



City of Morganton
Construction Specifications For
Sewer Lines 2016

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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 sewer collection system.

- a. The contractor shall furnish all materials, equipment, and labor for excavation, installation, backfilling of sewer mains and related appurtenances as shown on the plans. The Development and Design Department 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 Department 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 sewer main installation prior to permit issuance the City requires the work to be reinstated 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 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 sewer mains, manholes and appurtenances where shown on the plans, or as directed by the City Engineer.
- b. Plans will be required on all sewer 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. A profile is required on all sewer mains to insure there are no conflicts with existing utilities. Size, material and clearance shall be clearly shown for all utilities crossing the sewer line.
- e. The Water Resources Department may require calculations of sewer flow.
- f. 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 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 sewer 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 the 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. Sewer line easements shall meet the following criteria when required. Sewer line easements must be a minimum of twenty-five feet in width with the sewer line centered in the easement. No sewer line shall be installed unless an easement by deed or recorded plat has been provided.
- b. All off-site easements shall be acquired by the developer. These offsite easements shall have functional access to public right of way and be recorded by map and by deed of easement prior to construction approval. The easements shall be dedicated to the City of Morganton and entitled "City of Morganton Sanitary Sewer Easement". Plan and elevation drawings of all access roads shall be shown on the plans prior to approval.
- c. Prior to actual construction, the contractor shall acquire the necessary encroachments from the North Carolina Department of Transportation when working within the rights-of-way of state system roads or highways. The encroachment permit shall be kept on the job site at all times.
- d. No individuals shall place any part of a structure, any permanent equipment, or impoundment on sanitary sewer easements or mains. Prohibited structures include buildings, houses, air conditioning units /heat pumps, decks, garages, tool or storage sheds, swimming pools, walls, and fences. Fences may be allowed across easements as long as there is an access gate the full width of the easement. No fences may be installed longitudinally (lengthwise) within easements.
- e. No individuals shall plant trees, shrubs, or other plants within a sewer easement without prior written approval from the Director of the Water Resources Department. Any such plantings approved by the Director shall be done so at the risk of the property owner having to replace the plantings due to removal by the City during maintenance activities.
- f. The contractor shall be responsible for securing all other local, state and federal permits required for the utility construction.
- g. 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 sewer materials. The contractor shall replace any material which is damaged or defective.
- b. The loading and unloading of all pipe, manholes, 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. A City Inspector or its representative shall be on site to verify the loading and unloading of all sewer 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 the 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. SEWER LINE DESIGN

- a. Described in this section are the general design standards which are to be followed by all parties in preparing subdivision, utility extension, and utility replacement plans for the City of Morganton. These design standards will ensure that the citizens of Morganton will continue to have a quality sewer collection system.
- b. No public gravity sewer conveying wastewater shall be less than 8 inches in diameter.
- c. All engineering plans for public sewer systems must meet State and City minimum design standards as indicated in the most recent amended Rules Governing Public Water Supplies by the N.C. Department of Environment, and Natural Resources and/or the City of Morganton construction specifications and sewer line material specifications whichever, is the more

stringent. All projects must be certified by the engineer of record or the City Engineer.

- d. Plan and profile drawings shall be prepared by a registered professional engineer signed, sealed, and dated showing the various elements of the utility mains and shall include an overall utility plan layout on a single sheet. Design of improvements must be based upon actual field verification by the engineer of existing utilities. The utility drawings shall be on separate sheets, free of landscaping and other details not pertinent to the utility plans. The water and sewer drawings may be on the same sheets. A separate landscaping plan must also be submitted with the utility showing any proposed landscaping and all water or sewer utilities or easement. All adjacent tracts and topographic information must be shown on the landscaping plan. Landscaping plans shall show all utilities and engineering drawings and shall be on paper 24 inches by 36 inches.
- e. When preparing the plans for sewer mains, deflection angles for all horizontal turns shall be shown on the drawings. All elevations shall be tied to mean sea datum and the benchmark shall be shown or described on the plans. Spot elevations shall be on 100 foot stations. The plans shall show the manhole number (MH #1 etc.), top elevation, station, depth along with invert elevations, length of sewer reach, and slope (in percent). Established creek centerlines and inverts will be plotted on the sewer plan and profile sheets, adjacent to proposed sewer alignment.
- f. All public sanitary sewer mains shall be installed within dedicated street rights-of-way or City of Morganton dedicated sanitary sewer easements. When sanitary sewer mains are installed in street rights-of-way, they shall be located in the center of the pavement or right-of-way where practical or in the south or west side of the pavement. Refer to section 6 "Easements, Encroachment Contracts and Permits.
- g. Sewer clean-outs are prohibited in driveways and parking lots and may only be approved upon special request to the Water Resources Director and the City Engineer. When necessary and so approved they must be installed with a standard water-tight clean-out plug within the cast iron valve box with a cast iron lid indicating "Sewer". See Standard Details 213 & 215.

10. SITE PREPARATION

- a. Set all lines, elevations and grades for sewer 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 sewer 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 of trees and the removal of all vegetation, snags, brush, and rubbish occurring within the limits of the area required for the 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 an 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.

11. 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 Standard Detail 224.
- 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 sewer main installation. The water shall be pumped out of the trench or check dams to be built to keep it 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. Sheeting or bracing shall be used wherever necessary to prevent failure of the trench banks. All sheeting 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 sheeting 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. Stone in trench for stabilization and bedding shall be ¼" to 1 ½" angular washed stone. See City of Morganton Standard Detail 223. Stone in trench for stabilization and bedding stone shall be paid for by the ton as per the contractor's bid.

- h. Trenches shall not be backfilled until required tests are performed and the sewer 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.
- i. 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.

12. EROSION CONTROL MEASURES

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

13. 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.

14. PIPE INSTALLATION

- a. Sewer pipe shall be laid to the line and grade as shown on the plans with all manholes located as shown on the plans. No deviations from line and grade shall be made, unless they have been approved by the City Engineer or Water Resources Supervisor. The sewer main pipe shall have detectable underground 5 Mil warning tap that reads "CAUTION BURIED SEWER LINE

BELOW” installed 12 inches above the top barrel of the sewer main pipe and extend from manhole to manhole.

- b. The depth of sewer pipe cover, unless otherwise approved by the City of Morganton Development and Design Services Department/Engineering Division shall be 3 feet (36 inches) 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. No sewer main shall be deeper than 10 feet unless approved by the City Engineer and the Water Resources Supervisor.
- 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 the 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. The sewer pipe installation shall start at the outlet end and proceed upstream to the termination of the project as shown on the plans. The bell ends shall point upstream. Exceptions to this provision will be considered on a case by case basis, when requested in writing by the owner of the development at the time engineering construction plans are submitted to the City for review and approval. The development owner must agree to hold the City harmless. He must accept full responsibility for compliance with state and federal regulations of the Clean Water Act, including any associated penalties for the release of wastewater from sanitary sewer to the environment. The development owner must further agree to not request building permits, if an exception is granted for that portion of the development, until connecting sewer is constructed and accepted by the City.
- e. Where sewer lines are laid on a slope 20 percent or greater that sewer line shall be anchored securely with concrete, or equal, with anchors spaced as follows:
 - 1. Not greater than 36 feet center to center on grades 21% to 35%.
 - 2. Not greater than 24 feet center to center on grades 35% to 50%.
 - 3. Not greater than 16 feet center to center on grades 50% and over.
- f. While working on any part of an existing sewer main, the contractor shall maintain the existing sewage flow. No discharge of sewage to the storm waters will be allowed. Water for the flushing of new sanitary sewer mains must be obtained through a fire hydrant meter and must be pumped out and may not be discharged into the sanitary sewer system. Construction requiring existing sewer flow to be pumped from existing manholes shall be the

- responsibility of the contractor and must be approved prior to proceeding by the City Engineer, Water Resources Supervisor and the City Inspector.
- g. After the trench foundation has been properly graded with bell holes, the pipe shall be carefully lowered into the trench with approved methods. Under no circumstances shall the pipe or accessories be dropped or dumped into the trench. All damaged pipe shall be properly repaired or replaced at the contractor's expense.
 - h. The pipe interior shall be kept clean before and after laying by means approved by the City Engineer, Water Resources Supervisor and the City Inspector. Pipe ends shall be plugged at the end of each workday or when work is temporarily stopped. The plugs shall be watertight so the water and debris will be kept out.
 - i. When installing a sewer main the horizontal separation between sewer and water shall be 10 feet. In cases where it is not practical to maintain a 10 foot separation, DWQ (Division of Water Quality) 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 a undisturbed earth shelf on one side of the sewer and at an elevation so that 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.
 - j. 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.
 - k. 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 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.
 - l. 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.
 - m. All sewer 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.

