



**City of Morganton**  
**Construction Specifications For**  
**Water Lines 2021**

**CITY OF MORGANTON**  
**CONSTRUCTION SPECIFICATIONS FOR WATER LINES**

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## 1. **SCOPE**

The guidelines contained within this section are aimed at providing the general public and design community the minimum standards and procedural requirements required to design, construct and convey new extensions, replacements or upgrades to the City of Morganton public water distribution system.

- a. The contractor shall furnish all materials, equipment, and labor for excavation, installation, backfilling of water mains and related appurtenances as shown on the plans. The Development and Design Services Department/Engineering Division and the Water Resources Department shall conduct all City inspections on all water main extension projects.
- b. The contractor shall be responsible for notifying the Development and Design Services Department/Engineering Division at 438-5260 and the Water Resources Department at 438-5276 at least twenty-four hours in advance of beginning any construction work on any project. The contractor must call and give the location, project name and individual's name, and company name, and start date.
- c. Once construction has begun, the contractor shall contact the Development and Design Services Department/Engineering Division at 438-5260 and the Water Resources Department at 438-5276 each morning by 9:00 a.m. to notify where and what will be done that day. The City requires a 24 hour notice prior to an inspection. Any work requiring inspector's observation outside of the normal workday shall be charged at the current inspector hourly rate.
- d. If a developer, engineer or contractor proceeds with the water main installation prior to permit issuance, the City would require the work to be reinstalled and the developer, engineer or contractor shall be fully liable for all actions and costs, including prosecution by the City or the State for proceeding with installation prior to issuance of appropriate permit(s).
- e. "Field changes" are not considered approved by the Development and Design Services Department/Engineering Division and Water Resources Department unless revised plans have been submitted and approved by the Development and Design Services Department/Engineering Division and Water Resources Department. Therefore, the contractor that proceeds with construction prior to this approval is at his/her own risk.
- f. Upon notification by the City Engineer, the successful Bidder will be required to attend a preconstruction conference with his known principal subcontractors. The purpose of the preconstruction conference is to discuss,

among other considerations, the responsibility of the successful Bidder and his subcontractors in the prosecution and progress of the work.

**2. SUBMITTALS AND DRAWINGS**

- a. The Contractor shall furnish all materials, labor and equipment necessary to install all water mains, valves, hydrants and appurtenances where shown on the plans, or as directed by the City Engineer.
  
- b. Plans will be required on all water lines.
  
- c. Contractor shall submit 2 copies of catalog cuts to the City Engineer for review that are required to complete the work as described in the associated plans. The Engineer will retain two sets of original submittals and will respond with any changes or additions.
  
- d. Construction inspections will normally stop at the meter.
  
- e. A profile is required on all water mains to insure there are no conflicts with existing utilities. Size, material and clearance shall be clearly shown for all utilities crossing the water line.
  
- f. The Water Resources Department may require calculations of water flow and pressure.
  
- g. The contractor shall maintain a set of "As-Built" drawings for the project which will include changes made in materials, equipment, locations and dimensions of the work. A set of "As-Built" drawings shall be furnished to the City of Morganton Development and Design Services Department/Engineering Division upon project completion and shall be in a hard copy and digital form.

**3. EXISTING UTILITY LOCATION**

Prior to any excavation or construction, the contractor shall locate all existing utilities in the field.

**4. GENERAL CONSTRUCTION SAFETY AND TRAFFIC CONTROL**

- a. Signs, barricades, warning lights, guard rails and flaggers shall be employed as necessary when construction endangers either vehicular or pedestrian traffic. These devices shall remain in place until the traffic may proceed normally again. The contractor shall hold the City of Morganton harmless for any damages or injuries caused by the construction of water mains.

- b. Detours and all traffic control measures shall be set up and maintained by the contractor under the direction of the City of Morganton and the North Carolina Department of Transportation. Notice must be given a week in advance of any detour so that necessary notification of the traveling public may be made. The contractor will furnish all barricades, signs, lights and other safety devices to protect his/her construction. The contractor is in no way relieved of liability for providing this protection.
- c. Construction work zone signs and signing procedures shall conform to the MUTCD and supplements and to all applicable federal, state and local codes. The contractor shall be responsible for securing the necessary permits from the City and the North Carolina Department of Transportation and Inspections for all work to be performed in the public rights-of-way.
- d. The contractor and any subcontractors shall be responsible for the total compliance with all federal, state and local ordinances, laws and regulations as related to safe construction practices and to protecting the employees and the public's health and safety.
- e. The contractor shall ensure that all Occupational Safety and Health Administration (OSHA) regulations and standards are followed during all phases of the construction project.
- f. The City of Morganton shall not be responsible for the contractor's adherence to OSHA regulations and standards. However, the City of Morganton may report known violations or unsafe practices to the appropriate enforcement agency.
- g. The contractor shall be required to furnish safety equipment necessary to inspect the work including, but not limited to ladders, gas detectors/oxygen sensors, blowers, etc.

**5. PROTECTION OF WORK AND PROPERTY**

- a. The contractor shall at all times maintain protection of his work from damage.
- b. All trees, fences, poles and all other property shall be protected unless their removal is authorized, and any property not authorized for removal, but damaged by the contractor, shall be restored by the contractor to the owner's satisfaction.

**6. EASEMENTS, ENCROACHMENT CONTRACTS AND PERMITS**

- a. Water line easements shall meet the following criteria when required. Water line easements must be a minimum of twenty-five feet in width with the water line centered in the easement. No water line shall be installed unless an easement by deed or recorded plat has been provided.
- b. Prior to actual construction, the contractor shall acquire the necessary encroachments from North Carolina Department of Transportation when working within the rights-of-way of the state system roads or highways. The encroachment permit shall be kept on the job site at all times.
- c. The contractor shall be responsible for securing all other local, state and federal permits required for the utility construction.
- d. The contractor must have an approved set of permitted construction plans on site at all times.

**7. HANDLING AND STORAGE OF MATERIALS**

- a. The contractor shall be responsible for the shipping and storing of all water line materials. The contractor shall replace any material which is damaged or defective.
- b. The loading and unloading of all pipe, valves, hydrants, and other accessories shall be in accordance with the manufacturer's recommended practices and shall at all times be performed with care to avoid any damage to the material. The City Inspector or its representative shall be on site to verify the loading and unloading of all water line materials.
- c. The contractor shall locate and provide the necessary storage areas for materials and equipment. If private property is being used for storage then the contractor shall have written consent from owner.
- d. All pipes shall be kept free of dirt and other debris.
- e. The contractor shall be responsible for safeguarding and protecting all material and equipment stored on the job site until the project is complete.

**8. PAVEMENT, SIDEWALK REMOVAL AND REPLACEMENT**

- a. All pavement and sidewalk to be removed shall be cut along straight lines with the appropriate saw cut machine.
- b. All cuts of City streets and sidewalks must be patched the same day with a temporary or permanent patch. Once work has been completed, all temporary patches shall be replaced with permanent ones. All work from patching shall be cleaned up at the same time of patching.

- c. Pavement cuts within North Carolina Department of Transportation Right of Way shall not be performed without the proper encroachment permits on site. All patching of North Carolina Department of Transportation pavements shall conform to the approved on site encroachment permit.

**9. SITE PREPARATION**

- a. Set all lines, elevations and grades for water main and drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments or other reference points.
- b. Maintain in operating condition existing utilities, active utilities and drainage systems encountered in water main installation. Repair any surface or subsurface improvement shown on drawings.
- c. A clearing and grubbing technique shall be used to prepare the site for construction. Clearing shall consist of the felling trees and the removal of all vegetation, snags, brush, and rubbish occurring within the limits of the area required for construction process. Grubbing shall consist of the removal and disposal of all stumps of cut trees, buried logs and other objectionable material below grade. All materials removed during the clearing and grubbing operations shall be disposed of by removal to a site location approved by the North Carolina Department of Natural Resources and the City Engineer. Removal of materials by grinding into mulch to be left on site shall be approved by the City Engineer. All merchantable timber cut during the clearing shall remain the property of the owner if the owner so chooses to retain said timber. If the property owner chooses to retain timber, the Contractor shall cut the timber into lengths specified by the property owner and leave timber lying along the edge of the easement for the property owner's use. All limbs and laps of said timber shall be removed and disposed of as previously stated. All refuse, brush, deadwood or other debris shall also be disposed of by the Contractor. If the property owner does not want to keep the merchantable timber, said timber will become the property of the contractor to sell or dispose of in any manner above-stated or acceptable to the City Engineer.
- d. Perform **excavation** as indicated for specified depths. During excavation, stockpile materials suitable for backfilling in orderly manner far enough from bank of trench to avoid overloading, slides or cave-ins.
- e. Remove excavated materials not required or not suitable for backfilling or embankments and waste off-site. Any structures discovered during excavation shall be disposed of as specified.

- f. Remove excess or unsuitable materials from the site at no additional cost to the Owner. All excess and/or unsuitable material shall be wasted off site at a location approved by the North Carolina Department of Natural Resources and the City of Morganton Development and Design Services Department/Engineering Division.

## **10. TRENCH PREPARATION AND BACKFILLING**

- a. No trench shall be open more than 250 feet in advance of the pipe line being laid, without the permission of the City Engineer, who reserves the right to limit the length or distance through which any trench may be opened. If the work is stopped on the whole or any part of the trench and the same is left open for an unreasonable length of time in advance of the construction of the pipe line, the Contractor shall, when directed, refill such trench or part thereof until he is ready to proceed with the construction of the pipe line.
- b. Trench width shall be a minimum of twelve inches plus outside diameter of pipe and a maximum of twenty-four inches plus outside diameter of pipe, unless OSHA requires additional trench width. Trench width shall be measured between the faces of the cut at the top elevation of the pipe bell as shown on Detail 111.
- c. The contractor shall, at his/her own expense, prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required to keep all trenches free from water during the excavation for water main installation. The water shall be pumped out of the trench or check dams shall be built to keep the water out of the ditch in such a manner as not to cause injury to the public health, private property or the work in progress.
- d. Open cut excavation with trenching machine or backhoe. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill. Dispose of unsuitable material and provide other suitable material at no additional cost to owner.
- e. Sheet piling or bracing shall be used wherever necessary to prevent failure of the trench banks. All sheet piling shall conform to AASHTO and OSHA safety standards. The decision of the Engineer relative to bracing for the protection of property of the City shall be binding upon the contractor. The removal of sheet piling shall be done in such a manner as to minimize the loss of friction between the backfill and trench walls.
- f. Washed stone screening dust shall be spread prior to placing any trench material on pavement. This is to allow for a thorough cleaning of the pavement.



- g. Trenches shall not be backfilled until required test are performed and the water main is accepted by the City of Morganton. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact, as specified, to properly correct condition in an acceptable manner.
- h. Backfilling material shall consist of clean earth. All material shall contain no man-made material and be free of debris, roots, stumps and pervious materials, etc. Materials from on-site excavations may be used for select backfill provided they meet the specified requirements and contain optimum moisture content for proper compaction. If sufficient on-site select backfill material is not available, acceptable material from an off-site borrow area shall be secured.

## **11. EROSION CONTROL MEASURES**

Refer to the City of Morganton Utility Construction Erosion Control Specifications for requirements.

## **12. ROCK EXCAVATION**

- a. Excavation of hard rock, ledge rock or boulders larger than two cubic yards, which cannot be ripped, clawed, etc. and or removed by conventional construction methods will be considered as Rock Excavation.
- b. Blasting procedures shall conform to all applicable local, state and federal laws and ordinances.
- c. In determining the width of rock excavation, the Contractor will be allowed the actual trench width, up to a maximum of the diameter of the pipe, plus eight inches on each side. The depth of rock shall be from the top surface of the rock encountered to a maximum of six inches below the bottom of the pipe. No extra payment will be made for backfilling the under-cut subgrade in areas of rock excavation. Payment shall include removal and disposal of excavated rock and suitable replacement with backfill material.

\* Any rock encountered will be paid for at a unit price reflecting current market cost per cubic yard which will include all labor, material, and equipment necessary for the removal of rock from the trench. Any rock removal shall be approved by the City Engineer.

## **13. PIPE LAYING AND BEDDING**

- a. Water pipe shall be laid to the line and grade as shown on the plans with all valves and hydrants located as shown on the plans. The water main pipe shall have detectable underground 5 Mil tape that reads "CAUTION BURIED WATER LINE BELOW" installed 12 inches above the top barrel of the water main pipe and extend the length of the line.

All water mains shall be traced with AWG No.12-gauge solid copper wire with 30 Mil blue HDPE insulation along the length and detector tape placed above along the length.

- b. Depth of water pipe cover, unless otherwise approved by the City of Morganton Development and Design Services Department/Engineering Division shall be three feet above top of pipe. Depth of cover shall be measured from the established street grade or the surface of the permanent improvement to the top of the barrel of the pipe. The new water main shall have tracer wire located in the same trench to ensure the line can be located in the future.
- c. The trench bottom shall be accurately graded to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joint, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer or wider than needed to make joint connection properly.
- d. Maximum horizontal deflections for ductile iron and PVC pipe shall be as follows:

**Table 1.1**

**MAXIMUM DEFLECTION FOR 18 FOOT DUCTILE IRON PIPE**

<u>SIZE PIPE</u>	<u>MJ</u>	<u>PUSH-ON-JOINT</u>
6"	27"	19"
8"	20"	19"
10"	20"	19"
12"	20"	19"
14"	13"	11"
16"	13"	11"
18"	11"	11"
20"	11"	11"
24"	9"	11"

**Table 1.2**

**MAXIMUM DEFLECTION FOR 20 FOOT PVC PIPE**

<u>SIZE PIPE</u>	<u>DEFLECTION</u>
2"	40"
4"	12"
6"	4"
8"	3"
12"	2"

- e. Pipe will be placed on firm foundation so as to prevent subsequent settlement and the trench will be carefully excavated to the proper grade so that it will not be necessary to fill-in under the pipe. However, soil shall be back-filled and tamped by hand around the pipe (and completely under the pipe) in uniform layers not exceeding six (6) inches in depth to 1'-0" above the top of the pipe.
- f. Under no circumstances shall the pipe or accessories be dropped or dumped into the trench. All damaged pipe and accessories shall be removed from the job.
- g. Laying of pipe and jointing of pipe shall be done according to manufacturer's recommendations with care being taken to provide uniform bearing for the pipe. Bell and spigot of pipe shall be cleaned and properly lubricated where a mechanical joint of a "push on" type joint is employed.
- h. Open ends of pipe shall be plugged with a standard plug or cap at all times when pipe laying is not in progress. No trench water shall enter the water pipe.
- i. Pipe cutting for inserting valves, fittings or closure pieces shall be done in accordance with the manufacturer's recommendations and without damage to the pipe.
- j. Bell ends shall face the direction of laying unless a closure is being made. For lines on an appreciable slope, it may be necessary to lay bell ends with the face up (consult with the City Engineer and onsite inspector for approval.)
- k. When installing a water main, the horizontal separation between water and sewer shall be ten feet. In cases where it is not practical to maintain a 10 foot separation, DWQ may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the sewer closer to the water main, provided that the water main is in a separate trench or on an undisturbed earth shelf on one side of the sewer and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer. All distances are measured from outside diameter to outside diameter.
- l. If it is impossible to obtain proper horizontal and vertical separation as described above or anytime the sewer is over the water main, both the water main and sewer must be of ductile iron.
- m. When a water main crosses over a sewer main, there must be 18 inches of vertical separation. If the water main must go under the sewer main, both

these lines must be of ductile iron for a distance of ten feet on either side of the crossing. The crossing shall be arranged so that the water main joints will be equidistant and as far as possible from the sewer main joints.

- n. When it is impossible to obtain proper horizontal and vertical separation as stipulated above the water main shall be ductile iron or either the water main or sewer main may be encased in a watertight carrier pipe which extends ten feet on both sides of the crossing, measured perpendicular to the sewer main.
- o. All water mains crossing under a North Carolina Department of Transportation state road shall be made in accordance with the requirements of the North Carolina Department of Transportation as defined in their encroachment permits.

#### **14. BORING AND ENCASEMENT**

- a. In locations where open pipe trenches are not allowed, bore and jack operations may be allowed. All supervision, labor, equipment and materials required for the complete installation of encasement pipe and carrier pipes by boring and jacking operations shall be done as stated on the plans.
- b. The contractor shall inspect the proposed boring locations and familiarize himself with the conditions under which the work will be performed and consider all necessary details and the suitability of his equipment and methods for the work required.
- c. All boring and jacking operations crossing under a North Carolina Department of Transportation state road shall be made in accordance with the requirements of the North Carolina Department of Transportation.
- d. The boring machine shall be accurately aligned before the boring is started. The bore and encasement shall be installed as shown on plans. Payment will not be made for a bore and encasement that is not accurate as to line and grade as shown on plans.
- e. Carrier pipe supports shall be steel spiders. See Detail 109.
- f. The encasement pipe shall be smooth-wall, welded steel grade 'B' in accordance with the American Society of Testing and Materials (ASTM) Standards. The encasement pipe shall be of the size as shown on the plan drawings. The minimum inside diameter casing shall be 8 inches greater than the inside dimension of the carrier pipe as follows:

<u>CARRIER PIPE INSIDE DIA.</u>	<u>STEEL CASING PIPE MIN. INSIDE DIA.</u>
12"	20"
14"	24"
16"	24"
20"	30"
24"	30"
30"	40"
36"	46"

- g. When extending the encasement pipe for the boring operation, each new section of the encasement pipe shall be butt-welded to the section previously jacked into place. The boring auger shall not be of a greater diameter than the outside diameter of encasement. The leading edge of the steel casing shall be kept as close to the auger head as possible and shall be advanced at the same rate of speed as the earth auger in order to minimize any unsupported holes in the earth. Any voids that occur are to be filled with 3:1 ratio sand to cement grout mixture at 50 psi pressure before proceeding, to insure that there will be no settlement. The City Engineer will direct that this space be filled if the space is large enough to cause any earth settling. There will be no payment for grout work.
- h. In the event that an obstruction is encountered during the boring operation which cannot be penetrated as determined by the City Engineer, Water Resource Supervisor and the City Inspector, the auger is to be withdrawn and the steel pipe encasement is to be cut off, capped and completely filled with 3:1 ratio sand to cement grout mixture at 50 psi pressure before moving to a new site. Payment will be made by the Owner on work completed before the boring operation was stopped plus the additional linear footage at the new site. There will be no payment for the grout work.
- i. After completion of the boring and encasement, the Contractor shall insert the pipeline in pre-jointed segments. A steel spider shall be installed behind each carrier pipe bell in the encasement pipe, as shown on the plans. After placing and jointing the pipeline, the ends of casing pipes and tunnels shall be closed with brick masonry bulkheads.
- j. Measurement will be in feet along the flow line of the encasement pipe which is installed. Payment shall be for the total number of linear feet of encasement pipe installed at the respective unit price bid for the item. Price and payment shall constitute full compensation for furnishing all equipment, labor, tools, and materials to complete all of the work required under this section including excavation of working pits, encasement pipe, carrier pipe, dewatering, shoring, etc.

