST PRESSURE = 150 PSI
- 1.3 SAFETY FACTOR = 1.5 (RECOMMENDED BY DIPRA)
- 1.4 TYPE 3 LAYING CONDITION (RECOMMENDED BY DIPRA)
- 1.5 5' COVER
- 1.6 SOIL / BACKFILL CONDITIONS = CLAY 2 (ADJUST TO BE REPRESENTATIVE OF ACTUAL FIELD CONDITIONS)
2. CALCULATED RESTRAINT LENGTHS ARE FOR EACH SIDE OF THE FITTING. ALL FITTINGS SHALL BE RESTRAINED THE CALCULATED LENGTH AT A MINIMUM.
3. IF FITTINGS ARE IN CLOSE PROXIMITY AND RESTRAINT LENGTHS OVERLAP, REFER TO DIPRA DESIGN MANUAL FOR RESTRAINED LENGTH CALCULATIONS FOR ENCROACHMENT APPLICATIONS.

PROJECT ENGINEER RESPONSIBLE TO VERIFY ALL ASSUMPTIONS & ADJUST LENGTHS ACCORDINGLY. PROJECT ENGINEER SHALL SUBMIT FOR APPROVAL A JOINT RESTRAINT LENGTH SCHEDULE FOR EACH DIAMETER AND MATERIAL OF PIPING UTILIZED ON THE PROJECT AND REQUIRING RESTRAINT. RESTRAINT LENGTHS SHALL BE BASED ON APPROVED CALCULATION METHODOLOGY BY DIPRA, EBAA IRON'S JOINT RESTRAINT LENGTH CALCULATOR, OR APPROVED EQUAL.