- n. Where conditions are, in the opinion of the City Inspector, Water Resources Supervisor, or the City Engineer unsuitable for laying pipe because of weather or trench conditions, the Contractor shall be required to cease work until permission is given by the City Inspector, Water Resources Supervisor, or the City Engineer for work to commence again, providing such conditions have been corrected.
- o. Trench excavation for ductile iron and PVC shall be in accordance with City of Morganton Standard Detail 224. The foundation shall be a firm flat bottom trench. 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 foot above the top of the pipe.
- p. 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.
- q. 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. The bell and spigot of the pipe shall be cleaned and properly lubricated where a mechanical joint of a "push on" type joint is employed.
- r. 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 sewer pipe.

15. SEWER LATERALS

- a. Pipe for 4 inch sewer laterals shall be PVC pipe or DIP. Where installation by boring is specified, 4 inch ductile iron pipe shall be used. DIP (4" only) must be used for deep or shallow installations under the same standards as sewer mains. A minimum grade of 1% shall be maintained with 4 and 6 inch pipe. Each lateral shall be sealed at the end with an approved watertight plug. Lateral installation for 4 inch services shall conform to Standard Detail 213. A 6 inch service lateral must connect to a manhole. All laterals shall be left exposed until the City Inspector can verify the installation of each plug.
- b. Each sewer lateral shall be installed from the main to the street right-of-way line where a one piece combination wye and 1/8 bend and cleanout stack will be installed. The wyes on the laterals shall be sealed at the property line with a permanent plug.

- c. Trench support, bedding and backfill for laterals shall conform to the same specifications as those for sewer mains. The contractor shall properly backfill under all wye and lateral connections at the main. The lateral connection at the main shall be backfilled with #67 stone.
- d. Sewer laterals 4 inches in diameter shall be connected to the main by means of an in-line wye or a tap and saddle, installed over a hole cut in the top quadrant of the main at an angle of 45 degrees, with respect to direction of flow. The hole shall be cut with a mechanical circle type saw cutter designed for the particular use and rendering a smooth, uniform cut with no damage to the main and which retrieves the coupon. The saddle installation is shown on Standard Detail 213.
- e. All 4" sewer services may be tapped directly into 8, 10, and 12-inch mains or manholes in accordance with Standard Detail 213. Taps can only be made by using a mechanical tapping machine or other approved device. All sanitary sewer service connections 6 inches and larger shall be made into manholes only. Service connections on mains 15 inches and larger are only allowed at manholes. Service clean-outs shall be located at the right-of-way line or the easement boundary line. The maximum vertical drop for a 6-inch service into a manhole shall be 10 feet.
- f. All laterals tapped on newly constructed mains shall be air tested with the main. All laterals tied to a newly constructed manhole shall be vacuum tested with the manhole or conduct a separate air or water head test before any plumber connections are made.

16. MANHOLES

- a. Manhole dimensions shall conform to those shown on City of Morganton Standard Detail 201. The minimum diameter of manholes shall be 4 feet (48 inches). Manholes on all lines 12 inches in diameter or smaller shall have an inside diameter of 4 feet (48 inches). Manholes on lines 12 inches in diameter and larger shall be 5 feet (60 inches) or larger. A minimum access diameter of 22 inches shall be provided.
- b. Inverts shall be constructed with a width equal to that of the effluent pipe. Inverts shall be formed of concrete, and no laying pipe through manholes will be permitted. Inverts shall be brushed and troweled so that a minimum energy loss occurs in the manhole from invert roughness. "Bowl" shaped inverts shall not be allowed in the sanitary sewer collection system. Changes in size and grade shall be made gradually and evenly. The minimum bending radius of the trough centerline shall be 1.5 times the pipe I.D. A minimum 1/2" radius shall be provided at the intersection of 2 or more channels.

- c. Foundations for manholes shall be in accordance with City of Morganton Standard Detail 201, unless approval to the contrary is given by the City Engineer or the Water Resources Supervisor.
- d. All manholes in road rights-of-way shall be flush with grade. In easements, manholes will be a minimum of 12 inches above ground.
- e. Manholes shall be watertight and vented 24 inches (2 feet) above the 100-year flood elevation. Manholes shall be vented every 1,000 feet or every other manhole, whichever is greater.

17. DROP CONNECTIONS

- a. In all junction manholes where the grade line of the sewer entering the manhole is at an elevation greater than 2.5 feet (30 inches) above the manhole invert a drop connection shall be provided. Where the difference in elevation between the incoming sewer and the manhole invert is less than 2.5 feet (30 inches), the invert shall be filleted to prevent solids deposition.
- b. Drop manholes should be constructed with an outside drop connection. Inside drop connections (when necessary) shall be secured to the interior wall of the manhole and access shall be provided for cleaning.
- c. Due to unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be encased in concrete or ferrous pipe specified with necessary blocking for drop connection.

18. TESTING & INSPECTION

- a. Sewer lines and manholes shall be visually inspected, and the lines shall exhibit a fully circular pattern when viewed from one manhole to the next. Lines which do not exhibit a true line and grade and have structural defects shall be corrected to meet these specifications. Manholes that are installed within the street shall be inspected just prior to the final lift of surface course asphalt.
- b. The contractor shall take such precautions as required to prevent damage to the lines and appurtenances being tested. Damage resulting from any testing shall be repaired at the Contractor's expense. All testing shall be completed in the presence of the City Engineer, Water Resources Supervisor, and City Inspector.
- c. In an area where groundwater is known to exist, prior to conducting any tests, the Contractor shall provide for determining groundwater level by installing groundwater gauges in the manholes.

- d. Gauges shall consist of a minimum ½-inch diameter pipe, capped and inserted horizontally in the manhole wall as near as possible to the top of the sewer, sealed so as to be watertight.
- e. Immediately prior to the performance of the test, groundwater back pressure shall be determined by removing pipe cap and blowing air through the pipe into the ground to clean the pipe. A clear plastic tube shall be held vertically and measurement of the height (in feet) of water over the invert of pipe shall be taken after the water has stopped rising.
- f. The height shall be divided by 2.3 feet to establish pounds (psi) of back pressure to be added to all readings. Upon satisfactory completion of the air test, remove the groundwater gauge from the wall of the manhole and neatly and permanently close opening with a non-shrinking, noncorrosive grout. Prior to testing flush and clean sewer lines of any debris, also, plug all pipe outlets to resist test pressure.
- g. The sewer main shall be cleaned before testing by flushing to wet pipe surface and clean out any debris. A wetted interior pipe surface will produce more consistent results.
- h. Seal-test all pneumatic plugs before using in the test installation. Lay one length of pipe on the ground and seal at both ends with the pneumatic plug. Introduce air into the pneumatic plug to 24 psig. The sealed pipe shall be pressurized to 5 psig. Plugs shall hold against this pressure without external bracing.
- i. Contractor shall carefully observe safety precautions during air testing; no one shall be allowed in the manholes during testing.
- j. Place pneumatic plugs in the line at each manhole and inflate to 25 psig. Introduce low pressure air into sealed line until internal air pressure reaches a pressure of 4 psig plus the average groundwater back pressure. Allow two minutes for the internal air pressure to stabilize.
- k. If the pressure drops more than 1.0 psig during the test period, the line is presumed to have failed. Test may be discontinued when the prescribed test time has been reached.
- l. The time required for the pressure to decrease from 3.5 psig to 2.5 psig (greater than the average groundwater back pressure over the pipe) shall not be less than the time shown for the diameter given in the table below. Times shown are based on loss of air not to exceed 0.003 cubic feet per minute per square foot of internal pipe surface tested at an average pressure of 3.0 psi greater than the groundwater back pressure. *See **Table 1.1**.

