

TOWN OF MONROE

WATER SYSTEM CONSTRUCTION STANDARDS

SPECIFICATIONS AND DETAILS

April 2021

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TECHNICAL SPECIFICATIONS

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01010 - SUMMARY ITEMS

PART 1 - GENERAL

1.01 General Items

- A. The standard details and specifications for the Town of Monroe (Town) apply to all potable water system infrastructure construction. The applicable standard details and specifications shall be incorporated into the construction plans for all projects in the Town and are subject to change at any time without notice. Current water standards are available at 102 E. Walnut St. Monroe, IN 46772.
- B. The Town must approve all materials and any proposed deviations from the construction standards prior to construction and installation.
- C. One set of plans "approved" by the Town and the Indiana Department of Environmental Management (IDEM), if applicable, shall be maintained on the job at all times.
- D. Trenchless installation methods shall be used for all waterway crossings unless otherwise approved by the Town and any State or Federal permitting authority.
- E. For roadway crossings, installation method (open trench and trenchless methods) must be approved by the Town and any applicable permitting authority prior to construction.

1.02 Contact information for the Town of Monroe:

Department	Phone
Town Administration	260-692-6215
Town Utilities Department	260-692-6909
Police Department	260-692-6215
Fire Department	260-692-6215
Emergency	911

1.03 Design Requirements

- A. All water main projects that require approval of the Town shall be prepared by, or under the direct supervision of a Professional Engineer licensed in the State of Indiana. All submitted plans shall include the Professional Engineer's seal and signature.
- B. The layout of new water mains shall conform to these Standards and applicable regulatory requirements. Coordinate the location of mains, valves, hydrants, and related items with the Town during the design phase. The placement of valve boxes in driveways, sidewalk, or traffic areas shall be avoided.
- C. Unless otherwise approved by the Town, HDPE water mains shall only be used for trenchless installations or in open cut installations when used as a transmission main.

- D. Town easements for water mains shall be 30-feet for combined easements, or as otherwise required by the Adams County Planner.
- E. Purchase easements for all water mains to be installed outside the right-of-way. The easement shall be a minimum of 15-feet for exclusive easements or 30-feet for combined easements. All easements shall be in accordance with the Adams County requirements. Convey purchased easements to the Town.
- F. The Developer shall obtain all permits which are related to the design and construction of the completed facilities. Permits to be obtained by the Developer include, but are not limited to, permits from the following:
 - 1. Town of Monroe
 - 2. Adams County
 - 3. Indiana Department of Environmental Management
 - 4. Indiana Department of Natural Resources (if applicable)
 - 5. U.S. Army Corps of Engineers (if applicable)
 - 6. INDOT (if applicable)
- G. The construction shall be performed in full accordance with any and all permit requirements.
- H. Provide copies of all permits to the Town prior to commencing construction.
- I. Flushing hydrants are not allowed unless approved by the Town.
- J. Submit copies of all utility easement documents to the Town prior to construction.
- K. Submit copies of all applicable permits to the Town prior to construction.

1.04 Submittals

A. Final Design Drawings

- 1. Submit final design drawings with the Engineer Information Form to the Monroe Town Utilities Department for review. Review fees are as required by the Town's Plan Review Ordinance.
- 2. Once the final design drawings have been reviewed, a plan review letter from the Town will be provided to the applicant.
- 3. Revise the design drawings based on review comments and resubmit.
- 4. Reviewed and approved design drawings are required prior to construction. All other requirements as listed in this Specification must be met prior to construction.

B. Construction Schedules

- 1. Submit progress schedules to the Town prior to construction.
- 2. Provide complete sequence of construction by activity showing dates for beginning and completion of each element of construction.

C. As-Built Drawings

1. Provide "as-built" drawings at the completion of the utility construction. Submittal of as-built drawings is required prior to acceptance and placement in service of new water mains.
2. Provide (1) PDF digital copy, (1) CAD digital copy (.dwg format), (1) shapefile (.shp format) or other file type compatible with the Town's GIS software, and (1) hard copy set of as-built drawings in accordance with these Standards.
3. Include all installed water utility lines and structures, hydrants, valves, meters, service lines, and all existing gas and electric utility locations on as-built drawings.
4. Include any changes to the design drawings, including dimensions and revisions of details.
5. Provide offset measurements to all fittings, valves, blow-off assemblies, hydrants, and other appurtenances. Measure the offset from the centerline of the nearest street running parallel to the installed water main. Record a second measurement from another permanent structure to the fittings, valves, blow-off assemblies, hydrants, or other appurtenances.
6. Final vertical elevations shall be established and recorded.
7. Record all pipe sizes, lengths along the centerline of the pipe, manufacturer of each of the materials used in construction, and all easement locations, types, and dimensions.

D. Payment and Final Documents

1. The Town will verify payment of all fees and the submittal of all final documents prior to authorizing service from the existing water mains to the new water mains.

E. Other Submittals: Submit additional items as required by the Standards.

1.05 Bond Requirements

- A. The Town requires the posting of a performance bond and a separate maintenance bond from a company licensed by the State of Indiana to provide such surety. Each bond shall be equal to 100% of the contract amount or an amount established by the Town to provide surety for the satisfactory completion of the improvements and shall name the Town of Monroe as a party who can enforce the obligations included. The duration of each bond shall be three (3) years, unless the Town determines a longer Bond is warranted due to factors such as the type or phasing of a project.
- B. The Town may, as an alternative to the posting of such bond, accept other appropriate security such as properly conditioned irrevocable letter of credit which meets the same objective as the bonds described in this section, subject to approval of any other department or agency whose interests are protected by the same bonding requirement. The bank issuing the letter of credit must be a bank situated in Indiana and must be an FDIC insured institution.
- C. If the surety on any bond furnished to the Town becomes a party to a supervision, liquidation, rehabilitation action pursuant to IC 27-9 et. seq. or its right to do business in the State of Indiana is terminated, it shall be required that, within 30-days thereafter, a substitute bond and surety be provided, both of which must be acceptable to the Town. Failure to obtain a substitute bond within the state time

frame shall be cause for revocation or suspension of the project approval until such time that the bond is furnished to the Town.

1.06 Meetings

- A. A pre-construction conference must be scheduled with the Town a minimum 48 hours prior to commencement of construction. All materials must be onsite and available for inspection at the time of the pre-construction conference. All required permits shall be available for review at the pre-construction conference. The Contractor's superintendent shall attend.
- B. Pre-construction conference shall be scheduled through the Town Utilities Department.
- C. No work shall begin prior to pre-construction meeting with the Town.
- D. A final inspection will be performed one year from the "in-service" date of the project with the Contractor.

1.07 Coordination

- A. Commence construction within 120 days after release for construction is issued by the Town. If construction of the water main installation is halted for more than 120 days, resubmit plans for review and approval.
- B. If a construction delay of 10 days or more should occur on the project, submit a written notification to the Town a minimum of three working days before construction can resume.
- C. Give the Town a minimum of 48 hours' notice prior to commencement of construction.
- D. No water system construction may begin until approval from IDEM has been received by the Town.
- E. Coordinate work with other Contractors and the Town. Select order of work and establish schedule or working hours for construction, subject to approval of Town which will assure orderly and expeditious progress of work.
- F. Maintain existing service affected by Contractors' operations under the contract. Schedule construction to minimize interruptions to existing services and inconvenience to others.
- G. Coordinate with the Town for operation of valves, hydrants, and blow off assemblies. Only Town personnel shall operate valves, hydrants, and blow off assemblies.
- H. Locate all existing utilities prior to commencement of construction. Call Indiana811 at 811 or 1-800-382-5544. If any utility is not located through Indiana811, contact the utility directly to locate the existing utility.

- I. Should the Contractor propose to deviate from the approved plans or specifications, submit a revised set of plans and specifications of the alternative to the Town for approval. A stop work order shall be immediately issued to the Contractor until such alternative has been reviewed and approved or denied.
- J. Give due notice to the owners of all utilities and ensure all existing facilities are properly supported and protected before disturbing, undermining, or interfering with these facilities. All temporary support for existing utilities is the responsibility of the Contractor and shall be provided at no additional cost to the Town.
- K. If an existing utility is damaged, contact the appropriate utility immediately. Repair all damage in accordance with the directive and to the satisfaction of the affected utility. Complete all repairs at no additional cost to the Town. A representative from the Town must be on-site to inspect repair prior to backfill.
- L. Street closures must be approved by the Adams County Highway Department prior to beginning work.
- M. Notify the Town immediately upon the event of damage to any public street during the course of the work and requiring closure thereof. Contractor shall be responsible for repair and costs as determined by the Town.

1.08 Local Labor and Materials

- A. Whenever possible, the Contractor, his subcontractors, workers, or others who employ labor, shall employ labor locally.
- B. Purchase materials such as sand, cement, gravel, pipe, steel, lumber, etc., from local dealers wherever such local dealers' prices meet competitors' and where such materials meet the Specifications.

1.09 Quality Control

- A. All materials and each part or detail of the work shall be subject to inspection by the Town at all times. The Town shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.
- B. Provide quality-control services specified as required.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - 2. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
- C. Provide one year warranty period for all work completed. Any work requiring replacement or additional adjustment by the Contractor within the one year warranty period shall be completed at no cost to the Town.

1.10 Temporary Facilities

A. Provide the following temporary facilities:

1. Sanitary facilities
2. Trash Containers
3. Barricades and enclosures
4. Bulletin Board (for required notices and postings)

B. Sanitary Facilities

1. Provide sanitary facilities for use of all construction personnel including those of other contractors for the duration of the project as follows:
 - a. Chemical units complete with weathertight enclosure adequately ventilated and equipped with latching door.
 - b. Maintain chemical units weekly or at lesser periods if determined necessary. Chemical units shall be in accordance with all applicable rules and regulations.
 - c. Furnish toilet paper and hand sanitizer for the chemical units and replenish supply whenever required.

C. Trash Containers

1. Provide a trash container for the disposal of packaging materials, pieces of broken pipe, rubbish, trash and other debris.
2. Empty trash containers as often as necessary to prevent overflowing, but not less than one time per week.

D. Barricades

1. Provide, erect and maintain all necessary barricades, suitable and sufficient danger signals and signs.
2. Take all necessary precautions for the protection and safety of the public, workmen, structures and equipment. Roads closed to traffic shall be protected by effective barricades. Obstructions shall be illuminated during hours of darkness.
3. Erect warning signs in advance of any location on the project where operations may interfere with the use of the road by traffic and at all intermediate points where the new work crosses or coincides with the existing road. Construct and erect warning signs in accordance with the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) and the Indiana Supplement, latest editions.

1.11 Rights of Access

- A. Representatives of the Town, Environmental Protection Agency and the State of Indiana shall have access to the work wherever it is in preparation or progress and that the Contractor will provide facilities for such access and inspection.

1.12 Safety and Health Regulations for Construction

- A. The Contractor shall be solely responsible for all obligations prescribed as employer obligations under Chapter XVII of Title 29, Code of Federal Regulations, Part 1926, otherwise known as "Safety and Health Regulations for Construction and CFR Part 1910.46 Permit Required for Confined Space".
- B. Upon request, provide the Town with the name of the Contractor's Safety Officer, plus the on-site Safety Representative, if other than the Superintendent.

1.13 Operations within Right-of-Way

- A. In public thoroughfares, all operations of the Contractor, including those of temporary nature, must be confined within the applicable right-of-way limits.
- B. If the methods of the construction are such as to require the use of land beyond the public thoroughfares, Contractor shall make his own arrangements with the property owners affected for the use of such additional land. Such additional agreements will not include any liability for the Town.
- C. Perform all construction in existing roadways between the hours of sunrise and 6:00 pm.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 Site Maintenance

- A. The working area shall be kept free, at all time, of tools, materials, and equipment not essential to the work in progress. Debris, waste materials, and rubbish shall not be allowed to accumulate and shall properly be disposed. On site burning of trash and debris is prohibited. On-site burial of trash and debris is prohibited.
- B. If the site owner should fail to maintain the project site, the Town shall make the necessary arrangements to clean up the site at the owner's expense. If such action becomes necessary, in the opinion of the Town, the Town shall not be responsible for the inadvertent removal of materials which the owner would not have disposed of had he affected the required clean up.
- C. Where material or debris has washed, flowed, blown, or been purposely deposited into watercourses, drains, ditches, inlets, or elsewhere as a result of the construction operation, such material or debris shall be entirely removed and satisfactorily disposed of immediately upon identification.

- D. The site owner shall be responsible to restore or replace any public or private property damaged by operations, equipment, or employees to a condition at least equal to that existing immediately prior to beginning the project.
- E. The site owner shall be responsible to maintain and mow property, including all easements, right-of-ways, and common areas. If the site owner should fail to maintain the project site, the Town shall make the necessary arrangements to mow the site at the site owner's expense.

3.02 Site Survey

- A. Accurately survey and stake the main extension construction site in accordance with the approved plans.

END OF SECTION 01010

TECHNICAL SPECIFICATIONS

DIVISION 2 TECHNICAL REQUIREMENTS

SECTION 02101 - STORM WATER POLLUTION PREVENTION AND EROSION CONTROL

PART 1 - GENERAL

1.01 Summary

A. Section Includes

1. All temporary and permanent control measures required to control water pollution, soil erosion, and siltation through the use of berms, dams, dikes, sediment traps, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.
2. Temporary erosion control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites and waste areas.

1.02 References

- A. 327 IAC 15-5 Storm Water Runoff Associated with Construction Activity (Rule 5)
- B. INDOT Standard Specifications 2012, Section 918.02.

1.03 Submittals

- A. Provide notification to the Town a minimum of 48 hours before the start of construction.
- B. Provide notification to the Town when land disturbing activities have been completed, the entire site has been stabilized (permanent vegetation established at 70% density of coverage), and all temporary erosion control measures have been removed.

1.04 Quality Assurance

A. Regulatory Requirements

1. When applicable, comply with Rule 5 permit requirements and conditions until a Notice of Termination (NOT) is submitted to close out the permit.
2. Provide grass seed containers bearing a seed label tag in accordance with the requirements of the Indiana Seed Law.
3. Provide fertilizer conforming to federal and state regulations and to the standards of the Association of Official Agricultural Chemists.
4. Comply with all federal, state and local erosion control and pollution prevention laws

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 Protection

- A. Temporarily or permanently stabilize unvegetated areas that are scheduled or likely to be left inactive for 15 days or more with measures appropriate for the season in order to minimize erosion potential.
- B. Do not discharge pollutants such as sediments, fuels, lubricants, bitumen, raw sewage, or wash water from concrete mixing operations (concrete washout), water from trench or pit dewatering, and other harmful materials into or near storm water conveyances, wetlands, rivers, streams, and impoundments or into natural or manmade channels leading thereto.
- C. Do not apply pesticides when working in or adjacent to a floodway, river, stream, ditch, or other storm water conveyance.
- D. Properly dispose of all waste materials.

3.02 Installation - General

- A. Incorporate all permanent erosion control features into the project at the earliest practical time. Except where future construction operations will damage slopes, perform the permanent seeding, mulching and other slope protection work in stages as soon as substantial areas of exposed slopes can be made available.
- B. Use temporary erosion and pollution control measures to correct conditions that develop during construction, that are needed prior to installation of permanent control features, or that are needed temporarily to control erosion that develops during normal construction practices.
- C. Maintain all erosion and sediment control practices during the construction.

3.03 Installation - Erosion and Sediment Control Measures

- A. Temporary Construction Entrance
 - 1. Construct temporary construction entrances to prevent tracking of soil or mud onto publicly or privately owned paved surfaces.
 - 2. Place temporary construction entrances at locations where construction vehicles will repeatedly access a disturbed or unpaved area from a paved roadway.
 - 3. The contractor is responsible for locating and placing construction entrances to prevent tracking and to avoid disturbance to existing waterways.
 - 4. Should tracking of soil occur, clear accumulated sediment from public and private driveways on a daily basis at a minimum and more frequently as sediment is tracked onto roadways.
 - 5. Redistribute or properly dispose of collected sediments in a manner that is in accordance with all applicable statutes and regulations.
 - 6. Do not rinse tracked material with water unless water is collected and disposed of properly.

B. Silt Fence

1. Install silt fence to provide sediment control at the top of slopes, at the down-gradient project limits, as periodic filter breaks on down slopes, at project limits and other locations indicated.
2. Provide additional silt fence where the extents of land disturbance extend beyond the lengths of silt fence.

C. Fiber Filtration Tubes

1. Install in accordance with manufacturer's instructions.
2. Use fiber filtration tubes for the slowing and filtering of storm water.
3. The tubes shall allow water to flow freely and provide filtration of suspended particles.

D. Straw Bale Filters

1. Use straw bale filters for the slowing and filtering of storm water before it enters storm water conveyances such as driveway culverts or other inlet structures that drain small drainage areas.
2. Do not use across a stream, ditch, channel, swale or where concentrated flows will occur.
3. Trench straw bales into the ground so that runoff filters through the straw bale and not around or under the straw bale.

E. Dust Control

1. Use water to dampen surfaces to minimize dust and prevent wind erosion.
2. Do not rinse surfaces with water unless water is collected and disposed of properly.
3. Implement dust control methods on a routine basis where conditions warrant.
4. Provide water and dust suppression when requested by the Town.

F. Pumping Bags

1. Provide pumping bags to filter sediment from dewatering operations.
2. Properly dispose of used pumping bags.
3. Appropriately size the bags for the amount of flow.
4. Use pumping bags on an erosion resistant surface.
5. Do not discharge sediment-laden water from dewatering operations into or near storm water conveyances, wetlands, rivers, streams, and impoundments or into natural or manmade channels leading thereto.

G. Inlet Protection

1. Install inlet protection at all storm water inlets within the construction area, or in areas that receive runoff from disturbed areas, to prevent sediments, construction debris, and other potential storm water pollutants from entering storm sewer inlets and catch basins.
2. For inlets within a road or driving lane, equip the inlet protection practice with an overflow or bypass so ponding water does not cause unsafe driving conditions.

3. Remove accumulated sediment and debris collected by inlet protection practices and dispose of properly after every rain event.
 4. When cleaning or removing inlet protection, do not place sediment and debris in a ditch, stream, wetland, waterway or storm water conveyance.
- H. Riprap Check Dam: Install riprap check dams as needed to reduce erosion potential and capture potential pollutants in drainage channels or areas of concentrated flow.
- I. Concrete Washout Area: Refer to Section 02102 for Concrete Washout requirements.
- J. Temporary Slope Drains: When necessary, route runoff away from steep slopes through the use of a temporary slope drain.
- K. Temporary Sediment Trap: Construct temporary sediment traps to retain sediment in a pooling area. Construct the temporary sediment trap of an embankment or excavated area and provide a stone outlet structure.
- L. Grass
1. Restore all non-paved surfaces that were disturbed during construction with permanent seeding or sod.
 2. Keep seeded and fertilized areas adequately watered until germination of all seed is completed and uniform grass cover is accomplished.
- M. Erosion Control Blanket
1. Where construction disturbs slopes equal or steeper than 3 to 1 or within drainage channels, protect bare slopes with an erosion control blanket.
 2. When vegetation is to be established, place erosion control blanket over the seed and anchor according to manufacturer's instructions to prevent the seed from washing away.

3.04 Soil Stockpiles

- A. Manage soil stockpiles for wind erosion, storm water erosion and sediment control.
- B. Temporarily or permanently stabilize stockpiled soil that is scheduled or likely to be left inactive for 15 days or more with measures appropriate for the season in order to minimize erosion potential.
- C. Position stockpiles away from any ditch, stream, wetland, or storm water conveyance.
- D. Properly dispose of soil that will not be used for the project.

3.05 Trench Excavation

- A. Pile material from trench excavations in an area away from any ditch, stream, wetland or storm water conveyance and install silt fence around the material for sediment control.

- B. Install inlet protection within the project area when excavated material is placed on a paved surface.
 - C. Following pipe installation, backfill trenches and temporarily or permanently stabilized all bare areas to prevent soil erosion.
- 3.06 Work within a Waterway (Stream Crossing) or Floodway
- A. Obtain all permits required for construction activities in a waterway or floodway.
- 3.07 Directional Drilling or Horizontal Boring Erosion and Sediment Control
- A. Install silt fence around all work areas at bore and receiving pits to control sediments.
 - B. Pile materials from ditch excavation away from ditches, streams, wetlands or storm water conveyances.
 - C. Properly dispose of material that is not used to back fill pits.
 - D. Filter pit dewatering discharge in accordance with 02102 for the Disposal of Sediment-Laden Water.
 - E. Seed and mulch disturbed soil surfaces
- 3.08 Working Near Water Wells
- A. Identify water wells on the drawings.
 - B. Implement erosion and sediment control practices to reduce sedimentation introduction into groundwater.
 - C. Position construction materials and equipment so that the area slopes away from wells.
 - D. Provide secondary containment for all chemicals, fuels or other liquids to capture spills or leaks.
 - E. Clean up spills with absorbents or dry methods. Do not allow spills to soak into the ground and do not wash off with water or detergents.
 - F. Properly dispose of waste materials.
- 3.09 Field Quality Control
- A. Inspections
 - 1. Inspect all erosion and sediment control measures at least once every 7 days.
 - 2. Inspect all erosion control measures the next business day after any storm event with greater than 0.5 inches of rain has occurred.
 - 3. Conduct a weekly inspection of the construction site to identify areas contributing to storm water discharges associated with construction activity.

4. Inspect on a regular basis disturbed areas, material storage areas and equipment storage areas that are exposed to precipitation for evidence of, or the potential for, pollutants leaving the project site or entering a storm drainage conveyance.
5. Inspect storm water discharge locations to determine if control measures are effective in preventing adverse impacts to receiving waters.
6. Observe erosion and sediment control devices to ensure that they are operating properly.
7. Inspect haul routes and construction entrance(s) daily for evidence of off-site vehicle tracking of sediments.
8. Inspect staging area to ensure that solid and liquid wastes are being properly disposed of and are not allowed to be discharged into storm water runoff.

B. Inspection Reports

1. Summarize the results of each inspection.
2. Include the following:
 - a. Name(s) and qualifications of personnel making the inspection
 - b. Date(s) of the inspection
 - c. Major observations relating to the implementation of the erosion control plan
 - d. Identification of any incidents of noncompliance
3. Make reports available to inspecting authority within 48 hours of a request.

3.10 Maintenance

A. Maintain all erosion and sediment control measures and perform the following maintenance procedures throughout the project and until such time as the disturbed area has been completely stabilized or other provisions have altered the need for these measures.

1. Replace mulch materials to their original level when the level has been substantially reduced due to decomposition of the organic mulches and displacement or disappearance of both the organic and inorganic mulches.
2. Remove rubbish and channel obstructions from bare and vegetated channels within the project limits. Repair damage from scour or bank failure, rodent holes, and breaching of diversion structures. Remove deposits of sediment.
3. Immediately repair excessive wear, movement or failure of erosion control blankets.
4. Repair any damage to silt fence barriers immediately and monitor barriers daily during prolonged rainfall.
5. Repair or replace any filter fabric which has decomposed or become ineffective prior to its expected usable life.
6. Remove sediment deposits after each storm event. Remove sediment when deposits reach approximately half the height of a silt fence barrier.
7. Till and smooth to conform to the existing grade and reseed any sediment deposits remaining in place after erosion and sediment control measures are no longer required and have been removed.
8. Maintain construction entrances in a condition to prevent tracking or flowing of sediment onto roads. This could require periodic top dressing of the construction entrance with additional surface materials as conditions demand. Repair and clean out any features used to trap sediment and remove all sediment spilled, dropped, washed, or tracked onto road surfaces and dispose of properly.

9. Remove accumulated sediments and debris from inlet protection devices after each storm event.
10. Repair any and all rills that may appear.
11. Remove and dispose of all temporary erosion and sediment control practices within 30 days after site stabilization is achieved or after the temporary practices are no longer needed.
12. Stabilize the site and reapply seed and mulch to achieve 70 percent density of cover on vegetated areas.