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WAT-22

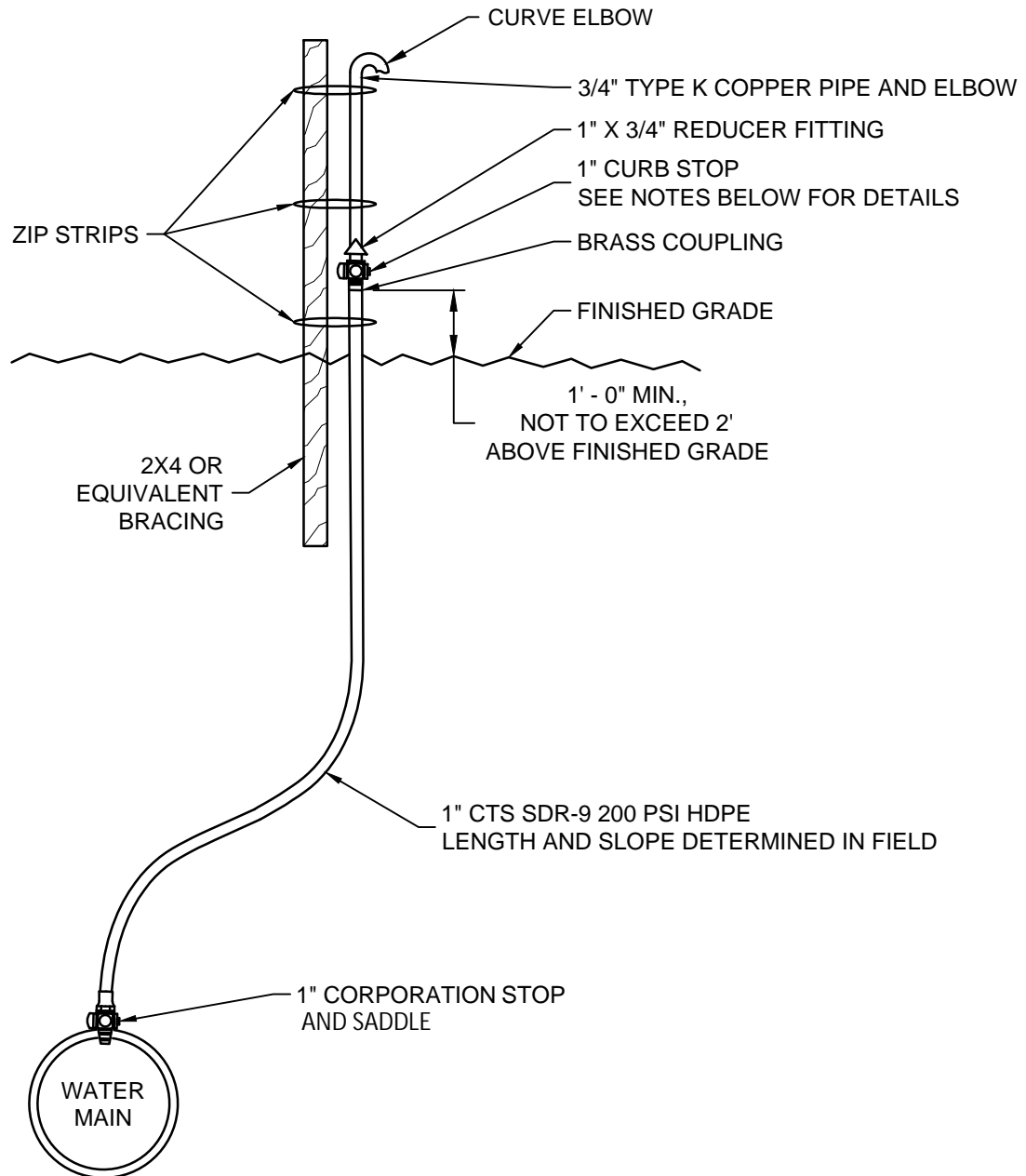
**PVC THRUST RESTRAINT
CALCULATIONS**

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE



NOTES:

1. FOR TEST RISER LOCATIONS NOT PROPOSED TO BE IN PAVEMENT, CURB STOP SHALL BE INSTALLED A MIN. OF 1 FT. ABOVE FINISHED GRADE.
2. FOR TEST RISER LOCATIONS PROPOSED TO BE IN PAVEMENT, CORPORATION SHALL BE INSTALLED 4 IN. BELOW FINISHED GRADE IN VALVE BOX OR COPPER SHOULD BE EXTENDED FROM TAP TO POINT OUTSIDE PAVEMENT; SEE "TEST RISER IN PAVEMENT" DETAIL.
3. TEST RISERS SHALL BE INSTALLED AND REMOVED BY CONTRACTOR UNLESS NOTED OTHERWISE.
4. TEST RISER REMOVAL SHALL CONSIST OF CLOSING LOWER CORPORATION AND REMOVING ALL OTHER MATERIALS.
5. ALL TEST RISER INSTALLATIONS SHALL BE APPROVED BY OWNER & ENGINEER.
6. TEST RISERS SHALL NOT BE UTILIZED FOR SERVICE TAPS.