Table 1.1

- To simplify the ASTM procedure, use the following table to determine the test time. If there are multiple sizes, add the various times together.

<u>Normal Pipe Size (inches)</u>	<u>Time (minutes: seconds)</u>	
6	2	50
8	3	56
10	4	43
12	5	40
15	7	05
18	8	30
21	9	55
24	11	20
27	12	45
30	14	10
36	17	00
42	19	50

- m. If the pressure stays between 3.5 and 2.5 psi for the test time length, the pipe is acceptable. If not, the section is not properly installed. Sanitary sewers failing to meet the requirements of the low pressure air test shall be tested again after the Contractor has located and remedied defects causing this failure. No sanitary sewer shall be accepted until the requirements of the test procedure are satisfied.

19. 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.

20. 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.

21. 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 include accurate information regarding pipe size, pipe material, pipe length, manhole size, invert and top elevations and accurate alignment and location of the constructed sewer mains, manholes and services and all other information included on the original design plans. All service stubs shall be shown on the surveyed "As-Built" plans. 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
Sewer Line Material Specifications 2016

CITY OF MORGANTON
SEWER LINE MATERIAL SPECIFICATIONS

- 1. SCOPE**
- 2. DUCTILE IRON SEWER PIPE**
- 3. POLYVINYL CHLORIDE (PVC) SEWER PIPE**
- 4. ENCASEMENT PIPE**
- 5. MANHOLES**
- 6. MANHOLE RING AND COVER**
- 7. MANHOLE STEPS**
- 8. RELATED MATERIALS**

1. SCOPE

This section covers the materials to be used for the construction of sewer 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. DUCTILE IRON SEWER PIPE

Ductile iron pipe and fittings used for sanitary sewers shall be manufactured in accordance with AWWA Standards C-150 and C-110 respectively. The minimum pressure class pipe shall be class 250 or a greater class may be required based upon the depth of cover and laying conditions. Pipe shall be supplied in 18 or 20 foot nominal lengths. Pipe and fittings shall have a minimum working pressure of 250 psi. Ductile iron may be used for any sewer main 6-inches and larger. Pipe joints shall be the "Push-on" type manufactured in accordance with AWWA Standard C-111-95. All ductile iron sewer mains shall use PROTECTO 401 lined pipe that meets the manufactured recommendations.

3. POLYVINYL CHLORIDE (PVC) SEWER PIPE

4 inch to 15 inch: PVC gravity sanitary sewer pipe and related fittings shall be manufactured in accordance with all the requirements of ASTM D-3034-98 SDR 35 Type PSM polyvinyl chloride sewer pipe and fittings.

18 inch to 27 inch: PVC gravity sanitary sewer pipe and related fitting shall be manufactured in accordance with ASTM F679-95, SDR 35 gravity sewer pipe. PVC gravity sewer pipe shall be supplied in 12.5 foot lengths with bell-and-spigot joints. The length of joints shall be at least 11 feet for the larger PVC pipe, unless approved differently by the City Engineer or the Water Resources Supervisor. All fittings shall use rubber gaskets, which conform to the requirements of ASTM F477-99.

4. ENCASEMENT PIPE

Steel pipe for directional boring and aerial creek crossing applications shall be smooth-wall or spiral-welded high strength steel, helical or straight seam-welded manufactured in accordance with ASTM A 139 and consisting of grade "B" steel with a minimum yield strength of 35,000 psi. Boring installations shall be high strength steel, spiral-welded or smooth-wall seamless manufactured in accordance with ASTM A252 and consisting of grade 2 steel with a minimum

yield strength of 35,000 psi. The minimum casing pipe wall thickness shall be 0.375" for bored encasement. Thicker encasement pipe may be required by the North Carolina Department of Transportation, railroads, or other agencies. All carrier piping shall be ductile iron with Field Lok Gaskets or Mega Lug Retainer Glands as specified by the City Engineer and Water Resource Supervisor. The minimum inside diameter casing shall be 8 inches greater than the inside dimension of the carrier pipe as follows:

<u>CARRIER PIPE INSIDE DIAMETER</u>	<u>STEEL CASING PIPE MINIMUM INSIDE DIAMETER</u>
4"	12"
6"	14"
8"	16"
12"	20"
16"	24"

Metal "spider" pipe alignment devices shall be installed in all casings with a minimum of two spiders per pipe joint, one fourth of the pipe joint length in from both the bell and spigot ends. See Standard Detail 219.

5. MANHOLES

Manholes will be precast reinforced concrete. Eccentric or concentric cones may be used on 8 through 12-inch mains. Concentric cones will be used on all 15-inch and larger mains. These different type manholes shall conform to these specifications and the City of Morganton Standard Details. All manholes located outside public right-of-way must be 2 foot above the 100-year flood or be watertight and vented 2 foot above the 100-year flood elevation. Manholes shall be vented every 1000 feet or every other manhole, whichever is greater. Precast reinforced concrete concentric and eccentric manholes shall be designed and manufactured in accordance with ASTM C478-97. Manhole diameters shall be 4, 5, or 6 feet in diameter. The walls shall be a minimum of 5 inches thick and have a 6-inch minimum base. The standard joint shall be sealed with cementitious grout meeting all Federal Specifications. An O-ring or "ram neck" joint seal may be used. All exterior joints shall be wrapped with a butyl resin sealant of 8" width. The "O" ring joint shall conform to the requirements of ASTM C443-98. A flexible rubber boot shall be supplied with the manholes to tie the pipe to the barrel section. These gaskets and clamps shall meet the requirements of ASTM C923. See Standard Detail 201.

6. MANHOLE RING AND COVER

Manhole rings and covers shall be manufactured to the dimensions shown on the Details 201 - 202 and shall meet the requirements of ASTM A48-94ae1. All covers must be domestically cast and so indicated by manufacturer name and "USA" in castings. All manhole rings on flat-top manholes shall be cast into the manhole top, as shall be the flange for the vent stack, if applicable. Manhole covers shall meet ASTM A48-94ae1 or latest standard. Cover shall

have "SANITARY SEWER" cast onto the face as shown on Detail 202. Covers shall also have (4) 1-inch vent holes.

7. MANHOLE STEPS

Manhole steps shall be made from reinforcing steel which is rubber plastic-coated to provide for safer footing. These steps shall be furnished in accordance with Detail 203 and the applicable OSHA regulations. Steps shall also be provided on outside of raised manholes when top elevation is greater than three (3) feet above existing ground elevation.

8. RELATED MATERIALS

Steel reinforcing for concrete structures shall meet all applicable provisions of the NCDOT specifications as to manufacture, fabrication and placement. Rubber boot sleeves shall meet or exceed ASTM C923 for connecting pipes through the barrel section of the manhole.

When connecting ductile iron pipe to PVC or vitrified clay pipe a hymax coupling shall be used.

Boot sleeves shall have stainless steel expansion bands and pipe clamps that meet or exceed ASTM C923 and A167.

Manhole inverts shall be constructed with a width equal to that of the effluent pipe, height to the springline and invert "shelves" from that point upward at a 60 deg. angle to the manhole walls. The invert shall be brushed and troweled so that minimum energy loss occurs in the manhole from invert roughness. "Bowl" shaped inverts will not be allowed.

PVC sewer service pipe shall be schedule 40 PVC including the clean-out stack .

PVC sewer pipe, saddles and adapters shall conform to the requirements of ASTM D3034-98. The saddle shall be installed in accordance with Standard Detail 213.

Cleanouts 4 inches or larger shall have a concrete collar.