3.11 Schedules

- A. Coordinate erosion and sediment control measures with construction activities so controls are in place before construction begins.
 1. Install the temporary construction entrance and sediment traps or filters before clearing and grading begins.
 2. Install temporary perimeter controls (e.g. silt fences and inlet protection) before clearing and grading begins.
 3. Do not clear, grub or grade until it is necessary for construction to proceed. Maintain natural vegetation and vegetated buffers when practical to reduce the need for control devices. Maintain all controls as described throughout the construction project and until upstream drainage areas are stabilized.
 4. Permanently stabilize bare soils once construction activities cease in an area.

END OF SECTION 02101

SECTION 02220 - TRENCHING, BACKFILLING AND COMPACTION FOR UTILITIES

PART 1 - GENERAL

1.01 Summary

A. Section Includes: Performing all excavation work as required for the installation of water mains, valves, hydrants, structures, and appurtenances including necessary clearing, grubbing, excavation, trenching, bedding, backfilling, and other related work.

B. Related Sections

1. Section 02224 - Trenchless Excavation - Horizontal Borings
2. Section 02226 - Trenchless Excavation - Directional Drilling
3. Section 02660 - Water Mains
4. Section 02661 - Water Services

1.02 References

A. American Society for Testing and Materials (ASTM), latest editions

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))

B. Indiana Department of Transportation (INDOT) Standard Specifications, latest edition

1. Section 904 - Aggregates

1.03 Definitions

A. Pavement Loading Zone: The area within 5 feet of any edge of pavement, curb, gutter, sidewalk, or similar structure.

1.04 Submittals

A. Test Results

1. Compaction testing results for trench bedding
2. Compaction testing results for trench backfill

1.05 Warranty

A. Refill and restore to the original grade. Any settlement in the backfill which takes place within one year (warranty period) shall be restored at no additional cost to the Town. Restore the surface area where settlement has occurred, including, but not limited to seeding, fertilizing, erosion control and restoration of streets, drives, yards, and sidewalks.

- B. Guarantee all disturbed and replaced trees and shrubs during the warranty period.

PART 2 - PRODUCTS

2.01 Bedding and Backfill Material Classes

- A. Class I - Angular, 6 to 40 millimeters (1/4 to 1-1/2 inches) unwashed, graded stone such as crushed stone. Slag may be used with non-metallic pipes (HDPE, PP, or PVC). A No. 8 gravel possessing a minimum 50 percent mechanical crush count, and meeting the following nominal sizes and percentage passing will be considered an equivalent Class I material:
 - 1. 100 percent passing 1-inch sieve
 - 2. 75-95 percent passing 3/4-inch sieve
 - 3. 40-70 percent passing 1/2-inch sieve
 - 4. 0-15 percent passing No. 4 sieve
- B. Class II (Granular Backfill) - Coarse sands and gravel-sand mixtures with a maximum particle size of 40 millimeters (1-1/2 inches), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class. Class II material shall comply with Classification for Structure Backfill as defined in INDOT Standard Specification Section 904.
- C. Excavated Material - Excavated material suitable for use as trench backfill as specified must be clean and free of: rocks and other debris larger than 4 inches, frozen soil lumps, wood, or other extraneous material.

2.02 Sheeting and Bracing

- A. Sheeting and Bracing, where required, shall be capable of sustaining the lateral forces of the trench banks. Comply with all applicable Occupational Safety and Health Act (OSHA) requirements.

PART 3 - EXECUTION

3.01 Bedding and Backfill Locations

- A. Refer to Standard Details for an illustration of the placement of bedding and backfill materials required for each pipe material class.

3.02 Site Preparation

- A. Before any excavation is started, provide adequate protection for all lawns, trees, landscape work, shrubs, fences, hydrants, sidewalks, utility poles, and other objects that are to remain in place. Maintain such protection for as long as necessary to prevent damage from the Contractor operations.

- B. Movable items such as mail boxes and roadway signs may be temporarily relocated during construction. Place movable items in their original location immediately after backfilling is complete. Replace movable items damaged during construction with new items at the Contractor's expense.
- C. Strip topsoil and vegetation from the excavated areas. Clean topsoil may be stockpiled for reuse as the upper 6-inches of fill. Do not mix grass, weeds, roots, brush, and stones larger than 1-inch in diameter with stockpiled topsoil. Dispose of root-contaminated topsoil.
- D. Clear and remove logs, stumps, brush, vegetation, rubbish and other perishable matter from the job site as required for construction.
- E. Remove existing pavement and walks from the excavated areas. The width of pavement to be removed shall not exceed the width of the trench by more than 12 inches on each side of the trench.

3.03 Material Disposal

- A. All existing utility infrastructure and appurtenances (piping, structures, etc.) that are to be replaced or removed to allow for new construction are the responsibility of the Contractor unless otherwise designated. As these appurtenances are removed during the excavation, remove them from the job site and dispose of them in accordance with applicable local, state and federal rules and regulations.

3.04 Existing Facilities

- A. Determine the exact location of and the means of protection for existing utility facilities and structures. Support and maintain operation of these facilities during construction.
- B. Proceed with caution in the excavation and preparation of trenches so that the exact location of underground utilities and structures, both known and unknown may be determined. The Contractor shall be responsible for the repair of existing utilities and structures when broken or otherwise damaged by operations. Immediately bring to the attention of the Town any unforeseen conflicts with existing utilities encountered during excavation and preparation of trenches. If it is determined that the proposed utility cannot be installed at locations as shown, make adjustments in its alignment or relocation of the existing utilities as approved by the Town.

3.05 Excavating

- A. Store excavated materials suitable and necessary for backfilling in a neat pile adjacent to the excavation in a manner so as to interfere as little as possible with traffic. Do not place such materials with sufficient height or proximity to excavation so as to endanger such openings due to earth slides or cave-ins. Do not stockpile excavated material closer than 2 feet from the top edge of the trench wall at ground surface.

- B. Remove excavated material not suitable for backfilling and excess suitable material from the job site and dispose of in a spoil area secured by the Contractor in accordance with all local, state, and federal regulations.
- C. Contaminated soils encountered during construction of the water main and related appurtenances shall require immediate cessation of construction and notification to the Town. Comply with all local, state, and federal regulations covering notification of authorities regarding the contaminated materials. Dispose contaminated soils in accordance with all local, state, and federal regulations. Contractor shall be listed solely as the waste generator.
- D. Provide and maintain adequate dewatering equipment to remove and dispose of surface and ground water entering excavations. Use diversion ditches, dikes or other suitable means to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Filter the water from dewatering operations to remove sediment before discharge.

3.06 Trenching

- A. Excavate trenches to a depth and width as required for the proper installation of the pipe and appurtenances. Fill excavations below the required grade with compacted bedding material.
- B. Make trenches as narrow as possible. Keep sides of trenches as near vertical as possible and properly sheet and/or brace, if required. Perform open cut excavation except where noted otherwise. Provide a clearance of not less than 8 inches or more than 12 inches on each side of the pipe for the width of the trench.
- C. Provide a continuous, uniform bearing support for the pipe on solid undisturbed soil or compacted granular backfill within trench dished to provide circumferential support to the lower third of each pipe. Dig out holes to receive pipe bells.
- D. Remove rock and soft material encountered in the trench which, in the opinion of the Town is incapable of providing adequate bearing to support the pipe, to a depth of 4 inches below the required elevation and fill with compacted granular backfill material. Field measure these locations where additional granular backfill is required, prior to backfilling.
- E. Do not open more than 50 feet of trench in advance of the installed pipe, unless otherwise directed or permitted by the Town. Excavate the trench within 6 inches of full depth for a distance of at least 30 feet in advance of the pipe installation, unless otherwise directed or permitted.
- F. Maintain one lane of traffic at all streets and service drives during construction. Streets and drives may be closed and traffic detoured if prior permission is obtained by the Contractor from the State, Town, County or Local Business having jurisdiction.

- G. Support all sewer, gas, water or other pipes or conduits crossing the trench without damage and without interrupting service. The manner of supporting such pipes or conduits will be subject to the approval of the Town involved.
- H. Provide adequate sheeting and bracing in open cut trenches to protect life, property and the work.
- I. Place, renew, and maintain all sheeting, planking, timbering, shoring, bracing, and bridging, and do not remove until sufficient backfill has been placed to protect the pipe. Sheeting, shoring and/or bracing is not a pay item unless the Contractor is directed by the Town to leave same in place. Be accountable and responsible for all sheeting and bracing used, and for damages to persons or property resulting from the improper quality, strength, placing, maintenance and removal of the sheeting and bracing, including damage to trees, shrubs, walkways and other similar property during the trenching, backfilling and pipe laying operations. Ensure all sheeting and bracing complies with applicable OSHA regulations.
- J. Where rock is encountered during trenching operations, Contractor may remove the rock by mechanical means. The use of a rock trencher which produces excavated material commensurate to "granular backfill" is preferred. Materials suitable for granular backfill excavated by a rock trencher may be used as bedding for pipe in areas of rock excavation. Blasting is not permitted.
- K. Water mains are to be installed with coordination with the Town under existing asphalt or concrete driveways, roads, or streets. Install the main by boring a hole and inserting the main in the bore hole.
- L. Do not cut fences when gates are available within a reasonable distance to move equipment from one field to another. Comply with applicable easements or obtain property access permission prior to accessing or traversing fields.

3.07 Bedding

A. Plastic Pipe for Pressure Pipe Applications

1. For plastic pressure pipe installed outside and within the pavement loading zone, provide with Class I granular material for bedding and initial backfill, shovel sliced or otherwise carefully placed and "walked" or hand tamped into place from 4 to 8 inches (based upon pipe diameter) below the pipe barrel, to a minimum of 12 inches above the crown of the pipe.
2. Place bedding and initial backfill in 6 to 8-inch balanced lifts to ensure proper compaction and filling of all voids.

3.08 Trench Backfilling

- A. Do not backfill trenches until all piping and utilities have been inspected and until the piping system, as installed, conforms to the requirements as shown on the Construction Standards and are approved by the Town.

- B. Backfill all trenches within State Highway Right-of-Way in accordance with Indiana Department of Transportation Specifications. Backfill all trenches within the right-of-way of other public authorities having jurisdiction in accordance with requirements of said public authority.
- C. Backfill
1. When located within the pavement loading zone, use Class I or Class II granular material compacted to 95 percent of Standard Proctor dry density in accordance with ASTM D698. Place fill in 6 to 8-inch maximum balanced lifts and compact each layer to 95 percent of Standard Proctor dry density in accordance with ASTM D698. Where existing pavement will be replaced as part of this project, place the final 12 inches of fill below the pavement in 6-inch maximum balanced lifts and compact each lift to 100 percent Standard Proctor dry density in accordance with ASTM D698. When subgrade treatment for new pavement will be provided as part of this project, coordinate with the Town regarding the top limit of granular backfill required.
 2. When located outside of the pavement loading zone, compact all backfill to a minimum of 80 percent of the Standard Proctor dry density in accordance with ASTM D698. Additional compaction efforts may be required to minimize settling. Excavated materials are suitable for backfilling outside the pavement loading zone. Place backfill in maximum 12-inch balanced lifts unless specified otherwise below. Make proper allowances for topsoil as applicable. Limited mounding of backfill above finish grade may be performed to compensate for settlement. Place 6 inches of topsoil over the area to be seeded.
 3. Backfill trenches at unpaved driveways and alleys with Class I or Class II granular material up to the last 12 inches, then replace the last 12 inches with the same material as the original surface. Place backfill in 8-inch balanced lifts and compact to 95 percent Standard Proctor dry density in accordance with ASTM D698.
- D. Compact backfill by using hand tamping or approved mechanical tamping device. Prepare upper portion of trench for pavement replacement as applicable.
- E. Maintain backfilled trenches in a smooth and uniform condition until paving or seeding operations are completed. Refill and restore to the original grade any settlement in the backfill which takes place within the warranty period at no additional cost.

3.09 Field Quality Control

A. Compaction Testing

1. Perform compaction tests at all road crossings in accordance with the INDOT Standard Specifications.
2. Notify the Town 24 hours prior to the tests.

END OF SECTION 02220

SECTION 02224 – TRENCHLESS EXCAVATION – HORIZONTAL BORINGS

PART 1 - GENERAL

1.01 Summary

- A. Section Includes: Furnishing and installing casing pipes beneath waterways, highways, railroads, and other locations and performing all related work necessary to complete work shown and specified.
- B. Products Installed but not Supplied Under this Section
 - 1. Carrier pipe
- C. Related Sections
 - 1. Section 02220 - Trenching, Backfilling and Compaction for Utilities
 - 2. Section 02226 - Trenchless Excavation - Directional Drilling
 - 3. Section 02660 - Water Mains

1.02 References

- A. American Society for Testing and Materials (ASTM), latest editions
 - 1. ASTM A139 - Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)

1.03 Submittals

- A. Quality Control Submittals: Before beginning any work, submit the following items to the Town. Do not proceed with the work until such documents have been reviewed by the Town. The review by the Town of any plan or method shall not relieve the Contractor of his responsibility in any way.
 - 1. Plans and details describing materials and methods proposed by the Contractor

1.04 Quality Assurance

- A. Regulatory Requirements
 - 1. Perform all horizontal boring work in accordance with laws, permits, requirements and regulations of the authority having jurisdiction.

PART 2 - PRODUCTS

2.01 General

- A. Within INDOT right-of-way, provide casing pipe in accordance with INDOT permit requirements.
- B. Provide casing pipe and joints capable of withstanding the load of traffic or the load of pavement, subgrade, and traffic, as applicable.

2.02 HDPE Casing and Fittings

A. HDPE Casing Pipe

1. Pipe material: conforming to AWWA C901 and C906, manufactured from high density, extra high molecular weight polyethylene and conforming to PE Standard Code PE 4710. Pipe shall have a minimum cell classification of 445574C per the requirements of ASTM D3350.
2. Designed and manufactured in iron pipe size and to a minimum pressure class of 200 psi. Provide Dimension Ratio 11 (DR-11) HDPE casing pipe conforming to all applicable regulatory requirements. Supply pipe designed to withstand crushing, buckling and deformation resulting in ovality at a depth of bury as indicated on the Drawings.
3. Deflection: Do not deflect pipe, unless approved by the Town. In no instance shall the casing pipe deflect on a radius of less than 50 times the pipe diameter, less than the manufacturer's recommendation or in a manner that prohibits removal and installation of the carrier pipe. If an HDPE fitting, flange or mechanical joint is present within the length of pipe to be deflected, do not deflect on a radius of less than 100 times the pipe diameter.

B. Furnish HDPE casing pipe sizes as listed in the following table:

Nominal Diameter of Carrier Pipe	Nominal Diameter of HDPE Casing Pipe
3"	12"
4"	14"
6"	18"
8"	22"
10"	26"
12"	28"
14"	32"
16"	34"
18"	36"

2.03 Steel Casing

- A. Assemble the casing pipe and joints to prevent leakage of any matter from the casing or carrier pipe throughout its entire length including the ends of the casing pipe.
- B. Use welded steel casing pipe, new and unused material in accordance with current ASTM A139 Grade B for “Electric Fusion of Welded Steel Pipe” with a minimum yield of 35,000 psi.
- C. Furnish steel casing pipe sizes as listed in the following table:

<u>Nominal Diameter of Carrier Pipe</u>	Nominal Diameter of Steel Casing Pipe
3"	10"
4"	12"
6"	14"
8"	16"
10"	20"
12"	24"
14"	26"
16"	28"
18"	30"

- D. The minimum wall thickness of the steel casing pipe shall be as shown in the following table:

Diameter of Casing	Minimum Wall Thickness (Inches)	
	Under Roadway or Waterway	Under Railroad
Under 14"	0.250	0.188
14"	0.250	0.219
16"	0.250	0.219
18"	0.250	0.250
20"	0.375	0.281
22"	0.375	0.312
24"	0.375	0.344
26"	0.375	0.375
28"	0.500	0.406
30"	0.500	0.406

- E. Coat the exterior walls of casing with protective coal tar or bitumastic material, after the welding of each joint has been completed.
- F. When casing is installed without benefit of a protective coating and the casing is not cathodically protected, increase the wall thickness shown above to the

nearest standard size, which is a minimum of 0.063 inch greater than the thickness shown.

- G. Mark the diameter, gauge, ASTM specification and manufacturer's name on the exterior of each pipe length.

2.04 Casing Spacers

- A. Provide casing pipe spacers with stainless steel bands and risers, plastic liner and runners as manufactured by Cascade Waterworks Manufacturing Company or approved equal.

PART 3 - EXECUTION

3.01 Installation of Casing Pipe

- A. Install casing pipe in accordance with approved jacking and boring methods. Maintain the lines and grades for the entire length of the casing.
- B. Proceed with installing the casing operation from a pit, excavated at a minimum of 30 feet from the edge of pavement or top of bank, as applicable. Contact the applicable authority before entering property to do work.
- C. Sheet excavation pits as necessary, in accordance with all applicable Occupational Safety and Health Act (OSHA) requirements. Ensure excavation and backfill is as specified in Section 02220.
- D. Set casing under railroads with top not less than 5-1/2 feet below base of the rails or as required by the railroad. Make casing centered under the track and measured at normal angle to centerline of track.
- E. Measure and locate each end of the casing pipe to a minimum of 2 permanent reference points for Record Drawing purposes.

3.02 Construction of Casing Pipe by Methods Other Than Jacking or Boring

- A. If the casing pipe is installed by methods other than the jacking method, perform it in a manner which meets with prior approval of the authorities.
- B. Be responsible for any expense incurred in connection with the construction of the crossing, removal, replacement, or maintenance resulting from the construction of the casing pipe and the carrier pipe.

3.03 Installation of Carrier Pipe

- A. The carrier pipe shall be as specified in Section 02660.
- B. Place the carrier pipe into and through the casing.

- C. Install casing pipe spacers to provide uniform support throughout the entire length of the casing.
- D. Block up ends of casing pipe in such a way as to prevent the entrance of foreign material, but do not tightly seal. Grouting of the void space between the casing and the carrier pipe is not required.

END OF SECTION 02224

SECTION 02226 - TRENCHLESS EXCAVATION - DIRECTIONAL DRILLING

PART 1 - GENERAL

1.01 Summary

A. Section Includes: Installation of water mains by the directional drilling method and performing all related work necessary to complete work shown and specified.

B. Related Sections

1. Section 02220 - Trenching, Backfilling and Compaction for Utilities
2. Section 02660 - Water Mains

1.02 References

A. American Society for Testing and Materials (ASTM), latest editions

1. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

1.03 Submittals

A. Quality Control Submittals: Before beginning any work, submit the following items to the Town. Do not proceed with the work until such documents have been reviewed by the Town. The review by the Town of any plan or method shall not relieve the Contractor of his responsibility in any way

1. Details of equipment and written procedure with working drawings describing in detail the proposed directional drilling method and the entire operation to be used

1.04 Quality Assurance

A. Qualifications

1. Adequately train all supervisory personnel and ensure they have at least 4 years of experience in directional drilling installation method. Submit the names and resumes of all supervisory field personnel for review by the Town.

B. Regulatory Requirements

1. Perform all directional drilling work in accordance with laws, permits, requirements and regulations of the authority having jurisdiction.

C. General Procedures

1. Attend all meetings and provide all necessary data, reports, information, details and construction schedules as requested by the governing officials.

2. Complete all work in a careful, workmanlike manner to the satisfaction of the proper officials, as well as the Town.

PART 2 - PRODUCTS

2.01 Pipe

- A. Water main pipe shall meet the requirements as specified in Section 02660.

PART 3 - EXECUTION

3.01 Examination

- A. Verify the location of all known and unknown utilities and structures by test pitting prior to any boring or drilling. These utilities and structures may include, but are not limited to:
 1. Underground utilities such as, but not limited to:
 - a. Cable television lines
 - b. Electric cables
 - c. Fiber optic lines
 - d. Field drain tiles
 - e. Gas lines
 - f. Sewer lines and septic systems
 - g. Storm lines
 - h. Telephone lines
 - i. Water mains
 - j. Wells
 2. Above-ground utilities and other obstructions such as, but not limited to:
 - a. Buildings
 - b. Electric and telephone poles
 - c. Road signs
 - d. Trees
- B. The Contractor is responsible for inspecting the site, for conducting investigations, surveys and tests, including subsurface investigations and tests that are necessary for the complete execution of all the work.

3.02 Installation

A. General

1. Notify the Town 48 hours in advance of starting directional drilling work. Do not begin the directional drilling until the Town, or his authorized representative, is present at the job site and agrees that proper preparations for the operation have been made. The Town's approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work.

2. Open cut disturbance of waterway, roadway, or railroad to retrieve any lost boring appurtenances or equipment is prohibited.
3. Maintain a log of drilling operations, including vertical depths of the pipe at established 25-foot horizontal intervals.

B. Equipment

1. The directional drilling system to be used must have the following features:
 - a. The system shall be remotely steerable and permit electronic monitoring of tunnel depth and location. The system shall be able to control the depth and direction of the pipe and must be accurate to a window of +/- 2 inches.
 - b. The system shall utilize a fluid-cutting process, using a liquid clay such as bentonite. This clay shall be totally inert and contain no risk to the environment.
 - c. The liquid clay shall remain in the tunnel to increase the stability of the tunnel and to provide a lubricant to reduce frictional drag when the pipe is installed.
 - d. Recover spoils by use of a vacuum system mounted on a vehicle. Do not discharge spoils into waterways, water bodies, sewers or storm drains. Properly dispose of all spoil material.
 - e. Equipment shall be fitted with a permanent alarm system capable of detecting an electrical current. The system will have an audible alarm to warn the operator when the drill head nears electrified cables within a safe operating distance.

C. Safety

1. Mechanical, pneumatic or water-jetting methods are not acceptable due to the risk of surface subsidence and damage.
2. Upon completion of drilling and pipe installation, remove all spoils from all starting and termination pits. Restore pits to their original condition.
3. Where manholes or grinder pumps are to be installed, use adequate protection in the form of steel plates in traffic areas and timber shutters in other areas until such times as the manhole or grinder pump is installed and the pit is backfilled and stabilized. The Contractor shall be responsible for maintaining these areas.
4. Because directional drilling may be performed while existing buried electrical cable is energized, meet the following safety requirements:
 - a. Include a permanent, inherent alarm system capable of detecting an electrical current on all drilling equipment. Equip the ground system with an audible alarm to warn the operator when the drill head nears electrified cable within a safe operating distance.
 - b. Provide all crews with grounded safety mats, heavy gauge ground cables with connectors, hot boots and gloves.
 - c. Adequately train all supervisor personnel. All supervisor personnel shall have direct supervisory experience in directional drilling.