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WAT-23

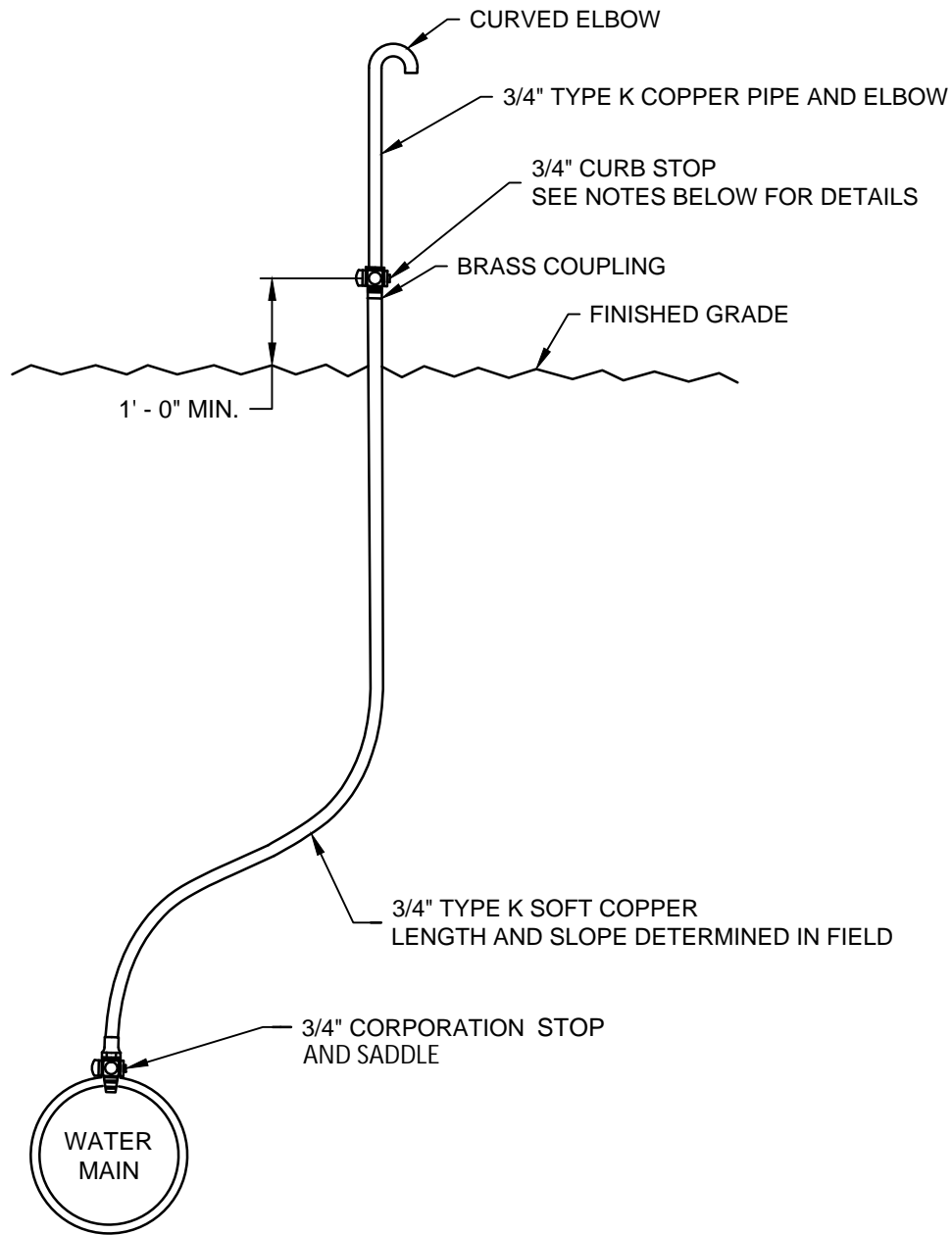
HDPE TEST RISER

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTES:

1. FOR TEST RISER LOCATIONS NOT PROPOSED TO BE IN PAVEMENT CURB STOP SHALL BE INSTALLED A MIN. OF 1 FT ABOVE FINISHED GRADE.
2. FOR TEST RISER LOCATIONS PROPOSED TO BE IN PAVEMENT, CORPORATION SHALL BE INSTALLED 4 IN BELOW FINISHED GRADE IN VALVE BOX OR COPPER SHOULD BE EXTENDED FROM TAP TO POINT OUTSIDE PAVEMENT. SEE "TEST RISER IN PAVEMENT" DETAIL.
3. TEST RISERS SHALL BE INSTALLED AND REMOVED BY CONTRACTOR UNLESS NOTED OTHERWISE.
4. TEST RISER REMOVAL SHALL CONSIST OF CLOSING LOWER CORPORATION AND REMOVING ALL OTHER MATERIALS.
5. ALL TEST RISER INSTALLATIONS SHALL BE APPROVED BY OWNER & ENGINEER.
6. TEST RISERS SHALL NOT BE UTILIZED FOR SERVICE TAPS.