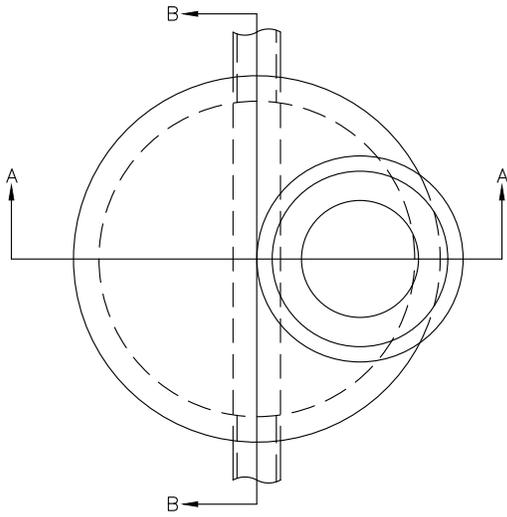
The sewer main pipe shall have detectable underground 5 Mil warning tape that reads "CAUTION BURIED SEWER LINE BELOW" installed 12 inches above the top of the sewer main pipe and extend from manhole to manhole.



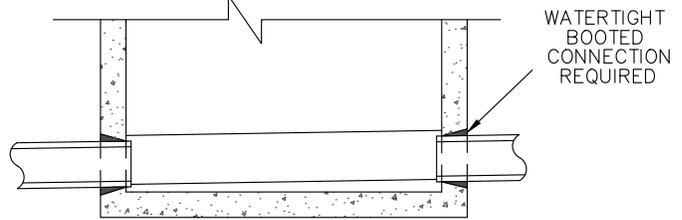
STANDARD SEWER LINE DETAILS 2016

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205	SANITARY SEWER INSIDE DROP CONNECTION
206	RESIDENTIAL SEWER TAP
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PLAN VIEW

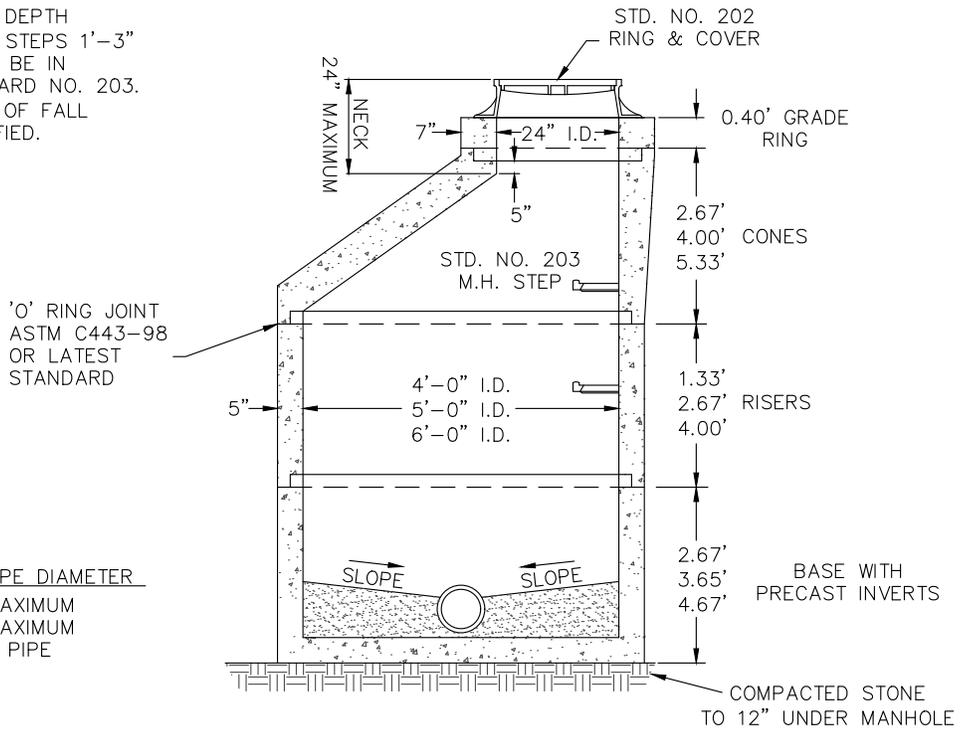


SECTION B-B

WATERTIGHT
BOOTED
CONNECTION
REQUIRED

NOTES:

1. ON NEW INSTALLATION, A MAXIMUM OF 2 GRADE RINGS SHALL BE USED.
2. CONCRETE SHALL BE 4000 PSI AS PER ASTM C-478.
3. STEEL REINFORCING SHALL MEET ASTM A-305, A-15, A-160 OR LATEST STANDARD
4. MANHOLES OVER 3'-6" IN DEPTH SHALL BE PROVIDED WITH STEPS 1'-3" ON CENTER. STEPS SHALL BE IN ACCORDANCE WITH STANDARD NO. 203.
5. INVERT SHALL HAVE 0.20' OF FALL UNLESS OTHERWISE SPECIFIED.



SECTION A-A

NOT TO SCALE

MANHOLE DIAMETER VS. PIPE DIAMETER

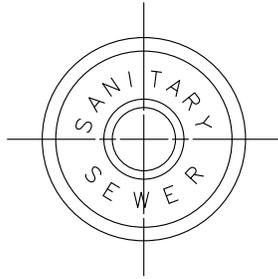
- 4'-0" = 27" PIPE MAXIMUM
- 5'-0" = 36" PIPE MAXIMUM
- 6'-0" = ABOVE 36" PIPE



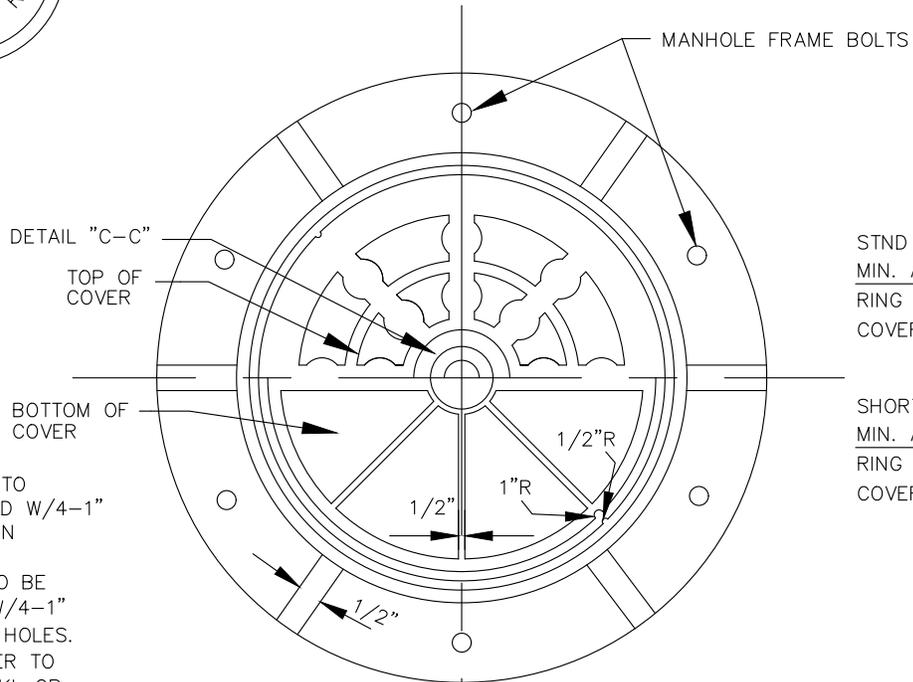
SANITARY SEWER MANHOLE DETAIL

STD. NO.	DATE
201	3-7-11
SHEET 1 OF 1	

CITY OF MORGANTON



*ALL MANHOLE COVERS SHALL MEET
ASTM A48-94 OR LATEST STANDARD



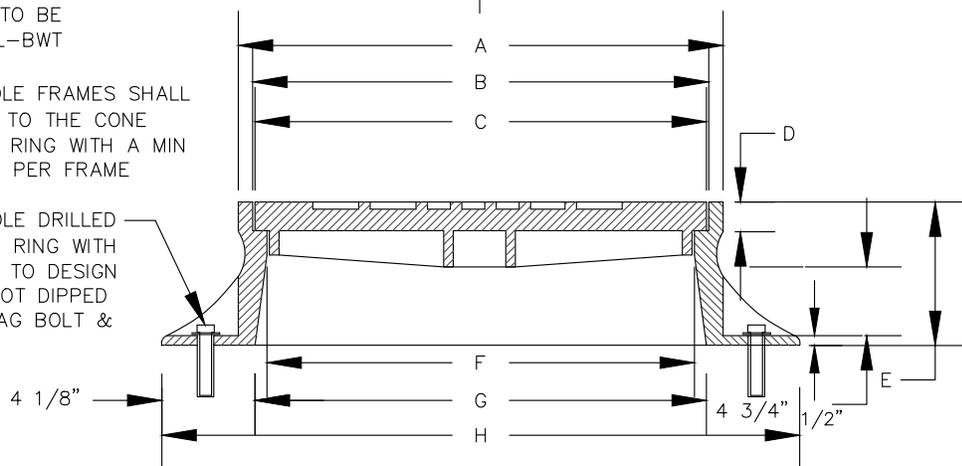
STND	
MIN. AVE. WTS.	
RING	190
COVER	125
	315