## **15. HORIZONTAL DIRECTIONAL DRILLING**

- a. In locations where open pipe trenches are not allowed, Horizontal Directional Drilling operations may be allowed. All supervision, labor, equipment and materials required for the complete installation of the pipe by directional boring operations shall be done as stated on the plans.
- b. The contractor shall inspect the proposed boring locations and familiarize himself with the conditions under which the work will be performed, and consider all necessary details and the suitability of his equipment and methods for the work required.
- c. All Horizontal Directional Drilling operations crossing under a North Carolina Department of Transportation state road shall be made in accordance with the requirements of the North Carolina Department of Transportation.

## **16. REACTION BLOCKING**

- a. All fittings or components subject to hydrostatic thrust shall be securely anchored by the use of concrete thrust blocks poured in place, unless otherwise directed by the engineer. The reaction areas required for these thrust blocks shall be shown on the plans. Where concrete must be reinforced, the contractor shall furnish such reinforcing as is required.
- b. Material for reaction blocking shall be twenty-eight day 3,000 psi compressive strength concrete. Any metal used to resist thrust which is not encased in concrete shall be "hot dipped" galvanized.

## **17. SETTING VALVES AND VALVE BOXES**

- a. Valves shall be set at locations shown on the plans with care being taken to support the valve properly and to accurately position the valve box over the operating nut of the valve.
- b. Where pavement is existing, the valve box shall be adjusted to finished street grade and a concrete collar shall be poured around the box two inches from the top of finished grade as shown on Standard Details 105 and 106. When valves are located in the street right-of-way, but out of pavement, the boxes shall be adjusted to finished grade.

## **18. SETTING FITTINGS**

Fittings shall be set at locations shown on the plans with care being taken to properly "bell-up" joints and support the body of the fitting. All dead-end lines shall be plugged with mechanical joint plugs or caps and anchored by using thrust collars and blocking as shown on plans.

## **19. SETTING HYDRANTS**

- a. Fire hydrants shall be located as shown on plans with spacing between hydrants at a maximum distance as set forth in the current applicable version of the Fire Code or at a lesser distance as specified and approved by the City Engineer.
- b. Hydrants shall be located in a manner to provide complete accessibility and minimize possibility of damage from vehicles or injury to pedestrians.
- c. All fire hydrants shall be connected to the main waterline with a 6" leg consisting of the same material as the main waterline and having at least the same depth of bury.
- d. All fire hydrants shall be installed plumb with the pumper nozzle facing parallel to the roadway and with the center of the lowest outlet not less than 18 inches or more than 24 inches above finished grade.
- e. Hydrants shall be rodded to the 6 inch gate valve and the valve rodded to the branch tee or mounted directly to a hydrant tee. See Standard Details 101 and 102.

## **20. HYDROSTATIC TEST**

- a. The Contractor shall coordinate with the City of Morganton Development and Design Services Department/Engineering Division, the Water Resources Supervisor and the City Inspector to test the installed water main section.
- b. All water main installations shall be pressure tested between each main line valve. The test shall be performed using a suitable pump and an accurate pressure gauge. As the pipeline is being filled with water in preparation of the test, all air shall be expelled from the pipe. If sufficient exit points are not available, the Contractor at his expense shall install air reliefs of a type and location as approved by the City Engineer. At the completion of a section of the water main, 200 psi ( $\pm$  5 psi) of pressure shall be applied and held for three hours. During the tests, all lines and appurtenances shall be checked for defects. The acceptable leakage rate at 200 psi shall not exceed 10 gallons per day, per mile, per inch of nominal diameter. Provided working pressure is greater than 200 psi, test shall be 25% higher than working pressure. Allowable leakage shall be calculated by the engineer.
- c. Failure of the water main to comply with the above acceptable leakage rate, shall require the contractor to replace any defective materials to insure a watertight installation.

- d. After any inadequacies have been corrected, the leakage rate will again be tested. This test shall be repeated until that portion of main is brought to compliance with the permissible leakage rate.
- e. After a section of the water main has passed the allowable leakage test and the City Engineer has given approval the Contractor may continue the installation of the water main.

## **21. CHLORINATION**

- a. All new water main additions or replacements shall be chlorinated before being placed in service. Such chlorination must take place under the supervision of a City of Morganton Representative.
- b. The Contractor shall chlorinate all pipelines and /or structures by use of liquid chlorine gas/water mixture or the use of calcium hypochlorite granules. All sterilization procedures shall be according to AWWA Standard C651-99.
- c. Prior to chlorination all dirt and foreign matter shall be removed by thoroughly Preliminary Flushing or cleaning of the pipelines and/or structures.
- d. The chlorinating agent shall be applied at the beginning of the section adjacent to the feeder connection and shall be injected through a corporation stop, hydrant, or other connection insuring treatment of the entire line. Water shall be fed slowly into the new line with chlorine applied in such amounts as to produce a dosage of 50 parts per million. Lines previously filled shall be treated to a concentrated dosage at intervals along the line.
- e. A 24-hour residual of 10 parts per million shall be produced in all parts of the line. During the chlorination process all valves, hydrants, and accessories shall be operated. After chlorination, the water shall be flushed from the line at its extremities until the replacement water tests are equal bacteriologically to those of the permanent source of supply and shall conform otherwise in all respects to the requirements of the NCDNER - Public Water Supply section.
- f. The Contractor shall discharge chlorinated water in an environmentally safe way. Under no circumstances shall water with elevated chlorine residual be discharged into waters of the state or wetlands.
- g. Provided HTH is used for sterilization, one (1) pound per thousand (1,000) feet shall be proportionately deposited in each joint laid.



## **22. SERVICE CONNECTIONS**

No taps will be made on a new water main until the North Carolina Division of Water Quality has given approval or specific authorization from the City Engineer. Taps can then be made only on a line under pressure and after the main has been tested and chlorinated.

## **23. SURFACE RESTORATION**

- a. The Contractor shall furnish all labor, equipment and materials necessary for the proper restoration of existing surfaces disturbed or damaged as a result of any construction activity. Any damage to existing surfaces or structures shall be restored to original condition or better using like materials and workmanship to the original.
- b. Rough clean up shall, in general, be completed no later than 1 day after pipe laying.
- c. Final clean-up consisting of pavement replacement, sidewalk replacement, removal of rocks, hand raking with seeding, strawing, etc., of lawns and neutral grounds, adjusting grade of ground over pipeline, property repairs, and other items shall, in general, be completed no later than 2 to 3 weeks after pipe has been laid and backfilled. See City of Morganton Seeding Specifications.

## **24. FINAL INSPECTION**

- a. The Contractor is instructed to request a final inspection only after the work has been checked by the Contractor or his appointed agent. When the Contractor has a project ready for final inspection, he shall inform the Engineer in writing and a date will be scheduled for the final inspection. The Engineer or his representative will meet with the Contractor's representative, and they shall make a thorough inspection of the job.
- b. The Contractor shall furnish all labor necessary to open and inspect all manholes, catch basins, and valve boxes.
- c. A list of all deficiencies shall be made by the City within one week of final inspection. The Contractor must correct the deficiencies prior to the acceptance of the project by the City. The Contractor shall complete the punch list within 30 days of receipt unless otherwise approved by the Owner. All defects observed by the Engineer during the final inspection shall be repaired by the Contractor at his expense.
- d. The work furnished under these specifications shall be guaranteed for a period of one (1) year from the date of acceptance, by the City of Morganton City Council, against defective materials, equipment, and workmanship. Upon receipt of notice from the City of failure of any part of the material, equipment

or workmanship during the guarantee period, the affected part or parts shall be replaced with new material or equipment by and at the expense of the Contractor.

**25. AS-BUILT PLANS**

A set of 24 x 36 "As-Built" plans with profiles, sealed by a Professional Engineer shall be furnished to the Development and Design Services Department/Engineering Division and the Water Resources Department upon completion and acceptance of the public main by the City. The surveyed "As-Built" plans shall have located all meter boxes, valves, manholes, and mains along with the depth information. All service stubs shall be shown on the surveyed "As-Built" plans. The water distribution system drawings should show main sizes, material, hydrants, valves, blow-off assemblies, and any other relevant information (backflow preventers, air release valves, etc.). All plan and profile sheets shall be 24 x 36; vellum or paper is acceptable along with a digital file delivered in DWG or DXF format.



**City of Morganton**  
**Water Line Materials 2021**

**CITY OF MORGANTON**  
**WATER LINE MATERIAL SPECIFICATIONS**

- 1. SCOPE**
- 2. WATER MAIN PIPE**
- 3. POLYVINYL CHLORIDE (PVC) PRESSURE PIPE**
- 4. DUCTILE IRON PIPE**
- 5. WATER PIPE FITTINGS**
- 6. RETAINER GLANDS**
- 7. TAPPING SLEEVES AND SADDLES**
- 8. GATE VALVES**
- 9. VALVE BOXES**
- 10. CORPORATION STOPS**
- 11. WATER SERVICE CONNECTIONS**
- 12. WATER METERS AND COPPERSETTERS**
- 13. METER BOXES**
- 14. HYDRANTS**
- 15. AIR RELEASE VALVES**

## **1. SCOPE**

This section covers the materials to be used for the construction of water mains. It is the intent of the city to provide materials of the highest standard known to the trade and to provide materials that are free from defects in workmanship and materials. All pipes and materials shall be first class quality. No used or second hand materials will be permitted. Any equivalent item proposed for use in lieu of a named item shall require submittal of a sample and cut-sheet to be received by the City prior to bid opening for evaluation. The City shall approve or disapprove of the equivalence of the item prior to bid opening. Any proposed equivalent item that has not been evaluated in accordance with the above procedure shall be declared non-equivalent for the purpose of the bid. Any item not declared equivalent by this procedure shall be refused acceptance upon delivery and shall be returned and replaced by an approved item at no additional cost to the City.

## **2. WATER MAIN PIPE**

All water main piping shall be Ductile Iron Zinc Coated Pipe (DIP) or Polyvinyl Chloride (PVC) Pressure Pipe as specified below. Water main pipe two inches to four inches in diameter shall be copper type K soft, PVC or ductile iron zinc coated. Water mains six inches to eight inches in diameter shall be either cement lined ductile iron zinc coated or PVC (C-900). Water mains twelve inches to sixteen inches in diameter shall be ductile iron zinc coated pipe. Water main pipe in excess of sixteen inches in diameter shall be approved by the City Engineer. All water main piping shall be marked with detectable tape to the edge of the road right-of-way. In lieu of detectable tape, nonmetallic water mains shall be traced with AWG No.12 gauge solid copper wire with 30 Mil blue HDPE insulation along the length and detector tape placed above along the length.

## **3. POLYVINYL CHLORIDE (PVC) PRESSURE PIPE**

**2 inch PVC:** Pipe shall be manufactured and tested in the U.S.A. The pipe shall be twin gasketed coupling or integral bell and o-ring rubber gasket type pipe. All 2 inch PVC pipe shall have a hydrostatic working pressure of 200 psi (SDR 13.5) and shall conform to ASTM 1598-63T, ASTM D-2241 or the latest revision. PVC pipe shall have the National Sanitation Foundation (NSF) seal of approval. All 2 inch PVC pipe shall be NSF approved type I, grade I polyvinyl chloride conforming to ASTM D-1784 resin specification. Certaineed Certa-Lok Yelomine PVC pipe shall be used where the City Engineer and the Water Resources Supervisor deem necessary. PVC pipe shall be furnished in standard lay lengths of twenty feet with one or both ends tapered for use with twin gasketed coupling or with the integral bell. All couplings, bells and joints shall be sealed with a gasket or o-ring in accordance with the manufacturer's specifications. Any lubrication used shall conform to AWWA and the pipe manufacturer.

**4 inch to 12 inch PVC:** Pipe shall be manufactured and tested in the U.S.A. Pipe shall be Class 150 PVC pressure pipe conforming to AWWA C-900 (DR18 or DR 14), or latest revision. PVC piping shall conform to ASTM 1598-63T, ASTM D-2241 or the latest revision. PVC pipe shall have the National Sanitation Foundation (NSF) seal of approval. All outside diameters shall be compatible with cast and ductile iron fittings. All 4 inch to 12 inch PVC pipe shall be assembled using elastomeric seals and appropriate gasket(s) shall be furnished with each length of pipe. Any certified test results shall be provided to the City Engineer when requested.

#### **4. DUCTILE IRON PIPE**

All ductile iron zinc coated water pipe shall be manufactured in the U.S.A. and conform to AWWA specification C-151 and ANSI standard A21-51 or latest revision. Cement linings with an asphaltic seal coat for ductile iron shall conform to AWWA specification C-104. All ductile iron joints shall conform to tables in AWWA C-151 and to ANSI A-21.11 or latest version. Ductile iron zinc coated pipe shall be mechanical joint or push-on joint type. Push-on type joints shall be manufactured under the trade name "Tyton", "Bell-Tite", or approved equal. All pipes shall be clean and without defects that will impair their service. No welding or other methods to repair defects will be permitted. Any flanged ductile iron pipe shall be cement-mortar lined and shall conform to AWWA C-115, C-151 and ANSI A21.15. Flanges shall be screw type, faced and drilled. Flanges and bolts shall conform to ANSI B16.1. The ductile iron zinc coated pipe and flanges shall be class 350 ductile iron. 2-inch ductile iron can be used where the City Engineer and Water Resources Supervisor approve.

#### **5. WATER PIPE FITTINGS**

All water pipe fittings shall be manufactured in the U.S.A. and tested according to AWWA standards. Water line fittings shall be K soft copper, brass or Ford compression type fittings. Water lines greater than two inches in diameter shall be ductile iron mechanical joint and shall have a minimum working pressure of 150 psi and meet AWWA C-110 and ANSI 21.11 for mechanical joint pipe. Compact ductile iron fittings may be used in lieu of standard cast iron or ductile iron fittings. All compact fittings shall be mechanical joint and have a minimum working pressure of 350 psi and meet AWWA C-153 and ANSI A21-53 and AWWA C-111 and ANSI A21.11 for mechanical joint pipe.

#### **6. RETAINER GLANDS**

**Ductile Iron Pipe:** Retainer glands for water line connections shall be Meg-A-Lug type as manufactured by EBAA Iron, series 1100 or Uni-Flange, series 1400 as manufactured by FORD; or approved equal. Retainer glands shall be rated at a working pressure of 250 or 350 psi with a minimum safety factor of 2:1. Factory restrained joint pipe shall be used for construction of new water lines and connecting to existing.

The US Pipe Company Field Lok 350 Gasket shall be used where the City Engineer and Water Resource Supervisor deem necessary.

The field Lok Gasket shall meet ANSI/AWWA C111/A21.11 performance requirements and have a working pressure of 350 psi.

**PVC Pipe:** Retainer glands for 1 ½ inch to 4 inch shall be “Knuckle Joint Restraint” as manufactured by HARCO. For pipe diameters 4 inch to 24 inch retainer glands shall be Meg-A-Lug type as manufactured by EBAA Iron, Series 2000PV or Uni-Flange series 1500 as manufactured by FORD.

Retainer glands shall have a working pressure rating equal to that found in the most current manufacturer product specification.

## **7. TAPPING SLEEVES & SADDLES**

Tapping sleeves shall be mechanical joint Mueller, Ford, American or Tyler Union and be constructed of stainless steel or ductile iron with 150 psi minimum working pressure. Tapping sleeves that are 8 inches and greater shall be American Flow Control ductile iron series 2800 tapping sleeve. All taps shall be machined drilled. The tapping sleeve and valve shall be tested per the manufactures specifications before any tap work on the main line can be done.

Service saddles shall be manufactured by Ford and have a brass alloy body per ASTM B62 and AWWA C800 requirements. The gasket “O” ring design shall conform to ASTM D2000 requirements. Service saddles for PVC pipe shall be Ford S90 with CC threads for PVC pipe. Service saddles for C900 PVC pipe shall be Ford S90 with F.I.P. threads for PVC pipe. Service saddles for ductile iron pipe shall be Ford F202 double strap iron saddle with CC threads for ductile iron, cast iron and steel pipe. Service saddles for asbestos cement lined pipe shall be Ford FS202 double strap iron saddle with CC threads for asbestos cement lined pipe. See City of Morganton Standard Drawings 108 & 119.

## **8. GATE VALVES**

Ductile iron resilient wedge style vertical or horizontal gate valves and tapping valves shall be used for all main line and hydrant branch valves in sizes from 2 inches through 24 inches. Manufacturers accepted are American, Mueller, Kennedy and Clow. All valves must meet or exceed requirements in accordance with AWWA C-509, C-515, or the appropriate AWWA standard as applicable shall be used. All resilient wedge valves shall have internal and external epoxy coating, O-ring seals at the stuffing box and bonnet to body and dual O-rings at the stem seal above the thrust collar. Tapping valves shall be the same valves as gate valves listed above, subject to the standards, providing that tapping valves shall have the tapping ring. Gate valves twelve inches in diameter and smaller, shall be mechanical joint. They shall have “O” ring seals, open counterclockwise, and have a non-rising stem. These valves shall be designed for a minimum of 175 psi working pressure and 300 psi hydrostatic test pressure with a two (2) inch operating nut. See City of Morganton Standard Drawing 105.

## **9. VALVE BOXES**

Valve boxes shall be manufactured by Sigma or Accucast. Valve boxes shall be class 30 cast iron and manufactured in accordance with ASTM A48. Valve boxes shall be adjustable two-piece, cast iron, and screw-type construction. Lids shall have the word "Water" cast into the lid. See City of Morganton Standard Drawing 105.

## **10. CORPORATION STOPS**

Corporation stops shall be made of brass and manufactured by Ford with a working pressure of 300 psi. Corporation stops shall meet AWWA standard C800. Corporation stops shall be supplied with a gasket and 1/8 inch bend coupling for connection to copper pipe. Approved Ford corporation's stops are Ford FB1000-3 for 3/4 inch and Ford FB1000-4 for 1 inch, both with AWWA/CC taper threads. See City of Morganton Standard Drawing 108.

## **11. WATER SERVICE CONNECTIONS**

Water service pipe for 3/4" to 2 inch connections shall be type "K" soft copper with no joints or couplings to the water meter or in the right-of-way. All water services and fittings shall be compression (grip joint) type fittings. 1 1/2 inch and 2 inch taps may only be made with use of a double strap saddles listed in section 7 above. See City of Morganton Standard Drawing 108.

## **12. WATER METERS AND COPPERSETTERS**

Water meter services shall use a Badger series meter and meet or exceed the latest AWWA C700 standard. All Badger water meters before installation shall be approved by the City of Morganton Water Resource Department. Refer to City of Morganton Standard Drawing 108.

## **13. METER BOXES**

Meter Boxes shall be manufactured by Sigma or Carson. Sigma meter boxes shall be the MBX-1 or 5A series and Carson meter boxes shall be L series 1730-18 or an approved equal. All meter boxes shall be constructed of cast iron or high-density polyethylene. Meter boxes shall be set to insure that the meter, yoke or coppersetter are positioned inside the box area. Meter boxes shall not be placed within the sidewalk unless no other alternatives are available and approval is obtained from the City Engineer. See City of Morganton Standard Drawing 108.