D. Drilling Procedure

1. Place erosion and sediment control for perimeter protection necessary to contain any hydraulic or drilling fluid spills, including berms, liners, turbidity curtains and other erosion control measures. Adhere to all applicable environmental regulations. Do not store fuel and oil in bulk containers within 200 feet of any water-body or wetland.
2. Grade or fill the work site to provide a level working area. Make no alterations beyond what is required for operations. Confine all activities to the designated work areas and construction limits.
3. Accurately survey the entire drill path and place entry and exit stakes in the appropriate locations. If the Contractor is using a magnetic guidance system, survey the drill path for any surface geo-magnetic variations or anomalies.
4. Place pipe resting on paved or hardened surfaces (i.e., sidewalks, asphalt, concrete, gravel, etc.) on pipe rollers before being pulled into the drill hole, with rollers spaced close enough to prevent excessive sagging and dragging of the pipe upon rough surfaces which could scar the pipe.
5. Calibrate the directional drilling head locator at the start of each day and at each new directional drilling operation. Keep a daily calibration log for the Town's review.
6. Ensure the directional drilling operator has full control of the direction of the drilling tool at all times. Abandon and fill shallow, misdirected or other unsuccessful drills at the direction of the Town and at own expense.
7. The maximum drill angle shall be 15 degrees measured perpendicular from existing grade to the design depth elevation.
8. Drill a pilot hole on the drill path with no deviations greater than 5 percent of depth over a length of 100 feet. In the event that the pilot hole does deviate from the drill path more than 5 percent of depth in 100 feet, notify the Town. The Town may require pull back and re-drill from the location along the drill path before the deviation.
9. In the event of a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a Marsh funnel and then wait another 30 minutes. If mud fracture or returns loss continues, cease operations and notify the Town. The Town and Contractor will discuss additional options and work will then proceed accordingly.
10. Upon successful completion of the pilot hole, ream the drill hole to a minimum of 25 percent greater than the outside diameter of the pipe using the appropriate tools. Do not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.
11. After successfully reaming the drill hole to the required diameter, pull the pipe through the drill hole. Provide a swiveling mandrel in front of the pipe. Once pull-back operations have commenced, operations must continue without interruption until the pipe is completely pulled into the drill hole. Do not apply more than the maximum safe pipe pull pressure at any time during pull-back operations.
12. Pull back tracer wire with the pipe as specified in the applicable specification for the type of pipe.

13. In the event the pipe becomes stuck during pull-back, cease pulling operations to allow any potential hydro-lock to subside and then commence pulling operations. If the pipe remains stuck, notify the Town. The Town and the Contractor will discuss options and then work will proceed accordingly.
14. At all drill pits and directional drilling entrances and exits to the surface, use a backhoe or equivalent to gradually return the bore depth to the prescribed depth.
15. Backfill and compact all drill pits and directional drilling entrances and exits to the surface as specified in Section 02220.

3.03 Field Quality Control

A. Line and Grade

1. Maintain a daily calibration log of the directional drilling head locator. Provide completed forms or computer generated output to the Town on a daily basis for checking line and grade of the drilling operation.
2. Dig test/pressure relief holes (potholes) every 50 feet along the bore route to confirm alignment and grade, and to relieve subsurface pressure.
3. Allowable deviation in pressure pipe line shall be a maximum of 12 inches in any 100-foot section.
4. Allowable deviation in gravity pipe grade, as measured from the upstream manhole, shall be a maximum of 4 inches for the 100-foot length of gravity sewer. At no point in the gravity sewer shall the slope be less than 0.40%.
5. Perform a post CCTV inspection of all gravity pipes. A belly in the pipe that, in the opinion of the Town, exceeds 3 inches is not acceptable.
6. Replace sections of pipe that do not meet the above requirements at no additional cost to the Town. If the new installed pipe does not meet the above requirements, either grout and abandon the pipe in place, or remove the pipe and fill the void as directed by the Town at no additional cost to the Town.

B. Additional Testing

1. Perform all testing as required in other sections for the type of utility pipe installed.

END OF SECTION 02226

SECTION 02660 - WATER MAINS

PART 1 - GENERAL

1.01 Summary

A. Section Includes: Furnishing and installing all water mains, fittings, valves, hydrants, casings and appurtenances as required for completing the work as shown on the Drawings and as specified herein.

B. Related Sections

1. Section 02220 - Trenching, Backfilling and Compaction for Utilities
2. Section 02224 - Trenchless Excavation – Horizontal Borings
3. Section 02226 - Trenchless Excavation – Directional Drilling
4. Section 02661 - Water Services
5. Section 02675 - Disinfection

1.02 References

A. American Society of Mechanical Engineers (ASME), latest editions

1. ASME B16 - Standards of Pipes and Fittings
2. ASME B18 - Hex Cap Screw, Hex Bolt, Machine Bolt fasteners
3. ASME B31 - Standards of Pressure Piping

B. American Society for Testing and Materials (ASTM), latest editions

1. ASTM A36 - Carbon Structural Steel
2. ASTM A194 - Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
3. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
4. ASTM C94 - Standard Specification for Ready-Mixed Concrete
5. ASTM D1330 - Rubber Sheet Gaskets
6. ASTM D1784 - Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
7. ASTM D2000 - Classification System for Rubber Products in Automotive Applications
8. ASTM D3139 - Plastic Pressure Pipes Using Flexible Elastomeric Seals
9. ASTM D3261 - Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
10. ASTM D3350 - Polyethylene Plastics Pipe and Fittings Materials
11. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe

C. American Water Works Association (AWWA) Standards, latest editions

1. AWWA C104 - Cement Mortar Lining for Ductile Iron Pipe and Fittings
2. AWWA C110 - Ductile Iron and Gray Pipe Fittings

3. AWWA C111 - Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings
4. AWWA C151 - Ductile Iron Pipe, Centrifugally Cast
5. AWWA C153 - Ductile Iron Compact Fittings for Water Service (3-inch through 64-inch)
6. AWWA C207 - Steel Pipe Flanges for Waterworks Service (4-inch through 144-inch)
7. AWWA C213 - Fusion-Bonded Epoxy Coatings for the Interior and Exterior of Steel Water Pipelines
8. AWWA C223 – Fabricated Steel and Stainless Steel Tapping Sleeves
9. AWWA C502 - Dry Barrel Hydrants
10. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service
11. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
12. AWWA C600 - Installation of Ductile-Iron Water Mains and their Appurtenances
13. AWWA C605 - Underground Installation of PVC Pressure Pipe and Fittings for Water
14. AWWA C651 - Disinfecting Water Mains
15. AWWA C900 - PVC Pipe and Fabricated Fittings (4-inch through 12-inch) for Water Transmission and Distribution
16. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing (1/2-inch through 3-inch) for Water Service
17. AWWA C905 - PVC Pipe and Fabricated Fittings (14-inch through 48-inch) for Water Transmission and Distribution
18. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, (4-inch through 63-inch), for Water Distribution and Transmission

D. Indiana Department of Environmental Management (IDEM) Regulations in 327 of the Indiana Administrative Code (IAC), latest edition

1.03 Submittals

A. Test Results

1. Hydrostatic test

B. Other Items

1. HDPE bonding qualifications

1.04 Quality Assurance

- A. HDPE Pipe: Bonders and bonding operators shall be qualified in the use of the written bonding procedure specification (BPS) as required by ASME B31.3, Chapter VII, paragraph A-328. Qualification records certifying that bonders and bonding operators employed to perform the fusion bonding are qualified in the BPS shall be submitted prior to the commencement of fusion bonding work. Bonders and bonding operators shall be qualified for the specific fusion bonding equipment utilized in the fusion bonding work.

1.05 Delivery, Storage, and Handling

A. Acceptance at Site

1. Deliver, store and handle all materials in accordance with manufacturer's recommendations.
2. Load and unload all pipe, fittings, valves, hydrants, and appurtenances by hoists. Do not drop materials. Do not skid or roll materials on or against each other. Use padded slings, hooks and pipe tongs to handle materials in a manner to prevent damage.
3. Pipe possessing defects including, but not limited to, the following will be rejected for installation:
 - a. Variations from straight centerline
 - b. Elliptical shape in round pipe
 - c. Lack of rigidity
 - d. Illegible markings as required herein
 - e. Bruised, broken, or otherwise damaged metallic or bituminous coating or liner, as applicable
 - f. Deep or excessive gouges, dents, bends, or scratches on the pipe wall
 - g. Fractures, punctures, or cracks passing through the pipe wall
 - h. Damaged or cracked ends where such damage would prevent making a satisfactory joint
4. All materials deemed damaged by the Town will not be accepted.

B. Storage and Protection

1. Store materials in an area safe from damage and deterioration. Keep the interior of pipe, fittings, valves, hydrants and appurtenances free from dirt and foreign matter. Drain and store valves and hydrants in a manner to prevent damage from freezing. Store gaskets in a cool location out of direct sunlight and free from contact with petroleum products.
2. Do not stack any pipe higher than recommended by manufacturer. Do not stack fittings, valves, and hydrants.

1.06 Warranty

- A. Locate and repair leaks that occur within a one-year warranty period on any and all installed water mains at no cost to the Town.

PART 2 - PRODUCTS

2.01 General

- A. All pipes, fittings, valves, hydrants, and appurtenances shall be new and unused. Materials from which all pipes, fittings, valves, hydrants, and appurtenances are manufactured by shall have been tested and approved for conveying potable water by the National Sanitation Foundation and the Underwriters Laboratory.

- B. All products specified in this specification section and used in potable water applications shall meet NSF Standard 61 and either NSF Standard 61 – Annex G or NSF Standard 372 and shall be clearly marked as being in compliance with these standards.

2.02 Polyvinyl chloride (PVC) Water Main Pipe

A. Polyvinyl Chloride (PVC) Pipe C900

1. Provide PVC pipe conforming to AWWA C900 as applicable and having Dimension Ratio of DR 18 for pipe 12-inches in diameter or smaller and DR-25 for pipe larger than 12-inches in diameter.
2. Pipe materials: conforming to ASTM D1784, Class 12454-A or Class 12454-B virgin compounds with hydrostatic design basis of 4,000 psi. All pipe shall be marked with the Underwriters Laboratory logo.
3. Pipe joint and gasket: conforming to ASTM D3139 for joints; single gasket bell and spigot type, the bells being formed integrally with the pipe; bell consisting of a factory-installed solid cross section elastomeric gasket which meets the requirements of ASTM F477. Gasket lubricant shall be used and as specified by the pipe manufacturer for approved use.
4. Furnish PVC pipe as manufactured by J-M Eagle, North American Pipe Corporation, Diamond, IPEX, PW Eagle, National Pipe and Plastics, Inc., or approved equal. All manufacturers must be a member of Uni-Bell PVC Pipe Association.

B. Joints and Joint Restraint

1. Supply the pipe with push-on type joints conforming to AWWA C111 unless otherwise noted.
2. Use restrained joints in addition to thrust blocking.
3. Restrain pipe joints as specified in Part 3 of this section.
4. Approved manufacturers:
 - a. Series 1500/1600 Bell Restraint Harness by EBAA Iron for C900 PVC pipe (4- to 12-inch diameter)

C. Pipe Markings

1. Each length of pipe shall be clearly marked with the following information at a minimum, conforming with AWWA C151:
 - a. Manufacturer's name or trade mark
 - b. Pipe class
 - c. Year of manufacture

D. Pipe Joint Restraints in Casing Pipe

1. Provide restrained joints for all pipe installed in steel casing.

E. Nuts, Bolts, and Washers

1. Nuts shall be hexagon and bolts shall be tee head conforming to AWWA C111.
2. All nuts, bolts, and washers shall be stainless steel.

F. Contaminated Soils

1. If approved by the Town, provide gaskets suitable for the contamination in construction areas where contaminated soils or steam utility lines are present. Provide gaskets specifically designed for use with the contaminant present in the soil.

2.03 High Density Polyethylene (HDPE) Water Main

A. Use of HDPE water main requires pre-approval by the Town and shall only be considered for Horizontal Directional Drilling installations or for transmission mains.

B. Pipe

1. Provide HDPE pipe conforming to AWWA C906. Supply HDPE pipe manufactured from high density, extra high molecular weight polyethylene and conforming to PE Standard Code PE 4710. Polyethylene pipe shall have a minimum cell classification of 445574C per the requirements of ASTM D3350.
2. Supply minimum DR-13.5 HDPE pipe designed and manufactured to pressure class 160. Supply HDPE pipe designed to withstand crushing, buckling and deformation resulting in ovality at a depth of bury indicated. Furnish HDPE pipe designed and manufactured in ductile iron pipe size.
3. Do not deflect HDPE pipe on a radius of less than 50 times the pipe diameter or less than the manufacturer's recommendation. If an HDPE fitting, flange or mechanical joint is present within the length of pipe to be deflected, do not deflect on a radius of less than 100 times the pipe diameter.
4. Provide HDPE pipe which has a blue shell or blue permanent striping and the AWWA specification stamp embedment or permanent blue-line print clearly and continuously marked longitudinally along the outside pipe wall.
5. Provide HDPE pipe as manufactured by Performance Pipe, North American Pipe Company, Dura-Line, or approved equal.

C. Fittings

1. Provide HDPE fittings manufactured from high density, extra high molecular weight polyethylene conforming to PE Standard Code PE 4710. All HDPE fittings shall have a minimum cell classification of 445574C per the requirements of ASTM D3350.
2. Furnish fabricated polyethylene fittings designed and manufactured for one pressure class rating higher than the pressure class rating of the pipe specified in this section.

3. Provide HDPE fittings manufactured per the requirements of ASTM D3261 and which are injection molded or fabricated using a combination of extrusion and machining. Provide HDPE fittings manufactured from HDPE pipe specified in this section. Supply HDPE fittings manufactured or fabricated in facilities designed for that purpose. Field fabricated HDPE fittings will not be allowed.
4. Provide HDPE fittings which have a blue shell or permanent blue striping and the AWWA pipe specification stamp embedment or permanent blue-line print clearly and continuously marked longitudinally along the outside wall.

D. Flange Backup Rings and Gaskets

1. Provide flange backup rings conforming to AWWA C207. Supply ring type Class D with bolting dimensions conforming to ASTM B16.5.
2. Furnish flange backup rings having fusion-bonded epoxy coating applied to all exterior and interior exposed surfaces with a minimum dry film thickness of 4 mil.
3. Provide flange gaskets which are synthetic red rubber (SBR) hardness (Shore A) 80 +/- 5, ring or full face, 1/8-inch thick and conforming to ASTM D1330 grades I and II. Asbestos gaskets will not be allowed.
4. Supply flange to flange connection bolts which are carbon steel, ASTM A307 grade B for Class D flanges. Supply nuts conforming to ASTM A194 grade 2H. Furnish bolts and nuts having regular unfinished hexagonal dimensions in accordance with ASTM B18.2.1 for wrench head bolts and nuts and wrench openings. Minimum bolt lengths shall be the sum of the mating flange maximum thicknesses, the gasket and the depth of nut plus 1/8 inch minimum before torquing.

E. Mechanical Joints

1. Use polyethylene mechanical joint adaptors when making connections to mechanical joint fittings and when connecting to dissimilar pipe materials (e.g., PVC). Supply polyethylene mechanical joint adaptors complying with the specifications contained herein for HDPE fittings. Connect polyethylene mechanical joint adaptor to mechanical joint fitting by means of a mechanical joint gland and gasket in accordance with the specifications regarding mechanical joint ductile iron fittings contained herein and in accordance with AWWA C110, AWWA C111 and AWWA C153. Meg-A-Lugs and Field-Lok gaskets will not be allowed for use with polyethylene mechanical joint adaptors.
2. Provide "Harvey" style polyethylene mechanical joint adaptors (transition coupling) which include a stainless steel stiffener inserted into the inside of the mechanical seal end of the adaptor to provide additional axial strength and prevent pipe diameter reduction at the seal. Provide transition coupling as a kit complete with gasket, mechanical gland, bolts and nuts per this section.

F. Pipe Markings

1. Each length of pipe shall be clearly marked with the following information at a minimum, conforming to AWWA C906:
 - a. Nominal size and diameter base
 - b. Dimension ratio (DR-13.5)
 - c. Manufacturer's name or trademark
 - d. Material designation code (PE 4710)
 - e. Pressure class (PC 160)
 - f. AWWA designation number (AWWA C906)
 - g. Manufacturer's production (lot) code
 - h. Date of manufacture
 - i. Seal or mark of testing agency certifying tubing for potable water service

2.04 Valves

A. Gate Valves

1. Provide resilient seated gate valves conforming to AWWA C509 or AWWA C515. Valve ends shall be mechanical joint unless specifically approved by the Town. Valves shall be iron body with bronze stem nuts, glands and bushings, and shall be non-rising stem type with O-ring packing. All fasteners connecting the bonnet to the valve body, the bonnet thrust plate to the bonnet, and the operating nut to the stem shall be ANSI Type 304 or 316 stainless steel. A fusion epoxy coating complying with AWWA C550 and certified to NSF 61 with a minimum dry film thickness of 6 mils shall be applied to protect all interior and exterior exposed iron surfaces. Valves shall open counterclockwise (left) and have a 2-inch operating nut.
2. Provide gate valves as manufactured by Kennedy Valve Company, M&H Valve Company, Mueller Company, U.S. Pipe, Clow Valve, American Cast Iron Pipe Company or approved equal.

- B. Tapping Valves - Provide iron body, non-rising stem gate valves conforming to AWWA C515. Supply valve gates, gate rings and body-seat rings which are oversized to permit entry and exit of tapping machine cutters. A valve end connecting to a tapping sleeve shall have a flange for bolting to the sleeve. The flange shall have a tongue which fits a recess in the tapping sleeve. Mechanical joint tapping sleeves are not allowed. A valve end connecting to the plain end of a water main pipe or adapter shall be mechanical joint. Provide valves which open counterclockwise (left) and have a 2-inch operating nut.

C. Tapping Sleeves

1. Furnish stainless steel tapping sleeves for use on pipe up to 16-inches in diameter. Approval from the Town must be obtained prior to using tapping sleeves on pipe larger than 16-inches in diameter.
2. The sleeve body shall be manufactured entirely of stainless steel for total corrosion control. All welds shall be fully passivated to restore stainless characteristics.

3. Provide gridded virgin gasket fabricated of SBR per ASTM D2000 and glued to the face of the flange. The gasket shall provide 360 degrees of pipe coverage.
 4. Furnish tapping sleeve with stainless steel flange conforming to AWWA C207 Class D with recess to accept standard tapping valves.
 5. Supply tapping sleeve with oversized branch connection with an inside diameter to permit entry and exit of full-size tapping machine cutters.
 6. Provide all Type 304 or 316 stainless steel nuts and bolts with NC threads.
 7. Conduct a hydrostatic test of 150 psi for 10 minutes of the tapping sleeve and valve prior to tapping the pipe.
 8. Provide tapping sleeves as manufactured by Cascade Waterworks Manufacturing, Romac Industries Inc., Ford Meter Box, JCM Industries, Mueller Company, Smith Blair Inc., or approved equal.
- D. Air Release Valves – Provide APCO Model No. 145C air release valve with cast iron body, cover and baffle, stainless steel float brass water diffuser, and Buna-N seat as manufactured by DeZurik or approved equal.

2.05 Valve Boxes

- A. Supply all buried valves with a special utility 5-1/4" cast iron valve box, lid, and solid 4" diameter PVC riser with a minimum thickness of 3/16" and centered of the valve, constructed so that the removable cover will not be thrown out by travel over it.
- B. Provide all valves boxes with a posi-cap or equivalent item for valve box stabilization and centering.
- C. Provide all valves boxes located outside of traffic areas with a six foot long steel fence post painted blue.
- D. Covers for valve boxes on water service valves shall be marked "WATER".

2.06 Hydrant Assemblies

- A. Standard Fire Hydrants - Provide dry barrel, compression shutoff, traffic model hydrants conforming to AWWA C502. Supply hydrants with 5-1/4-inch main valve opening, 6-inch mechanical joint inlets, two 2-1/2-inch hose nozzles with 7/8- national standard threads per inch, and one 4-1/2-inch pumper nozzle.
- B. Supply hydrants with nozzle threads and counterclockwise operating directions consistent with existing hydrants in the Town's distribution system.
- C. Auxiliary Gate Valves - Install 6-inch auxiliary gate valve with each hydrant.
- D. Provide each hydrant with a 2-component exterior grade full gloss polyurethane exterior enamel topcoat. Touch-up painting for field repairs shall be in accordance with Manufacturer's recommendations. Provide hydrant colors as follows:
 1. Safety Yellow, 7-8 mils with reflective white tape on the bonnet flange

- E. Provide Clow Medallion, Kennedy Guardian, or Waterous Pacer standard fire hydrants.
- 2.07 Blow-off Assemblies
- A. Provide blow-off assemblies as manufactured by Gil Industries or with automatic freeze proof design with a weep hole drilled with a 2" ball valve approved equal. Valve shall be 600 pound WOG bronze body with chrome plated brass ball and Teflon seals conforming to "lead free" requirements.
- 2.08 Tracer Wire
- A. Furnish tracer wire with all pipe.
 - B. For pipe installed by open excavation or within a casing pipe, provide one strand of solid 10-gauge AWG copper wire for the entire length of pipe.
 - C. For pipe installed by horizontal directional drilling or jack and bore, provide 3 strands of 6-gauge solid, steel core hard drawn extra high strength copper tracer wire for the entire length of pipe. Supply Copperhead Direct Burial tracer wire, or approved equal.
 - D. Provide splice kits suitable for underground installation for splices and branch connections. Seal connection with epoxy contained in splice kit and wrap with waterproof tape.
- 2.09 Location Material
- A. Provide metallic type tape such as Terra Tape Detectable as manufactured by Reef Industries, Inc. or approved equal. Supply blue location material marked with "Caution Water Line Buried Below". Install tape per manufacturers directions 2-3 feet above the top of the water main.
- 2.10 Meters
- A. Meter Pits will not be installed. New meters will be installed in basements or utility/mechanical rooms.
 - B. The Town will provide: Neptune Meter equipped with radio technology, inline check valve, ball valve, and meter tail piece.
- 2.11 Additional Items
- A. Concrete Blocking - Provide minimum 2,000 psi compressive strength concrete thrust blocking where indicated. Do not use packaged concrete (Quikrete, etc.).
 - B. Cast-in-Place Concrete - Provide ready-mixed concrete meeting the requirements of ASTM C94. Each cubic yard of concrete shall have:
 - 1. Cement - minimum 6 bags

2. Air Content - 5 to 7 percent
3. Coarse Aggregate Size - maximum 1-1/2 inches
4. Slump - 3 to 5 inches
5. Compressive Strength - 4,000 psi unless noted otherwise

PART 3 - EXECUTION

3.01 General

- A. Inspect water mains, fittings, valves, hydrants, and appurtenances prior to installation and promptly remove damaged or unsuitable materials from the job site. Replace damaged or unsuitable materials with new and unused materials.
- B. Install all water mains, fittings, valves, hydrants, casing and appurtenances as shown on the Standard Details and as specified in this Section. Do not install pipe when, in the opinion of the Town, trench conditions are unsuitable.
- C. Follow manufacturer's installation procedures when installing water mains, fittings, valves, hydrants and appurtenances.

3.02 Installation of Water Mains

- A. Install water mains to the lines shown on the Drawings, except as specified in this Section.
- B. Install all water mains and accessories in accordance with applicable AWWA standards.
- C. Water mains installed parallel to existing sanitary sewers, sewage force mains, or storm sewers shall have a minimum horizontal separation of 10 feet measured from edge of pipe to edge of pipe. Where local conditions prevent this separation, water mains shall be installed with the bottom of the water main at least 18 inches above the top of the sewer.
- D. Water mains crossing sanitary sewers, sewage force mains, or storm sewers shall have a minimum vertical separation of 18 inches measured from edge of pipe to edge of pipe. This separation shall apply whether the water main is above or below the sewer or force main. Install water mains so that a full length of pipe is centered on the sewer or force main. No water main shall pass through or come in contact with any part of a sanitary sewer manhole.
- E. Install water mains with a minimum of 60 inches of cover. Install water mains beneath stream crossings with a minimum of 48 inches of cover.
- F. Installed piping systems shall be temporarily plugged at the end of each day's work or other interruption of progress on a given line. Plugging shall be installed in a manner satisfactory to the Town, and it shall be adequate to prevent entry of animals into the pipe or the entrance or insertion of deleterious materials.