SHORT	
MIN. AVE. WTS.	
RING	150
COVER	130
	280

NOTES

1. ALL COVERS TO BE SUPPORTED W/4-1" VENT HOLES IN COVER
2. ALL RINGS TO BE SUPPORTED W/4-1" DIA. ANCHOR HOLES.
3. RING & COVER TO BE USF 669/KL OR EQUAL
4. SHORT R&C TO BE USF 686/KM OR EQUAL
5. BOLT DOWN/ WATER TIGHT R&C TO BE USF 668-KL-BWT OR EQUAL
6. ALL MANHOLE FRAMES SHALL BE BOLTED TO THE CONE SECTION OR RING WITH A MIN OF 4 BOLTS PER FRAME

LAGSHIELD IN HOLE DRILLED INTO CONE OR RING WITH ANCHOR SUNK TO DESIGN DEPTH, AND HOT DIPPED GALVANIZED LAG BOLT & WASHER



	A	B	C	D	E	F	G	H
STND	25 ¹ / ₄ "	23 ³ / ₄ "	23 ¹ / ₂ "	1"	7 ¹ / ₂ "	22"	25"	33 ¹ / ₄ "
SHORT	25"	23 ¹ / ₂ "	23 ¹ / ₄ "	1"	4"	22 ¹ / ₈ "	23 ¹ / ₈ "	33 ¹ / ₄ "

NOT TO SCALE

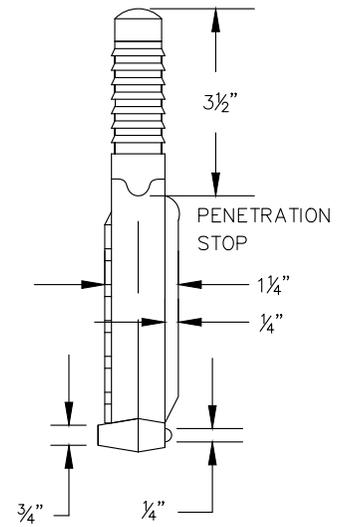
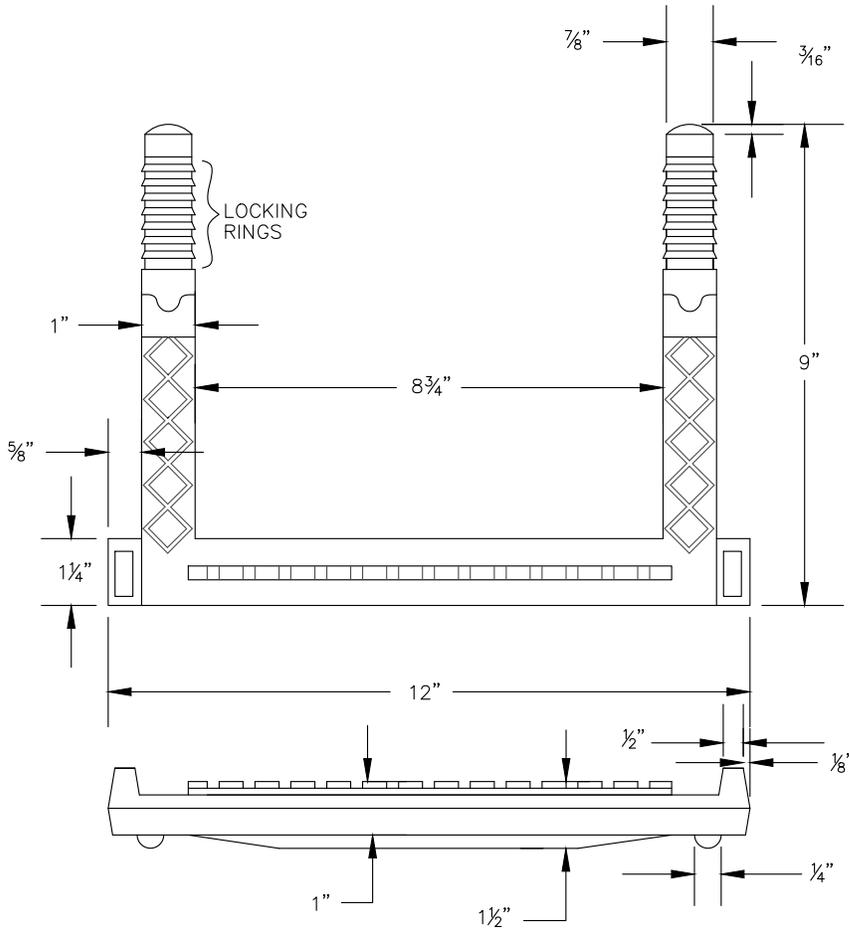
REVISED 3-4-13



STANDARD & SHORT
MANHOLE RING & COVER

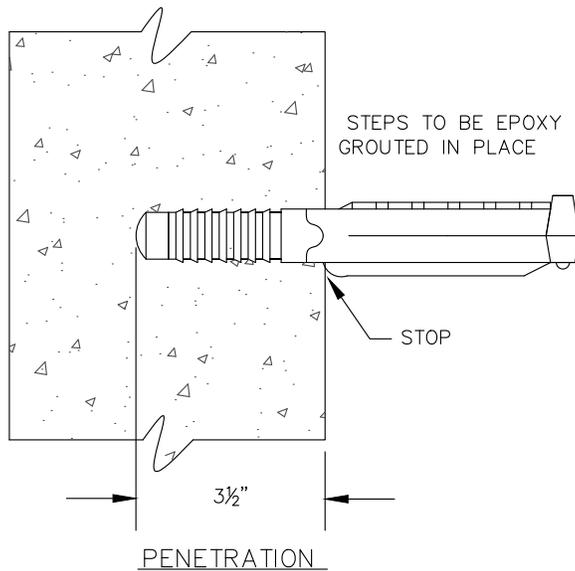
STD. NO.	DATE
202	3-7-11
SHEET 1 OF 1	

CITY OF MORGANTON



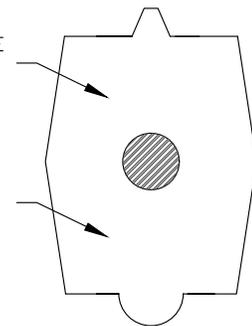
NOTES:

1. STEPS TO BE EPOXY GROUTED IN PLACE.
2. CENTERLINE OF THREAD TO BE LEVEL & PLUMB W/ ALL IN MH SECTION.



COPOLYMER
POLYPROPYLENE
PLASTIC

3 DEFORMED
STEEL ROD



SECTION A-A

NOT TO SCALE



MANHOLE STEP FOR PRECAST
CONCRETE MANHOLE

STD. NO.