## **14. HYDRANTS**

Fire hydrants shall comply with AWWA C-502 standard or most recent revision. Acceptable manufactures are American Darling, Kennedy, and Mueller. Fire hydrants shall have a cast iron body, full bronze mounted, suitable for a working pressure of 150 psi. Hydrants shall have a breakable safety flange in the barrel and safety coupling in valve stem. Valve openings shall be 4 1/2" and 5 1/4" in diameter. Each hydrant shall have 2 - 2 1/2" hose nozzles that are bronze or non-corrosive metal, National Standard Threads



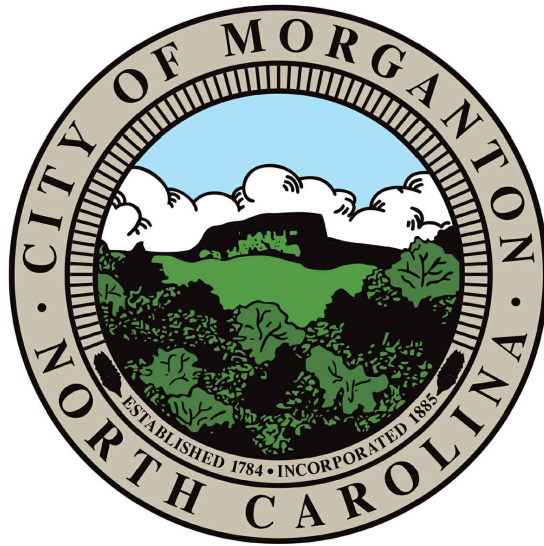
and one steamer port opening 4 7/8" outside diameter. Hydrants shall have 6-inch mechanical joint hub with strapping lugs and 1 1/4" pentagon operating nut. The hydrant valve shall open in a clockwise (right) direction. Hydrants shall be set on a stone base and securely rodded/restrained to prevent blowing-off under pressure. All hydrants shall be set plumb. The fire hydrant assembly shall be cast iron with mechanical joint connections and include the valve box, tee, pipe, rodding/restraints, and other fittings. No slip joint pipe or fittings will be permitted for fire hydrant assemblies. All hydrants shall be installed, as shown on City of Morganton Standard Drawings 101 & 102, or as directed by the City Engineer.

#### **15. BLOW-OFF VALVES**

Blow-off valves shall be constructed at the end of all dead end lines, except where there is a fire hydrant on the line within 50 feet of the dead end of the line. The contractor shall supply all labor, material, and equipment necessary to install blow-offs as shown on City of Morganton Standard Drawings 106 & 107, or as directed by the City Engineer.

#### **16. AIR RELEASE VALVES**

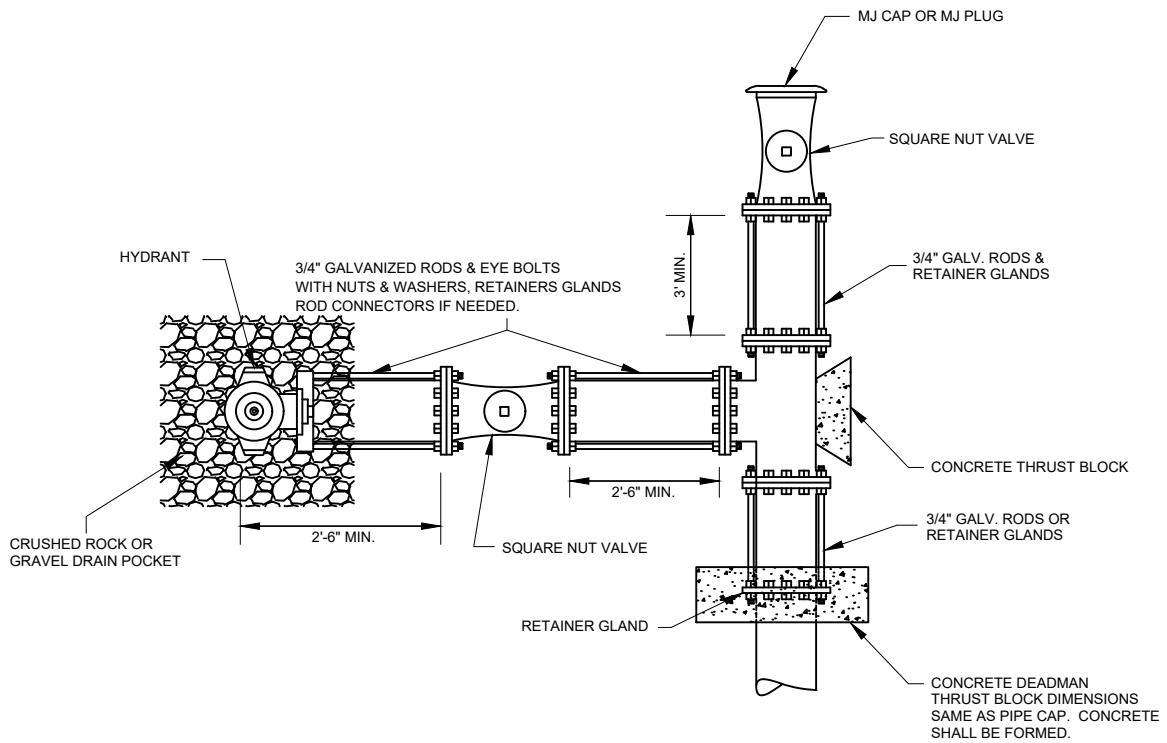
Air release valves shall be GA Industries Simple Lever Pressure Air Release Valve. The air release valve shall fully conform to AWWA C512 (latest revision) and suitable for use with clean water. It shall be float operated and automatically release accumulated air from the pipeline or system while in operation and under pressure. The valve connection size shall be as shown on the plans and/or in the valve schedule with NPT inlet and outlet connections and additional plugged NPT connections near the top and bottom for testing and draining. Valves with 1 inch or larger connection size shall be compound lever type with adjustable seat, smaller size valves shall be simple lever type. The valve's venting orifice diameter shall be selected for 150 PSI or 300 PSI maximum working pressure as shown on the plans, in the valve schedule or in the engineer's information. The valve body and cover shall be rated for 300 PSI and made from cast iron conforming to ASTM A126 Class B. The float ball, orifice and internal linkage mechanism shall be made from Type 316 stainless steel. Non-metallic components are not acceptable. The seat shall be replaceable and made from Buna-N rubber or other suitable elastomer compounds. The exterior of the valve shall be shop coated with enamel primer. The valve shall be housed in a manhole. Air release valve locations shall be approved by the City Engineer, or as shown on the plans. The contractor must field stake the air release location.



## **STANDARD WATERLINE DETAILS 2021**

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NOTES: ALL CONCRETE SHOWN IS TO BE 3000 P.S.I.  
 MAINTAIN A 3FT. UNOBSTRUCTED RADIUS AROUND FIRE HYDRANT PER FIRE CODE.  
 ALL FITTING SHALL BE SECURED WITH MEGALUGS AND RETAINER GLANDS  
 3/4" RODS GALVANIZED  
 3/4" EYE BOLTS, NUTS & WASHERS  
 3/4" RODS GALVANIZED  
 3/4" ROD CONNECTORS IF NEEDED

NOTES: WITH THE ENGINEERS APPROVAL THE  
 HYDRANT VALVE MAY BE CONNECTED  
 DIRECTLY TO THE HYDRANT TEE.

NOTES: FIRE HYDRANTS SHALL BE ONE OF THE FOLLOWING THREE TYPES WITH THE 4 1/2"  
 PUMPER NOZZLES BEING NATIONAL STANDARD PIPE THREADS AND 2 (TWO) 2 1/2" HOSE  
 NOZZLES BEING NATIONAL STANDARD THREADS. ALL HYDRANTS SHALL OPEN IN A CLOCKWISE DIRECTION.  
 A) CENTURION, MANUFACTURED BY MUELLER COMPANY  
 B) SUPER CENTURION, MANUFACTURED BY MULLER COMPANY  
 C) GUARDIAN, MANUFACTURED BY KENNEDY VALVE COMPANY

NOT TO SCALE



**END OF WATERLINE FIRE  
 HYDRANT INSTALLATION**

STD. NO.

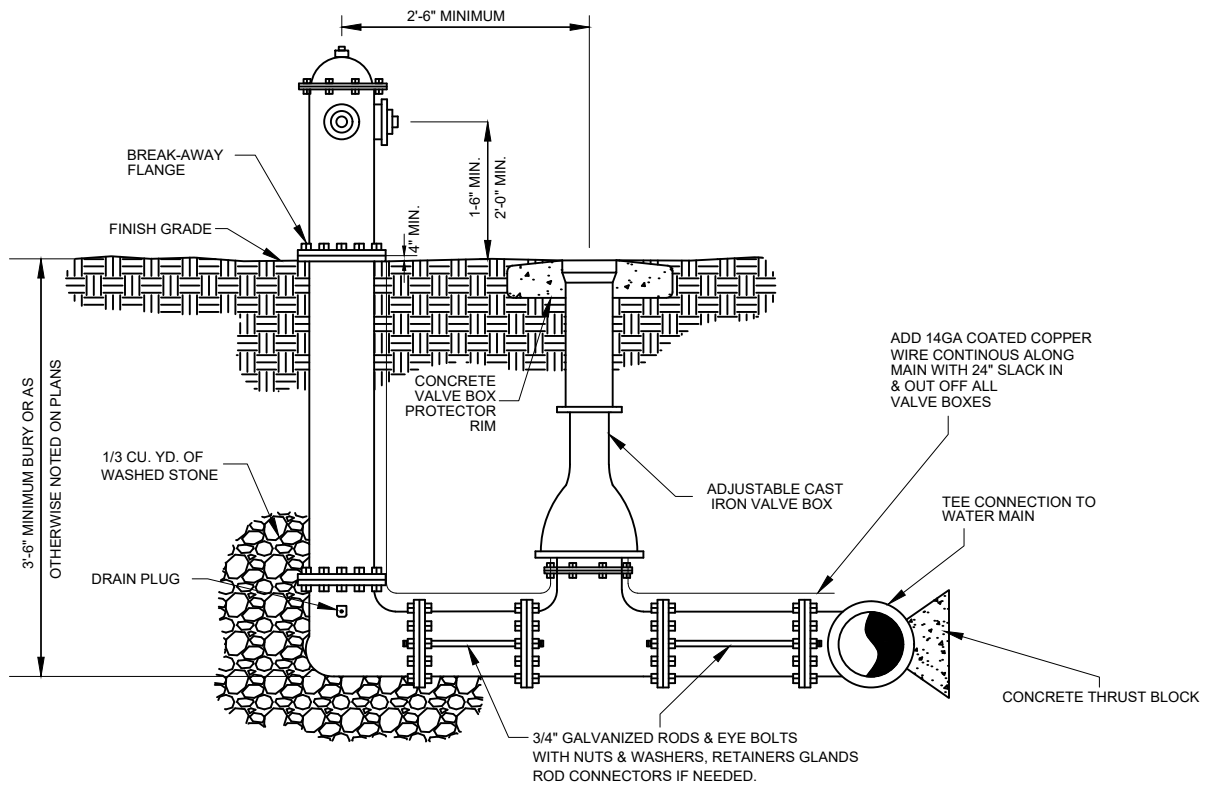
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101

3-7-11

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**CITY OF MORGANTON**



**SECTION**

NOTES: ALL CONCRETE SHOWN IS TO BE 3000 P.S.I.  
 MAINTAIN A 3FT. UNOBSTRUCTED RADIUS AROUND FIRE HYDRANT PER FIRE CODE.  
 ALL FITTING SHALL BE SECURED WITH MEGALUGS AND RETAINER GLANDS  
 3/4" RODS GALVANIZED  
 3/4" EYE BOLTS, NUTS & WASHERS  
 3/4" RODS GALVANIZED  
 3/4" ROD CONNECTORS IF NEEDED

NOTES: WITH THE ENGINEERS APPROVAL THE  
 HYDRANT VALVE MAY BE CONNECTED  
 DIRECTLY TO THE HYDRANT TEE.

NOTES: FIRE HYDRANTS SHALL BE ONE OF THE FOLLOWING THREE TYPES WITH THE 4 1/2"  
 PUMPER NOZZLES BEING NATIONAL STANDARD PIPE THREADS AND 2 (TWO) 2 1/2" HOSE  
 NOZZLES BEING NATIONAL STANDARD THREADS. ALL HYDRANTS SHALL OPEN IN A CLOCKWISE DIRECTION.  
 A) CENTURION, MANUFACTURED BY MUELLER COMPANY  
 B) SUPER CENTURION, MANUFACTURED BY MULLER COMPANY  
 C) GUARDIAN, MANUFACTURED BY KENNEDY VALVE COMPANY

NOT TO SCALE



**FIRE HYDRANT ROD TYPE  
 INSTALLATION**

STD. NO.

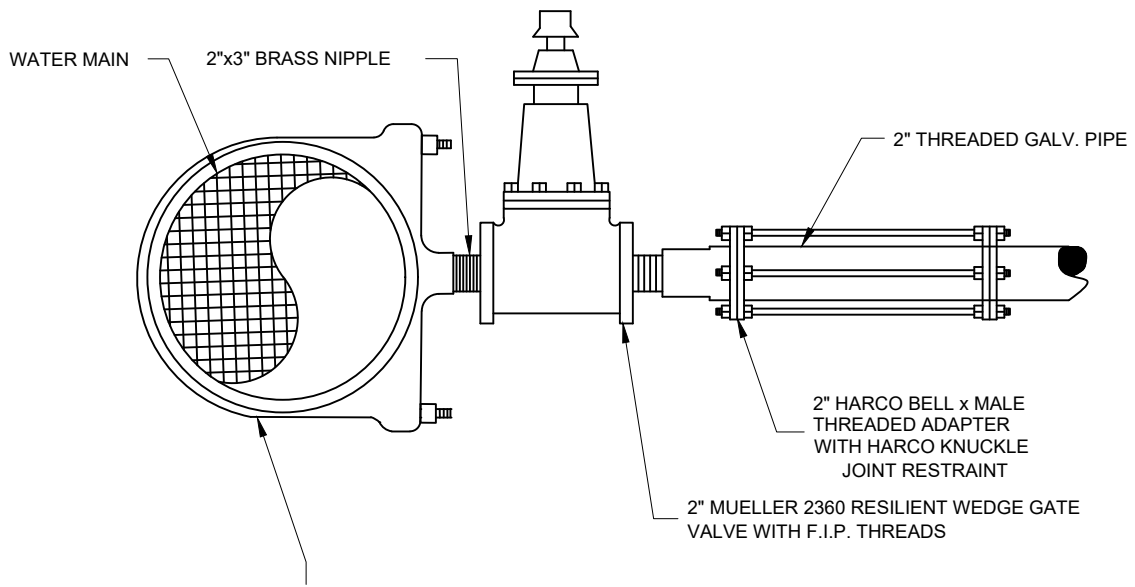
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SHEET 1 OF 1

**CITY OF MORGANTON**



FORD S 91 BRASS SADDLE WITH F.I.P. THREADS FOR USE ON PVC  
 FORD F202 DOUBLE STRAP IRON SADDLE WITH F.I.P. THREADS FOR USE ON DIP, CIP & STEEL PIPE  
 FORD FS202 DOUBLE STRAP IRON SADDLE WITH F.I.P. THREADS FOR USE ON A.C. PIPE  
 USE S-90 SADDLE TO FIT C-900 PIPE

NOTE:  
 ADJUSTABLE CAST IRON VALVE BOX IS REQUIRED BUT NOT SHOWN, SEE TYPICAL VERTICAL GATE VALVE ASSEMBLY

NOT TO SCALE



**2" MAIN CONNECTION TO 6"  
 OR LARGER WATERLINE**

STD. NO.

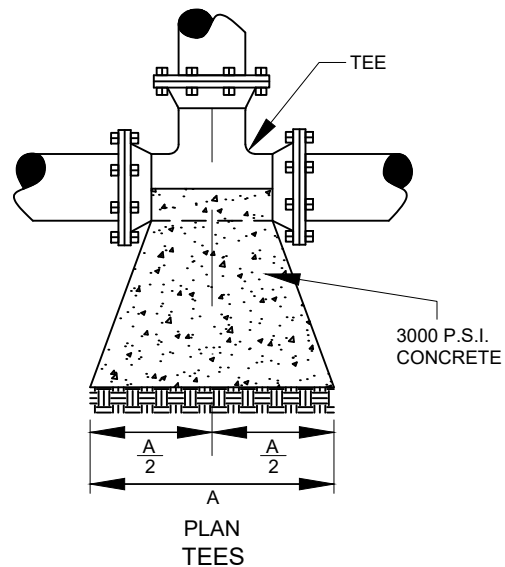
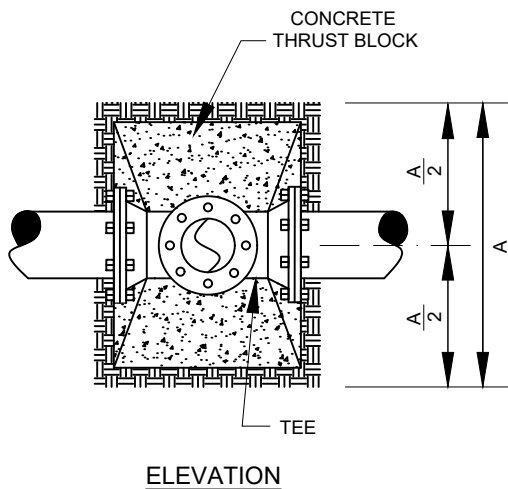
DATE

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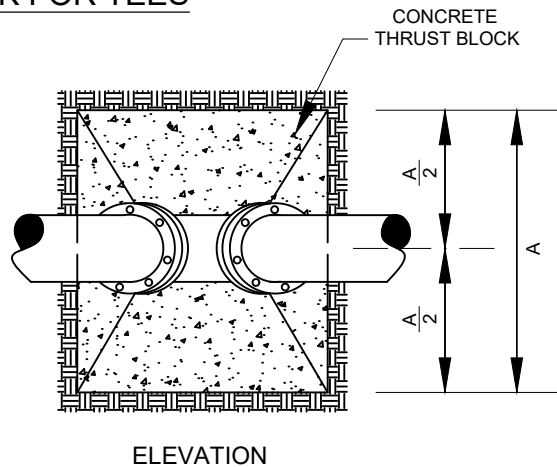
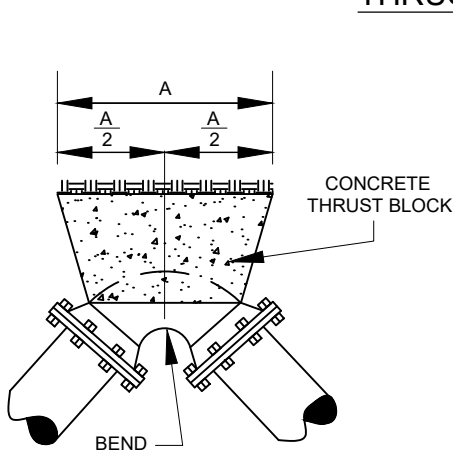
3-7-11

SHEET 1 OF 1

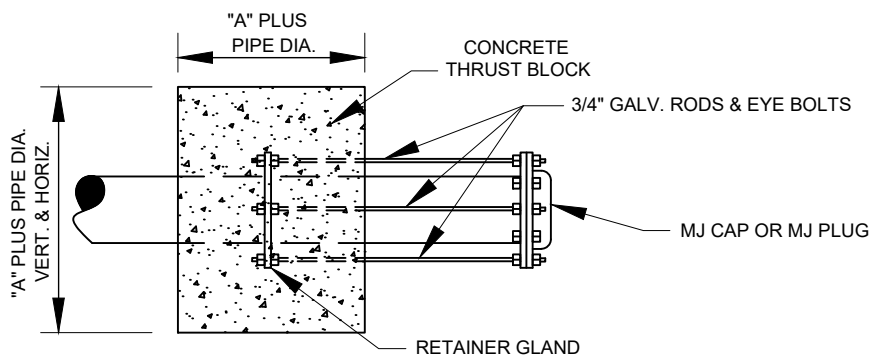
**CITY OF MORGANTON**



**THRUST BLOCK FOR TEES**



**THRUST BLOCK FOR BENDS**



**THRUST BLOCK FOR PIPE CAP**

- NOTES:  
 1. DEAD MAN RESTRAINED  
 W/ 2-3/4" ALL THREAD  
 RODS 3" TO 8" AND 4-3/4"  
 ALL THREAD RODS 12" TO 16"

NOT TO SCALE

	<b>THRUST BLOCK FOR WATER MAINS          (150 PSI WORKING PRESSURE)</b>	STD. NO.	DATE
		104.1	3-7-11
			SHEET 1 OF 2
<b>CITY OF MORGANTON</b>			

SIZE	11 1/4° BEND	22 1/2° BEND	45° BEND	90° BEND	TEE	CAP
6	12	12	12	16	16	14
8	12	12	16	22	22	18
10	12	14	20	28	28	22
12	12	18	24	32	32	28
14	14	20	28	38	38	32
16	16	22	32	42	42	36
18	18	26	36	48	48	40
20	20	28	40	52	52	44
24	24	34	46	64	64	54
30	30	42	58	78	78	66
36	36	50	70	94	94	80
42	40	58	80	108	108	90
48	46	66	90	124	124	104

**THRUST BLOCK DIMENSION "A"**

(DIMENSION "A" IN INCHES)  
4,000 P.S.I. CONCRETE

NOT TO SCALE



**THRUST BLOCK FOR WATER MAINS**

STD. NO.