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WAT-24

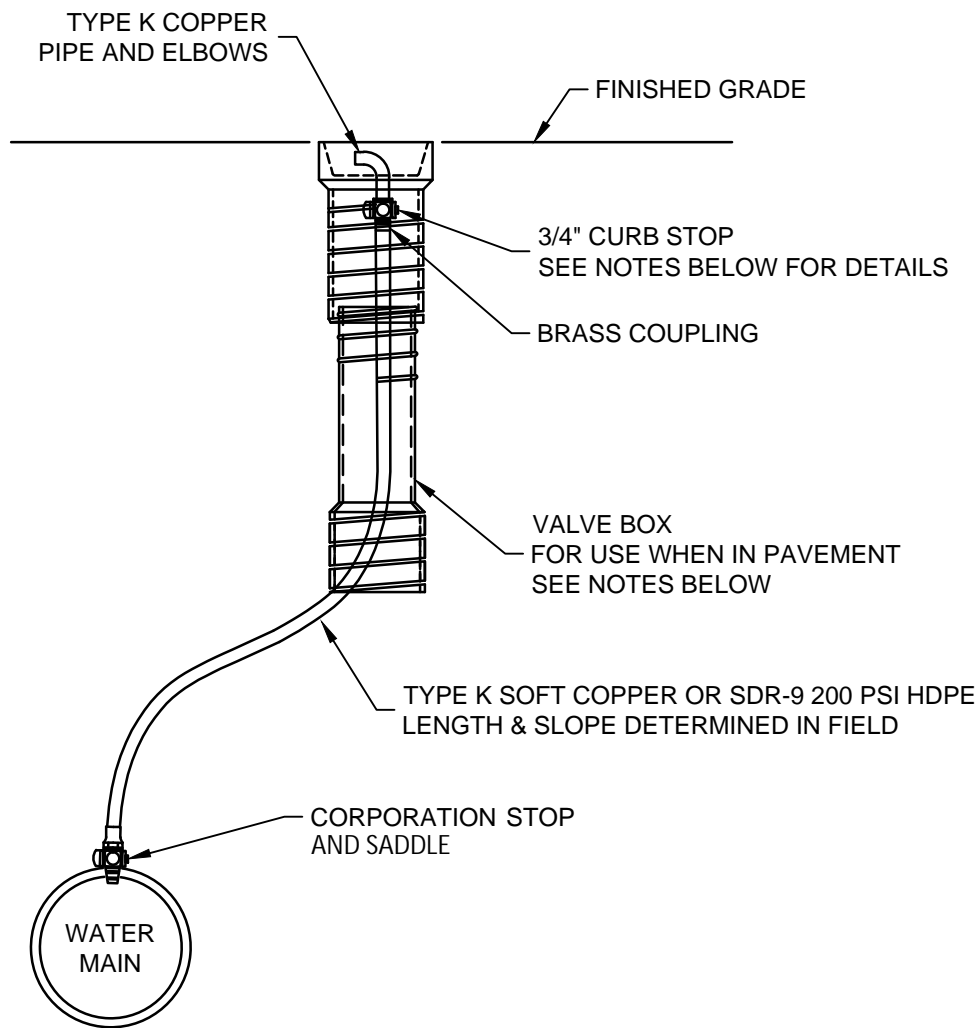
COPPER TEST RISER

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. FOR TEST RISER LOCATIONS PROPOSED TO BE IN PAVEMENT, CURB STOP SHALL BE INSTALLED 4 IN. BELOW FINISHED GRADE IN VALVE BOX OR COPPER SHOULD BE EXTENDED FROM TAP TO POINT OUTSIDE PAVEMENT.
2. TEST RISERS SHALL BE INSTALLED AND REMOVED BY CONTRACTOR UNLESS NOTED OTHERWISE.
3. TEST RISER REMOVAL SHALL CONSIST OF CLOSING LOWER CORPORATION STOP AND REMOVING ALL OTHER MATERIALS.
4. ALL TEST RISER INSTALLATIONS SHALL BE APPROVED BY OWNER & ENGINEER.
5. TEST RISERS SHALL NOT BE UTILIZED FOR SERVICE TAPS.