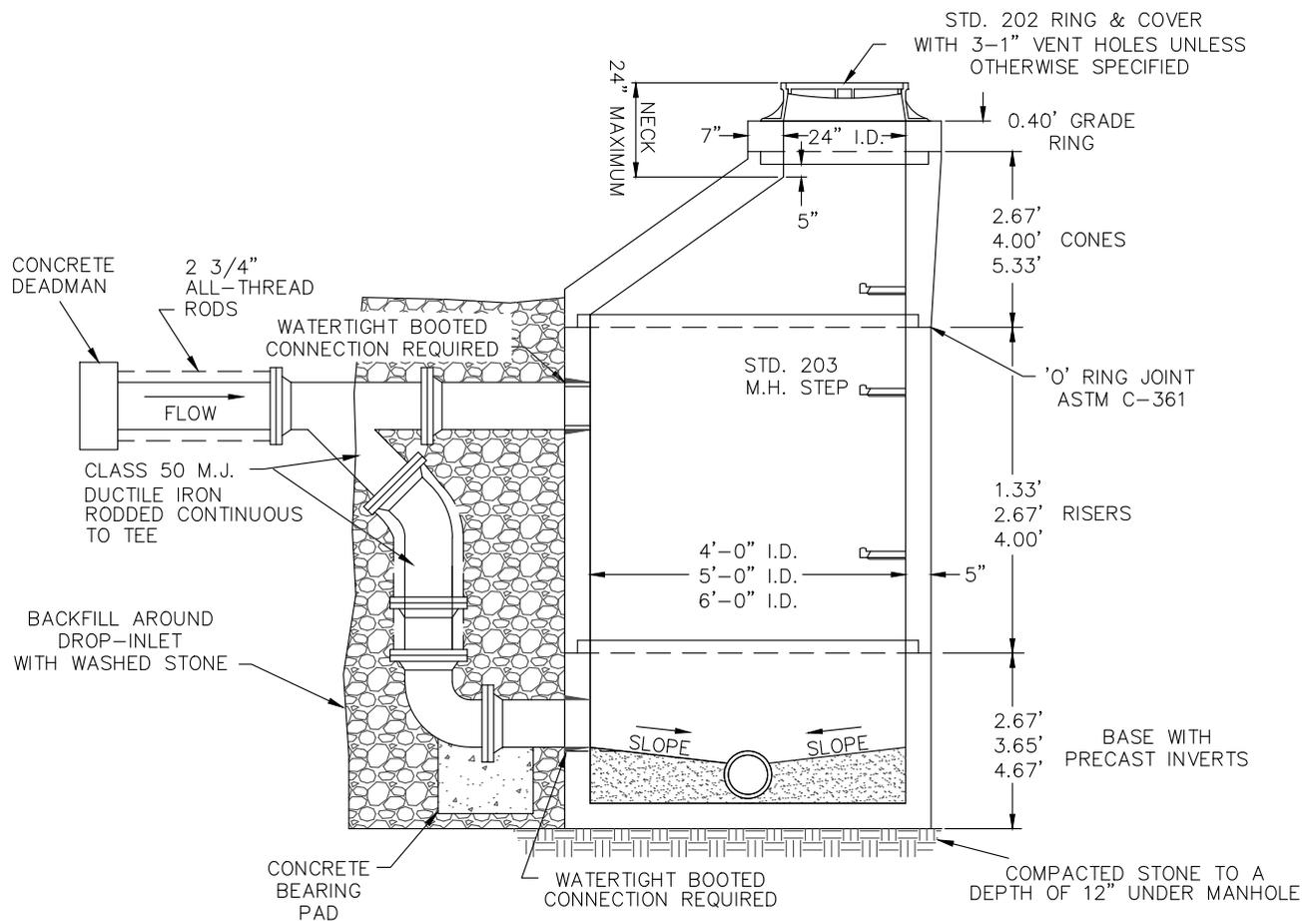
DATE

203

3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



SANITARY SEWER DROP MANHOLE DETAIL

NOTES:

1. ON NEW INSTALLATION, A MAXIMUM OF 2 GRADE RINGS SHALL BE USED.
2. CONCRETE SHALL BE 4000 PSI AS PER ASTM C-478.
3. STEEL REINFORCING SHALL MEET ASTM C-185 FOR 4' DIAMETER, OR ASTM C-478 FOR 5' DIAMETER.
4. MANHOLES OVER 3'-6" IN DEPTH SHALL BE PROVIDED WITH STEPS 1'-3" ON CENTER. STEPS SHALL BE IN ACCORDANCE WITH STANDARD NO. 203.
5. INVERT SHALL HAVE 0.20' OF FALL UNLESS OTHERWISE SPECIFIED.

MANHOLE DIAMETER VS. PIPE DIAMETER

4'-0" = 27" PIPE MAXIMUM
 5'-0" = 36" PIPE MAXIMUM
 6'-0" = ABOVE 36" PIPE

NOT TO SCALE



SANITARY SEWER OUTSIDE
 DROP CONNECTION

STD. NO.

DATE

204

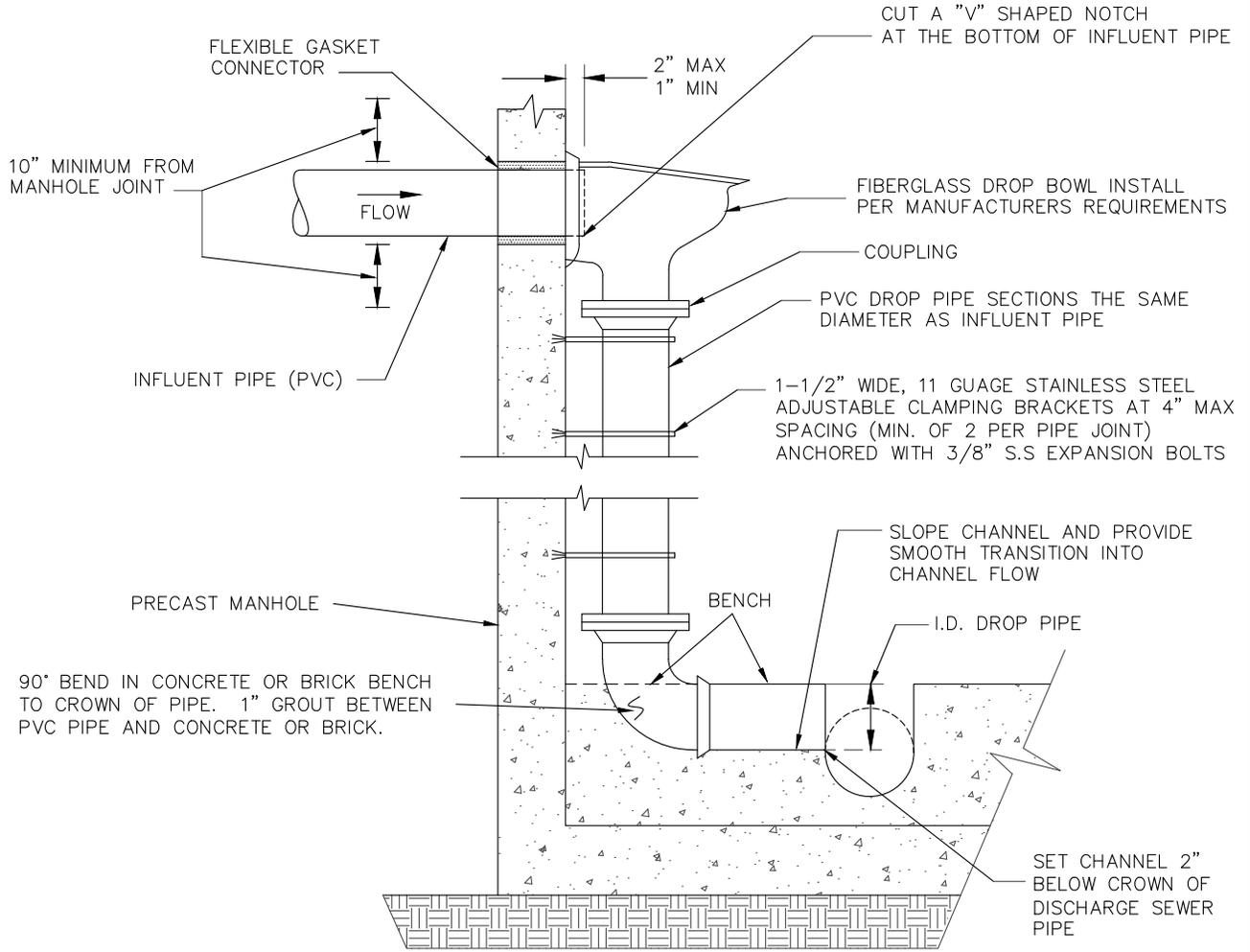
3-7-11

SHEET 1 OF 1

CITY OF MORGANTON

NOTES

1. ONLY ONE INSIDE DROP CONNECTION PER MANHOLE WILL BE ALLOWED UNLESS APPROVED BY THE CITY ENGINEER.
2. THE DROP BOWL SHALL NOT EXTEND INTO THE AREA IS DEFINED BY THE PROJECTION OF THE MANHOLE ENTRANCE VERTICALLY DOWN TO THE MANHOLE BOTTOM. IF NECESSARY, MANHOLE FRAME, COVER CONE SECTION, AND STEPS SHALL BE REMOVED AND PLACED TO ALLOW FOR UNOBSTRUCTED ENTRY ENTRY AND EXIT.
3. INFLUENT PIPE SLOPE SHALL NOT EXCEED 10%.
4. MAXIMUM SIZE OF INFLUENT PIPE IS 12".