DATE

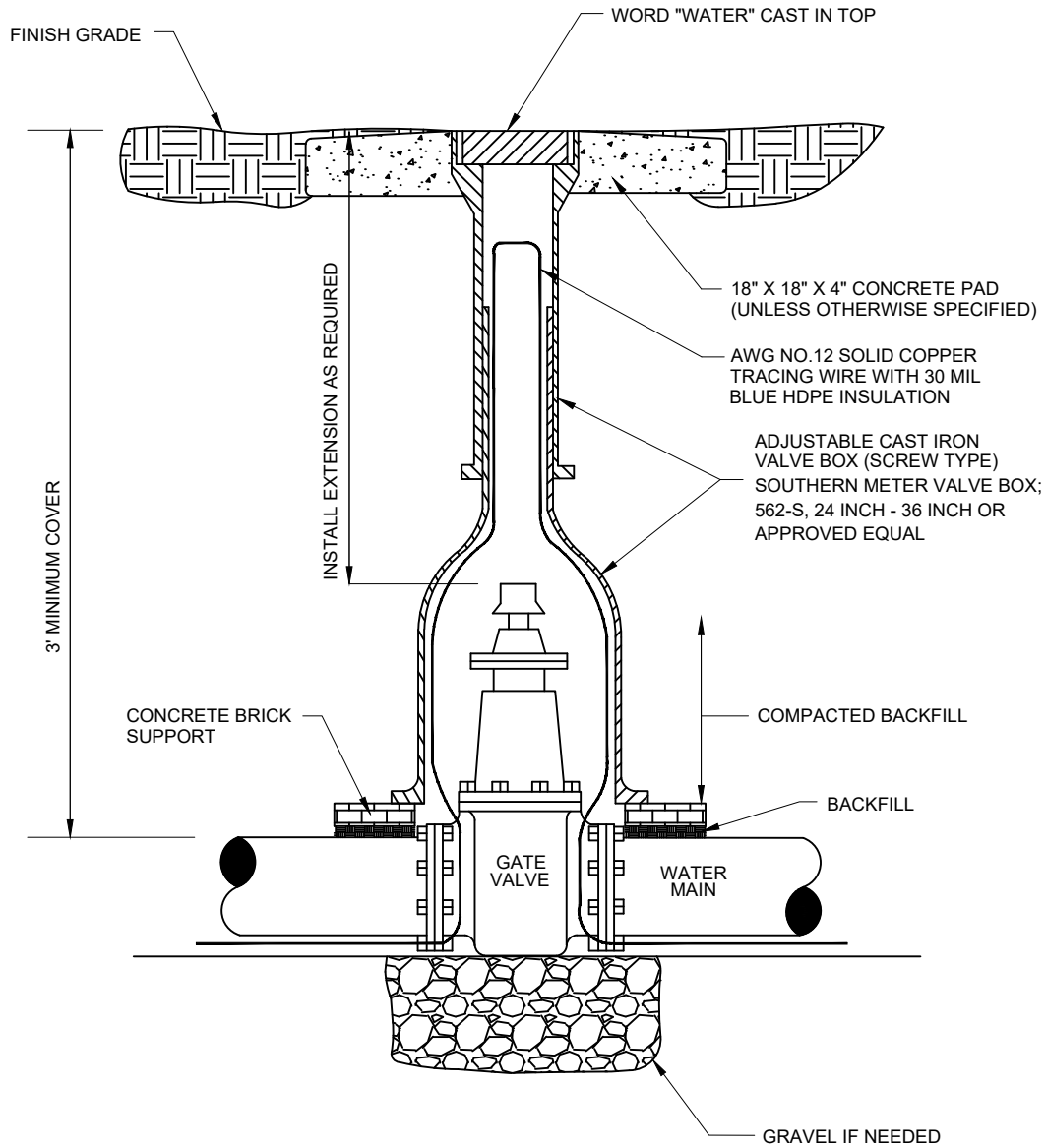
104.2

3-7-11

SHEET 2 OF 2

**CITY OF MORGANTON**





NOT TO SCALE

REVISED: 3-4-19



**VERTICAL GATE VALVE  
ASSEMBLY**

STD. NO.

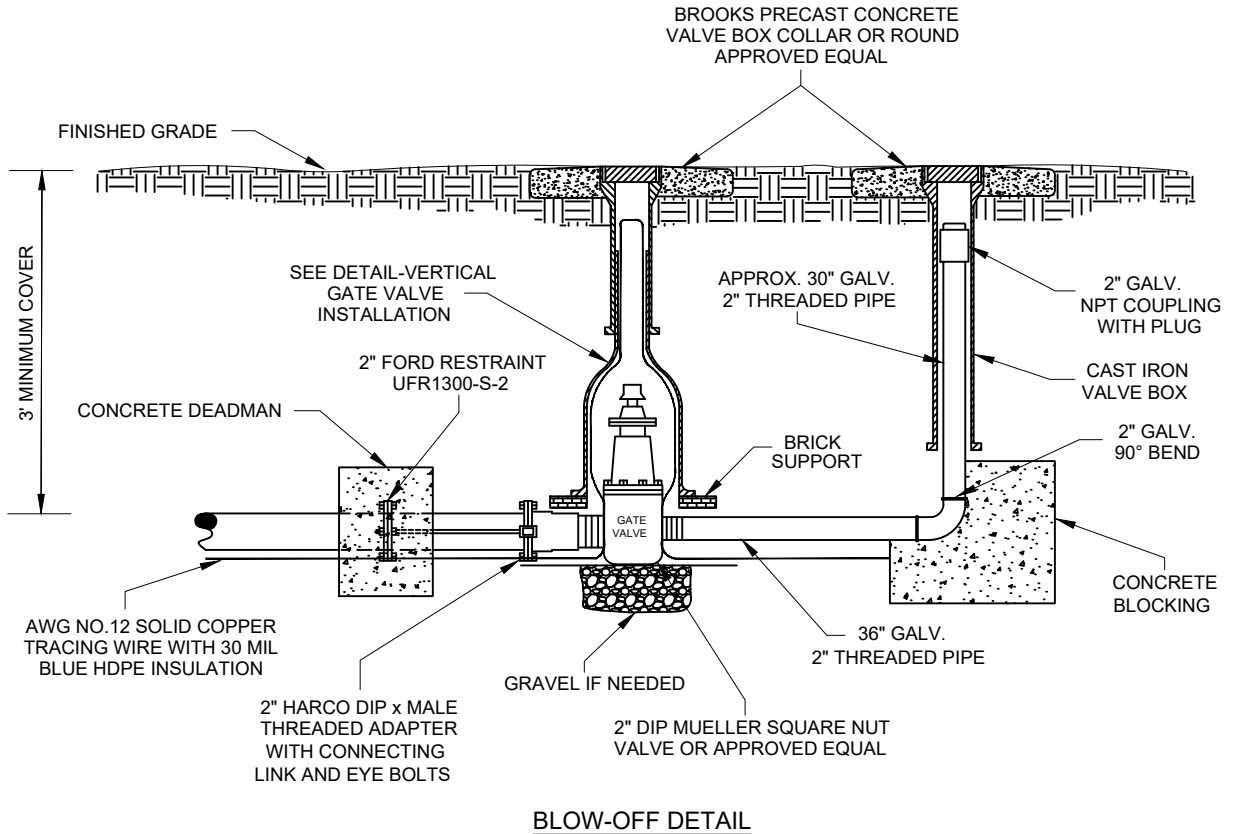
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105

3-7-11

SHEET 1 OF 1

**CITY OF MORGANTON**



- NOTE:  
 1. GLUED JOINTS WILL NOT BE PERMITTED.  
 2. ALL CONCRETE SHOWN IS TO BE 4000 P.S.I.

NOT TO SCALE

REVISED: 3-4-19



**2" BLOW-OFF**

STD. NO.

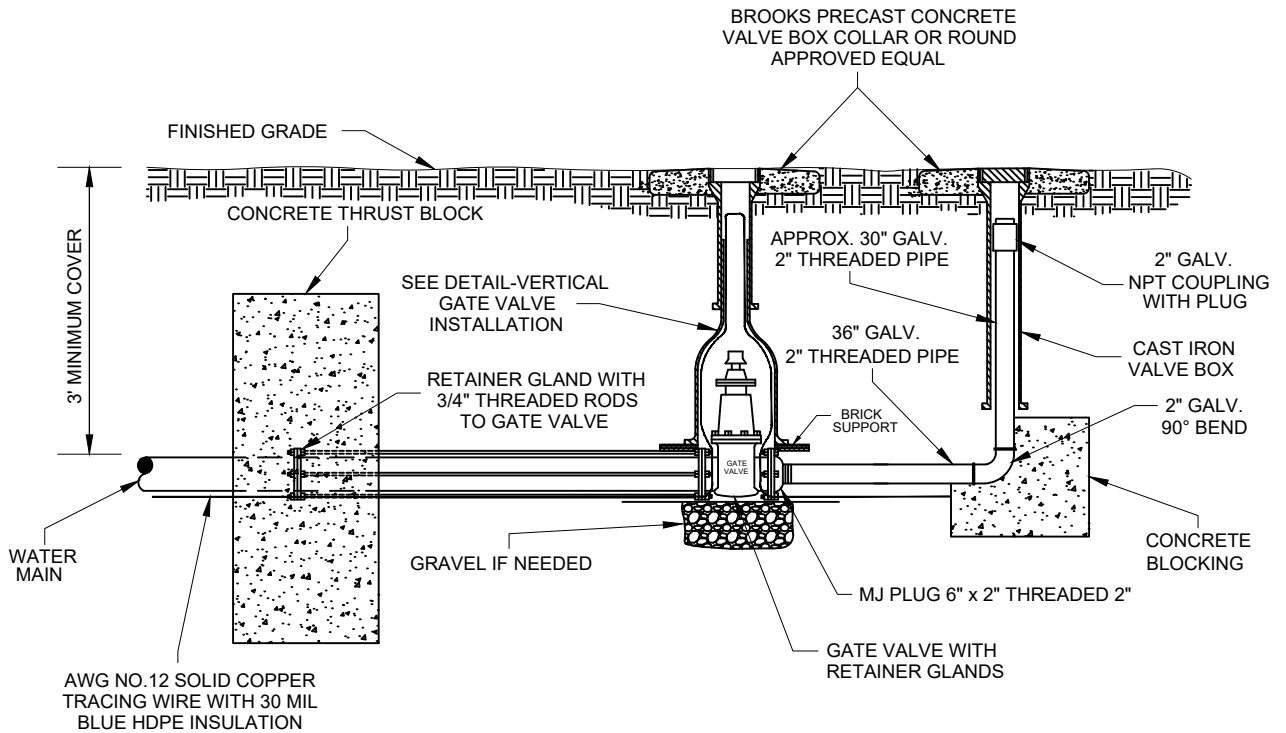
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3-7-11

SHEET 1 OF 1

**CITY OF MORGANTON**



**BLOW-OFF DETAIL**

- NOTE:  
 1. GLUED JOINTS WILL NOT BE PERMITTED.  
 2. ALL CONCRETE SHOWN IS TO BE 4,000 P.S.I.

NOT TO SCALE

REVISED: 3-4-19



**6" OR LARGER MAIN TO 2" BLOW-OFF**

STD. NO.

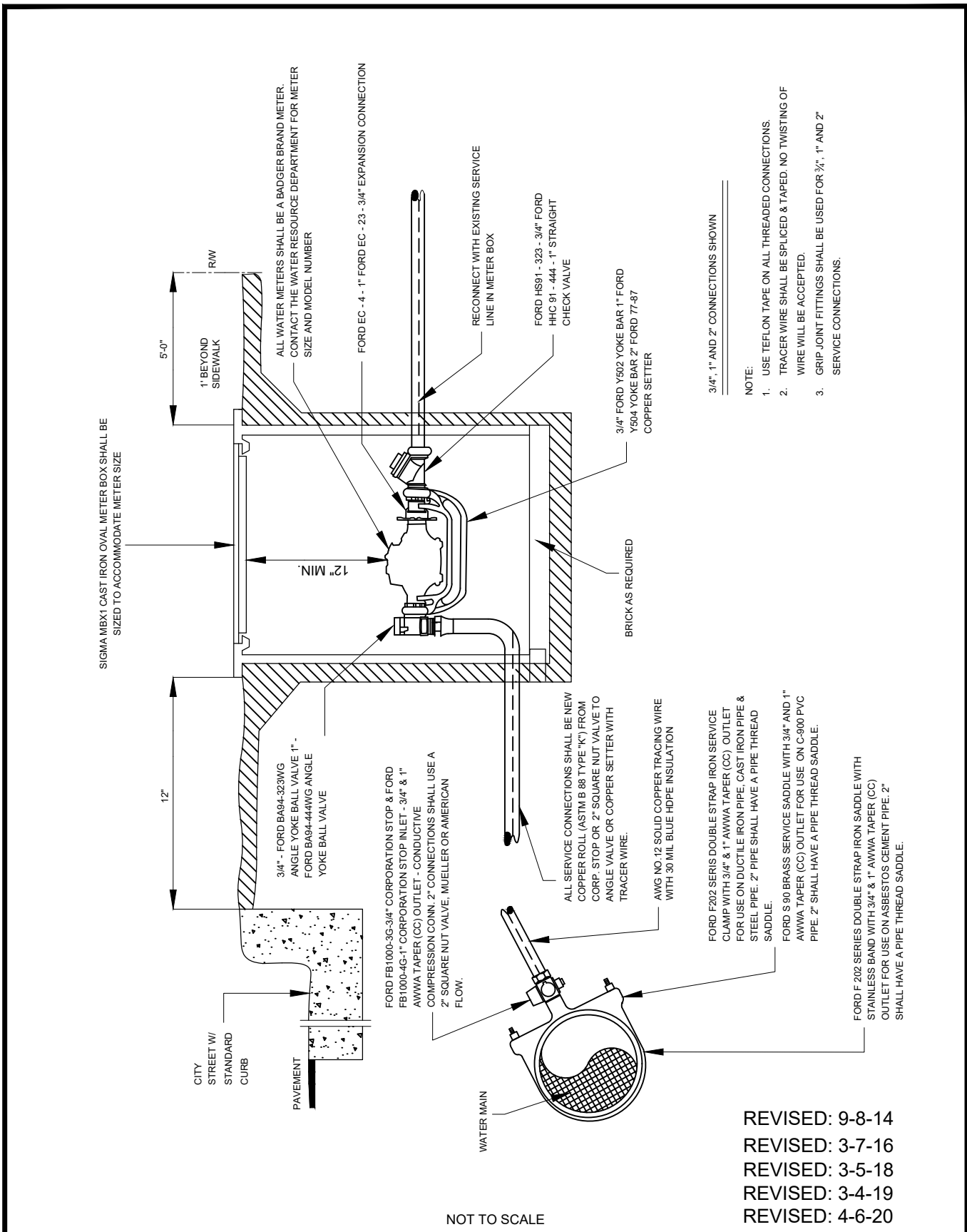
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SHEET 1 OF 1

**CITY OF MORGANTON**



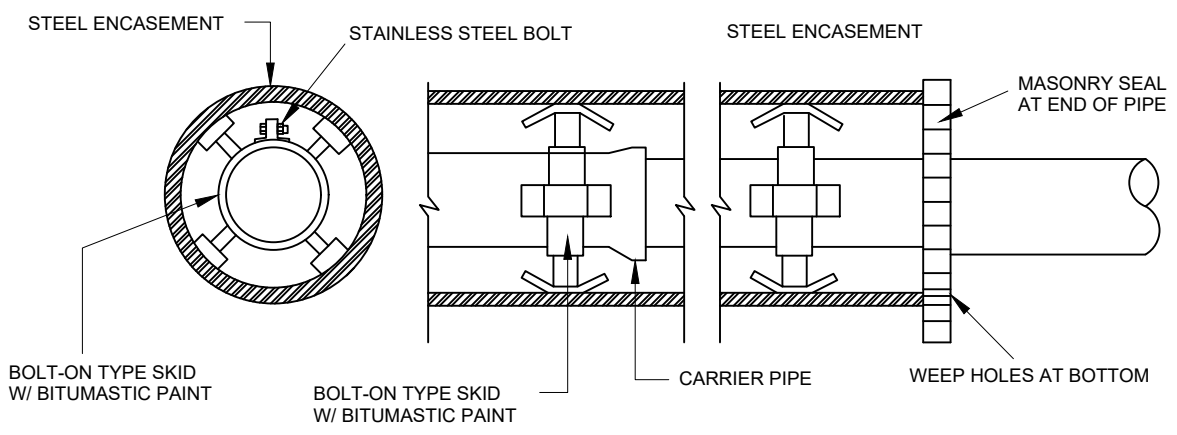
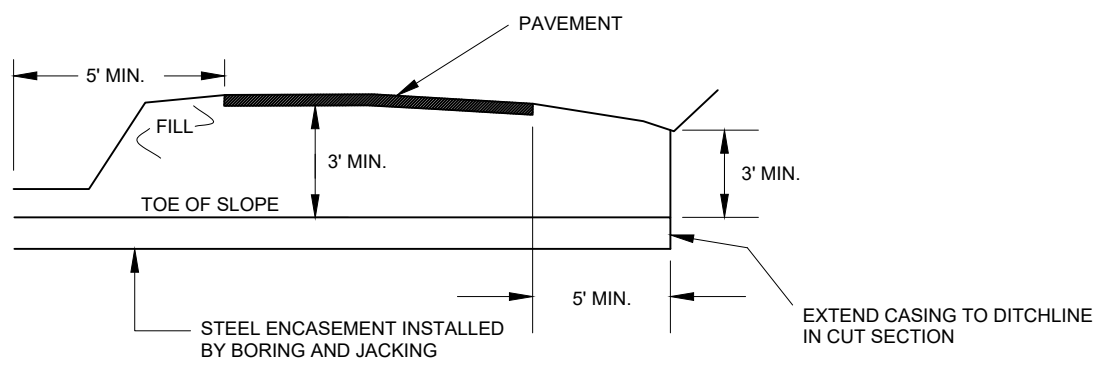
3/4", 1" AND 2" CONNECTIONS SHOWN

NOTE:

1. USE TEFLON TAPE ON ALL THREADED CONNECTIONS.
2. TRACER WIRE SHALL BE SPLICED & TAPED. NO TWISTING OF WIRE WILL BE ACCEPTED.
3. GRIP JOINT FITTINGS SHALL BE USED FOR 3/4", 1" AND 2" SERVICE CONNECTIONS.