- G. Follow manufacturer's installation procedures when installing water mains, fittings, valves, hydrants and appurtenances.
- H. Excavate trenches to widths which provide adequate working space for proper pipe installation, jointing and embedment. Shape the bottom of trench to give uniform circumferential support to the lower quarter of each pipe. Lay pipe with bell ends facing in the direction of laying.
- I. Lower pipe, fittings, valves and hydrants into trench by hand, by means of hoists or ropes, or by other suitable tools or equipment which will not damage materials, coatings or linings. Do not drop or dump pipe, fittings, valves or hydrants into trench.
- J. As each length of pipe is installed, join the pipe to the previously installed pipe. Bring the pipe to the correct line and grade and secure in place with bedding tamped under and around each side of the pipe. Deposit and compact backfill material uniformly and simultaneously on each side of the pipe to prevent lateral displacement.
- K. Wherever it is necessary to deflect pipe from a straight line in either a vertical or horizontal plane, the amount of deflection allowed shall not exceed that allowed by the pipe manufacturer's specifications. If the alignment requires joint deflections in excess of the allowable, furnish and install fittings or a sufficient number of shorter lengths of pipe.
- L. Cut pipe in a neat and workmanlike manner without damage to PVC pipe. Use a cutting machine so as to leave smooth ends at right angles to the axis of the pipe. For bell and spigot joint installation, bevel the edges of all field-cut pipe after cutting. For mechanical joint installation do not bevel the pipe end. Remove all burs that form as a result of field cutting the pipe, whether the pipe end is beveled or not.
- M. Fusion Bonding Procedure for HDPE Pipe
 - 1. The method of joining polyethylene pipe to polyethylene pipe or polyethylene fitting, other than those shown as flanged or otherwise mechanically connected, shall be by means of butt-fusion or sidewall fusion in accordance with the polyethylene pipe manufacturer's written bonding procedure specifications (BPS) and conforming to ASME B31.3, Chapter VII, paragraph A-328. BPS shall include, but not be limited to, cutting and facing requirements and shall utilize a data logger, such as the "Datalogger" manufactured by McElroy Manufacturing, Inc., to monitor and record the assembly of each butt-fusion or sidewall fusion joint.
 - 2. Materials to be butt-fused or sidewall fused shall be from Standard Code PE 4710 and 445574C cell classification. Mechanical sleeves and saddles will not be allowed for branch or service connections.
 - 3. Fusion bonding equipment specified in the BPS shall be clean and in proper operating condition capable of meeting all conditions and requirements of the pipe and bonding equipment manufacturer, including temperature, alignment and fusion pressure. Equipment heater performance shall be tested and

certified prior to use for fusion bonding each day at start up and at one other time each day, no sooner than 4 hours after start up. A data logger for quality control shall electronically log each fusion joint, except as noted above. Logged fusion joints shall be stored in the data logger unit such that it can be downloaded. Logged fusion joints shall be printed weekly and submitted within 2 days of the completion of last fusion joint to the Town for review. One fusion joint for every 5 days of fusing bonding work will be removed and forwarded to a certified lab for testing. Testing shall include bend back tests of the fused joint per AWWA C906.

- N. Allow HDPE pipe to reach ambient temperature for the installed condition before final cutting, installation of concrete restraint system, or connection of transition couplings.
- O. Where HDPE pipe is installed at stream crossings by means of open cutting the streambed, install concrete river weights to prevent the HDPE from floating during installation.

3.03 Connections to Existing Water Mains

- A. After approval by the Town, connect the disinfected mains to the existing distribution system as directed by the Town's inspector. Under no circumstances shall the Contractor or Subcontractors operate any valves, hydrants, or blow-off assemblies on the existing distribution system. Schedule the final connection with the Town providing at least three working days advance notice. Do not connect to the existing system without a Town's inspector present.
- B. To ensure the pressure is off the main, the Town shall open the closest hydrant, blow-off assembly, or service line. If there is no means for checking pressure, install a 3/4" tap on the top of the main adjacent to the existing plug.
- C. Connect to existing system at a time and under conditions authorized by the Town. Provide for proper dewatering and removal of all water from dewatered lines and excavations to avoid contamination of new and existing mains. Connect to existing dead end lines after flushing of the existing water main to eliminate any potential accumulated sediment. Once the work has begun to connect to the existing system, no stoppage of work shall be permitted until the new water system is connected.
- D. If temporary interruption to existing customers is expected, provide notice to the Town a minimum of 48 hours prior to connection to the existing system.

3.04 Installation of Fittings, Valves, Hydrants, and Appurtenances

- A. General
 - 1. Clean the interiors of all fittings, valves and hydrants of foreign matter prior to installation. Inspect valves and hydrants in open and closed positions to ensure all parts are in working condition.

2. Provide adequate blocking in addition to thrust restraint for all hydrants, valves and fittings such as bends, tees and plugs as shown on the standard details or a minimum of one full length of pipe on each side of all valves and fittings, whichever is more stringent.
3. Provide thrust restraint as shown on the Standard Details or a minimum of one full length of pipe on each side of all valves and fittings, whichever is more stringent.
4. Where concrete blocking is used, place concrete between fitting and solid trench wall where shown on the standard details. Concrete thrust blocking shall be quick set with a minimum of 2,000 psi compressive strength. Form concrete thrust block in place and do not cover bolted glands. Place a sheet of polyethylene plastic wrap between the main or fitting and concrete thrust block prior to placement of the concrete thrust block.

B. Valves

1. Place valves vertically on solid concrete block as shown on the standard details and bed them solidly. The valve box shall rest on the valve bonnet and be centered over the valve, and the top of the section shall be approximately on line with nut at top of valve stem. The entire assembly shall be plumb.
2. Place and compact backfill in lifts around valve box so valve box remains plumb. Tamp backfill on all sides of each valve box to the undisturbed trench face.
3. Adjust valve box covers so they are flush with finished grade. Re-adjust covers as necessary so that they remain flush with the finished grade after final paving and grading work is complete. The valve box shall be supported by means of three (3) 'S' hooks hung from the top of the riser pipe to prevent the box from sliding down the riser.
4. Isolation valves shall be required to provide zonal isolation. Maximum valve spacing shall be 800 feet or one per block, whichever is less. No valves shall be installed in traffic areas, unless pre-approved by the Town.
5. Install air release valves in meter pits as shown on the Standard Details in locations as directed by the Town.

C. Hydrants

1. All hydrants shall be installed with a minimum bury not less than that required for the water mains. Check the hydrant locations and determine whether the hydrant requires a deeper bury depth.
2. Set hydrants plumb with the pumper nozzle facing toward the street or drive surface. Set hydrants so the centerline of hydrant outlet nozzles are not less than 18 inches nor more than 20 inches above finish grade. Provide hydrant extensions where required to obtain proper elevation. Install hydrants as shown on the Standard Details. Provide washed coarse gravel at hydrant shoe to ensure proper drainage of hydrant barrel. Place and compact backfill around hydrant to finish grade so that hydrant remains plumb. Furnish and install an auxiliary gate valve and valve box on each hydrant branch connection.
3. All hydrant installations must be inspected by the Town prior to backfilling.

4. At locations where a new hydrant assembly is to be installed on an existing water main, install new tee in the existing main to connect the new lead to the new hydrant assembly.
5. At locations where a hydrant is to be replaced with a new hydrant assembly and existing hydrant lead is smaller than required for the new hydrant, remove the existing tee, lead, valve, and hydrant. Install a new tee in the existing main with a new lead to the new hydrant assembly. Damage to hydrant coating shall be field repaired in accordance with the hydrant manufacturer's recommendations or the hydrant shall be replaced at no additional cost to the Town.
6. A standard fire hydrant with auxiliary gate valve is required at all dead end water mains, unless approved by the Town.
7. The maximum spacing between fire hydrants in residential neighborhoods and residentially zoned areas shall be 500 feet.
8. The maximum spacing between fire hydrants in commercial and industrial zoned areas shall be 300 feet.

D. Water Stops

1. Install water stops to help minimize the effects of thermal contraction and expansion for HDPE pipe. When connecting to dissimilar pipe materials, thrust restraints shall be installed at the point of connection. Encase water stops in concrete with dimensions adequate to safely transmit all thrust forces caused by expansion and contraction to the surrounding undisturbed soil.

E. Tracer Wire

1. Install tracer wire by taping to pipe in 15- to 20-foot intervals. Do not wrap wire around pipe. Seal splices and branch connections with epoxy and wrap with tape. Install one pound anodes every mile or less.
2. Assemble tracer wire splices and branch connections with 10 AWG splice kits suitable for underground installation. Remove 1/2 inch of insulation from wire. Tie together wires using an overhand knot to prevent pull apart and use a split bolt connector or solder to connect for electrical continuity. Seal connection with epoxy contained in splice kit and wrap with tape.
3. At each valve and hydrant tracing wire shall be brought up to the surface.
 - a. At hydrants, connect the tracer wire to the loop below the 4-1/2" nozzle and tape to the hydrant barrel as it is brought to ground level.
 - b. At valves, bring the tracer wire to the surface on the outside of the riser. A 1/2" diameter hole shall be cut in the side of the riser and tracing wire looped and knotted on the inside of the riser to keep the tracing wire at this elevation. A minimum 12" loop of tracing wire must be left inside the valve box riser. The tracing wire shall continue down the valve box in a continuous run to the pipe on the opposite side of the valve.

3.05 Field Quality Control

A. Filling and Disinfection

1. When constructed, fill the water mains with water from the Town's existing facilities adjacent to the new construction. The Town will direct the Contractor in the method to be used to fill the new piping system. Conduct the flushing, air removal, and hydrostatic testing in accordance with Section 3.05C and as directed by the Town's inspector.
2. Sterilize all new water mains, services, leads and appurtenances in accordance with AWWA C651 and Section 02675.

B. Continuity Test

1. Conduct continuity test on all tracer wire. All tracer wire found not to be continuous after testing shall be repaired or replaced at no additional cost to the Town.

C. Hydrostatic Leakage Test

1. Hydrostatically test all water mains installed. Perform leakage test under a hydrostatic pressure in accordance with AWWA C600 and these specifications. Ensure all gate valves and hydrant auxiliary valves are open prior to testing. The hydrostatic pressure shall be 150 psi or 1-1/2 times the working pressure at the point of testing, whichever is greater, but shall not exceed 150 psi at the lowest point in elevation of the system being tested. Allow the pipeline to stabilize at the test pressure before conducting the hydrostatic test.
2. The hydrostatic test shall be at least 2 hours in duration. Maintain the test pressure within +/-5 psi during the test period by adding makeup water using a test pump. At the end of the test duration, return the line pressure to the original test pressure by adding makeup water. Accurately measure the total amount of makeup water added during and at the end of the test duration, or leakage, in gallons by means of a water meter installed on the supply side of the pressure pump.
3. The pipe installation will not be accepted if the leakage is greater than that determined by the following formula in which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested, in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gage.:
 - a. Polyvinyl Chloride $L=0.0000068SD(P)^{1/2}$ See Table 3.05-1
 - b. Polyethylene See Table 3.05-2
4. Where the leakage rate exceeds the permissible maximum, locate and repair the leak or leaks. Repeat the leakage test until the test results are acceptable.
5. Repair all leaks discovered within the warranty period and retest the repaired segments to confirm leaks have been stopped.

Table 3.05-1: Allowable Leakage for PVC Pipe per 1000 ft. of Pipeline* - gph

psi	Average Test Pressure					Nominal Pipe Diameter – in.						
	4	6	8	10	12	14	16	18	20	24	30	36
50	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.96	1.15	1.43	1.72
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44
250	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.20	3.85

Table 3.05-2 – Allowance for Expansion of HDPE Pipe Under Pressure* for Ambient Conditions

Nominal Pipe Size (inch)	Allowance for Expansion (U.S. gal per 100 feet of Pipe)		
	1-Hour Test	2-Hour Test	3-Hour Test
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.00	1.50
10	0.75	1.30	2.10
12	1.10	2.30	3.40

**These allowances only apply to the test phase and not the initial expansion phase. In addition, they assume that the pipe is being tested for a system design pressure equal to the pipe's pressure class. If the pipe is being tested to a lower system design pressure, the above allowances should be reduced by the ratio of the system design pressure to the pipe's pressure class.*

END OF SECTION 02660

SECTION 02661 - WATER SERVICES

PART 1 - GENERAL

1.01 Summary

A. Section Includes: Furnishing and installing all water service connections to Town water mains, including service taps, service lines, and appurtenances as required for completing the work shown or specified.

B. Related Sections

1. Section 02220 - Trenching, Backfilling and Compaction for Utilities
2. Section 02660 - Water Mains
3. Section 02675 - Disinfection

1.02 References

A. American Society for Testing and Materials (ASTM), latest editions

1. ASTM D2239 - Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
2. ASTM D3350 - Polyethylene Plastics Pipe and Fittings Materials

B. American Water Works Association (AWWA), latest editions

1. AWWA C651 - Disinfecting Water Mains
2. AWWA C800 - Underground Service Line Valves and Fittings
3. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing (1/2-inch through 3-inch) for Water Service

C. Indiana Department of Environmental Management (IDEM) Regulations in 327 of the Indiana Administrative Code (IAC), latest edition

D. Indiana Plumbing Code, latest edition

E. NSF Standard 14 – Plastic Pipe System Components

1.03 Submittals

A. Product Data

1. Service Lines
2. Fittings
3. Other related items and appurtenances

B. Test Results

1. Continuity test

1.04 Delivery, Storage, and Handling

A. Acceptance at Site

1. Deliver, store and handle all materials in accordance with manufacturer's recommendations.
2. Load and unload all tubing, fittings, and appurtenances by hoists. Do not drop materials. Do not skid or roll materials on or against each other. Use padded slings, hooks and pipe tongs to handle materials in a manner to prevent damage.
3. All brass fittings, and lids/rings shall be delivered to the job site and be the Developers/Contractors responsibility.
4. All materials deemed damaged by the Town will not be accepted.

B. Storage and Protection

1. Store materials in an area safe from damage and deterioration. Keep the interior of tubing, fittings, and appurtenances free from dirt and foreign matter. Drain and store materials in a manner to prevent damage from freezing. Store gaskets in a cool location out of direct sunlight and free from contact with petroleum products.

1.05 Items to Be Provided by the Town

- A. The Town will provide: Neptune Meter with radio read technology, inline check valve, ball valve, and meter tail piece.
- B. All other items required for the complete installation shall be provided by the Contractor.

1.06 Warranty

- A. Locate and repair leaks on any and all water services between the residence and the main that occur within the warranty period at no cost to the Town.

PART 2 - PRODUCTS

2.01 General

- A. All services lines and appurtenances shall be new and unused.
- B. All products specified in this specification section and used in potable water applications shall meet NSF Standard 61 and either NSF Standard 61 – Annex G or NSF Standard 372 and shall be clearly marked as being in compliance with these standards.
- C. Manufacturers
 1. Contact the Water Department for a list of approved equipment and material manufacturers.

2.02 Corporation Stops

- A. Provide easy turning, O-ring sealed on the top and bottom, balanced pressure plug valve having a round, fully open, unobstructed flow way corporation stop with AWWA taper inlet and compression connection for CTS O.D. outlet.
- B. Provide corporation stop with one piece body construction with integral wrench slats.
- C. Furnish Model H-15008 as manufactured by Mueller Company, Model 4701 as manufactured by A.Y. McDonald, Model F-1000 as manufactured by Ford Meter Box Company, or approved equal.

2.03 Saddles – Are Not Used

- A. Provide stainless steel service tapping sleeves for all chlorination, air relief taps, and service lines on all PVC and HDPE water mains.
- B. Provide UWC rolled thread, Type 304 stainless steel bolts conforming to ASTM A192 with Teflon coated threads.
- C. Furnish Type 304 stainless steel nuts conforming to ASTM A198 or an approved equal.

2.04 Service Line Tubing

- A. Provide HDPE or copper service lines, sized as shown on the meter setting detail or as required for adequate service, whichever is greater.
- B. Copper Service Line Tubing
 - 1. Provide Type "K" copper service line tubing.
- C. High Density Polyethylene (HDPE)
 - 1. Provide DR-9 HDPE tubing in accordance with AWWA C901, ASTM 3350, ASTM D2239, and NSF 14. Supply HDPE pipe manufactured from high density, extra high molecular weight polyethylene and conforming to PE Standard Code PE 4710. Polyethylene pipe shall have a minimum cell classification of 445574C per the requirements of ASTM D3350.
 - 2. Provide stainless steel stiffeners for HDPE service line.
 - 3. Each length of pipe shall be clearly marked with the following information at a minimum, in conformance with AWWA C901:
 - a. Nominal size and diameter base
 - b. Dimension ratio or minimum wall thickness (DR-13.5)
 - c. Manufacturer's name or trademark
 - d. Material designation code (PE 4710)
 - e. Pressure class (PC 250) – minimum pressure rating of 160 psi
 - f. AWWA designation number (AWWA C901)
 - g. Manufacturer's production (lot) code

- h. Date of manufacture
- i. Seal or mark of testing agency certifying tubing for potable water service

2.05 Tracer Wire

- A. Furnish tracer wire with all service lines.
- B. For service line tubing installed by open excavation or within a casing pipe, provide one strand of solid 10-gauge AWG copper wire for the entire length of service.
- C. For service line tubing installed by horizontal directional drilling, provide 2 strands of 10-gauge solid, steel core hard drawn extra high strength copper tracer wire for the entire length of service. Supply Copperhead Direct Burial tracer wire, or approved equal.
- D. Provide splice kits suitable for underground installation for splices and branch connections. Seal connection with epoxy contained in splice kit and wrap with waterproof tape.

2.06 Building Meters

- A. Provide building meter settings with by-pass shut off.

2.07 Additional Items

- A. All fitting connections shall be compression. No solder of any type will be accepted.
- B. Concrete Blocking - Provide minimum 2,000 psi compressive strength concrete blocking where indicated. Do not use packaged concrete (Quikrete, etc.).

PART 3 - EXECUTION

3.01 General

- A. Request for water service shall be directed through the Utilities Department at (260) 692-6909.
- B. The Town Utilities Department requires a minimum of 24 hours advance notice for all water taps and meter sets. No water taps or meter sets shall be made without a written work order issued from the Town Utilities Department.
- C. When installing water meters or water main taps all specifications below shall be followed and enforced. Any alterations to these specifications must be approved by the Town Utilities Department Personnel.
- D. No taps will be permitted under driveways.

- E. A total count of the service meters is required as soon as the Town approves the construction drawings.
- F. Trenching and backfilling shall be in accordance with Section 02220.
- G. Inspect water services, fittings, and appurtenances prior to installation and promptly remove damaged or unsuitable materials from the job site. Replace damaged or unsuitable materials with new and unused materials.
- H. Install all water services, fittings, and appurtenances as shown on the standard details and as specified in this Section. Do not install items when, in the opinion of the Town, trench conditions are unsuitable.
- I. Absolutely no electrical boxes, transformers, or telephone boxes are to be installed between the water meter pit location and the proposed building structure.
- J. No ground wires are to be attached to any water main service line.

3.02 Installation of Water Services

- A. Install new corporation stops on the new main at the locations of new service lines.
- B. Follow manufacturer's installation procedures for installation.
- C. All service lines shall be buried to a depth of 60 inches.
- D. All services greater than 100 feet in length shall be minimum 1-inch diameter and sized per the Indiana Plumbing Code.
- E. Separate service lines shall be provided for each unit served.
- F. Install all service lines in accordance with AWWA C800.
- G. Expose the water main (at least a 4-foot by 4-foot hole is required), and provide a safe and dry working area with safe and easy access into and out of the excavation. Town Personnel may, at their discretion, refuse to work in an unsafe hole or trench.
- H. Where new meters are installed on opposite sides of road from new mains, push services under road to connect to meters. No open cutting of road surfaces will be allowed for service lines.
- I. Excavate trenches to widths which provide adequate working space for proper pipe installation, jointing and embedment.
- J. Cut pipe in a neat and workmanlike manner. Use a cutting machine so as to leave smooth ends at right angles to the axis of the pipe. Remove all burs that form as a result of field cutting the pipe, whether the pipe end is beveled or not.

K. No joints will be allowed in service lines between the main and the shutoff valve.

L. Fusion Bonding Procedure for HDPE Tubing

1. The method of joining polyethylene pipe to polyethylene fitting, other than those shown as flanged or otherwise mechanically connected, shall be by means of butt-fusion or sidewall fusion in accordance with the polyethylene pipe manufacturer's written bonding procedure specifications (BPS) and conforming to ASME B31.3, Chapter VII, paragraph A-328. BPS shall include, but not be limited to, cutting and facing requirements and shall utilize a data logger, such as the "Datalogger" manufactured by McElroy Manufacturing, Inc., to monitor and record the assembly of each butt-fusion or sidewall fusion joint, except when making small diameter service connections (2-inch or smaller).
2. Materials to be butt-fused or sidewall fused shall be from Standard Code PE 4710 and 445474C cell classification. Mechanical sleeves and saddles will not be allowed for branch or service connections.
3. Fusion bonding equipment specified in the BPS shall be clean and in proper operating condition capable of meeting all conditions and requirements of the pipe and bonding equipment manufacturer, including temperature, alignment and fusion pressure. Equipment heater performance shall be tested and certified prior to use for fusion bonding each day at start up and at one other time each day, no sooner than 4 hours after start up. A data logger for quality control shall electronically log each fusion joint, except as noted above. Logged fusion joints shall be stored in the data logger unit such that it can be downloaded. Logged fusion joints shall be printed weekly and submitted within 2 days of the completion of last fusion joint to the Town for review. One fusion joint for every 5 days of fusing bonding work will be removed and forwarded to a certified lab for testing. Testing shall include bend back tests of the fused joint per AWWA C906.

M. When using HDPE tubing, attach a tracer wire to the pipe at 3-foot intervals and terminate inside the pit. HDPE tubing may only be used between the building and water meter pit.

N. Allow HDPE pipe to reach ambient temperature for the installed condition before final cutting, installation of concrete restraint system, or connection of transition couplings.

O. The Town will inspect all lines from house and from water main to water meter pit location before meter is set and before Contractor may backfill trench.

3.03 Installation of Building Meters

A. All services shall be installed inside of the building.

B. Any water meter to be installed inside a building must be first approved by the Town.

- C. Water meters to be installed inside a building must be equipped with a radio reading device provided by the Town. The Contractor is responsible for installing the appropriate water meter setters inside the building before the meter is to be set.

3.04 Commercial Domestic Water Taps

- A. The Town will allow domestic water service connections to a commercial building fire main under the following conditions:
 - 1. Domestic water service tap shall be made between the public/private water main and the Post Indicator Valve (P.I.V.) on the fire suppression main. No domestic water taps may be installed between the P.I.V. and the building.
 - 2. Any domestic water service tap made on a PIV between the Public/Private water main must be metered using the appropriately sized meter per the size of the tap.
 - 3. Upon completion of work and prior to placing the system in operation, the fire suppression main shall, up to the point of domestic service connection, be sterilized per Section 02675.

3.05 Field Quality Control

- A. Install, flush, and perform leakage test on service lines in accordance with the Indiana Plumbing Code.
- B. Conduct continuity test on all tracer wire. All tracer wire found not to be continuous after testing shall be repaired or replaced at no cost to the Town.

END OF SECTION 02661

SECTION 02675 - DISINFECTION

PART 1 - GENERAL

1.01 Summary

A. Section Includes: Disinfection of all potable water lines, valves, hydrants, service connections, and all other appurtenances which are to store, handle or carry potable water. Furnish all labor, water, chemical and equipment, including taps, corporation stops, temporary pumps and other items necessary to perform the Work, unless noted otherwise.

B. Related Sections

1. Section 02660 – Water Mains

1.02 References

A. All disinfection work shall be acceptable to the Indiana Department of Environmental Management. If any requirements of this section are in conflict with requirements of the authority of disinfection, those of the authority shall govern.

B. American Water Works Association (AWWA), latest editions

1. AWWA C651 – Disinfecting Water Mains

C. Indiana Plumbing Code

1.03 Submittals

A. Quality Control Submittals

1. Prior to starting any disinfection work, furnish for the Town's review a detailed outline of the proposed sequence of operation, disinfection method to be used, manner of filling and flushing units, source and quality of water to be used, and disposal of heavily chlorinated water.