TOWN OF HUNTERTOWN
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WAT-25

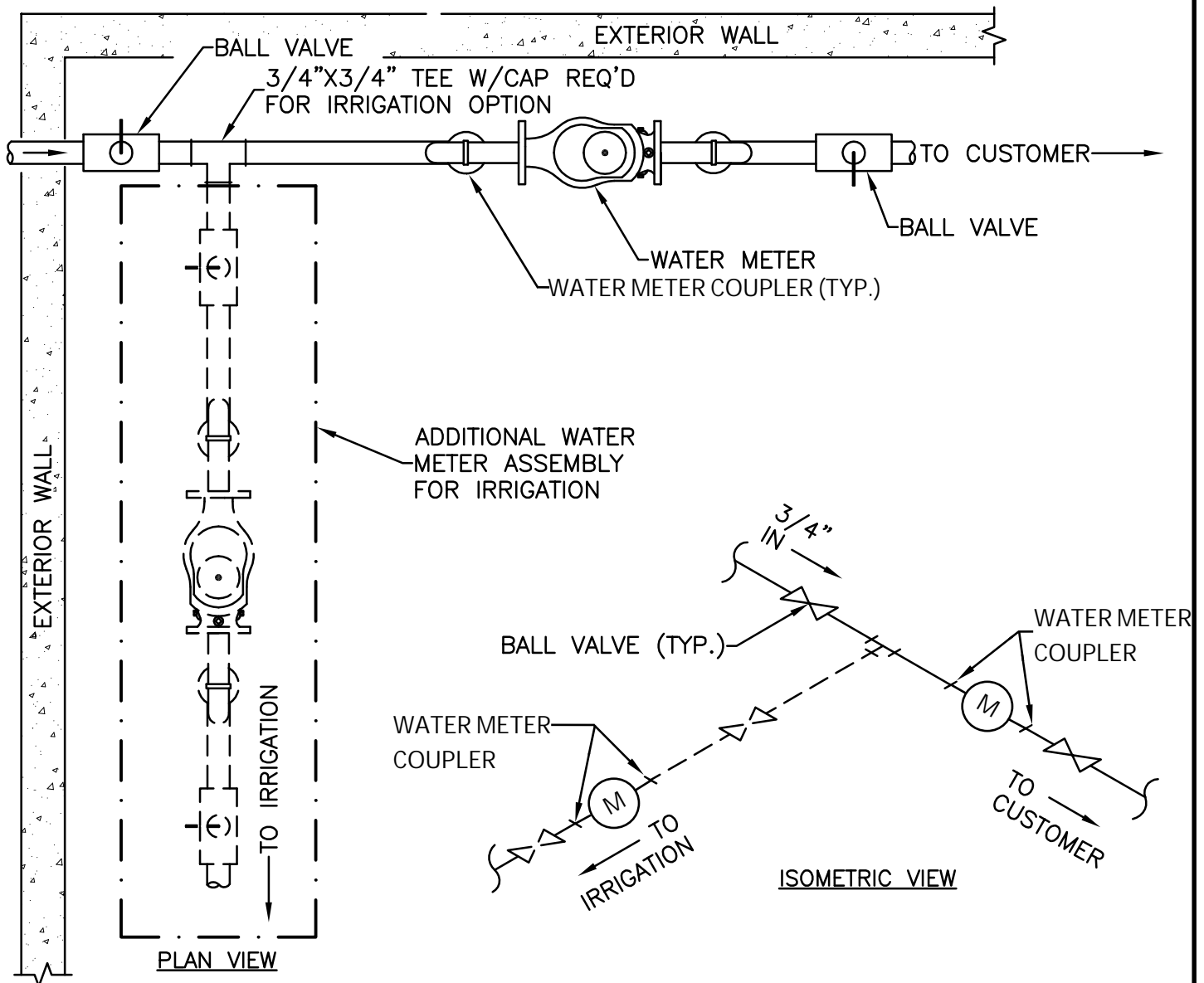
TEST RISER IN PAVEMENT

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: _____ NONE



NOTES:

1. NO OBSTRUCTION(S) SHALL BE PLACED IN FRONT OF METER THAT MAY OBSTRUCT READING, REPAIR, OR REPLACEMENT OF METER.
2. A BALL VALVE SHALL BE INSTALLED ON INLET AND OUTLET SIDE OF METER.
3. METER SHALL BE LOCATED SUCH THAT IT WILL NOT BE SUBJECTED TO FREEZING OR EXCESSIVE HEAT.
4. METERS SHALL BE INSTALLED IN A HORIZONTAL POSITION WITH FACE OF READING DIAL ALSO HORIZONTAL.
5. METER SHALL NOT BE LOCATED IN A CRAWL SPACE, UNDER TRAILERS, WELL PITS OR OTHER UNHEATED AREA.
6. METER SHALL NOT BE LOCATED IN CABINETS, CLOSETS OR OTHER SUCH LOCATIONS WHICH PREVENT READY ACCESS.
7. WHERE PIPING IS NOT RIGID ENOUGH TO SUPPORT METER, MECHANICAL SUPPORTS MUST BE USED.
8. MUST HAVE (COPPER) FEMALE I.P. ADAPTER BEFORE & AFTER METERSET. IF USING HDPE BEFORE METER AND PLASTIC OR PEX AFTER METER, INSTALL A MIN. OF 12" OF COPPER PIPE ON BOTH SIDES OF METER.
9. INSTALL BACKFLOW PREVENTER ON IRRIGATION LINE IN COMPLIANCE WITH 327 IAC 8- 10 AND TOWN CODE OF ORDINANCES CHAPTER 51.