REVISED: 9-8-14  
 REVISED: 3-7-16  
 REVISED: 3-5-18  
 REVISED: 3-4-19  
 REVISED: 4-6-20

	<b>TYPICAL WATER SERVICE CONNECTION</b>	
	STD. NO.  108	DATE 3-7-11 SHEET 1 OF 1
<b>CITY OF MORGANTON</b>		



**BORE ENCASEMENT DETAIL**

**NOTES**

CARRIER PIPE SUPPORTS SHALL BE STEEL SPIDERS (A.S.T.M. A-36 STEEL. SUPPORTS SHALL BE APPROPRIATE SIZE TO SUPPORT AND HOLD THE CARRIER PIPE TO THE SPECIFIED GRADE. THE SUPPORTS SHALL BE LOCATED FOLLOWING AND ADJACENT TO EACH CARRIER PIPE BELL.

MECHANICAL JOINT DUCTILE IRON PIPE WITH FIELD LOK 350 GASKETS BY US PIPE CO. SHALL BE USED WITHIN THE ENCASEMENT PIPE.

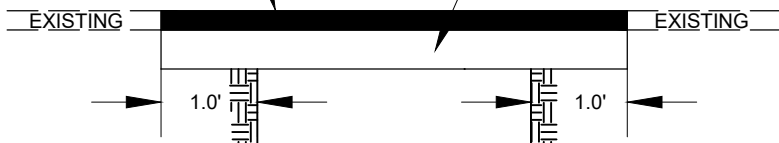
NOT TO SCALE

REVISED 3-4-13

	<b>BORE ENCASEMENT</b>	STD. NO.	DATE
		109	3-7-11
			SHEET 1 OF 1
<b>CITY OF MORGANTON</b>			

2" ASPHALT SURFACE COURSE  
TYPE S 9.5 B OR S 9.5 C

11" B 25.OB OR B25.OC BASE COURSE



AFTER PLACEMENT AND COMPACTION OF  
PIPE AND EMBEDMENT MATERIALS, THE  
BALANCE OF BACFILL MATERIALS MAY BE  
MACHINE PLACED IN UNIFORM LOOSE LIFTS  
OF SIX TO 8 INCH (6"-8") LAYERS AND  
COMPACTED TO THE APPROPRIATE DENSITY.  
ROADWAY 98% - ALL OTHER AREAS 90%

FILL EVENLY ON BOTH SIDES OF PIPE  
TO CENTERLINE AND COMPACT USING  
HAND SHOVEL OR MECHANICAL TAMP.

NOT TO SCALE

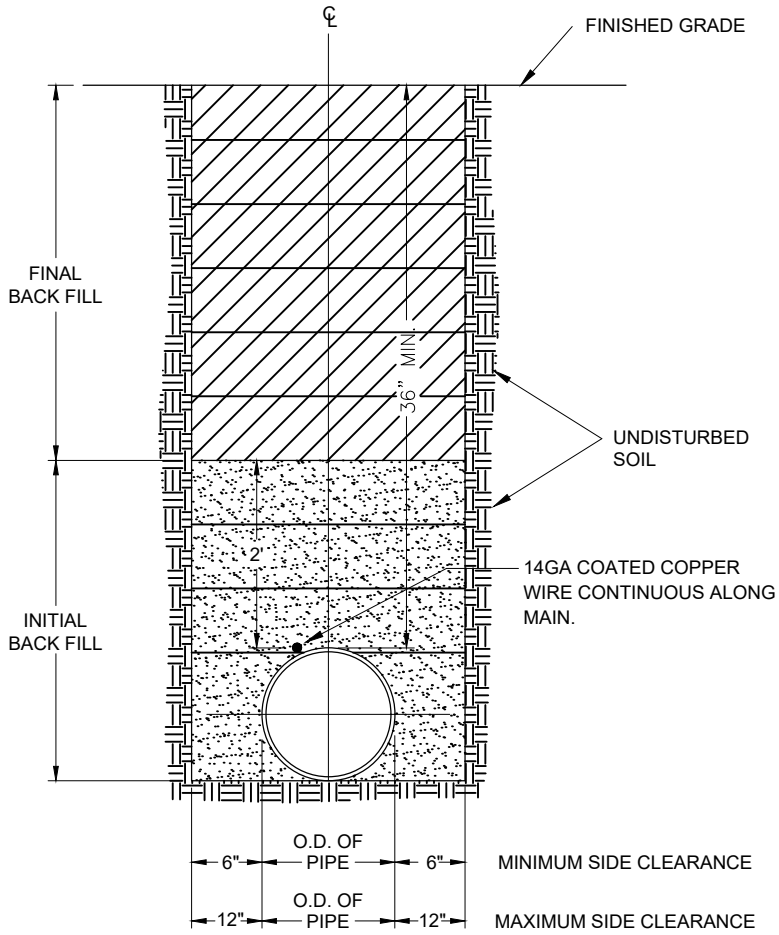
REVISED 3-3-14



**ROAD PATCH AND REPAIR**

STD. NO.	DATE
110	3-7-11
SHEET 1 OF 1	

**CITY OF MORGANTON**



TYPICAL TRENCH BOTTOM DIMENSIONS FOR:  
DUCTILE IRON, C-900 PVC, AND CONCRETE PIPE

**TRENCH DETAIL**  
**CLASS D FLAT SUBGRADE**

NOTES:

1. TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
2. NO ROCKS OR BOULDERS 2" OR LARGER TO BE USED IN INITIAL BACKFILL.
3. ALL BACKFILL MATERIAL SHALL BE SUITABLE MATERIAL.
4. BACKFILL SHALL BE COMPACTED IN 6" LAYERS IN TRAFFIC AREAS, 12" LAYERS IN NON-TRAFFIC AREAS USING VIBRATORY EQUIPMENT.

DEPTH OF BEDDING  
MATERIAL BELOW PIPE

D	d (MIN.)
27" & SMALLER	6"
30" - 60"	12"
66" & LARGER	18"

NOT TO SCALE



**WATER LINE TRENCH BOTTOM  
AND BACKFILLING REQUIREMENTS**

STD. NO.

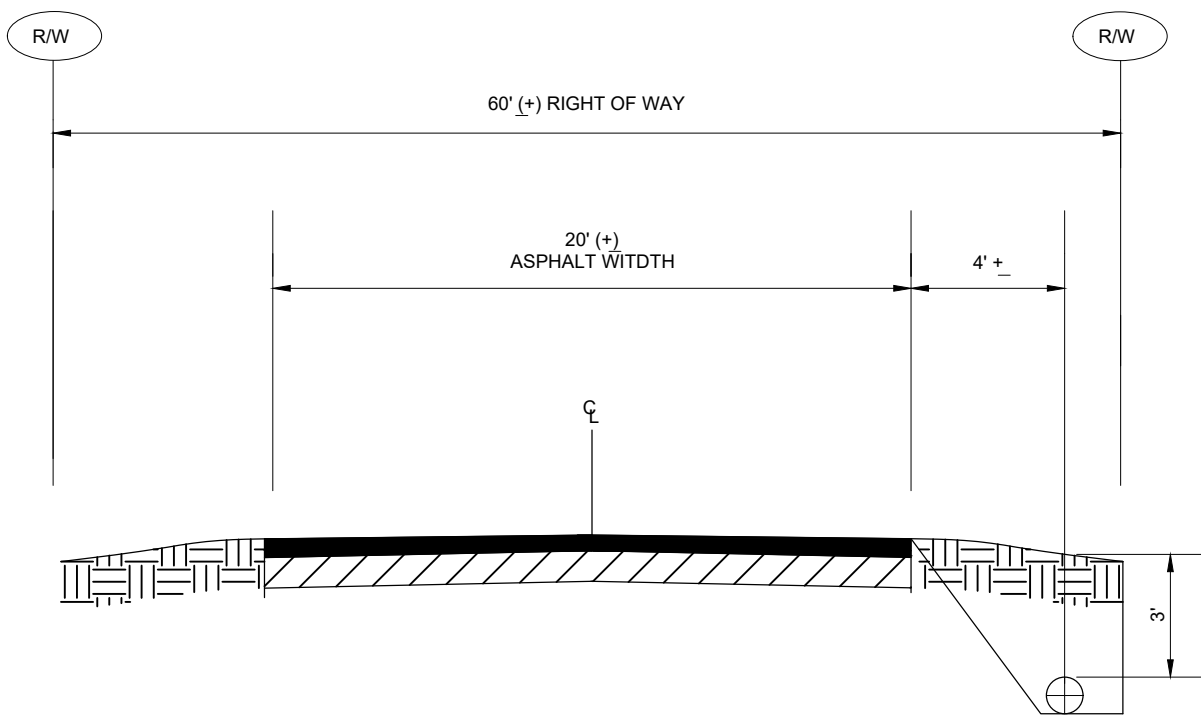
111

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SHEET 1 OF 1

**CITY OF MORGANTON**



TYPICAL PAVED SECTION  
NTS

NOTES

- WATER MAIN SHALL HAVE MINIMUM 3' OF COVER OVER THE PIPE MEASURED FROM TOP OF PIPE TO FINISH GROUND.
- BACKFILL TO BE PLACED IN 4" TO 6" LAYERS WITH PNEUMATIC TAMP AND THE SHOULDERS TO BE PLACED BACK IN ORIGINAL CONDITIONS.
- SEED AND STRAW TO BE PLACED
- CONCRETE DRIVEWAYS ARE TO BE SMOOTH CUT AND PLACED BACK IN ORIGINAL CONDITION AT COMPLETION OF PROJECT.
- POUR CONCRETE FOR ALL WATER LINE FITTINGS, INCLUDING PLUGS, FIRE HYDRANTS, BENDS, ETC. UNLESS OTHERWISE NOTED IN PLANS.

NOT TO SCALE

REVISED: 4-6-20

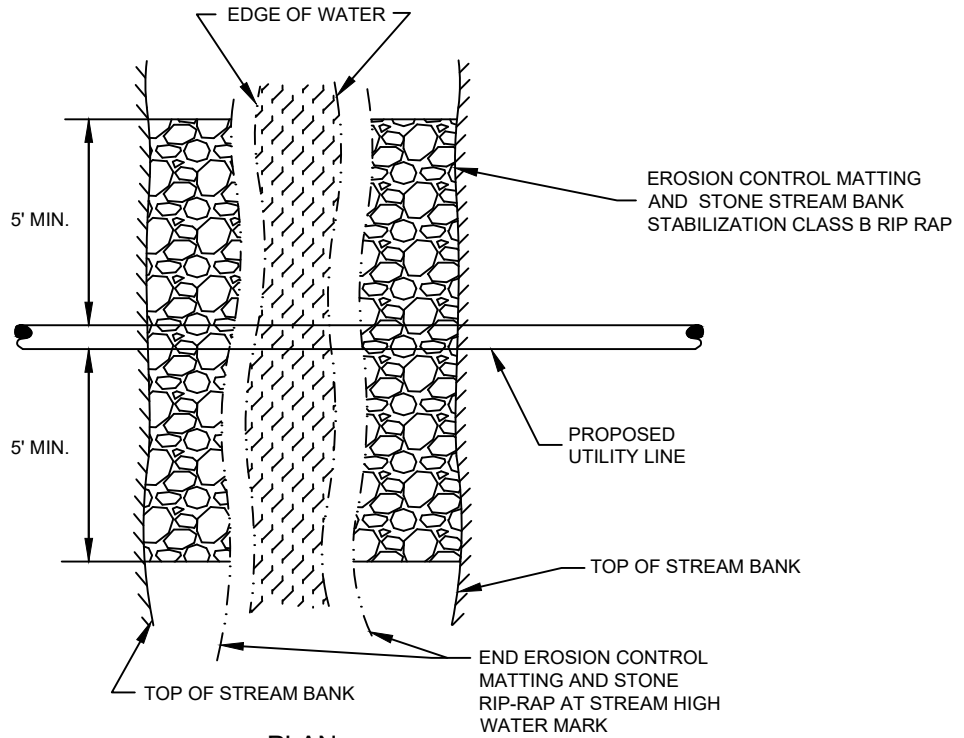


**WATERLINE INSTALLATION  
IN ROADWAY SHOULDER**

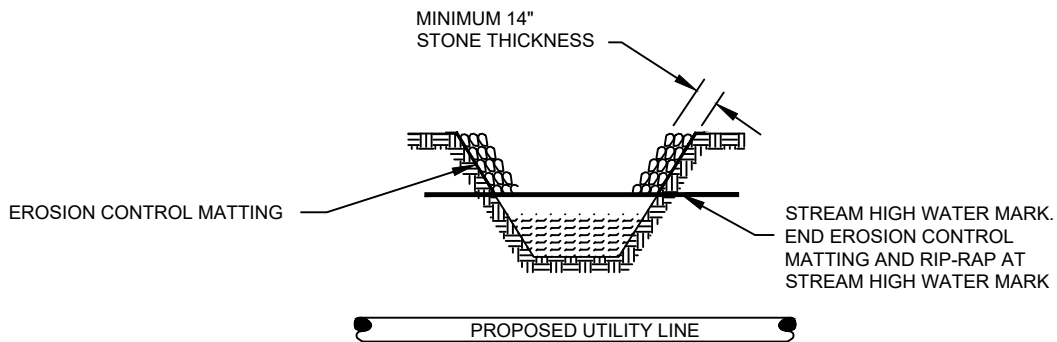
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**CITY OF MORGANTON**





**PLAN**



**SECTION**

**NOTES:**

1. EXCAVATION IN THE STREAM BED SHALL BE AS NARROW AS POSSIBLE IN ORDER TO MINIMIZE DISTURBANCE AND SEDIMENTATION DURING INSTALLATION.
2. EROSION CONTROL MATTING CONSISTING OF WOVEN COCONUT COIR FIBER MATERIAL OR APPROVED EQUAL SHALL BE USED TO REPAIR DISTURBED AREAS ALONG THE STREAM BANK. MATTING SHALL BE INSTALLED PER THE MANUFACTURES SPECIFICATIONS.
3. THE USE OF PLASTIC MESH AND/OR PLASTIC TWINE SHALL NOT BE USED ALONG STREAM BANKS OR WITHIN WETLANDS.
4. STONE TO WELL GRADED CLASS B RIP RAP
5. STONE IS TO BE KEYED INTO EACH SIDE OF STREAM BED AND EACH END OF THE STABILIZATION 1FT. DEEP TO PREVENT EROSION AROUND EDGES OF STABILIZATION.
6. STONE SHALL EXTEND FROM THE STREAM HIGH WATER MARK TO THE TOP OF THE STREAM BANK.
7. STONE TO BE PLACED AT A THICKNESS OF 14" MINIMUM THROUGHOUT.
8. STABILIZE THE STREAM CHANNEL WITH CLASS B RIP RAP STONE UP TO A LEVEL EQUAL TO THE BOTTOM OF THE NATURAL CHANNEL.

NOT TO SCALE

REVISED: 3-1-21



**STREAM BANK STABILIZATION**

STD. NO.

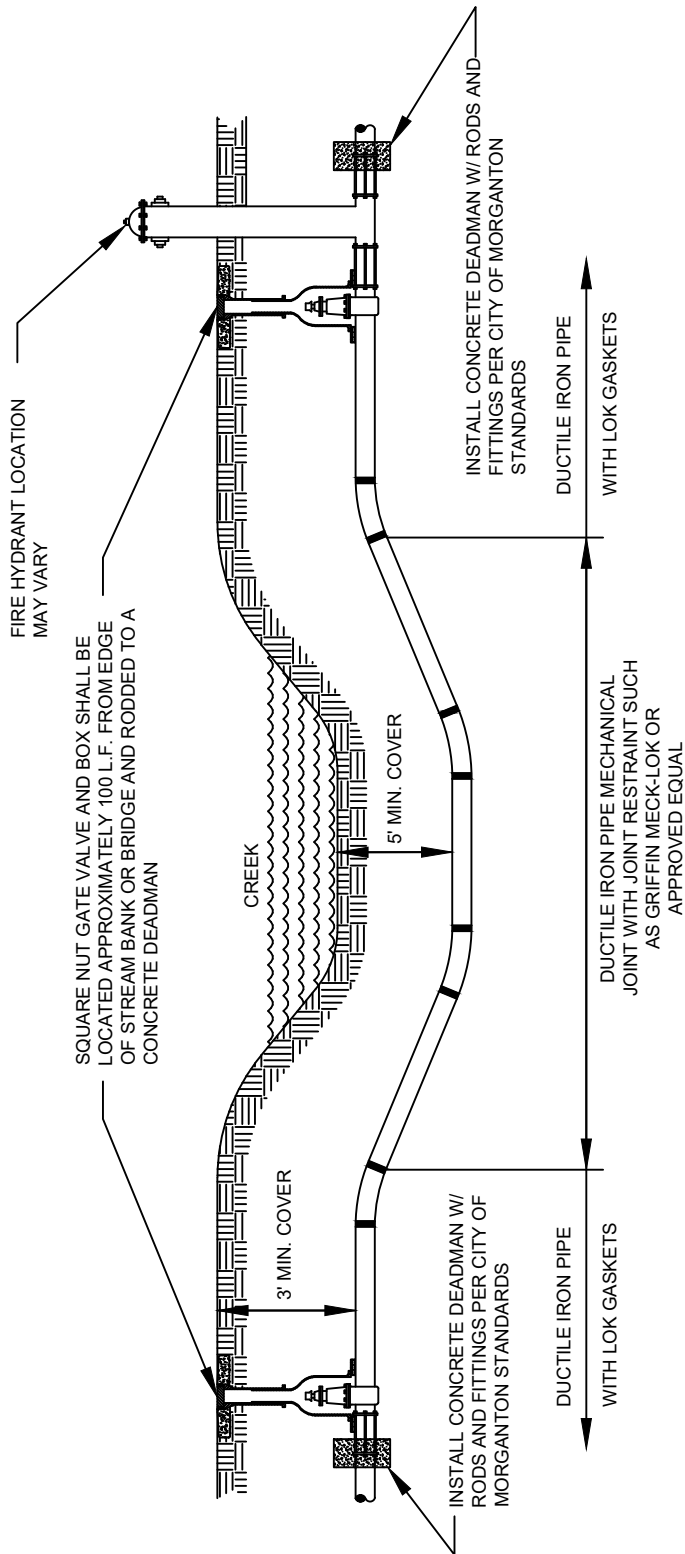
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**CITY OF MORGANTON**



- NOTES:
1. 3'-0" MIN. COVER SHALL BE MAINTAINED IN EMBANKMENTS AND SHALL BE ACHIEVED BY BLASTING IF NECESSARY.
  2. BALL JOINT PIPE SHALL BE LAID INTO RIVER BED AS DEEP AS POSSIBLE WITHOUT BLASTING.