B. Test Results

1. Submit copies of all bacteriological and chlorine residual test results to the Town.

1.04 Quality Assurance

A. Perform all work for and in connection with disinfection under the direction of an experienced supervisor.

B. All equipment used in disinfection work shall be in proper working condition, and shall be adequate for the specified work.

PART 2 - PRODUCTS

2.01 Materials

- A. Liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granules or tablets, as identified by AWWA as acceptable disinfection materials.

PART 3 - EXECUTION

3.01 Preparation

- A. Perform pressure and leakage tests prior to disinfection when specified in related sections.
- B. Fill and sterilize all new water mains, services, leads and appurtenances in accordance with AWWA C651 and this section.
- C. Each section of water main shall be complete and concrete thrust blocking shall have been in place for not less than 10 days prior to being filled and disinfected.
- D. The source of potable water shall be flushed prior to use to ensure that contaminants or debris are not introduced into the new pipes. Flush all water mains and fire hydrants to remove foreign material prior to disinfection. Flush mains with a flushing velocity of at least 2.5 feet per second. Flush water mains and hydrants until the water discharged is clear.
- E. Fill the new mains with water from the Town distribution system. All air shall be expelled from the mains as they are filled. Tap the water main at high points on a 45 degree angle on the customer side of the main. At no point shall a tap be made for a customer that has to circle back around and cross over the main to get to the customer. Provide necessary corporation cocks and vent piping in the event that complete venting cannot be accomplished through available outlets.
- F. Prevent admission of contaminated water into previously disinfected units.

3.02 Application

- A. Disinfection Procedures for Water Mains, Valves, Fittings, and Appurtenances
 - 1. Disinfect by one of the two following methods as described in AWWA C651: tablet or continuous feed. The slug method is not allowed.
 - a. Tablet Method
 - 1) Perform in accordance with AWWA C651.
 - 2) Do not use calcium hypochlorite on solvent-weld plastic or screwed-joint steel pipe due to the danger of fire or explosion.
 - 3) Keep pipe and appurtenances clean and dry during construction.
 - 4) Place calcium hypochlorite granules or tablets to give an average chlorine dose of 25 mg/L as follows:

- a) During construction, place calcium hypochlorite granules at the upstream end of the first section of pipe, at the upstream end of each branch, and at 500-foot intervals.
 - b) During construction, place 5 gram calcium hypochlorite tables in each section of pipe. Also, place 1 tablet in each hydrant, hydrant branch, and other appurtenances. Attach tablets using a food grade adhesive.
- 5) After installation is complete, fill the water main slowly and ensure that all air pockets are eliminated.
 - 6) The chlorinated water shall remain in the pipe for at least 24 hours. If the water temperature is less than 41 degrees Fahrenheit, the chlorinated water shall remain in the pipe for at least 48 hours. Operate valves and hydrants during this time to ensure disinfection of appurtenances.
 - 7) At the end of the retention period, the chlorine residual shall not be less than 10 mg/L.
- b. Continuous-Feed Method
- 1) Perform in accordance with AWWA C651.
 - 2) Perform a preliminary flushing of the water main to eliminate air pockets and remove particulates. The flushing velocity shall be not less than 2.5 feet per second.
 - 3) Provide a water supply through a temporary connection from a backflow protected source at a constant, measured rate.
 - 4) Chlorine Solution shall be prepared based on a chlorine gas-water solution or 1 percent chlorine solution prepared with calcium hypochlorite-water or sodium hypochlorite-water mixture.
 - 5) Direct-feed chlorinators, which operate from the gas pressure in the chlorine cylinder, shall not be used for the application of liquid chlorine. Apply liquid chlorine with a solution feed, vacuum operated chlorinator and booster pump.
 - 6) Hypochlorite solutions may be fed using a powered chemical feed pump designed for feeding chlorine solution.
 - 7) At a point not more than 10 feet downstream from the beginning of the new main, feed the new water main with a dose of chlorine at a constant rate such that the feed water will have not less than 25 mg/L free chlorine.
 - 8) Chlorine application shall not cease until the entire main is filled with heavily chlorinated water.
 - 9) The chlorinated water shall remain in the pipe for at least 24 hours.
 - 10) Operate valves and hydrants during this time to ensure disinfection of appurtenances.
 - 11) At the end of the retention period, the chlorine residual shall not be less than 10 mg/L.
2. To prevent damage, the heavily chlorinated water shall be flushed from the system as quickly as possible following the applicable retention period. The piping system shall be flushed until the water is found to be comparable to that of the Town or not less than 1 mg/L.
 3. Do not permit flushing water to discharge into existing water mains.

B. Disinfection of Items to be Immediately Returned to Service

1. Perform in accordance with AWWA C651.
2. Apply liberal quantities of hypochlorite to open trench areas when an existing water main or service connection is opened and the excavation is wet.
3. Disinfect pipe, fittings or appurtenances by thoroughly flushing and swabbing with a 5 percent solution of calcium hypochlorite immediately prior to assembly.
4. Following swabbing, flush the unit until replacement water in the system is proven to be comparable in quality to the water which will enter that unit or system. Flush toward the work location from both directions. Flushing shall be started as soon as the repairs are complete and shall be continued until discolored water is eliminated.
5. After appropriate procedures of disinfection and flushing have been completed, the existing main may be returned to service prior to completion of verification of disinfection in order to minimize the time customers are without water.

C. Disinfection of Service Lines and Accessories

1. Perform in accordance with the Indiana Plumbing Code.
2. Flush the piping with clean, potable water until only potable water appears at the points of outlet.
3. Disinfect the system according to one of the following procedures:
 - a. Fill the system with a water – chlorine solution containing at least 50 mg/L of free chlorine. Retain the heavily chlorinated water in the system for at least 24 hours.
 - b. Fill the system with a water – chlorine solution containing at least 300 mg/L of free chlorine. Retain the heavily chlorinated water in the system for at least 3 hours.
4. Following disinfection, flush the system with clean, potable water until the chlorine in the water coming from the system does not exceed the chlorine residual in the flushing water.
5. Verification of disinfection for service lines is not required.

3.03 Verification of Disinfection

- A. After application of disinfection is complete, perform final flushing of heavily chlorinated water, unless specified otherwise.
- B. Before the system, structure or well is placed in service, obtain 2 successive water samples 24 hours apart and have them tested for bacteriological analysis by a State-approved laboratory. Samples shall be drawn in accordance with the State's procedure.
- C. Mark all samples "Special Purpose" and in the "comments section" of the sample form, say what/why the sample is being submitted.
- D. If samples do not prove satisfactory, the system, structure or well shall be re-chlorinated and re-sampled until 2 successive water samples taken 24 hours apart have tested satisfactory.
- E. Assume the expense of taking and testing additional samples until satisfactory samples are obtained.

- F. Assume the expense of all water for subsequent fillings of the pipelines, basins, tanks and equipment.

3.04 Disposal of Waste

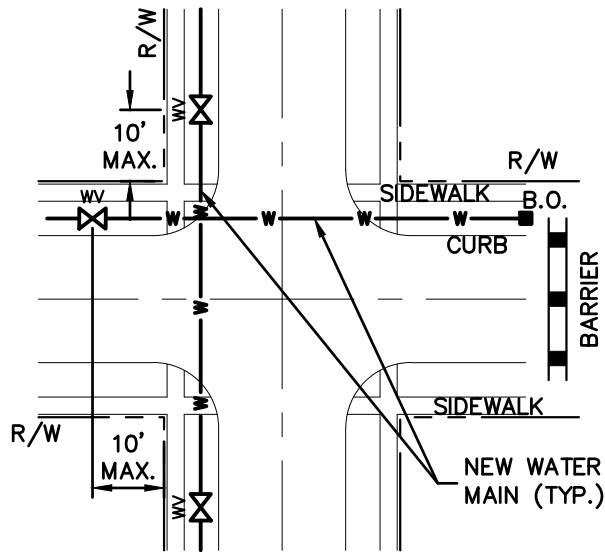
- A. Properly dispose of all heavily chlorinated water by neutralization and in accordance with the regulations of the local health department, Indiana Department of Environmental Management, and AWWA C651, Appendix C.
- B. Obtain written authorization from Town sewer department before discharging heavily chlorinated water to sanitary sewer system.

END OF SECTION 02675

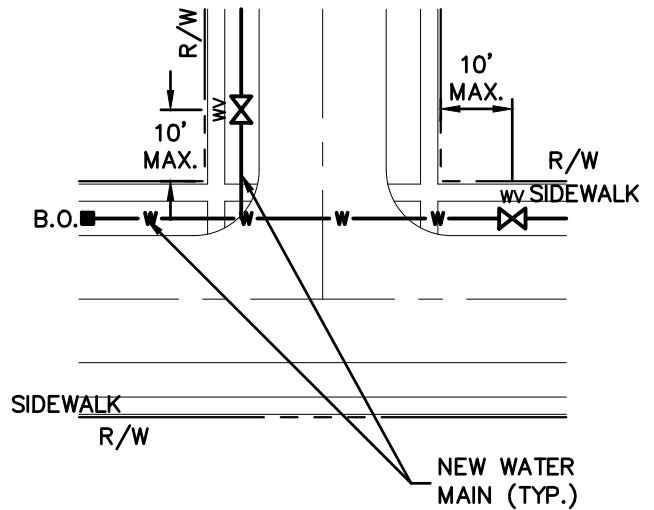
CONSTRUCTION DETAILS

DW - DRINKING WATER SYSTEM

VALVE DESIGN AT INTERSECTION



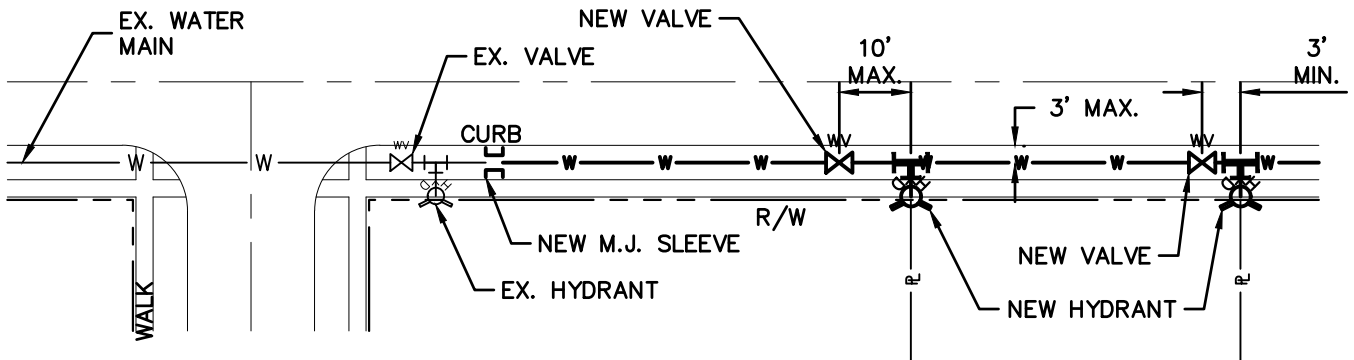
VALVE DESIGN AT TEE INTERSECTION



PLAN VIEWS

CONTINUOUS RUNS

VALVE SEPARATION: 6" THROUGH 12" VALVES, INSTALLATION EVERY 1000' TO 1200'
 16" THROUGH 18" VALVES, INSTALLATION EVERY 1200' TO 1800'
 FOR LARGER MAINS THE VALVE SEPARATION MAY BE REDUCED WITHIN A DEVELOPMENT,
 AS APPROVED BY THE TOWN OF MONROE.



PLAN VIEWS

NOTE:
 ALL VALVES ARE TO BE
 INSTALLED WITHIN 10' OF AN
 INTERSECTION OR NEAR A
 FIRE HYDRANT.

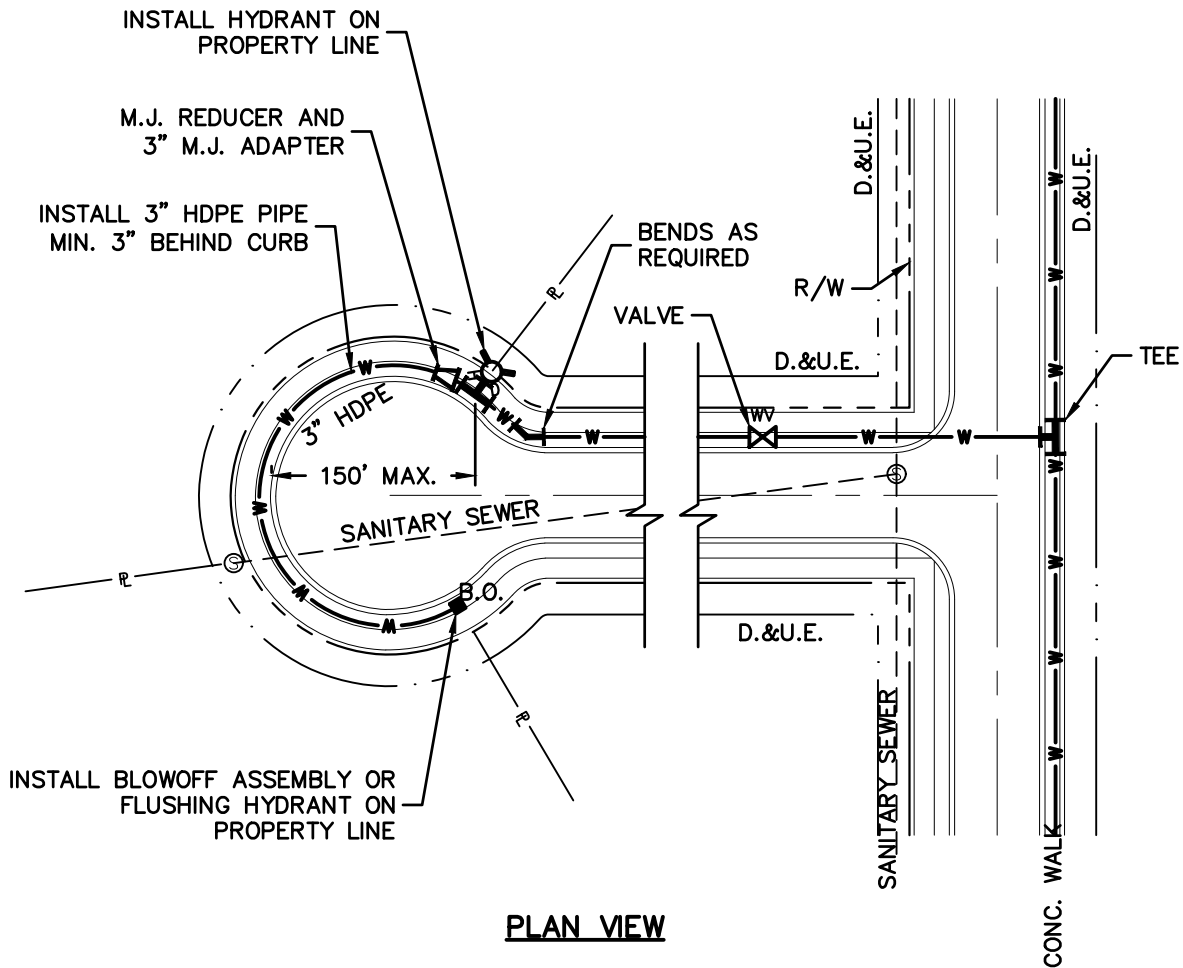
TYPICAL VALVE PLACEMENT

SCALE: NONE

DETAIL NO. DW-01
DATE: DEC 2017

NOTES:

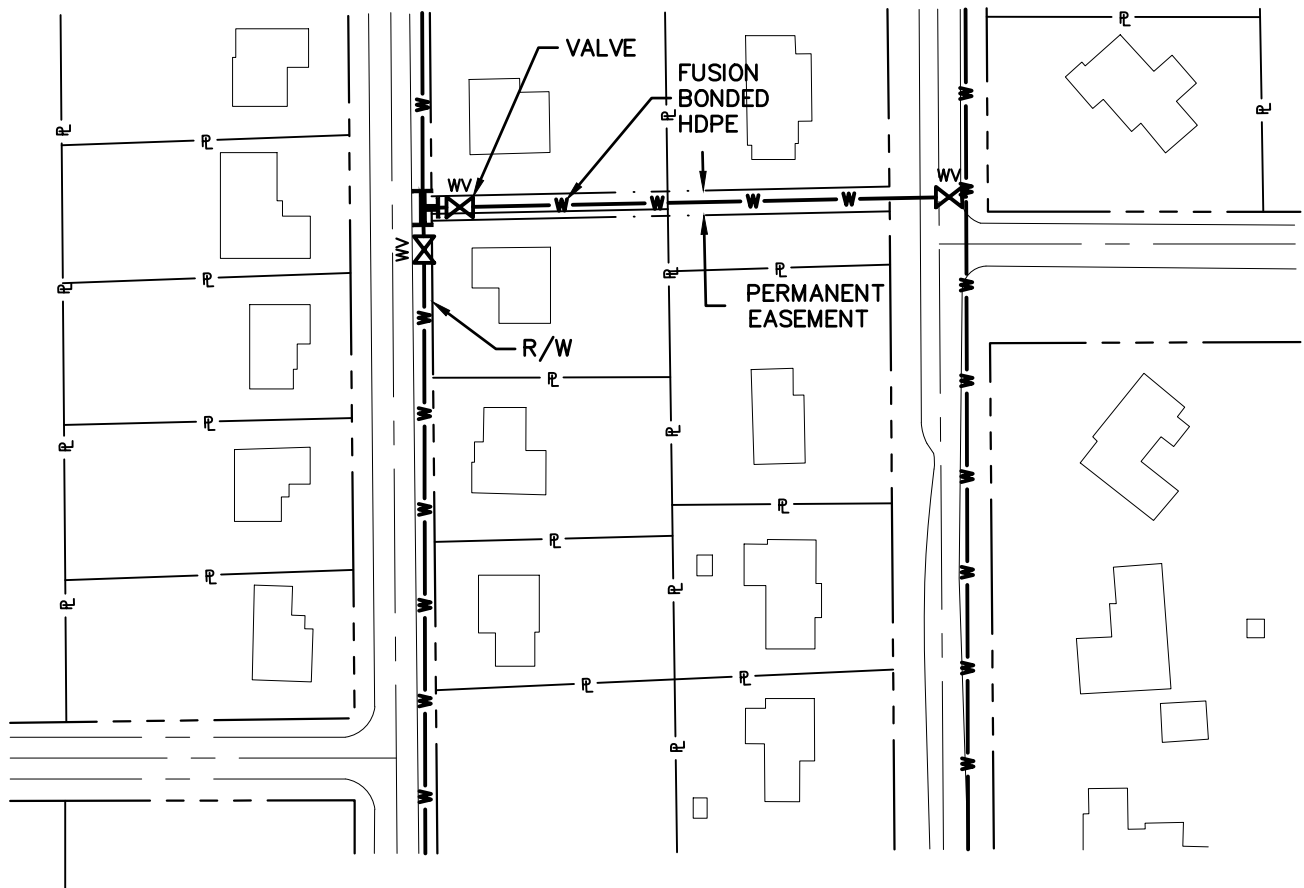
1. VALVE REQUIRED AT EACH CUL-DE-SAC. INSTALL VALVE TO AVOID CURBS & SIDEWALKS.
2. INSTALL HYDRANT WITHIN 150' OF THE BACK EDGE OF PAVEMENT OF CUL-DE-SAC.
3. INSTALL WATER MAINS ON OPPOSITE SIDE OF STREET FROM SANITARY SEWER.



CUL-DE-SAC WATER MAIN & HYDRANT INSTALLATION

SCALE: NONE

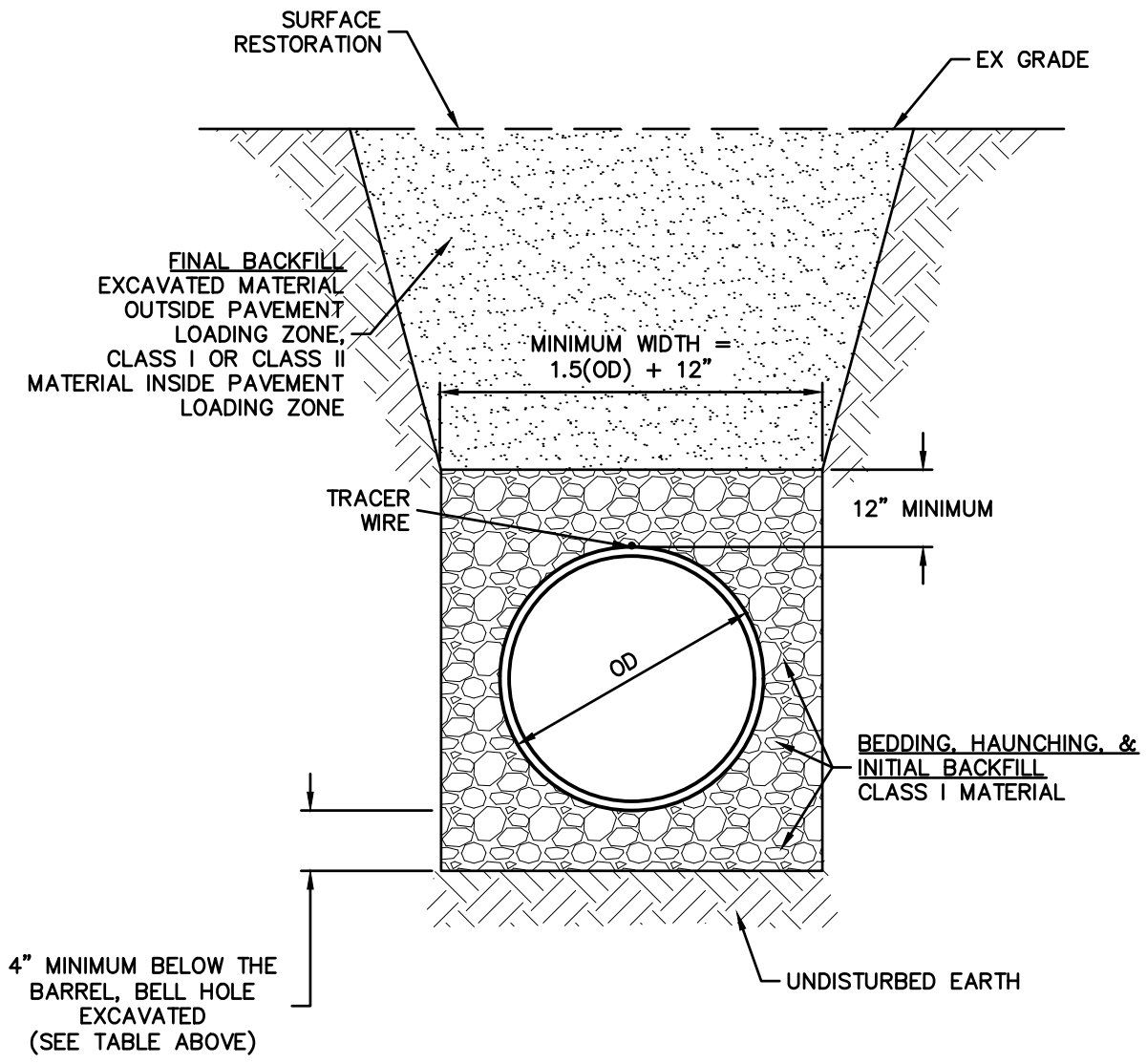
IN AREAS WHERE A MAIN MUST BE INSTALLED IN AN EASEMENT OR COMMON AREA THAT RUNS BETWEEN TWO OR MORE PROPERTIES, FUSION BONDED HIGH DENSITY POLYETHYLENE PIPE IS REQUIRED. THE INSTALLATION MUST TRAVERSE THE ENTIRE EASEMENT, COMMON AREA OR LOT AND SHALL BE INSTALLED AS ON CONTINUOUS PIPE WITH A VALVE LOCATED AT EACH END. THIS INSTALLATION WILL TYPICALLY GO FROM RIGHT-OF-WAY TO RIGHT-OF-WAY. NO TAPS WILL BE PERMITTED ON THIS SECTION OF MAIN. ALL TAPS MUST OCCUR WITHIN THE LIMITS OF THE RIGHT-OF-WAY AND NOT BETWEEN THE PROPERTIES. A MINIMUM 15' EXCLUSIVE WATER MAIN EASEMENT OR 30' NON-EXCLUSIVE EASEMENT WILL BE REQUIRED FOR INSTALLATION. NOTE: ADDITIONAL VALVES MAY BE REQUIRED TO ISOLATE SECTION.