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WAT-26

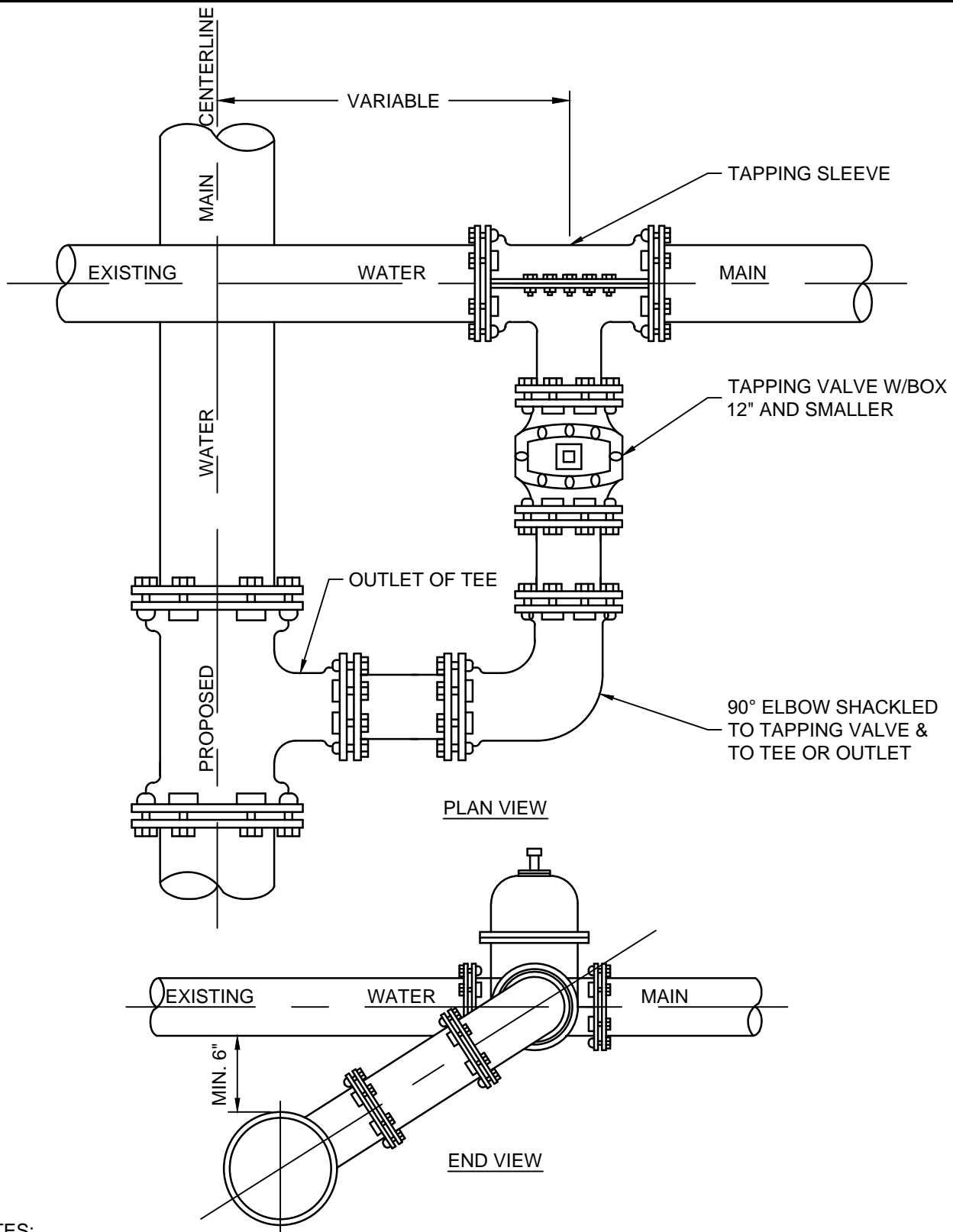
WATER METER ASSEMBLY

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED:

SCALE: NONE



NOTES:

1. PROPOSED MAIN MAY PASS OVER EXISTING MAIN IF EXISTING MAIN IS DEEP ENOUGH TO PROVIDE ADEQUATE CLEARANCE BETWEEN MAINS AND COVER OVER PROPOSED MAIN.
2. TAPPING SLEEVE AND TAPPING VALVE 12" AND SMALL SHALL BE FURNISHED AND INSTALLED BY OWNER. ALL TAPPING VALVES AND TAPPING SLEEVES GREATER THAN 12" SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR.



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WAT-27

ROUND WAY CONNECTION

STANDARD DRAWINGS

APPROVED: 2/4/19

REVISED: _____

SCALE: NONE