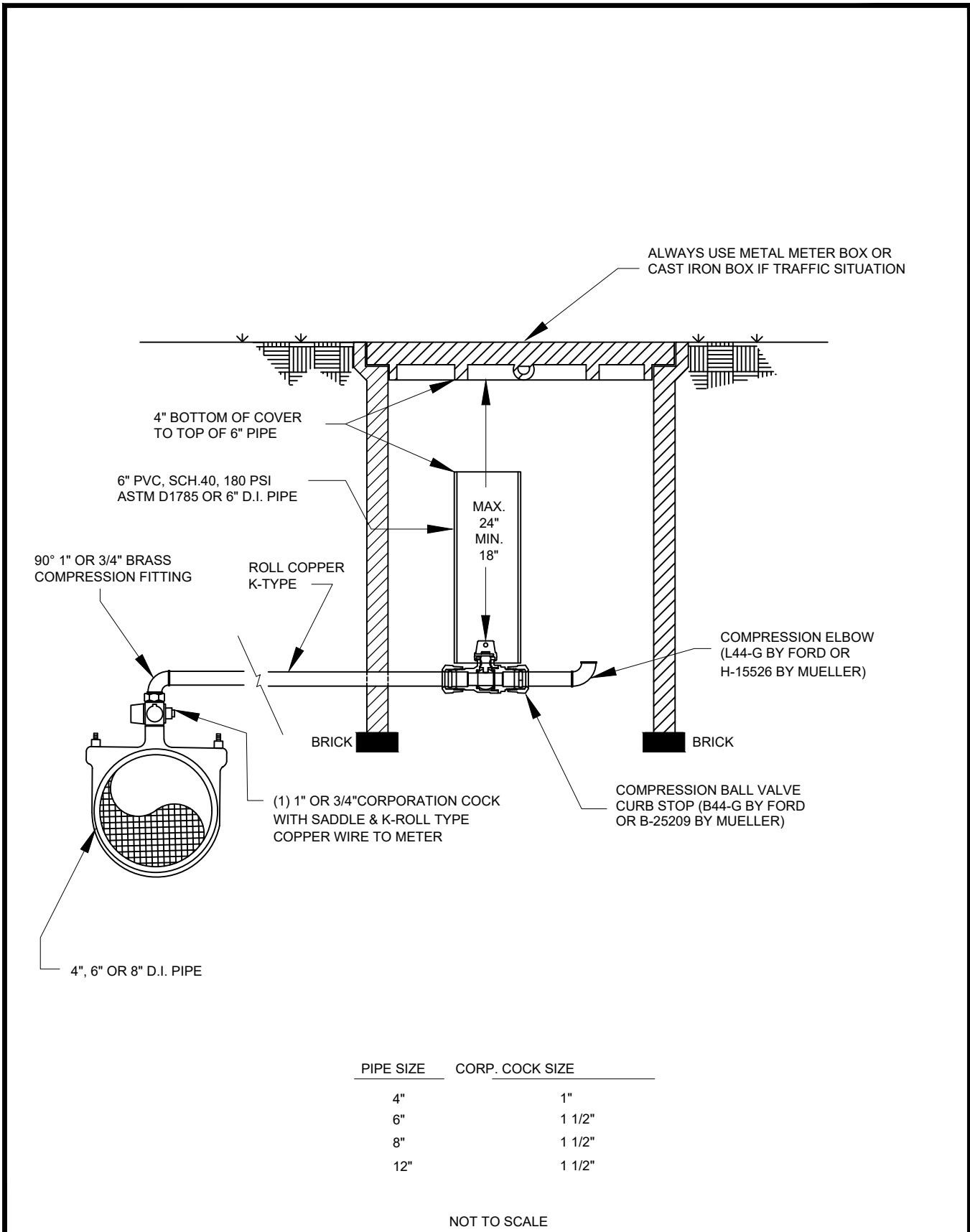
NOT TO SCALE



**BALL JOINT WATERLINE STREAM CROSSING**

STD. NO.	DATE
114	3-7-11
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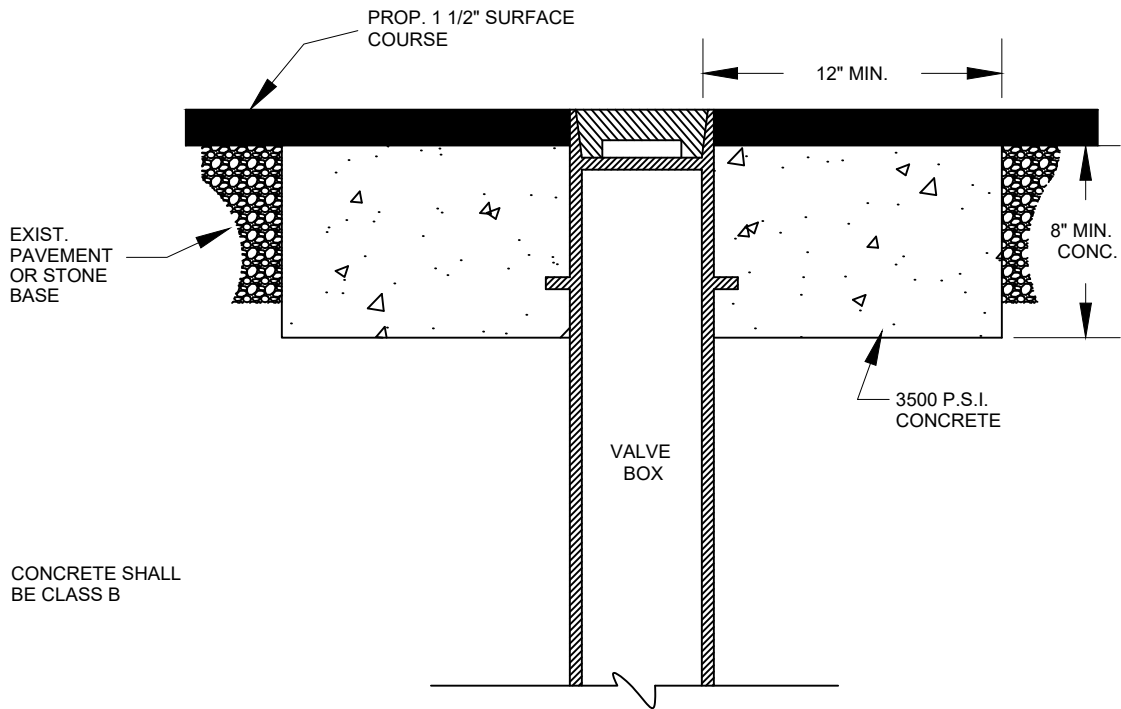
**CITY OF MORGANTON**



PIPE SIZE	CORP. COCK SIZE
4"	1"
6"	1 1/2"
8"	1 1/2"
12"	1 1/2"

NOT TO SCALE

	<b>AIR BLOW-OFF ASSEMBLY</b>	STD. NO.	DATE
		115	3-7-11
	CITY OF MORGANTON		SHEET 1 OF 1



NOT TO SCALE



**CONCRETE ENCASEMENT FOR VALVE BOX AND CASTING IN PAVEMENT**

STD. NO.

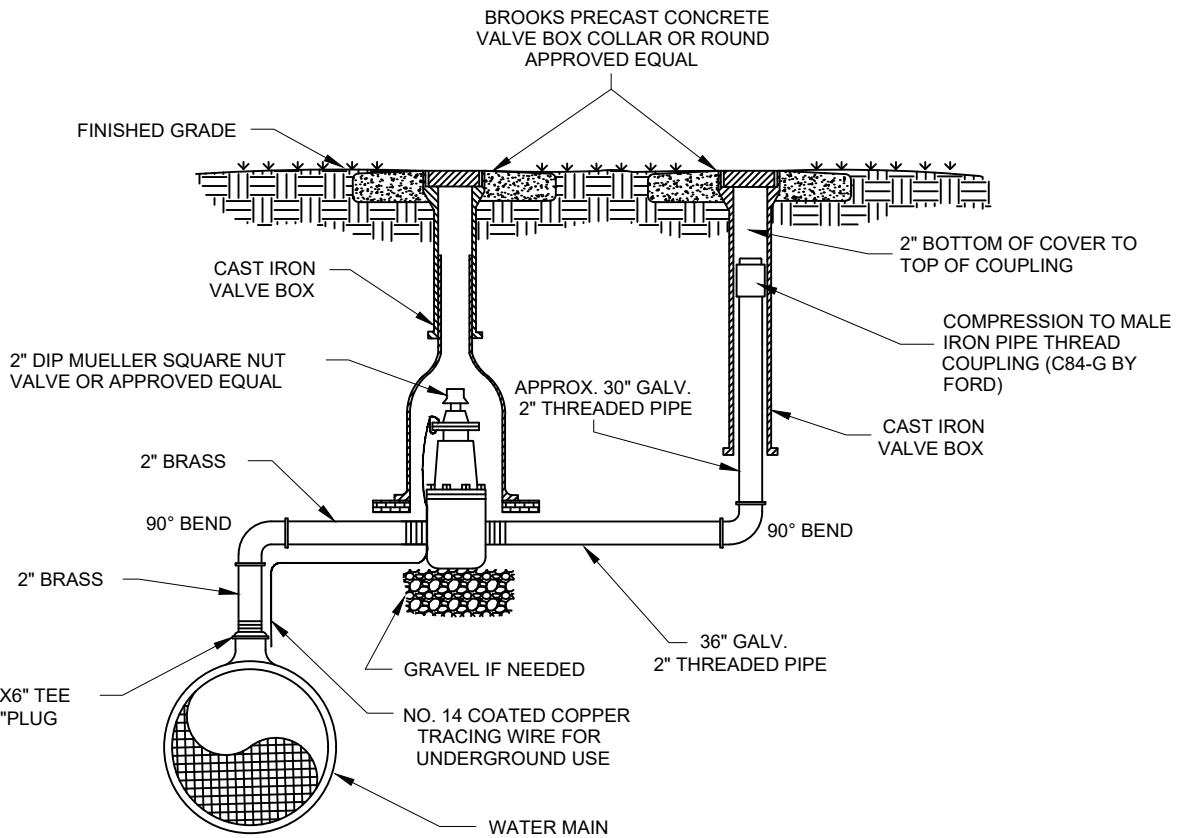
DATE

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3-7-11

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**CITY OF MORGANTON**



NOT TO SCALE



**AIR BLOW-OFF ASSEMBLY WITH TEE**

STD. NO.

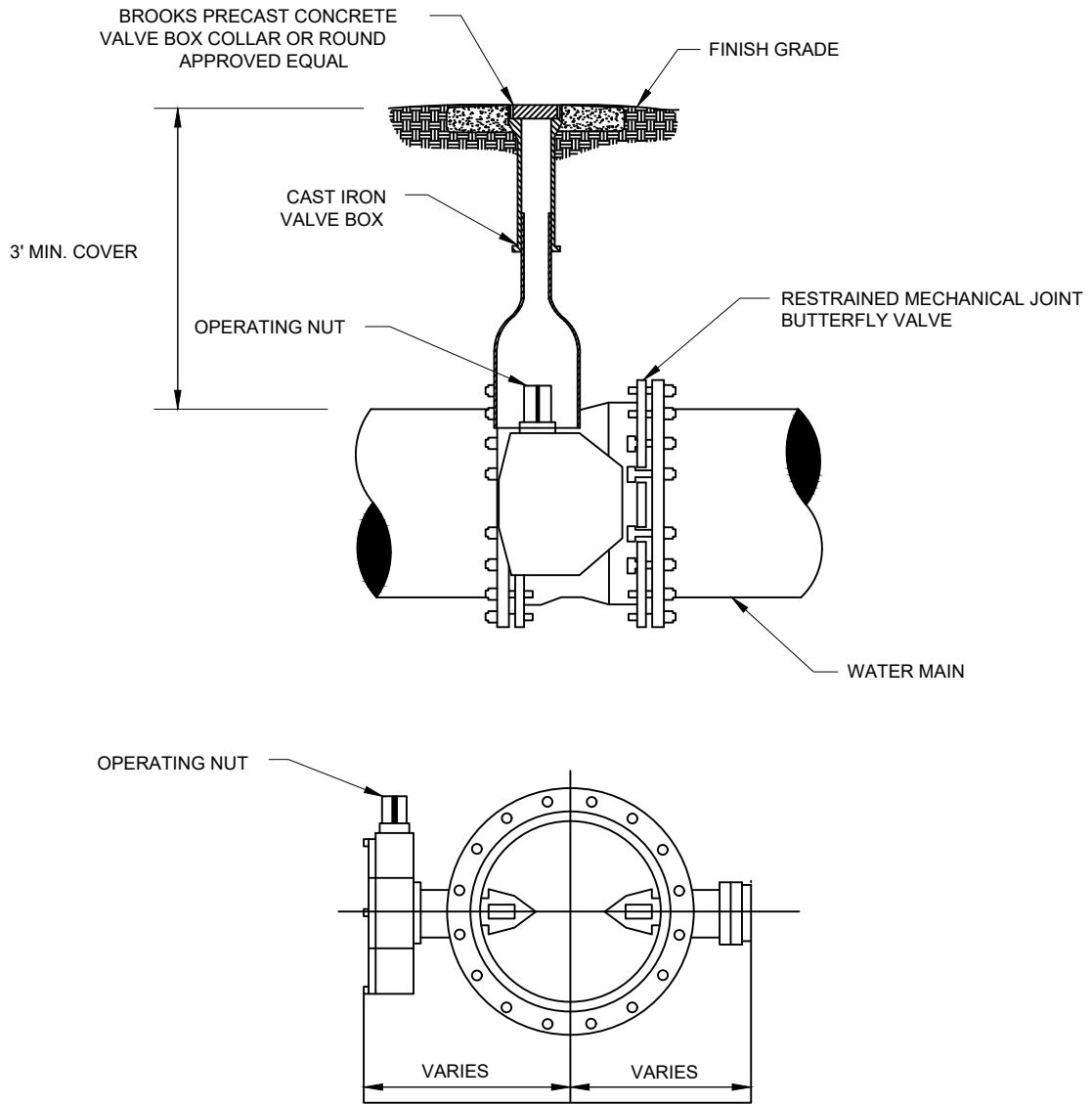
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**CITY OF MORGANTON**



NOTES:

1. BUTTERFLY VALVE SHALL BE A MUELLER OR CLOW MODEL OR APPROVED EQUAL.
2. IF OPERATING NUT IS MORE THAN 36" DEEP AN EXTENSION IS REQUIRED TO BRING OPERATING NUT TO 24"-36" BELOW FINISH GRADE. EXTENSION BOLTS AND NUTS SHALL BE STAINLESS STEEL.
3. VALVE BOXES SHALL BE BROOKS PRECAST CONCRETE OR ROUND OVAL APPROVED EQUAL.

NOT TO SCALE



**BUTTERFLY VALVE**

STD. NO.