INSIDE DROP CONNECTION FOR
PRECAST CONCRETE MANHOLES
(FIBERGLASS DROP BOWL)

NOT TO SCALE



SANITARY SEWER INSIDE DROP
CONNECTION

STD. NO.

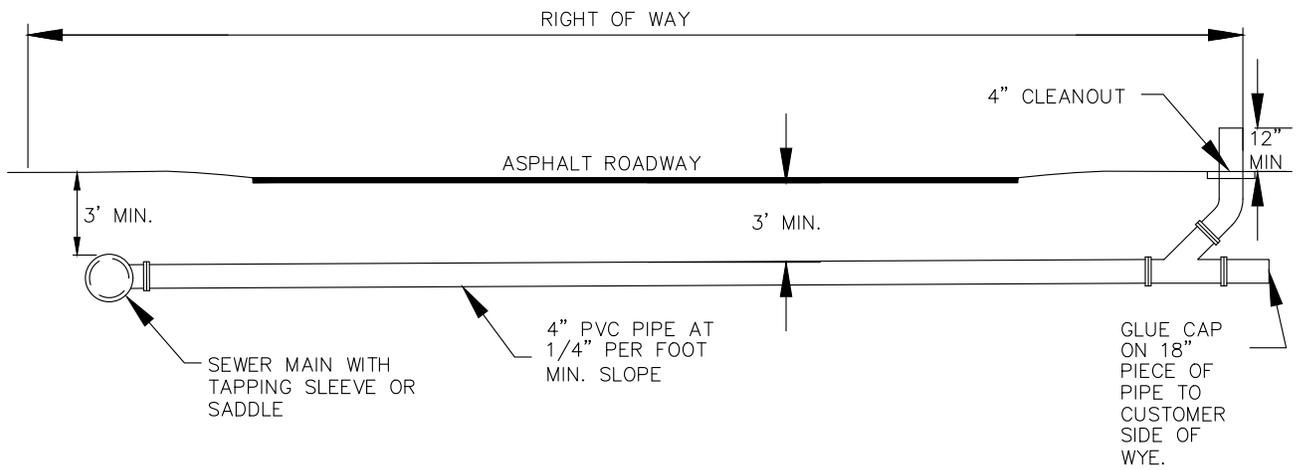
DATE

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3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



NOTE:

1. 4" CLEANOUT TO REMAIN VISIBLE
2. PLUMBER SHALL CONNECT TO 4" LINE BY REMOVING GLUE CAP AND COUPLING PIPE TOGETHER. IN NO CASE SHOULD PLUMBER TIE TO CITY CLEANOUT.

NOT TO SCALE



RESIDENTIAL SEWER TAP

STD. NO.

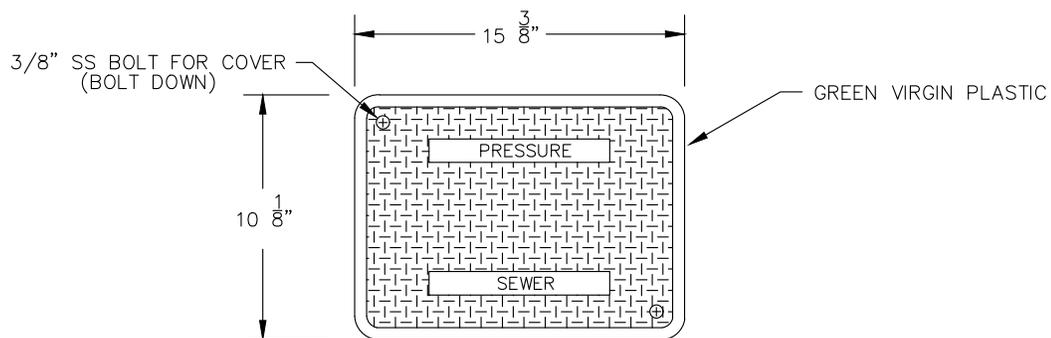
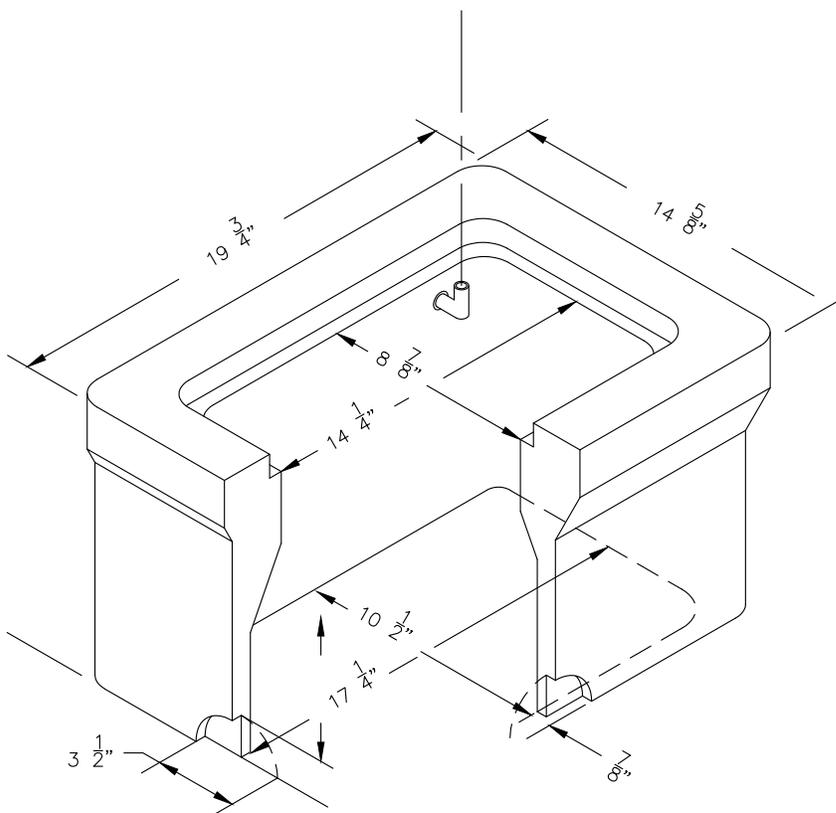
206

DATE

3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



PLAN

NOTE: METER BOX TO BE BROOKS CONCRETE BOX
SERIES 36 WITH PLASTIC COVER

NOT TO SCALE



LOW PRESSURE SEWER
CLEANOUT BOX

STD. NO.