MAIN INSTALLATION BETWEEN PROPERTIES

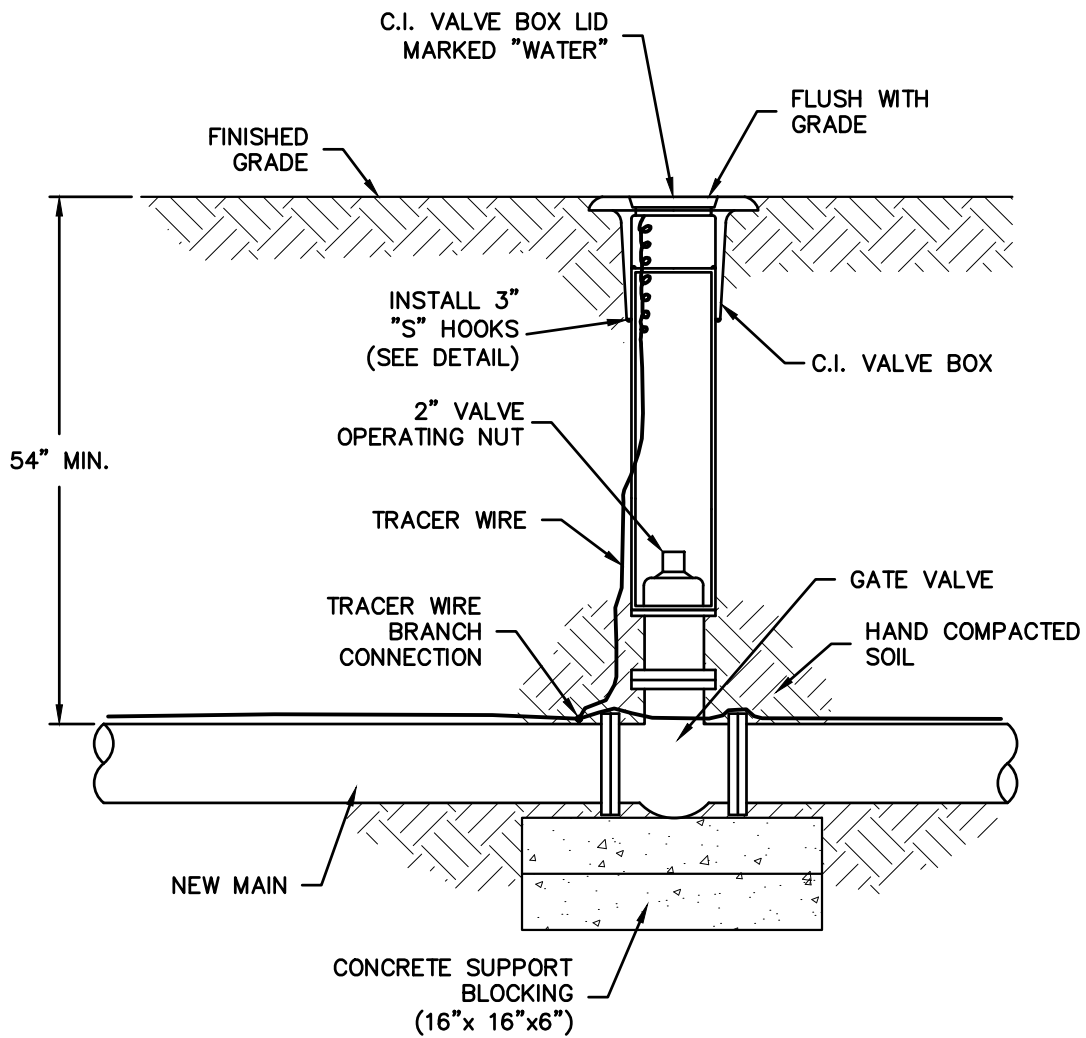
SCALE: NONE

PIPE SIZE	3" TO 15"	18" TO 30"
BEDDING BELOW THE PIPE BARREL	4"	OD / 4



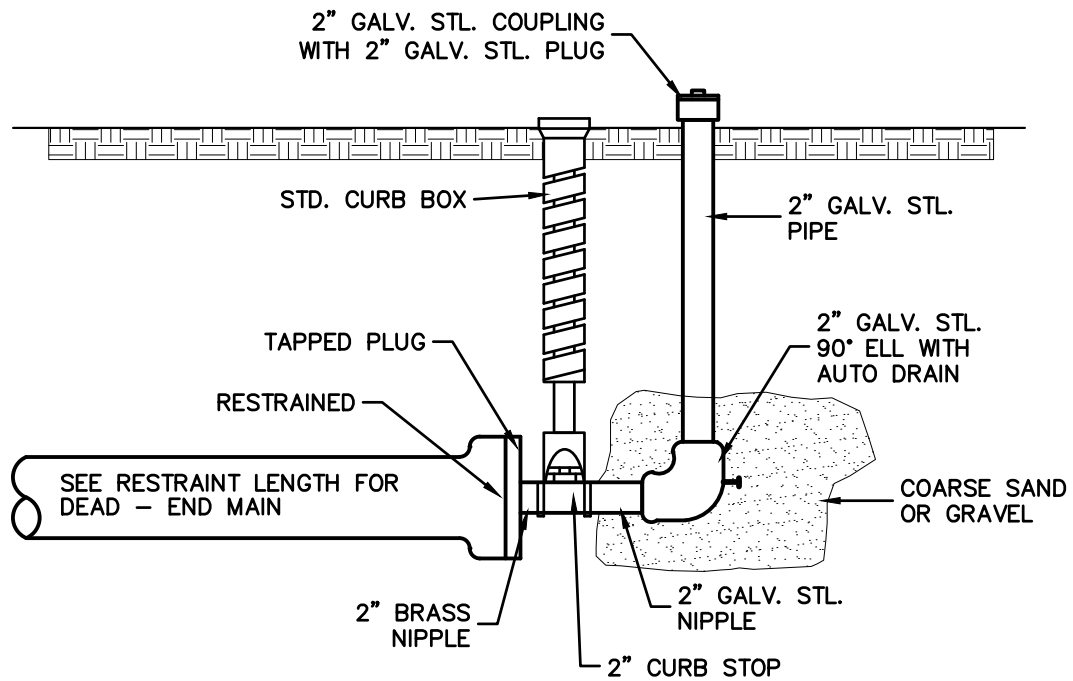
PLASTIC (PVC OR HDPE) PIPE TRENCH

SCALE: NONE



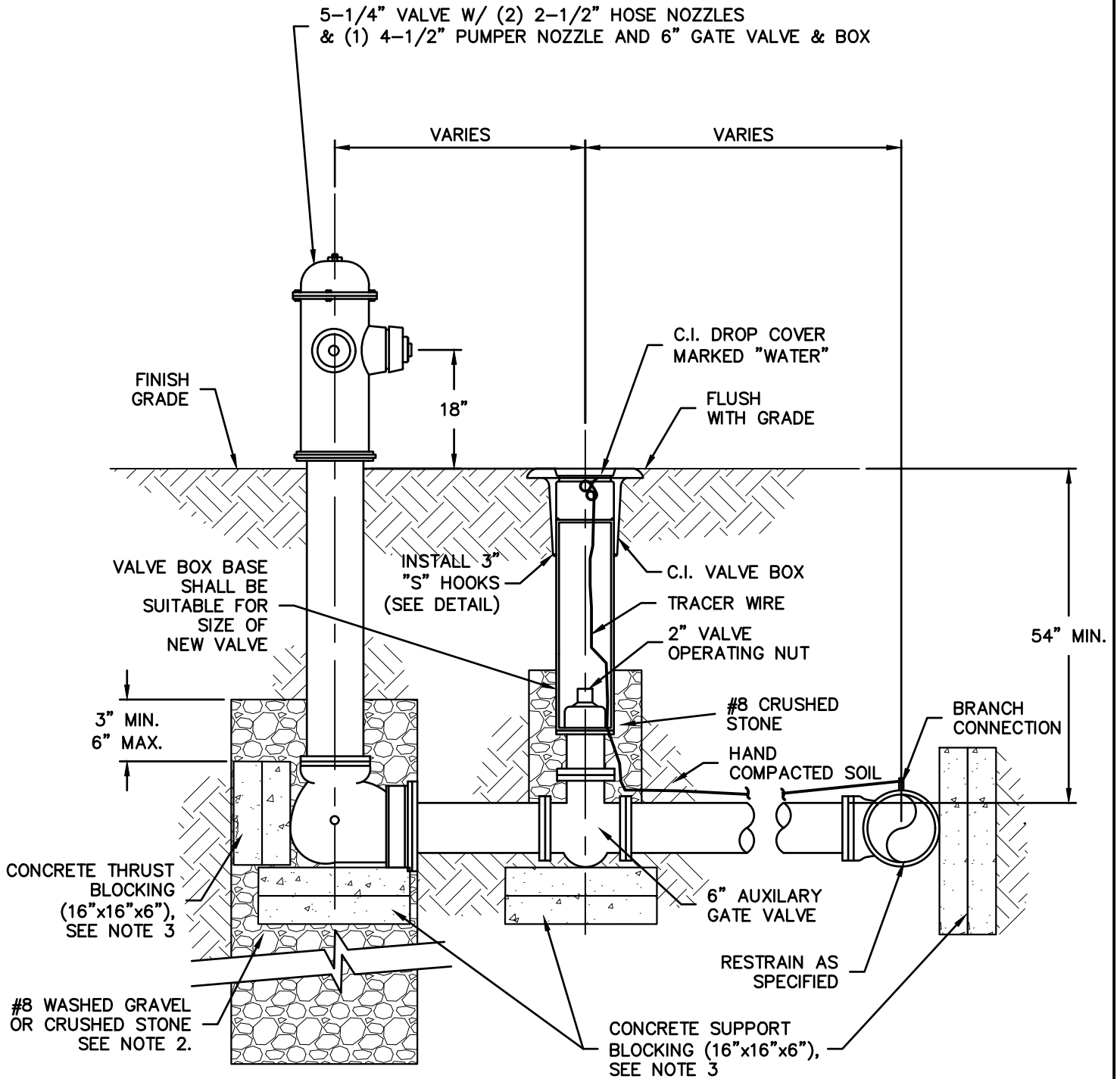
GATE VALVE

SCALE: NONE



BLOW-OFF INSTALLATION

SCALE: NONE



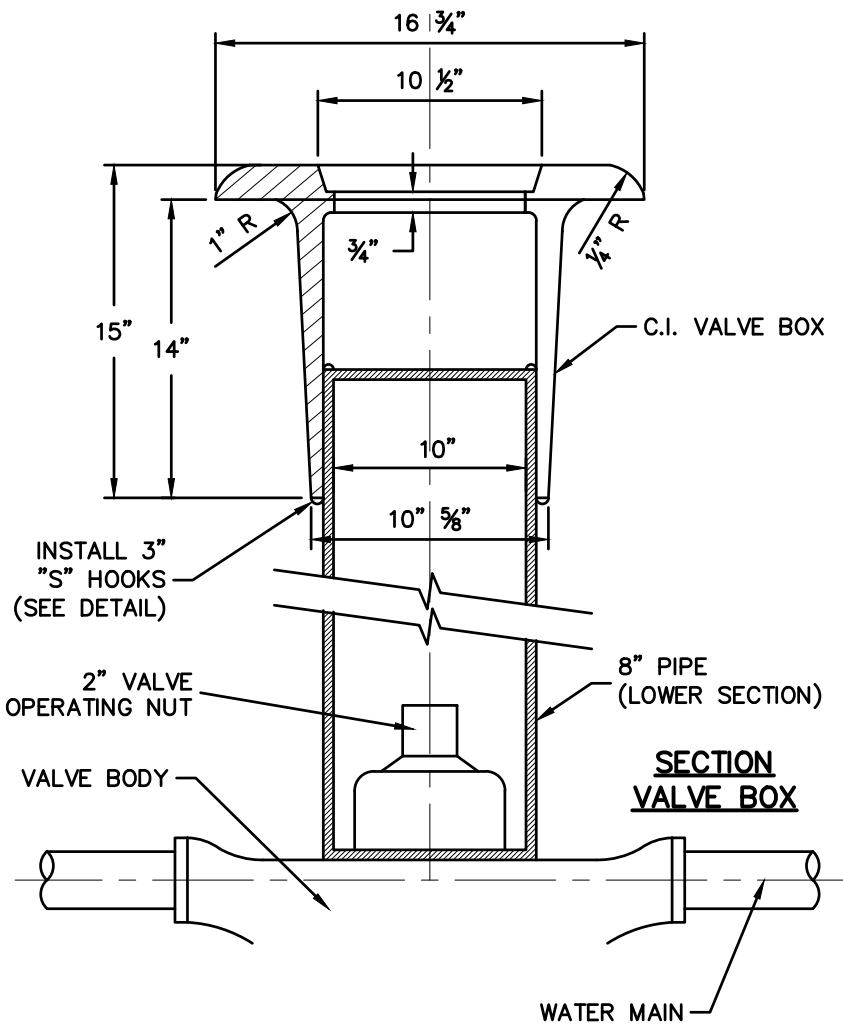
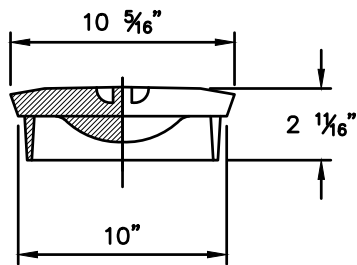
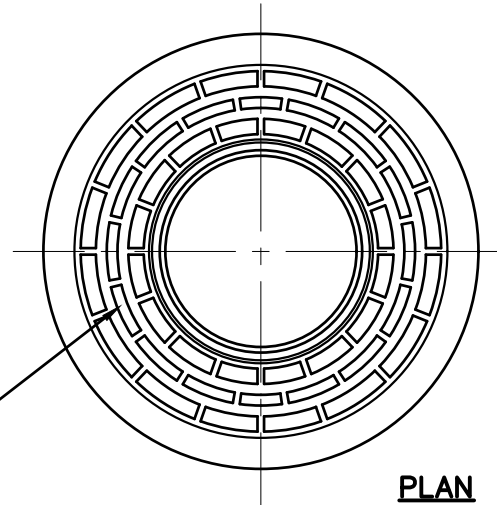
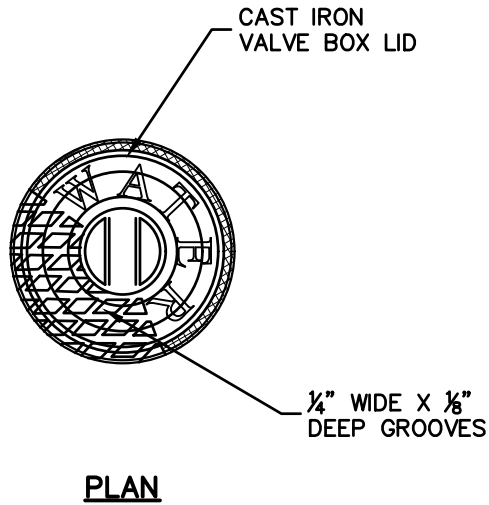
NOTES:

1. SET HYDRANT & VALVE ON CONCRETE SUPPORT BLOCKING.
2. PLACE 2'x3' DEEP DRAINAGE PIT, EXTEND A MINIMUM OF 3", AND MAXIMUM OF 6", ABOVE HYDRANT BOOT.
3. RESTRAINED FITTINGS SHALL BE USED IN ADDITION TO CONCRETE THRUST BLOCKING. RESTRAINTS MUST BE USED FROM THE DISTRIBUTION MAIN TO THE HYDRANT. PLACE CONCRETE BLOCKS BEHIND HYDRANT TO UNDISTURBED EARTH.
4. VALVE BOX SHALL BE CENTERED AND PLUMB OVER VALVE OPERATING NUT.

HYDRANT ASSEMBLY

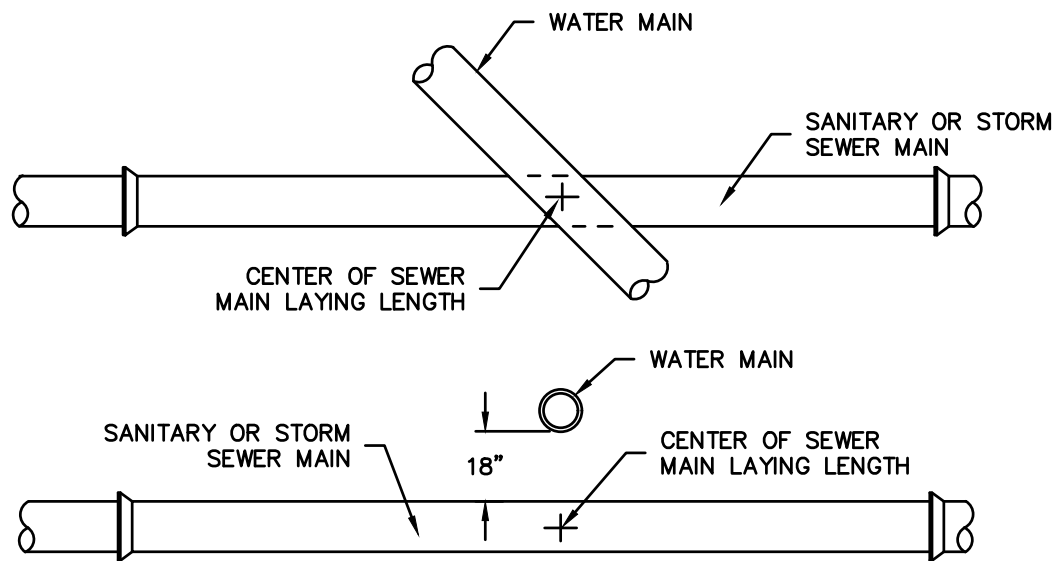
SCALE: NONE

DETAIL NO. DW-07
DATE: DEC 2017



STANDARD 8" VALVE BOX & COVER

SCALE: NONE

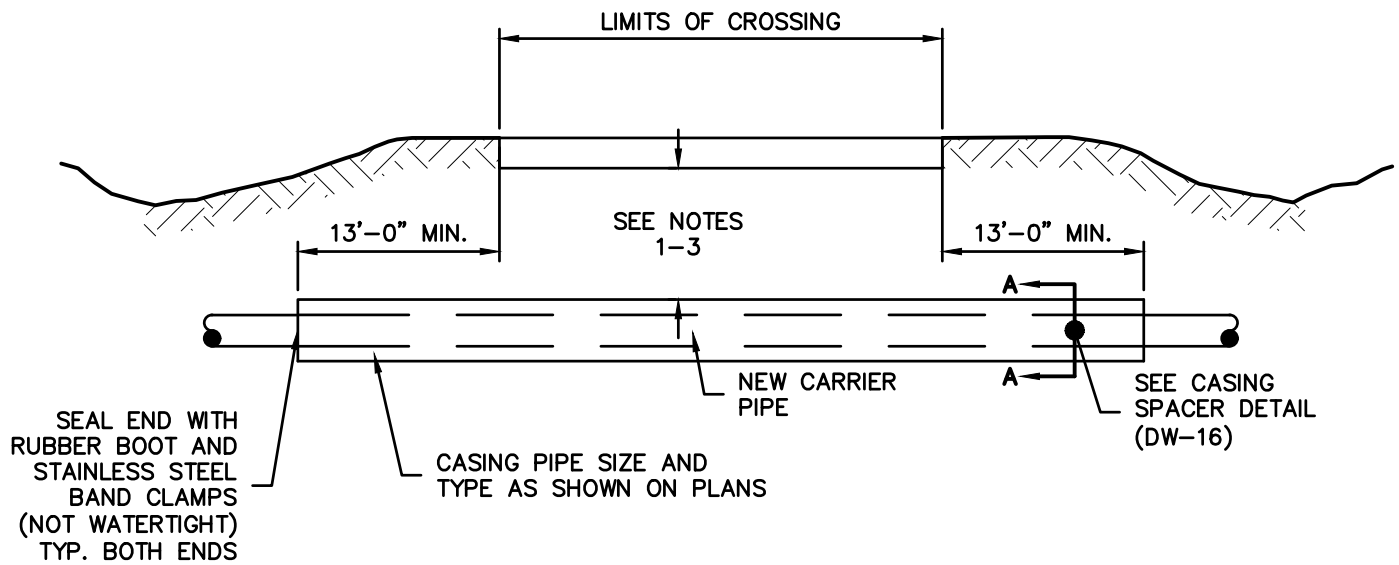


NOTES:

1. WATER MAIN AND SEWER MINIMUM SEPARATION: 18" VERTICAL SEPARATION 10'-0" HORIZONTAL SEPARATION.

MINIMUM CROSSOVER AND SEPARATION REQUIREMENTS FOR SEWER & WATER MAINS

SCALE: NONE



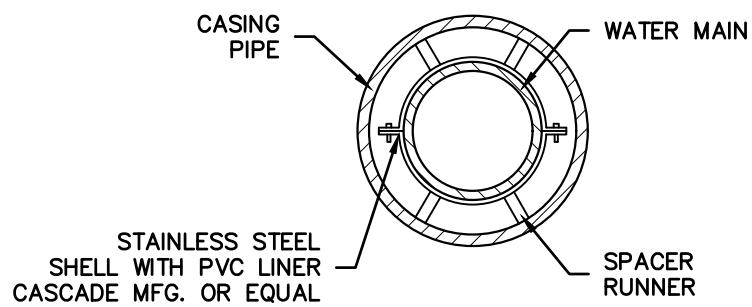
NOTES:

1. WATERWAY CROSSINGS: CASING PIPE SHALL BE AT LEAST 3'-0" BELOW WATERWAY BOTTOM.
2. HIGHWAY/ROADWAY CROSSINGS: CASING PIPE SHALL BE AT LEAST 4'-6" BELOW ROADWAY SUBBASE.
3. RAILROAD CROSSINGS: CASING PIPE SHALL BE DEPTH SPECIFIED BY RAILROAD AUTHORITY AND AS LISTED IN THE APPROVED PERMIT APPLICATION.