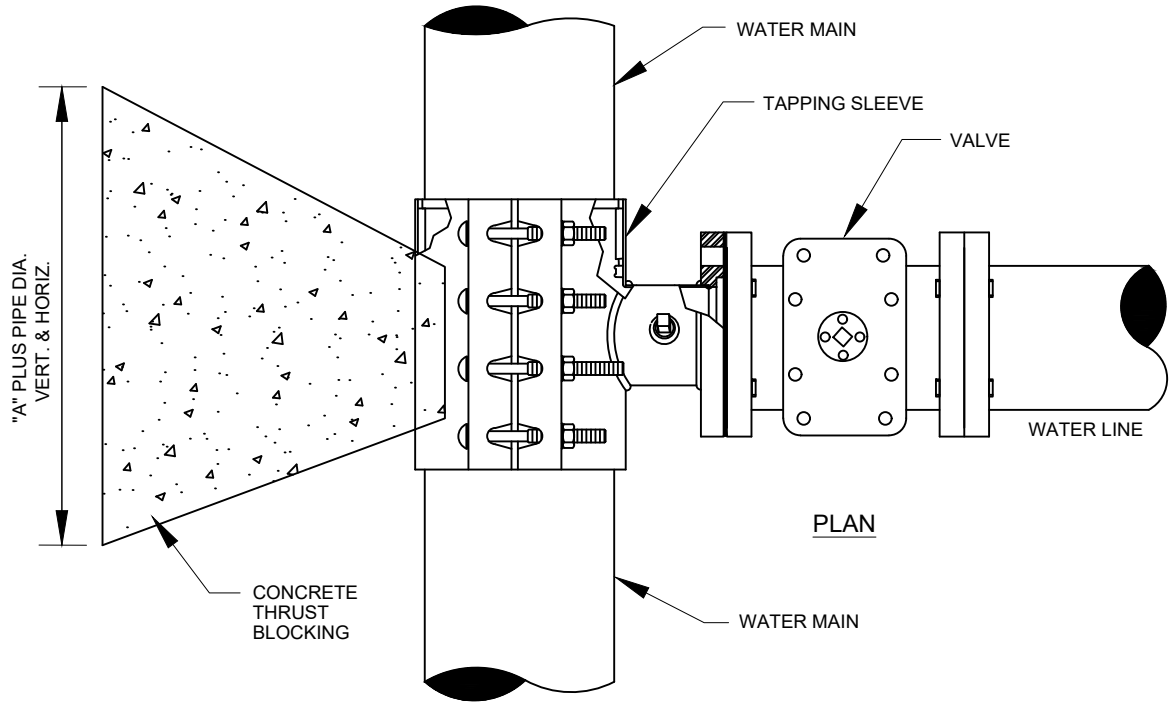
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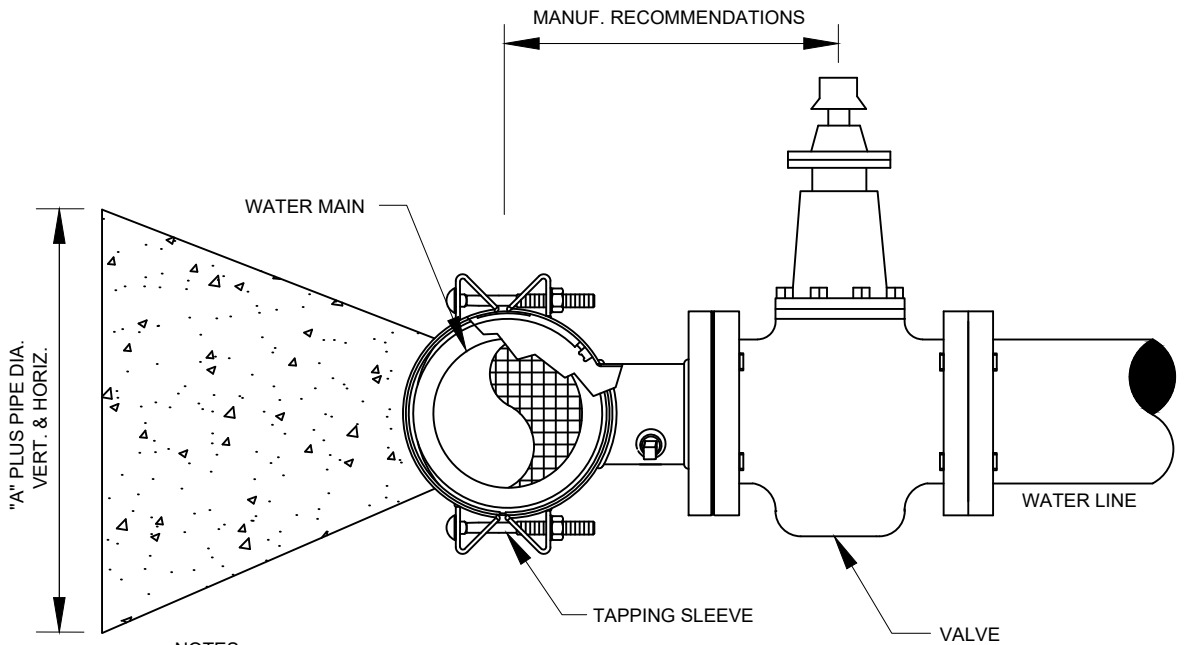
3-7-11

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**CITY OF MORGANTON**



PLAN



ELEVATION

NOTES

1. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTING.
2. SEE STANDARD THRUST BLOCK TABLES.
3. TAPPING A LINE BELOW 8" SHALL BE A FORD, MUELLER OR AMERICAN TAPPING SLEEVE.
4. TAPPING A LINE 8" OR GREATER SHALL BE AN AMERICAN FLOW CONTROL DUCTILE IRON TAPPING SLEEVE.
5. GATE VALVE SHALL BE A CLOW, KENNEDY OR MUELLER.
6. ALL FITTINGS AND APPURTENANCES SHALL BE RESTRAINED.
7. THE TAPPING SLEEVE AND VALVE SHALL BE TESTED PER THE MANUFACTURES SPECIFICATIONS BEFORE ANY TAP WORK ON THE MAIN LINE CAN BE DONE.

NOT TO SCALE

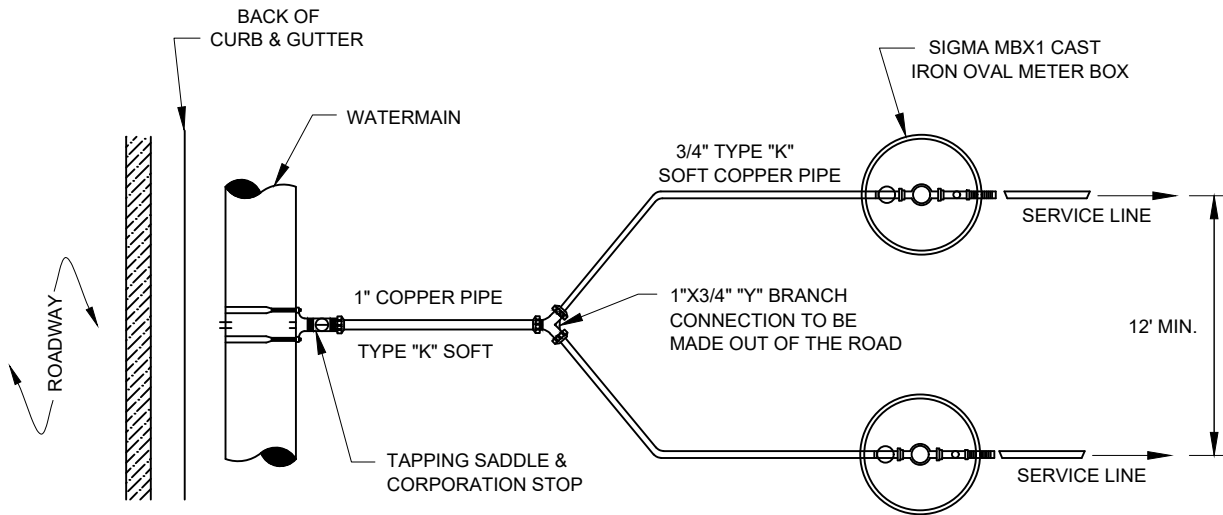
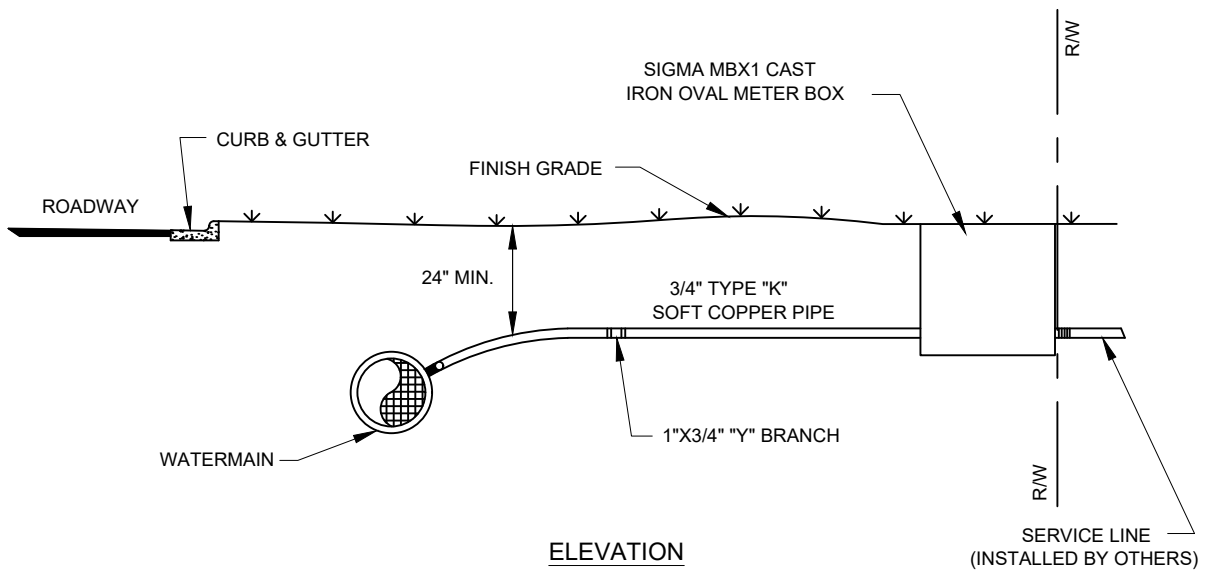
REVISED: 3-1-21  
REVISED: 3-4-13



TAPPING SLEEVE & VALVE ASSEMBLY

STD. NO.	DATE
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CITY OF MORGANTON



**NOTES**

1. METER BOX AND METER BOX LID TYPE & MANUFACTURER SHALL BE APPROVED BY THE CITY OF MORGANTON
2. MAXIMUM ALLOWABLE SERVICE IS 2-3/4" METERS SERVED BY A 1 INCH TAP & SERVICE LINE
3. METERS SHALL BE EQUALLY OFFSET FROM PROPERTY LINE
4. MINIMUM LENGTH OF BRASS NIPPLE SHALL BE 12 INCHES
5. TAPPING SADDLE SHALL FIT EITHER PVC, DUCTILE IRON OR AC PIPE.

NOT TO SCALE



**DUAL WATER SERVICE CONNECTION**

STD. NO.

DATE

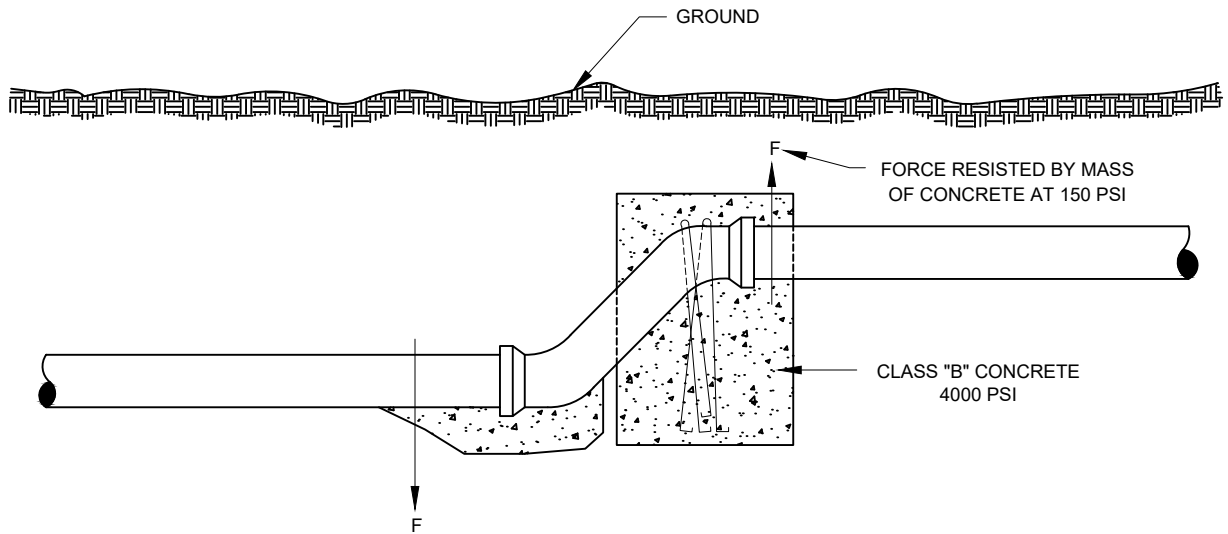
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**CITY OF MORGANTON**





THE FOLLOWING TABLE SHOWS WEIGHT AND VOLUME OF CONCRETE NECESSARY TO HOLD DOWN OFFSET. WEIGHT OF OFFSET, WEIGHT OF PIPE, AND TRENCH LOADS ARE IGNORED IN CALCULATIONS.

DIA.	6" DROP		12" DROP		18" DROP		24" DROP		30" DROP		36" DROP	
	FORCE	CONC.	FORCE	CONC.	FORCE	CONC.	FORCE	CONC.	FORCE	CONC.	FORCE	CONC.
6"	908#	1/4 CY.	1496#	1/2 CY.	1861#	1/2 CY.	2481#	3/4 CY.	3102#	3/4 CY.	3722#	1 CY.
8"	1569#	1/2 CY.	2528#	3/4CY.	3175#	3/4 CY.	4233#	1-1/4 CY.	5291#	1 1/2 CY.		
10"	2355#	3/4 CY.	3718#	1 CY.	4608#	1-1/4 CY.	6143#	1-1/4 CY.				
12"	2992#	3/4 CY.	4522#	1-1/4 CY.	5450#	1-1/2 CY.	7267#	1-3/4 CY.				
16"	4306#	1-1/4 CY.	7235#	1-3/4 CY.	9355#	2-1/2 CY.	12473#	3-1/4 CY.				

NOT TO SCALE



**ANCHORAGE OF VERTICAL OFFSETS**

STD. NO.

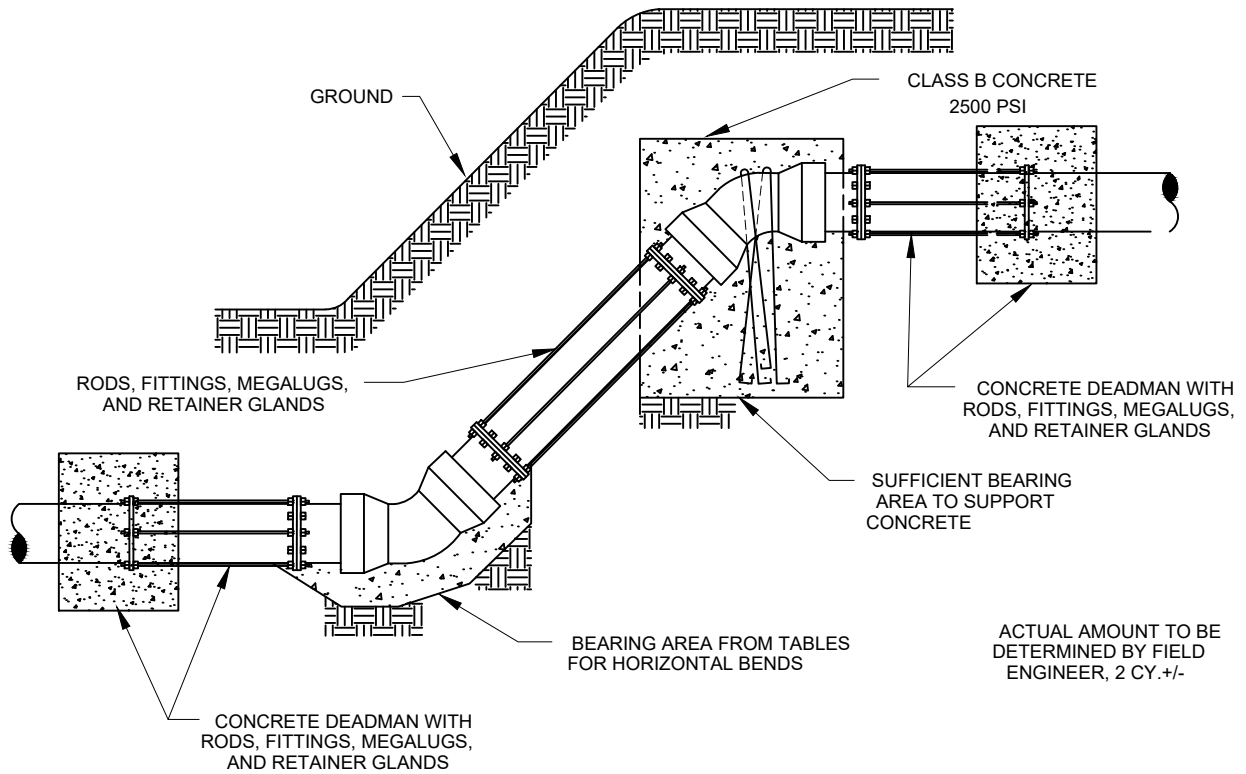
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**CITY OF MORGANTON**



CUBIC YARDS OF CONCRETE TO ANCHOR VERTICAL BENDS						
PIPE DIA.	11-1/4" BEND		22-1/2" BEND		45° BEND	
6"	812#	1/2 CY.	1653#	1/2 CY.	3247#	1.0 CY.
8"	1444#	1/2 CY.	2939#	3/4 CY.	5773#	1.5 CY.
12"	3248#	1.0 CY.	6612#	1-3/4 CY.	12988#	3.5 CY.
16"	5775#	1-1/2 CY.	11756#	3.0 CY.	23090#	6.0 CY.

NOT TO SCALE



**STANDARD VERTICAL BEND ANCHORS**

STD. NO.

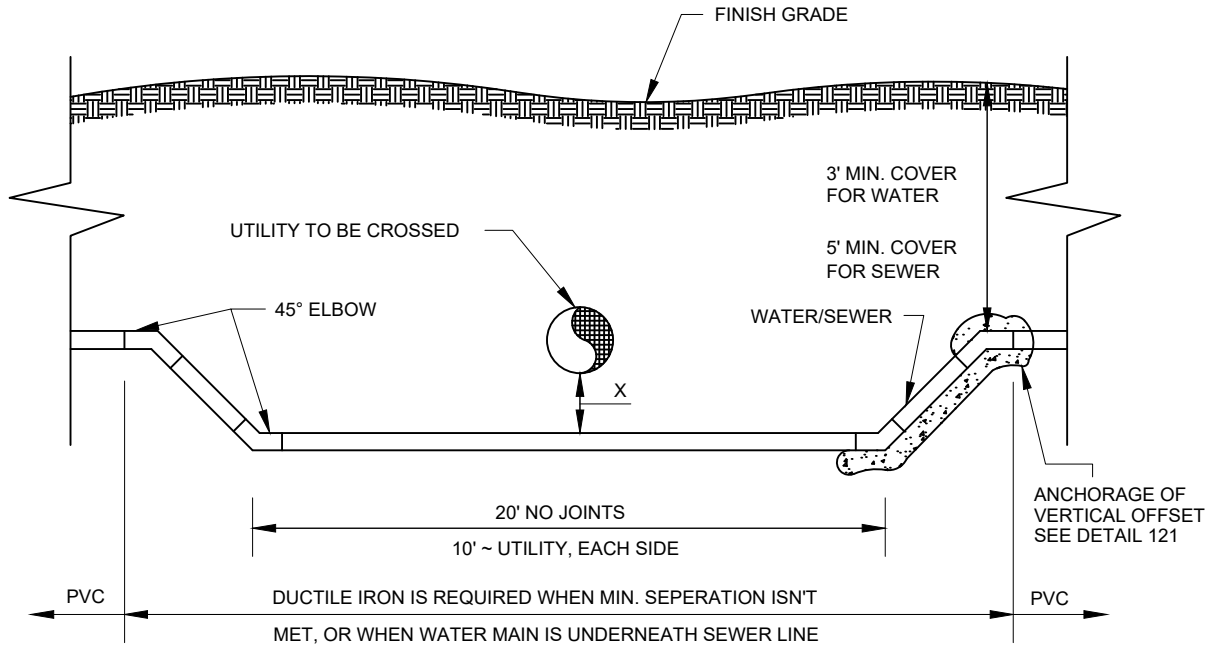
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**CITY OF MORGANTON**



NOTE:  
TO BE USED WHEN COVER NEEDS TO BE INCREASED TO ACHIEVE MIN. SEPERATION.

X: VERTICAL SEPERATION NOTE  
24" MIN. VERTICAL SEPERATION REQUIRED FOR WATER OR SEWER CROSSING STORM WATER.  
18" MIN. VERTICAL SEPERATION REQUIRED FOR WATER CROSSING SEWER.

X: HORIZONTAL SEPERATION NOTE  
5' MIN. HORIZONTAL SEPERATION REQUIRED FOR WATER OR SEWER CROSSING STORM WATER.  
10" MIN. HORIZONTAL SEPERATION REQUIRED FOR WATER CROSSING SEWER.

**WATER CROSSING NOTES:**

**1. CROSSING A WATER MAIN OVER A SEWER.**

WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS OVER A SEWER, THE WATER MAIN SHALL BE LAID AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENT AN 18 INCH VERTICAL SEPERATION; IN WHICH CASE BOTH THE WATER MAIN AND SEWER SHALL BE CONSTRUCTED OF FERROUS MATERIALS AND WITH JOINTS THAT ARE EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE POINT OF CROSSING.

**2 CROSSING A WATER MAIN UNDER A SEWER:**

WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS UNDER A SEWER, BOTH THE WATER MAIN AND THE SEWER SHALL BE CONSTRUCTED OF FERROUS MATERIALS AND WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE POINT OF CROSSING. A SECTION OF THE WATER MAIN PIPE SHALL BE CENTERED AT THE POINT OF CROSSING.

**3. IF LATERAL SEPERATION CANNOT BE MET, BOTH THE WATER MAIN AND THE SEWER / STORM SHALL BE CONSTRUCTED OF FERROUS MATERIALS AND WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE POINT OF CROSSING. A SECTION OF THE WATER MAIN PIPE SHALL BE CENTERED AT THE POINT OF CROSSING.**

NOT TO SCALE



**UTILITY CROSSING**

STD. NO.

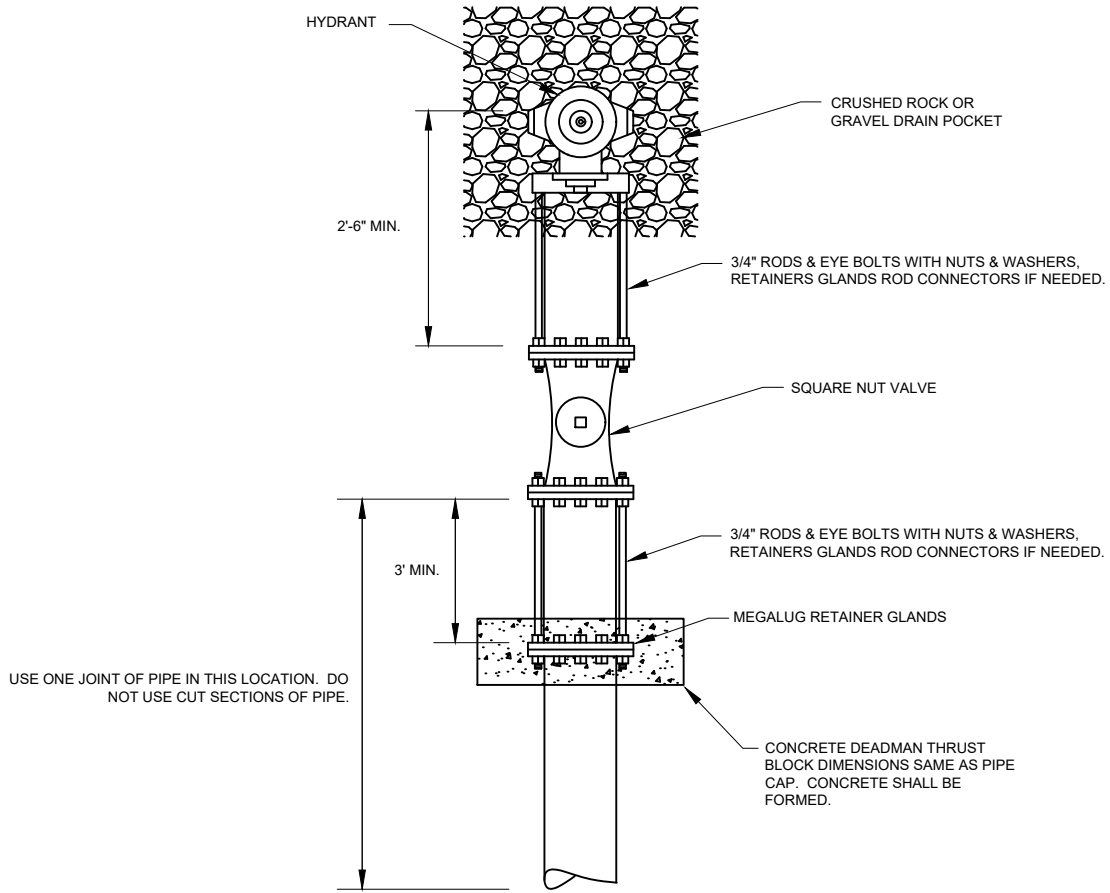
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SHEET 1 OF 1

**CITY OF MORGANTON**



USE ONE JOINT OF PIPE IN THIS LOCATION. DO NOT USE CUT SECTIONS OF PIPE.

- NOTES: ALL CONCRETE SHOWN IS TO BE 3000 P.S.I.  
 MAINTAIN A 3FT. UNOBSTRUCTED RADIUS AROUND FIRE HYDRANT PER FIRE CODE.  
 ALL FITTING SHALL BE SECURED WITH MEGALUGS AND RETAINER GLANDS  
 3/4" RODS GALVANIZED  
 3/4" EYE BOLTS, NUTS & WASHERS  
 3/4" RODS GALVANIZED  
 3/4" ROD CONNECTORS IF NEEDED

- NOTES: FIRE HYDRANTS SHALL BE ONE OF THE FOLLOWING THREE TYPES WITH THE 4 1/2" PUMPER NOZZLES BEING NATIONAL STANDARD PIPE THREADS AND 2 (TWO) 2 1/2" HOSE NOZZLES BEING NATIONAL STANDARD THREADS. ALL HYDRANTS SHALL OPEN IN A CLOCKWISE DIRECTION.  
 A) CENTURION, MANUFACTURED BY MUELLER COMPANY  
 B) SUPER CENTURION, MANUFACTURED BY MULLER COMPANY  
 C) GUARDIAN, MANUFACTURED BY KENNEDY VALVE COMPANY

NOT TO SCALE



**WATERLINE DEAD END FIRE HYDRANT  
 INSTALLATION  
 (COMMERCIAL APPLICATION)**

STD. NO.

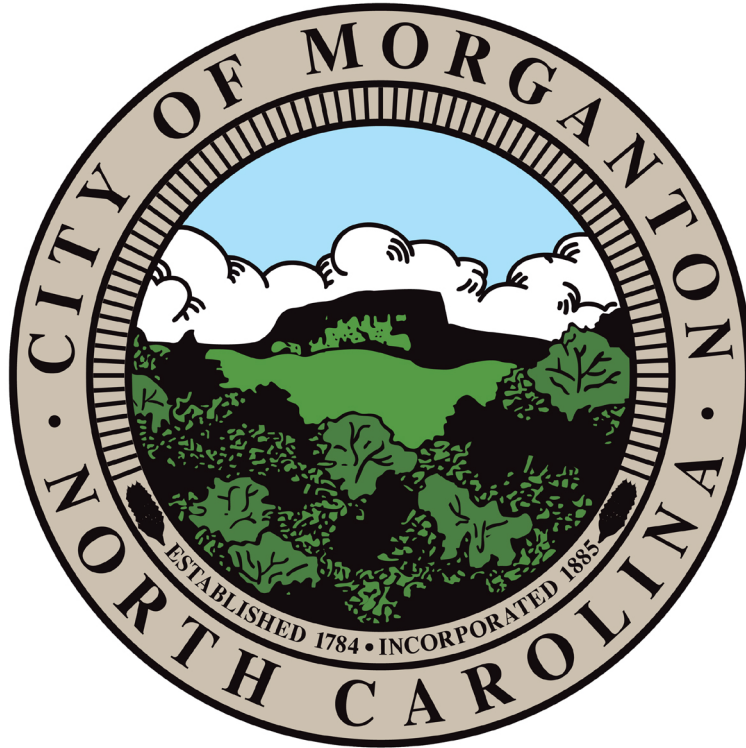
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**CITY OF MORGANTON**

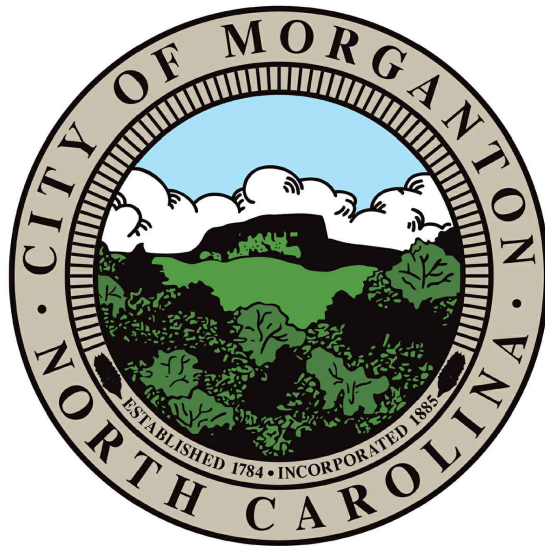


**City of Morganton**  
**Utility Construction Erosion Control**  
**Specifications 2021**

# **CITY OF MORGANTON** **UTILITY CONSTRUCTION EROSION CONTROL** **SPECIFICATIONS**

Erosion control measures shall be performed by the contractor, conforming to the requirements of, and in accordance with plans approved by the State of North Carolina Department of Environment and Natural Resources, and the City of Morganton Development and Design Department Services Department/Engineering Division, and as per the erosion control plan portion of the construction drawings and these specifications. The Contractor shall be familiar with the "Sedimentation Pollution Control Act of 1973" and abide by these laws and guidelines during the construction. The sedimentation and erosion control plan and permit shall remain on site at all times. The contractor shall not allow mud and debris to accumulate in the streets. Should the contractor pump water from trenches during construction, appropriate siltation preventative measures shall be taken prior to the entry into any storm drain or stream. All measures must be taken so that stormwater runoff does not go to the pipes or manholes of the utility system. All materials used for erosion control shall be approved by the Engineer prior to installation by the contractor.

- a. Temporary and permanent erosion control measures shall be shown on the plans. Temporary and permanent erosion control work shall be coordinated throughout the project to provide effective and continuous erosion control throughout construction and post construction, which minimizes siltation of streams, lakes, reservoirs, other water impoundments, ground surface, or other property. Seeding and mulching shall be carried out immediately behind construction.
- b. Temporary erosion control measures shall include but not be limited to swaled easements, silt fences, straw wattle check dam devices, crushed stone check dam devices, silt basins (sedimentation traps), mulching, earth berms, and rip-rap.
- c. Permanent erosion control measures shall include but not be limited to swaled easements, rip rap and seeding of disturbed areas.
- d. Erosion and siltation shall be controlled on projects by using swales to control run-off and convey run-off to controlled discharge points, by silt fences, rip-rap, crushed stone, and earth berms to contain silt, with pipe culverts where major access or haul roads cross drainage ditches or streams, silt basins where pipe lines cross drainage ditches or streams, and with seeding and mulching performed as soon after pipe installation as possible. When temporary measures are removed after completion of the project the disturbed area must be stabilized, if necessary.



## **City of Morganton Seeding Specifications 2021**

Site area description	Stabilization time frame	Stabilization time frame exceptions
Perimeter dikes, swales, ditches and slopes	7 Days	None
High quality water zones (HQW)	7 Days	None
Slopes steeper than 3:1	7 Days	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
Slopes 3:1 or flatter	14 Days	7 Days for slopes that are not greater than 50'
All other areas with slopes flatter than 4:1	14 Days	None (except for perimeters and HQW zones)

\* "Extensions of time may be approved by the permitting authority based on weather or other site-specific conditions that make compliance impracticable." (Section 11.B(2)(B))

**Note**

1. Refer to the most current version of the NC DENR "Erosion and Sediment Control Planning and Design Manual" for reference and changes.
2. Refer to the most current standards and regulations with NC DENR Division of Water Quality.



**GROUND STABILIZATION**

STD. NO.

DATE

1000

3-4-19

SHEET 1 OF 1

**CITY OF MORGANTON**



# SEEDBED PREPARATION

1. Chisel compacted areas and spread topsoil 3 inches deep over adverse soil conditions if available.
2. Rip the entire area 6 inches in depth.
3. Remove all loose rock, and other obstructions leaving the surface reasonably smooth and uniform.
4. Apply agricultural lime, fertilizer, and superphosphate uniformly and mix with soil (see below\*).
5. Continue tillage until a well pulverized, firm reasonably uniform seedbed is prepared 4 to 6 inches deep.
6. Seed on a freshly prepared seedbed and cover seed lightly with seeding equipment or cultipack after seeding.
7. Mulch immediately after seeding and anchor mulch.
8. Inspect all seeded areas and make necessary repairs or re-seed within the planting season, if possible. If stand should be over 60% damaged, re-establish the following original lime, fertilizer and seeding rates.
9. Consult conservation inspector on maintenance, treatment and fertilization after permanent cover is established.

- \* Apply: Agricultural limestone - 2 tons/acre and 3 tons/acre in clay soils.
- \* Fertilizer - 1000 lbs/acre of 10-10-10
- \* Superphosphate - 500 lbs/acre - 20% analysis
- \* Mulch - 2 tons/acre of small grain straw

**Note**

1. Refer to the most current version of the NC DENR "Erosion and Sediment Control Planning and Design Manual" for reference and changes.



**SEEDBED SPECIFICATIONS**

STD. NO.

DATE

1001

3-4-19

SHEET 1 OF 1

**CITY OF MORGANTON**

# TEMPORARY SEEDING FOR SUMMER

## Seeding Mixture

Species	Rate (lbs/acre)
German millet	40 lbs

## Seeding Dates

Mountains	May 15 - August 15
Piedmont	May 1 - August 15
Coastal Plain	April 15 - August 15

## Soil Amendments

Follow recommendations of soil test or apply 2,000 lbs/acre ground agricultural limestone and 750 lbs/acre 10-10-10 fertilizer.

## Mulch

Apply 4,000 lbs/acre straw, anchor straw by netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

## Maintenance

Re-fertilize if growth is not fully adequate. Re-seed, re-fertilize and mulch immediately following erosion or other damage.

### Note

1. Refer to the most current version of the NC DENR "Erosion and Sediment Control Planning and Design Manual" for reference and changes.



## TEMPORARY SEEDING SPECIFICATIONS FOR SUMMER

STD. NO.

1002

DATE

3-4-19

SHEET 1 OF 1

## CITY OF MORGANTON

# TEMPORARY SEEDING FOR WINTER & EARLY SPRING

## Seeding Mixture

Species	Rate (lbs/acre)
Rye (grain)	120 lbs
Annual Lespedeza (kobe in piedmont & coastal plain, korean in mountains)	50 lbs

## Seeding Dates

Mountains (above 2,500ft.)	February 15 - May 15
Mountains (below 2,500ft.)	February 15 - May 1
Piedmont	January 1 - May 1
Coastal Plain	December 1 - April 15

## Soil Amendments

Follow recommendations of soil test or apply 2,000 lbs/acre ground agricultural limestone and 750 lbs/acre 10-10-10 fertilizer.

## Mulch

Apply 4,000 lbs/acre straw, anchor straw by netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

## Maintenance

Re-fertilize if growth is not fully adequate. Re-seed, re-fertilize and mulch immediately following erosion or other damage.

### Note

1. Refer to the most current version of the NC DENR "Erosion and Sediment Control Planning and Design Manual" for reference and changes.



## TEMPORARY SEEDING SPECIFICATIONS FOR WINTER & EARLY SPRING

STD. NO.

1003

DATE

3-4-19

SHEET 1 OF 1

## CITY OF MORGANTON

# TEMPORARY SEEDING FOR FALL

## Seeding Mixture

Species	Rate (lbs/acre)
Rye (grain)	280 lbs

## Seeding Dates

Mountains	August 15 - December 15
Piedmont	August 15 - December 15
Coastal Plain	August 15 - December 30

## Soil Amendments

Follow recommendations of soil test or apply 2,000 lbs/acre ground agricultural limestone and 1,000 lbs/acre 10-10-10 fertilizer.

## Mulch

Apply 4,000 lbs/acre straw, anchor straw by netting ,or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

## Maintenance

Repair and re-fertilize damaged areas immediately. Topdress with 50 lbs/acre nitrogen in March. If it is necessary to extend temporary cover beyond June 15, overseed with 50 lbs/acre kobe (piedmont and coastal plain) or korean (mountains) lespedeza in late February or early March.

## Note

1. Refer to the most current version of the NC DENR "Erosion and Sediment Control Planning and Design Manual" for reference and changes.



## TEMPORARY SEEDING SPECIFICATIONS FOR FALL

STD. NO.

1004

DATE

3-4-19

SHEET 1 OF 1

## CITY OF MORGANTON

# PERMANENT SEEDING

## Seeding Mixture

Species	Rate (lbs/acre)
Kentucky bluegrass (20%)	260 lbs
Rebel fescue (80%)	

## Seeding Dates

Mountains	March 15 - May 15 August 15 - October 15
-----------	---------------------------------------------

## Soil Amendments

Follow recommendations of soil test or apply 2,000 lbs/acre ground agricultural limestone and 750 lbs/acre 10-10-10 fertilizer.

## Mulch

Apply 4,000 lbs/acre straw, anchor straw by netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

## Maintenance

Re-fertilize if growth is not fully adequate. Re-seed, re-fertilize and mulch immediately following erosion or other damage.

### Note

1. Refer to the most current version of the NC DENR "Erosion and Sediment Control Planning and Design Manual" for reference and changes.



## PERMANENT SEEDING SPECIFICATIONS

STD. NO.

1005

DATE

3-4-19

SHEET 1 OF 1

## CITY OF MORGANTON

# SLOPE SEEDING

## Seeding Mixture

Species	Rate (lbs/acre)
Valda hard fescue	20 lbs
Astro tall fescue	8 lbs
Penlawn red fescue	25 lbs
Perennial rye	25 lbs
Ken-Blu Kentucky bluegrass	1.5 lbs

## Seeding Dates

Mountains	March 15 - May 15 August 15 - October 15
-----------	---------------------------------------------

## Soil Amendments

Follow recommendations of soil test or apply 2,000 lbs/acre ground agricultural limestone and 400 lbs/acre 18-46-50 fertilizer.

## Mulch

Apply 4,000 lbs/acre straw, anchor straw by netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

## Maintenance

Re-fertilize if growth is not fully adequate. Re-seed, re-fertilize and mulch immediately following erosion or other damage.

### Note

1. Refer to the most current version of the NC DENR "Erosion and Sediment Control Planning and Design Manual" for reference and changes.



## SLOPE SEEDING SPECIFICATIONS

STD. NO.

1006

DATE

3-4-19

SHEET 1 OF 1

# CITY OF MORGANTON