CASING PIPE

SCALE: NONE

DETAIL NO. DW-10
DATE: DEC 2017

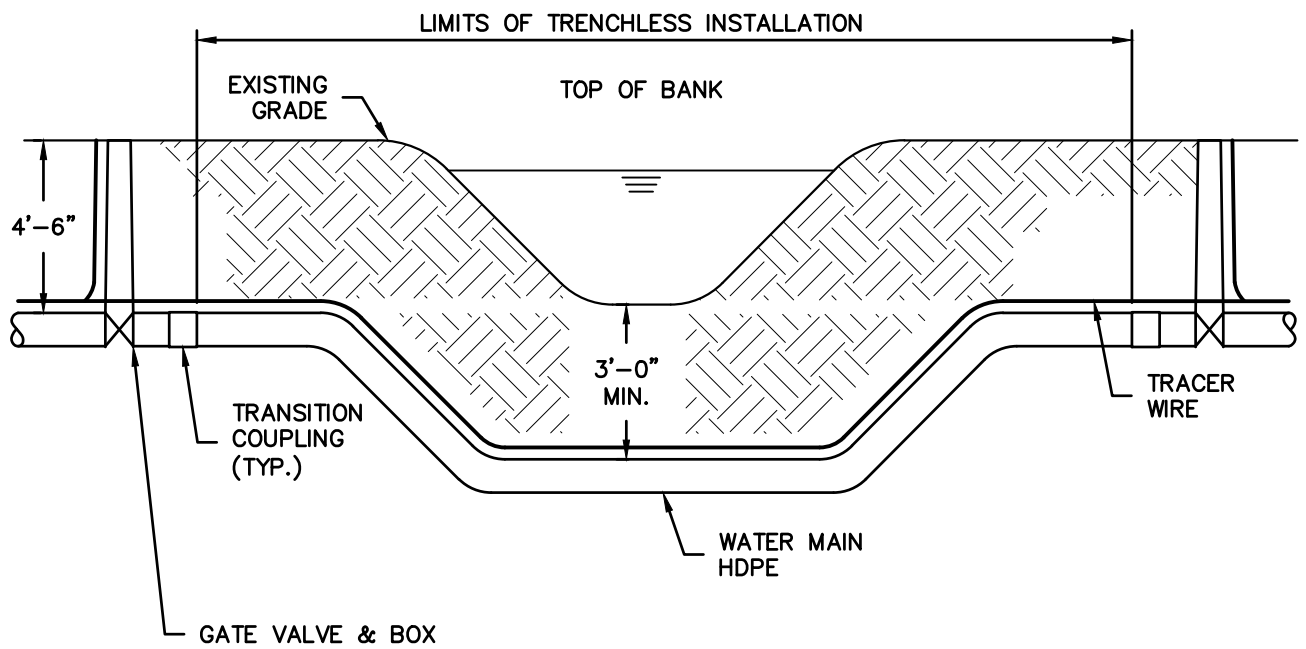


NOTES:

1. CASTING SPACERS TO BE THE CENTERED AND RESTRAINED TYPE.
2. INSTALL CASING SPACERS AT 6' INTERVALS.

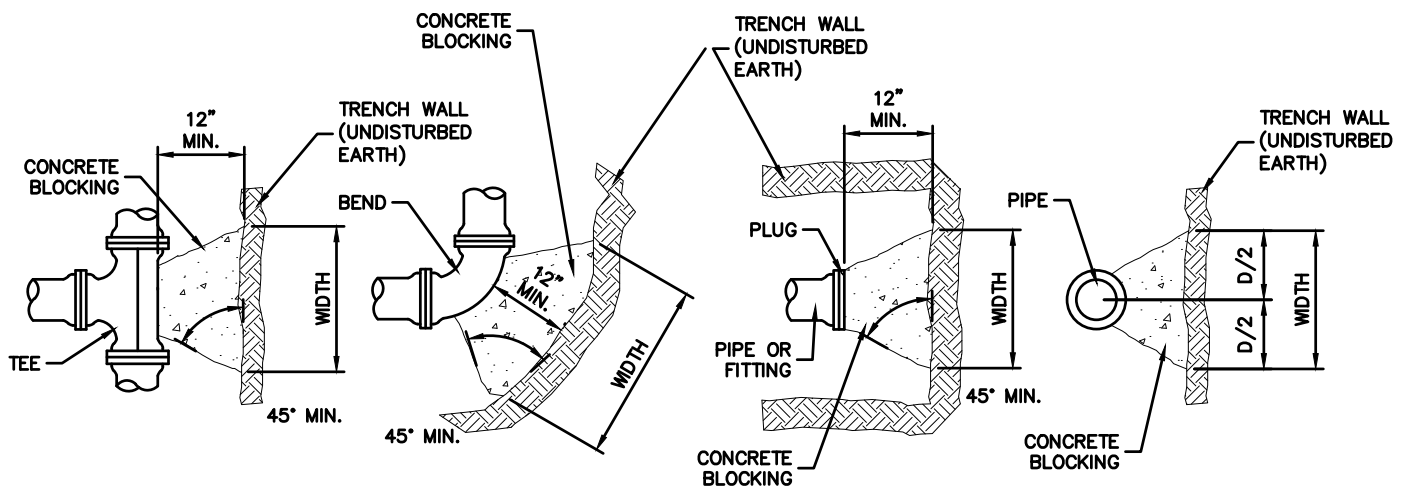
CASING SPACER DETAIL

SCALE: NONE



WATERWAY CROSSING

SCALE: NONE



SIZE	TEE		22½°		45°		90°		PLUG	
	W	D	W	D	W	D	W	D	W	D
3", 4"	2'-6"	1'-0"	1'-0"	0'-9"	1'-6"	1'-3"	2'-9"	1'-3"	1'-6"	1'-6"
6"	3'-3"	1'-6"	2'-0"	1'-0"	2'-6"	1'-6"	4'-3"	1'-6"	2'-3"	2'-3"
8"	4'-3"	2'-0"	2'-0"	1'-9"	3'-9"	1'-9"	6'-0"	2'-0"	3'-0"	3'-0"
10"	5'-3"	2'-6"	3'-0"	1'-9"	4'-0"	2'-6"	7'-3"	2'-6"	3'-9"	3'-9"
12"	6'-0"	3'-0"	3'-6"	2'-0"	4'-9"	3'-6"	7'-9"	3'-0"	4'-3"	4'-3"

NOTES:

1. CONCRETE REACTION BLOCKING SHALL NOT COVER PIPE JOINTS, BOLTS, OR GLANDS
2. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH NOT LESS THAN 2000 PSI AFTER 28 DAYS. UNOPENED BAGS OF SACKRETE ARE NOT ACCEPTABLE.
3. WRAP D.I. FITTINGS WITH 8 MIL. VISQUEEN OR POLYETHELENE ENCASEMENT.

TYPICAL WATER MAIN REACTION BLOCKING

SCALE: NONE

PVC & HDPE PIPE RESTRAINT

FEET OF RESTRAINED PIPE ● 150 PSI

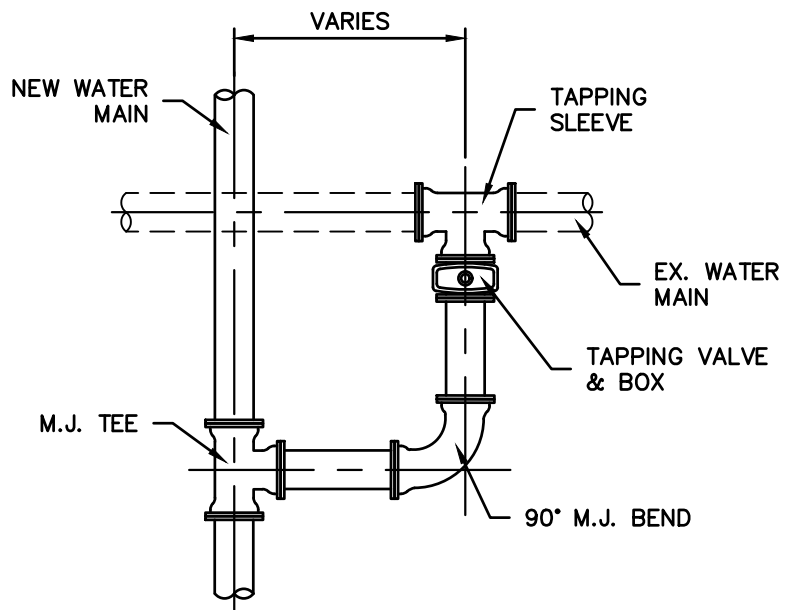
FITTING TYPE	WATER MAIN SIZE							
	4 INCH	6 INCH	8 INCH	10 INCH	12 INCH	14 INCH	16 INCH	18 INCH
11 1/4° BEND	1'	2'	2'	2'	2'	3'	3'	3'
22 1/2° BEND	2'	3'	3'	4'	4'	5'	5'	6'
45° BEND	3'	5'	6'	7'	8'	9'	10'	11'
90° BEND	8'	11'	13'	16'	19'	22'	24'	27'
11 1/4° VERTICAL BEND	2'	3'	4'	5'	6'	6'	7'	8'
22 1/2° VERTICAL BEND	4'	6'	8'	9'	11'	12'	14'	15'
45° VERTICAL BEND	9'	12'	15'	19'	22'	25'	28'	31'
90° VERTICAL BEND	20'	29'	37'	45'	52'	60'	67'	75'
VALVE/PLUG	20'	29'	37'	45'	52'	60'	67'	75'
TEE OUTLET	18'	27'	35'	43'	50'	58'	66'	73'
DEAD END	20'	29'	37'	45'	52'	60'	67'	75'

NOTE: TYPE 5 TRENCH, GOOD SAND OR GRAVEL BACKFILL

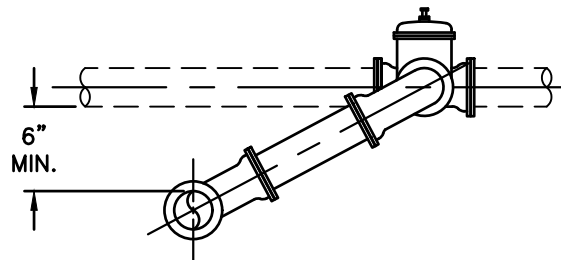
WATER MAIN RESTRAINED PIPING

SCALE: NONE

**DETAIL NO. DW-14
DATE: DEC 2017**



PLAN VIEW



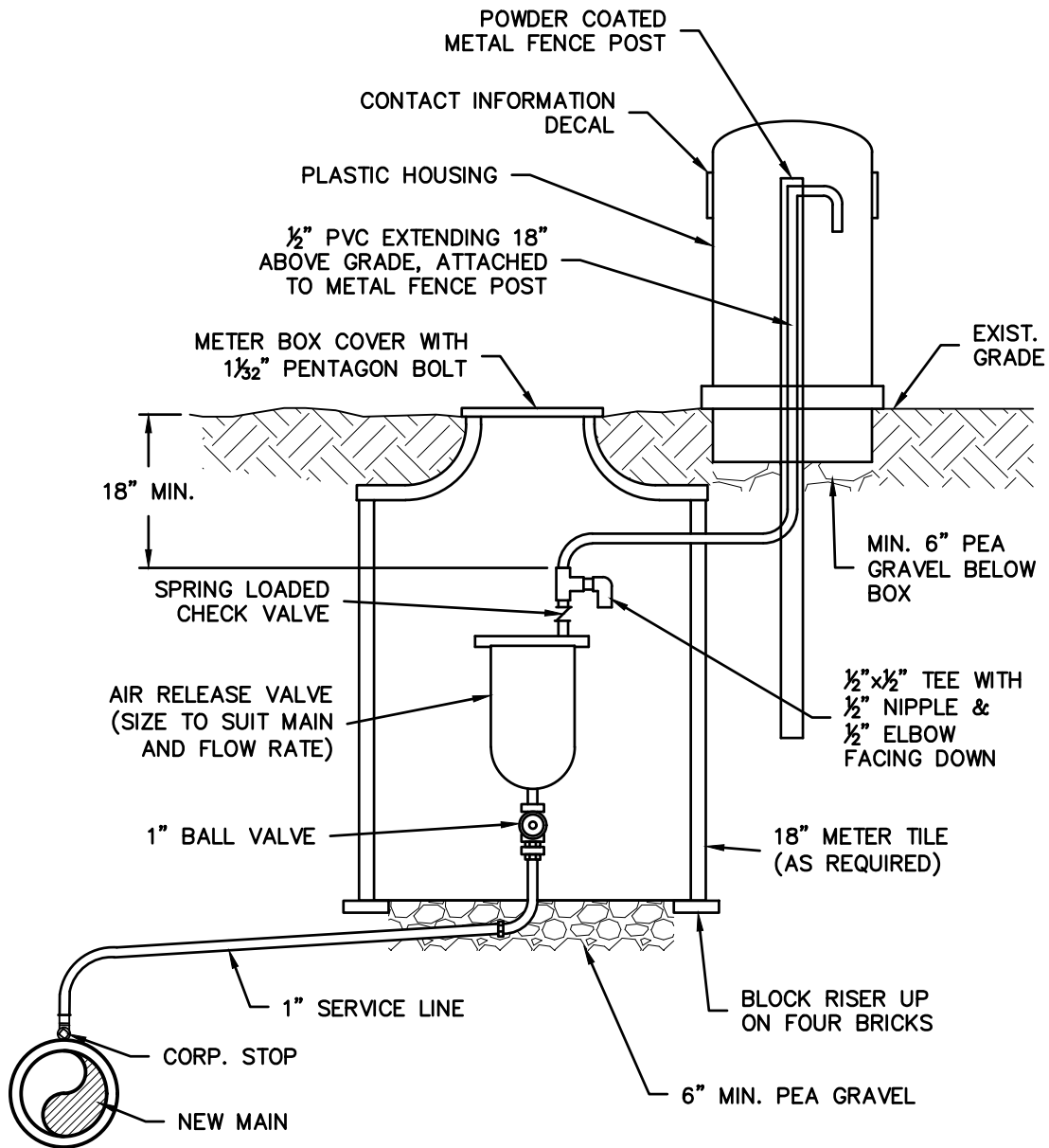
SECTION VIEW

NOTES:

1. USE RESTRAINED MECHANICAL JOINT FITTINGS IN ADDITION TO CONCRETE THRUST BLOCKING.

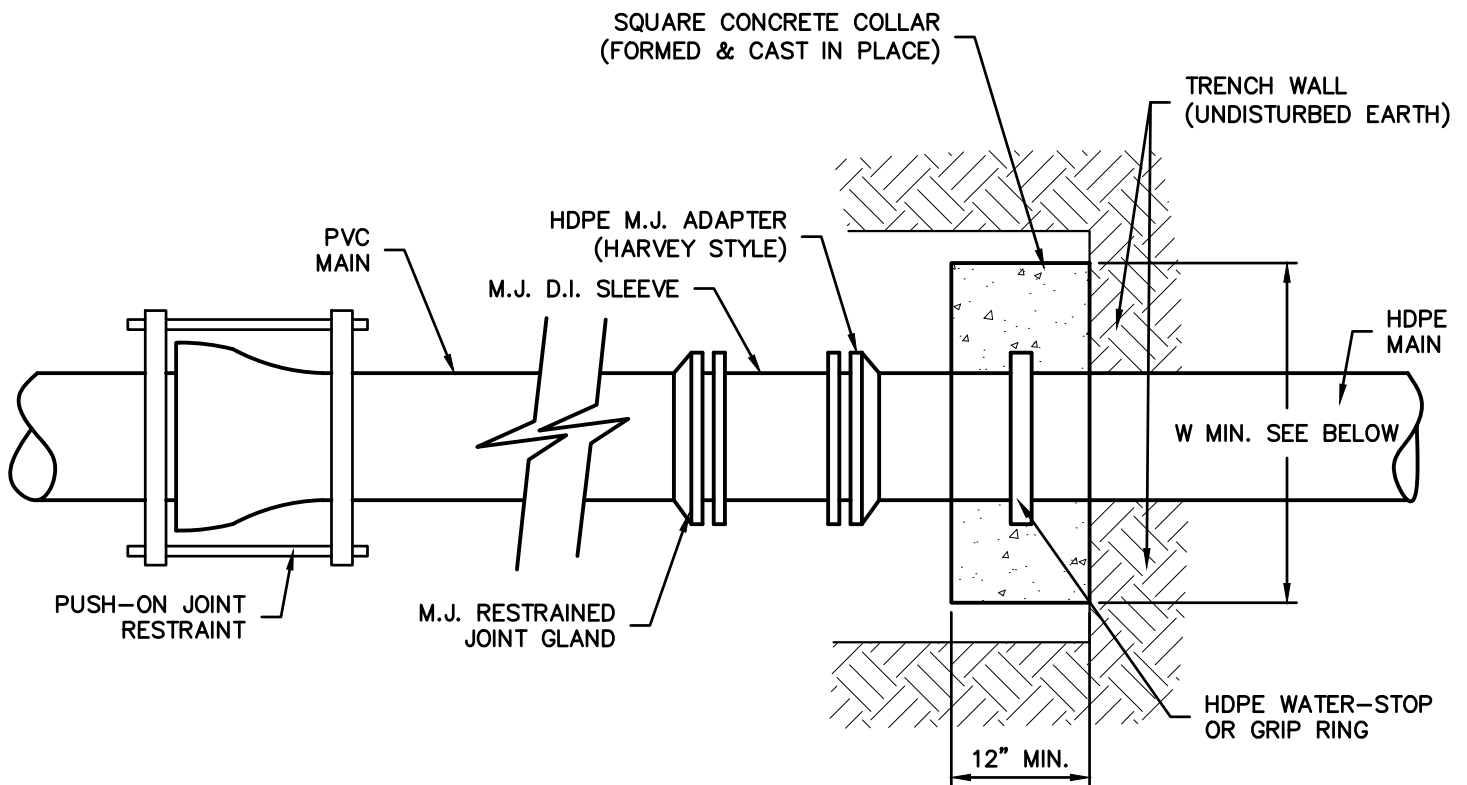
CROSS TAP CONFIGURATION

SCALE: NONE



AIR RELEASE VALVE

SCALE: NONE

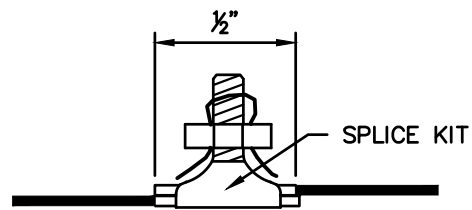


PIPE SIZE	BRACING AREA OF CONCRETE COLLAR	W MIN.
6"	5 SQ. FT.	3'-0"
8"	9 SQ. FT.	3'-6"
12"	18 SQ. FT.	4'-3"
16"	21 SQ. FT.	4'-9"
20"	24 SQ. FT.	5'-0"

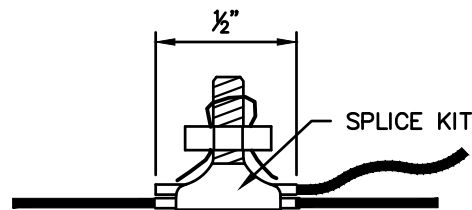
TRANSITION COUPLING

SCALE: NONE

DETAIL NO. DW-17
DATE: DEC 2017



EXISTING CONNECTION



BRANCH CONNECTION

TRACER WIRE BOLTED
CONNECTION

SCALE: NONE

See Specification
02661 - Water Services

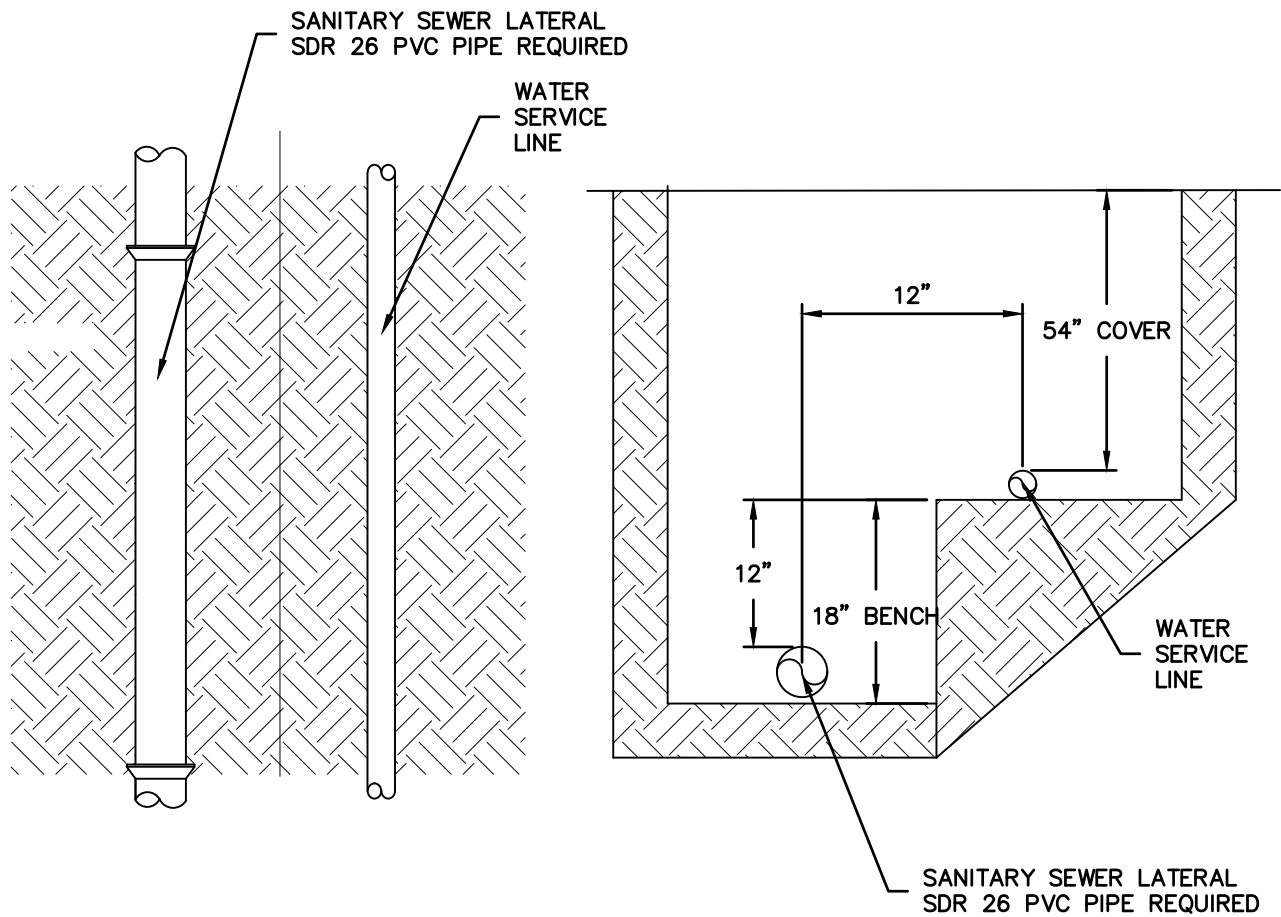
METER SETTING DETAIL

SCALE: NONE

DETAIL NO. DW-19
DATE: DEC 2017

v2 :: 2021-04-23

v1 :: 2017-12-07



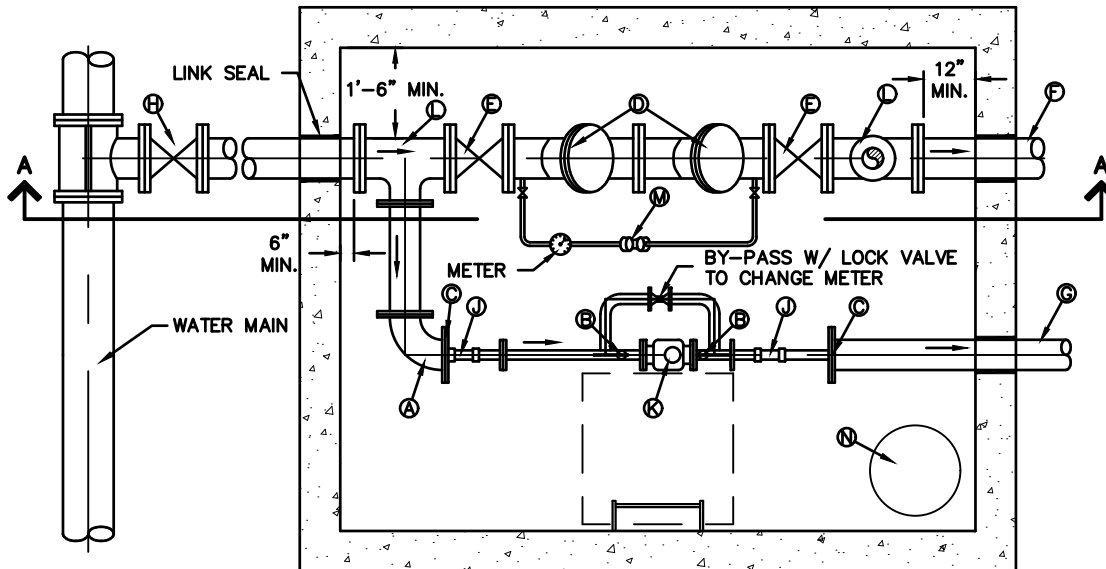
WATER SERVICE BENCHING

SCALE: NONE

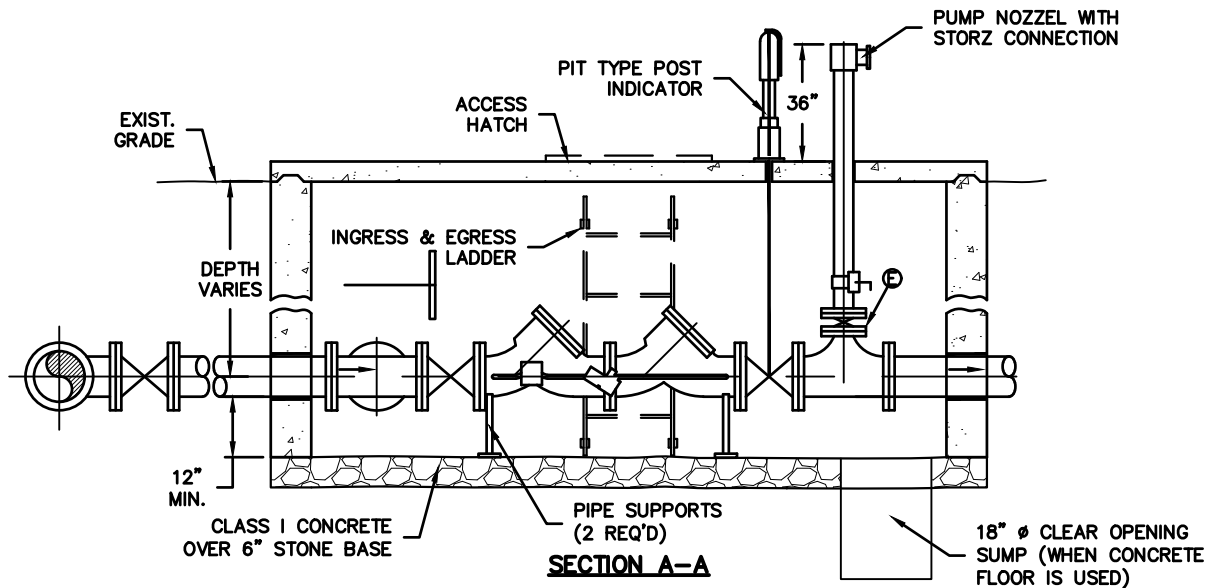
DETAIL NO. DW-20
DATE: DEC 2017

v2 :: 2021-04-23

v1 :: 2017-12-07



PLAN VIEW



SECTION A-A

NOTES:

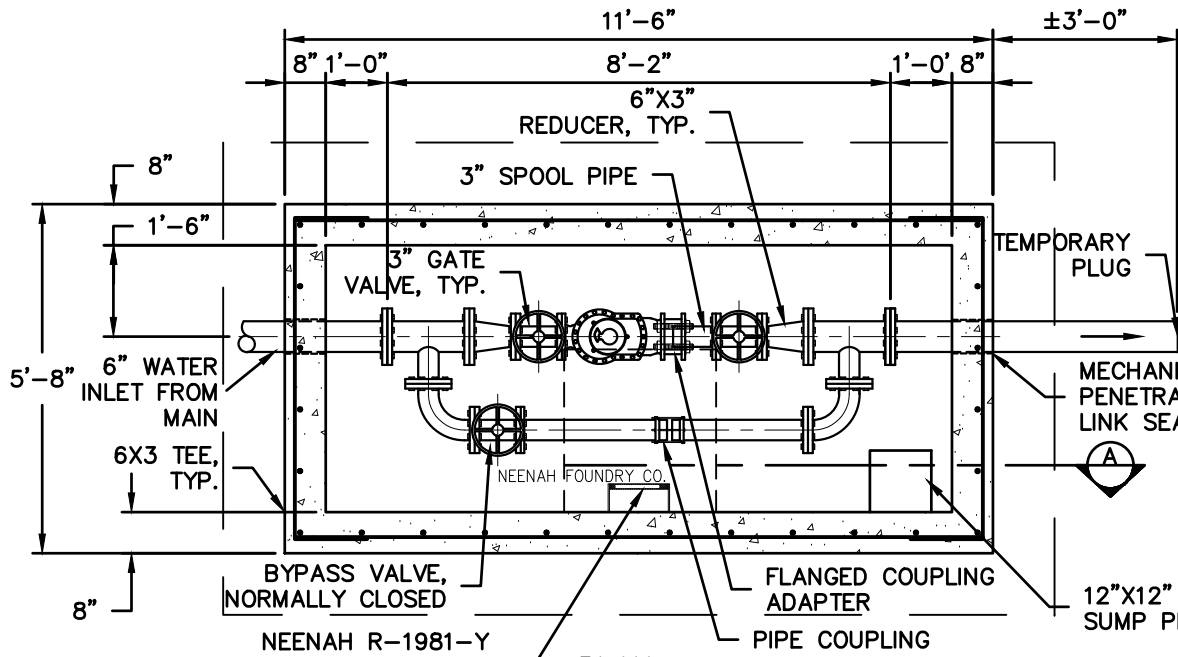
1. CONTRACTOR SHALL CONSTRUCT METER VAULT.
2. CONSTRUCTION MATERIALS: CONCRETE, OR PRECAST/CAST-IN-PLACE AS DIRECTED BY TOWN OF MONROE.
3. INSIDE DIMENSIONS PER DRAWING NOTES. VAULT TO BE SET LENGTHWISE WITH SERVICE.
4. TOP OF VAULT TO BE CONCRETE, AT LEAST 4" THICK WITH REINFORCING. WHEN VAULT IS CONSTRUCTED IN PAVED AREAS, PAVEMENT IS TO BE LEVEL WITH TOP OF VAULT, AND THE TOP REINFORCED AS REQUIRED TO SUPPORT TRAFFIC LOADS. WHEN VAULT IS CONSTRUCTED IN GRASS PLOT, TOP OF VAULT SHALL CORRESPOND WITH FINISHED GRADE LEVEL OF SURROUNDING AREA.
5. BOTTOM OF VAULT TO BE MINIMUM OF 6" OF CRUSHED STONE OR 4" CONCRETE AS DIRECTED BY TOWN OF MONROE, WITH MINIMUM CLEARANCE OF 12" BELOW BOTTOM OF FIRE/SERVICE LINE.
6. CUSTOMER SHALL FURNISH 2" BALL VALVES ON OUTLET SIDE OF THE 2" METER SETTING.
7. CUSTOMER SHALL FURNISH DOUBLE DETECTOR CHECK VALVE. METER IS FURNISHED BY TOWN OF MONROE.
8. CUSTOMER SHALL FURNISH VAULT FRAME AND LID TO BE INSTALLED IN TOP OF VAULT BY CUSTOMER (BILCO J-2AL OR 30"x30" ALUMINUM PCM)
9. TOWN OF MONROE WILL INSTALL DOMESTIC SERVICE METER INTO THE VAULT. COMBINATION SERVICES CAN BE USED AT THE DISCRETION OF THE WATER COMPANY.
10. CUSTOMER SHOULD INSTALL A LADDER IN PIT FOR INGRESS AND EGRESS.
11. A 2" TEST PLUG SHALL BE INSTALLED AT LEAST 2 PIPE DIAMETERS DOWNSTREAM OF 2" OR LARGER METERS.

KEYED NOTES:

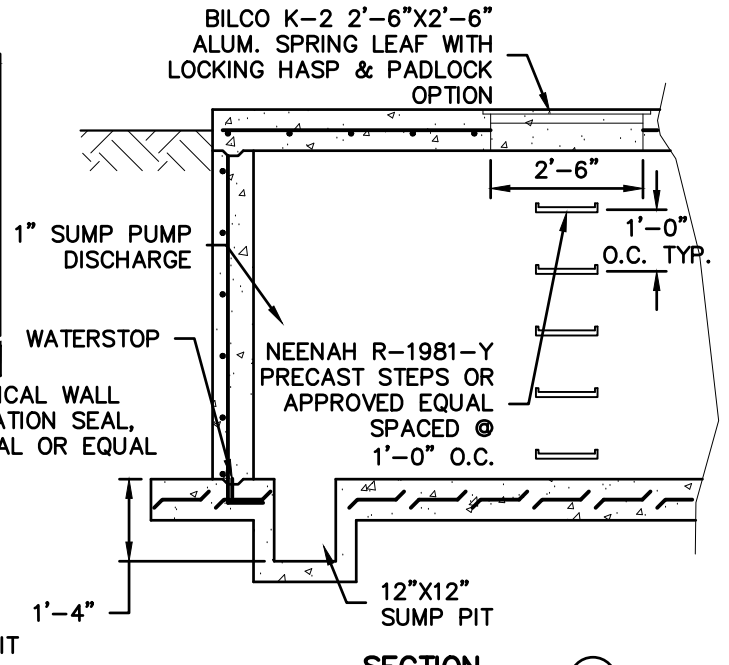
- (A) 90° FLANGED BEND w/ PIPE SUPPORT
- (B) BALL VALVE w/ FLANGED END
- (C) REDUCING FLANGE
- (D) DOUBLE DETECTOR CHECK VALVE ASS'Y
- (E) FLANGED OS & Y VALVE
- (F) FIRE LINE
- (G) DOMESTIC SERVICE
- (H) MECHANICAL JOINT GATE VALVE & BOX
- (I) TAPPING SLEEVE w/ TAPPING VALVE & BOX
- (J) LOK-PAK
- (K) METER - (BY UTILITY)
- (L) FLANGED TEE
- (M) DOUBLE CHECK VALVE
- (N) SUMP (USE WHEN FLOOR IS CONCRETE)

COMBINED FIRE & DOMESTIC SERVICE METER VAULT

**DETAIL NO. DW-21
DATE: DEC 2017**

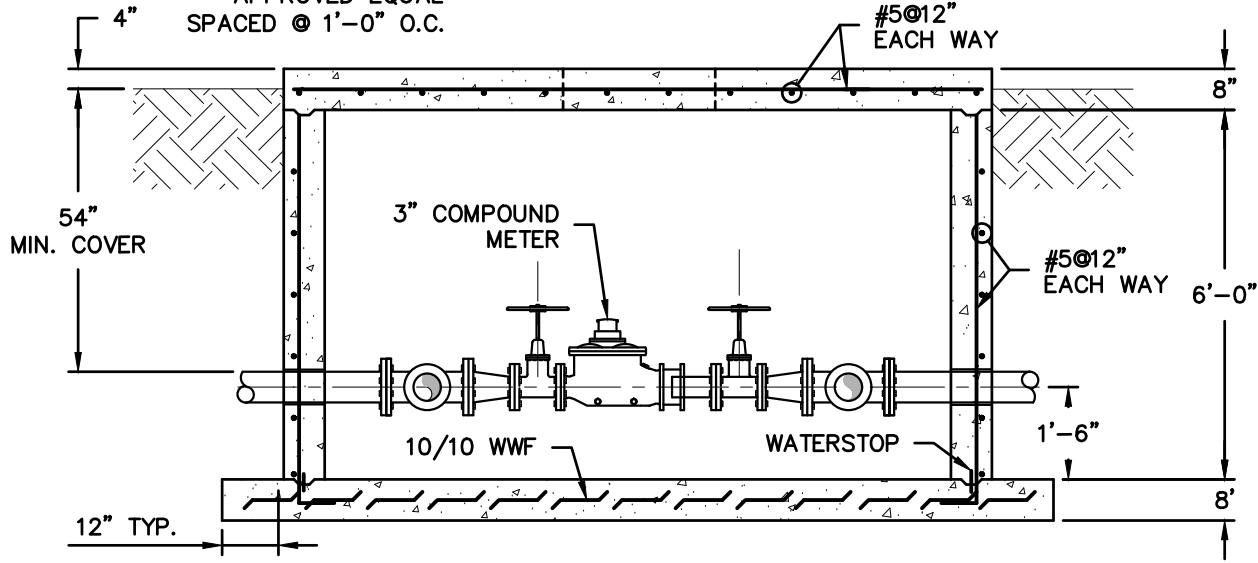


PLAN



SECTION

NOTE TO USER: THIS DETAIL IS INTENDED AS AN EXAMPLE OF THE MINIMUM INFORMATION TO BE INCLUDED IN A COMPOUND METERING DETAIL. IT HAS NOT BEEN DRAWN TO A TRUE SCALE. A UNIQUE COMPOUND METERING DETAIL SHALL BE PREPARED FOR EACH PROJECT WHERE NEEDED, DRAWN TO A TRUE SCALE, SHOWING THE SPECIFIC FEATURES REQUIRED FOR THAT INSTALLATION.



TYPICAL SECTION

COMPOUND METERING & METER PIT DETAILS

SCALE: NONE

DETAIL NO. DW-22
DATE: DEC 2017

APPENDIX A

FORMS AND CHECKLISTS

ENGINEER INFORMATION FORM

(To be submitted prior to the pre-construction conference)

Project Name/Location: _____

Main Extension Agreement No.: _____

Date: _____ **Received Date:** _____

Construction Schedule Start Date: _____

Engineer Name: _____

Address: _____

Contact Person: _____

Telephone: _____ **FAX:** _____

24-Hour Emergency Contact: _____

Developer: _____

Project Representative: _____ **Telephone:** _____

Internal Field Contact: _____ **Telephone:** _____

24-Hour Emergency Contact: _____

Signature: _____

CONTRACTOR INFORMATION FORM

(To be submitted prior to the pre-construction conference)

Project Name/Location: _____

Main Extension Agreement No.: _____

Date: _____ **Received Date:** _____

Construction Schedule Start Date: _____

Contractor Name: _____

Address: _____

Contact Person: _____

Telephone: _____ **FAX:** _____

24-Hour Emergency Contact: _____

Developer: _____

Project Representative: _____ **Telephone:** _____

Internal Field Contact: _____ **Telephone:** _____

24-Hour Emergency Contact: _____

Signature: _____

EASEMENT EXHIBIT CHECKLIST

General

	YES	NO	COMMENTS
Sheet size: 8 1/2" x 11" or 8 1/2" x 14"	<input type="checkbox"/>	<input type="checkbox"/>	
Scale: 1=1 (digital); standard recognized engineering scale	<input type="checkbox"/>	<input type="checkbox"/>	
Scale: 1=1 (digital, registered to State Plane Coordinates (IN East NAD83 US FT); standard recognized engineering scale	<input type="checkbox"/>	<input type="checkbox"/>	
North Arrow	<input type="checkbox"/>	<input type="checkbox"/>	
Utility Job Number for which easement is being granted	<input type="checkbox"/>	<input type="checkbox"/>	
Utility Distribution Map where easement is located	<input type="checkbox"/>	<input type="checkbox"/>	
Utility Easement Number	<input type="checkbox"/>	<input type="checkbox"/>	
Adjoining Street Name (or Project Name)	<input type="checkbox"/>	<input type="checkbox"/>	
Grantor Name(s) and Addresses(s)	<input type="checkbox"/>	<input type="checkbox"/>	
Name and Title of person(s) authorized to sign easement documents if Grantor is a corporation, company, partnership, trust, or legal entity other than an individual	<input type="checkbox"/>	<input type="checkbox"/>	
Recording information for Last Deed of Record	<input type="checkbox"/>	<input type="checkbox"/>	
Name of engineer/engineering firm and contact information	<input type="checkbox"/>	<input type="checkbox"/>	
Telephone Number(s) where Grantor(s) can be reached	<input type="checkbox"/>	<input type="checkbox"/>	
Section Corner (quarter section corner, range point) tie	<input type="checkbox"/>	<input type="checkbox"/>	
Description of section quarter	<input type="checkbox"/>	<input type="checkbox"/>	
Directions and dimensions to Point of Beginning	<input type="checkbox"/>	<input type="checkbox"/>	
Street names adjacent to property (Place on Drawing) on which easement is being granted	<input type="checkbox"/>	<input type="checkbox"/>	
Outline of Property on which easement is being granted	<input type="checkbox"/>	<input type="checkbox"/>	
Parcel number	<input type="checkbox"/>	<input type="checkbox"/>	

Easement

	YES	NO	COMMENTS
Point of Beginning	<input type="checkbox"/>	<input type="checkbox"/>	
Dimensions (directions to the nearest second, distances to the nearest hundredth of a foot	<input type="checkbox"/>	<input type="checkbox"/>	
Hatching (temporary or permanent)	<input type="checkbox"/>	<input type="checkbox"/>	
Easement label (temporary or permanent) and nominal width	<input type="checkbox"/>	<input type="checkbox"/>	
Legal Description of Easement	<input type="checkbox"/>	<input type="checkbox"/>	
Professional Land Surveyor's Seal and Signature	<input type="checkbox"/>	<input type="checkbox"/>	
The most recent deed of record for each parcel involved	<input type="checkbox"/>	<input type="checkbox"/>	

Title Block

	YES	NO	COMMENTS
Utility Job Number for which easement is being granted	<input type="checkbox"/>	<input type="checkbox"/>	
Utility Distribution Map where easement is located	<input type="checkbox"/>	<input type="checkbox"/>	
Utility Easement Number	<input type="checkbox"/>	<input type="checkbox"/>	
Adjoining Street Name (or Project Name)	<input type="checkbox"/>	<input type="checkbox"/>	
Brief Description of Easement location	<input type="checkbox"/>	<input type="checkbox"/>	

ADDITIONAL COMMENTS: (use back page, if necessary)

RECORD DRAWINGS CHECKLIST

General

	YES	NO	COMMENTS
Registered to State Plane Coordinates (IN East NAD83 US FT) on Sheet size: 24" x 36" (only)	<input type="checkbox"/>	<input type="checkbox"/>	
Scale 1=1	<input type="checkbox"/>	<input type="checkbox"/>	_____
1 – PDF digital copy	<input type="checkbox"/>	<input type="checkbox"/>	_____
1- CAD digital copy (.dwg format)	<input type="checkbox"/>	<input type="checkbox"/>	_____
1 – shapefile (.shp format) or other file type compatible with the Town's GIS software	<input type="checkbox"/>	<input type="checkbox"/>	_____
1 – hard copy set of as-built drawings	<input type="checkbox"/>	<input type="checkbox"/>	_____
1" = 50' (max) Plan View (paper copy)	<input type="checkbox"/>	<input type="checkbox"/>	_____
1" = 50' (max) horizontal/1"=5' Vertical Profile View	<input type="checkbox"/>	<input type="checkbox"/>	_____
North Arrow	<input type="checkbox"/>	<input type="checkbox"/>	_____
Drawing sheet match lines with drawing sheet [if proposed development lies on more than one (1) sheet]	<input type="checkbox"/>	<input type="checkbox"/>	_____

Project Information Block

COMMENTS

	YES	NO	
Name of proposed project	<input type="checkbox"/>	<input type="checkbox"/>	_____
Project number	<input type="checkbox"/>	<input type="checkbox"/>	_____
Number of lots	<input type="checkbox"/>	<input type="checkbox"/>	_____
Tax code (leave blank)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Name of engineer/engineering firm and contact information	<input type="checkbox"/>	<input type="checkbox"/>	_____
Date of submittal	<input type="checkbox"/>	<input type="checkbox"/>	_____
Date of revision	<input type="checkbox"/>	<input type="checkbox"/>	_____
County	<input type="checkbox"/>	<input type="checkbox"/>	_____
Township	<input type="checkbox"/>	<input type="checkbox"/>	_____
Sewer Utility serving the project	<input type="checkbox"/>	<input type="checkbox"/>	_____

Project Location Map Block

COMMENTS

	YES	NO	
North Arrow	<input type="checkbox"/>	<input type="checkbox"/>	_____
Scale 1"=2000'	<input type="checkbox"/>	<input type="checkbox"/>	_____
Cross Streets (label)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Project Site Location (label)	<input type="checkbox"/>	<input type="checkbox"/>	_____

RECORD DRAWINGS CHECKLIST

Existing Information

	YES	NO	COMMENTS
Offsite information (area between existing water main connection point to boundary of proposed development	<input type="checkbox"/>	<input type="checkbox"/>	
Streets bounding proposed area and/or cross streets (include centerline of pavement) and street names	<input type="checkbox"/>	<input type="checkbox"/>	
Driveways, parking areas, etc.	<input type="checkbox"/>	<input type="checkbox"/>	
Right-of-way, both sides of street	<input type="checkbox"/>	<input type="checkbox"/>	
Easements and type; if Company easement, include deed and instrument numbers if available	<input type="checkbox"/>	<input type="checkbox"/>	
Waterways, legal drains and names	<input type="checkbox"/>	<input type="checkbox"/>	
Utilities, including water mains, sanitary sewers and storm sewers	<input type="checkbox"/>	<input type="checkbox"/>	
Railroads	<input type="checkbox"/>	<input type="checkbox"/>	
Property lines and lot numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Building footprints	<input type="checkbox"/>	<input type="checkbox"/>	
Addresses	<input type="checkbox"/>	<input type="checkbox"/>	
Additional physical features (foliage, buildings, utility structures, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	
Capital Improvements Project information (that falls within the proposed project area)	<input type="checkbox"/>	<input type="checkbox"/>	

Record Drawing Information

	YES	NO	COMMENTS
Topography	<input type="checkbox"/>	<input type="checkbox"/>	
Onsite information [area including, around and adjacent to perimeter of actual proposed development project area, including area(s) across the bounding roads]	<input type="checkbox"/>	<input type="checkbox"/>	
Property boundary	<input type="checkbox"/>	<input type="checkbox"/>	
Development section/phase lines	<input type="checkbox"/>	<input type="checkbox"/>	
Right-of-way, both sides of street	<input type="checkbox"/>	<input type="checkbox"/>	
Future rights-of-way, each side	<input type="checkbox"/>	<input type="checkbox"/>	
Proposed streets include centerlines of pavement and street names	<input type="checkbox"/>	<input type="checkbox"/>	
Driveways, parking areas, etc.	<input type="checkbox"/>	<input type="checkbox"/>	
Lot lines and lot numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Waterways and legal drains with names	<input type="checkbox"/>	<input type="checkbox"/>	
Easements and type; include deed and instrument numbers	<input type="checkbox"/>	<input type="checkbox"/>	
Commercial and industrial building footprints (outlines)	<input type="checkbox"/>	<input type="checkbox"/>	
Addresses	<input type="checkbox"/>	<input type="checkbox"/>	
Parcel Identification Blocks	<input type="checkbox"/>	<input type="checkbox"/>	
Utilities, including sanitary sewers and storm sewers	<input type="checkbox"/>	<input type="checkbox"/>	

RECORD DRAWINGS CHECKLIST

Water Mains and Appurtenances

	YES	NO	COMMENTS
Valves (do not label)	<input type="checkbox"/>	<input type="checkbox"/>	
Fittings (do not label)	<input type="checkbox"/>	<input type="checkbox"/>	
Bends (label degree), Blow-off valves (label as B.O.)	<input type="checkbox"/>	<input type="checkbox"/>	
Air Reliefs	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Stations	<input type="checkbox"/>	<input type="checkbox"/>	
Hydrants	<input type="checkbox"/>	<input type="checkbox"/>	
Water main size, type and length	<input type="checkbox"/>	<input type="checkbox"/>	
Commercial, industrial building footprints	<input type="checkbox"/>	<input type="checkbox"/>	
Include all dimensions for items above	<input type="checkbox"/>	<input type="checkbox"/>	

Miscellaneous Information

	YES	NO	COMMENTS
Dimension and label all above (although no drawing scale is required, should look proportional; 8 pt minimum text size)	<input type="checkbox"/>	<input type="checkbox"/>	

ADDITIONAL COMMENTS: (use back page, if necessary)