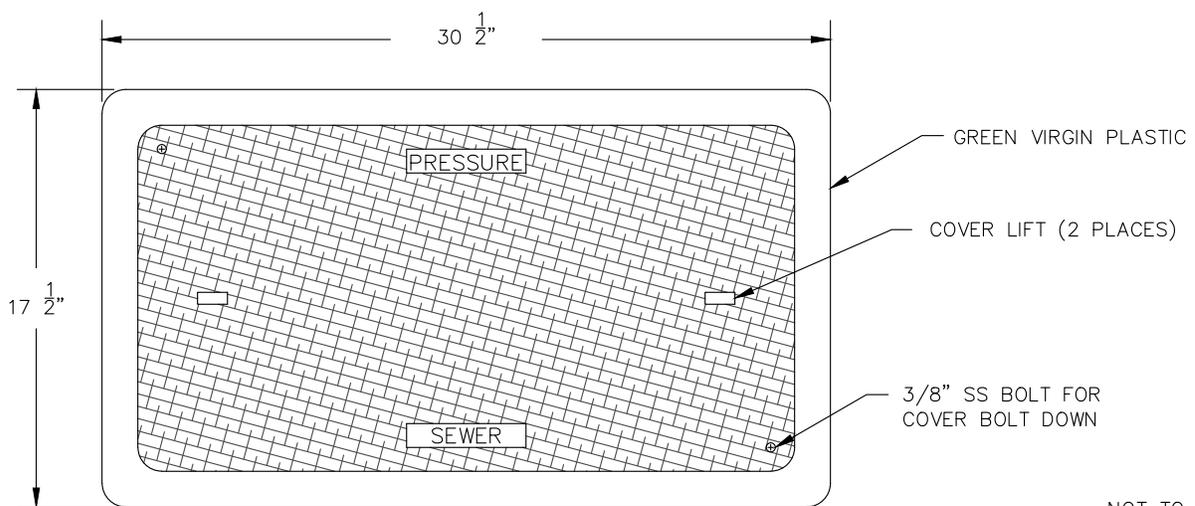
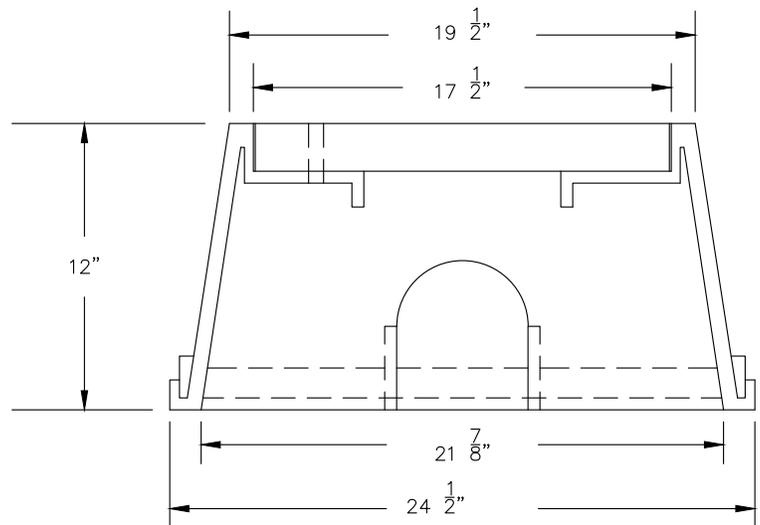
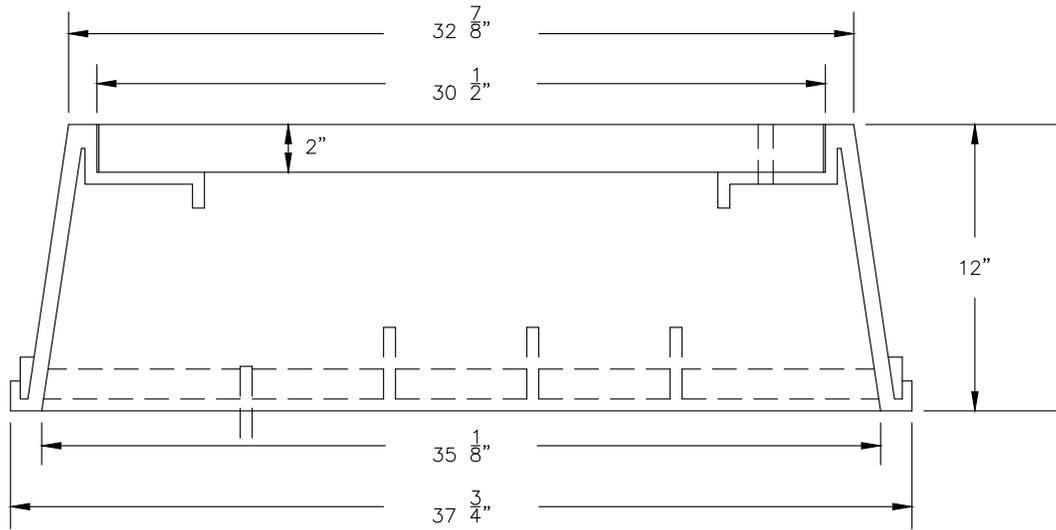
DATE

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3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



NOT TO SCALE



LOW PRESSURE SEWER
SERVICE BOX

STD. NO.

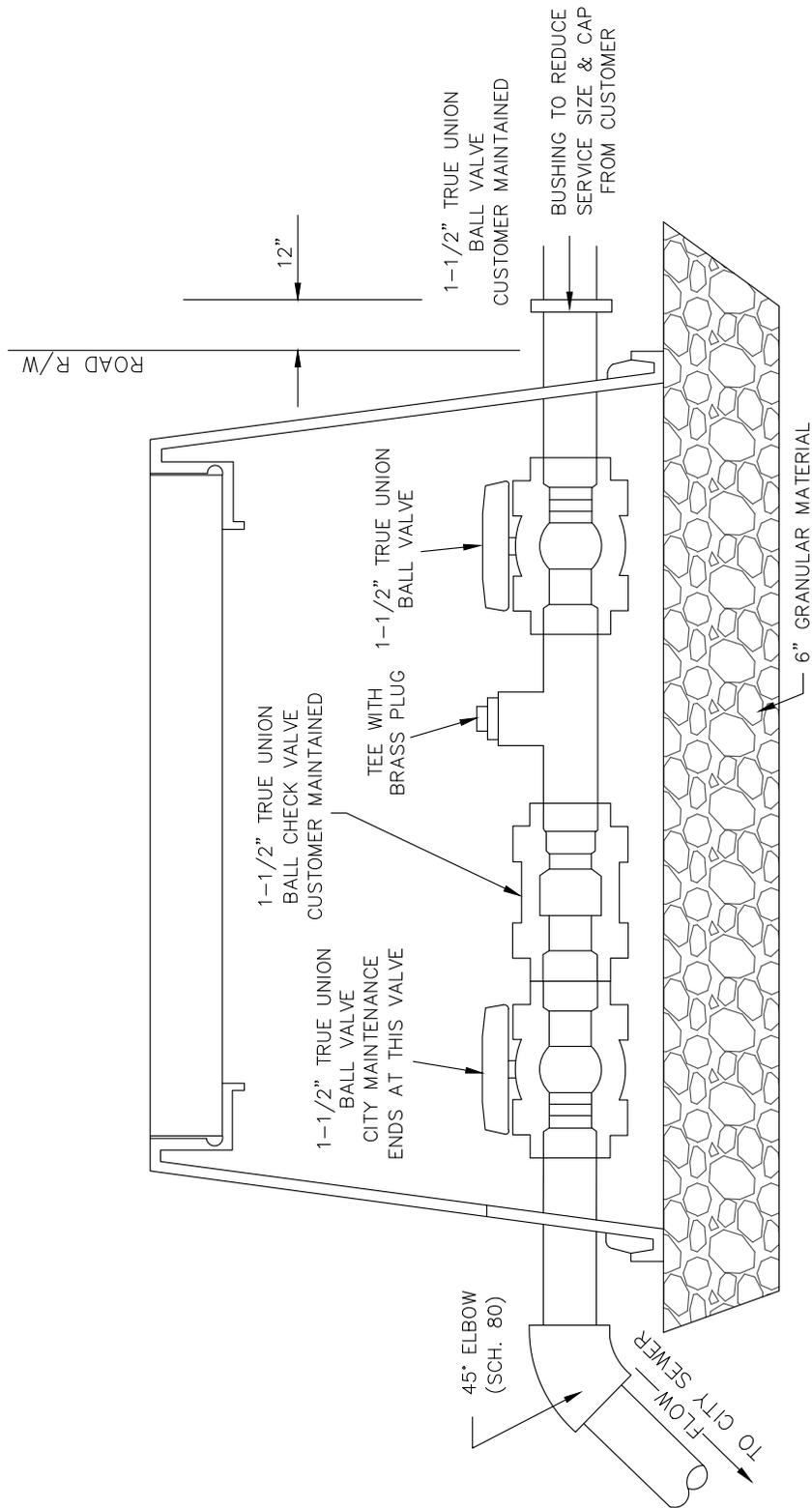
DATE

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3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



NOT TO SCALE



LOW PRESSURE SEWER
SERVICE CONNECTION

STD. NO.

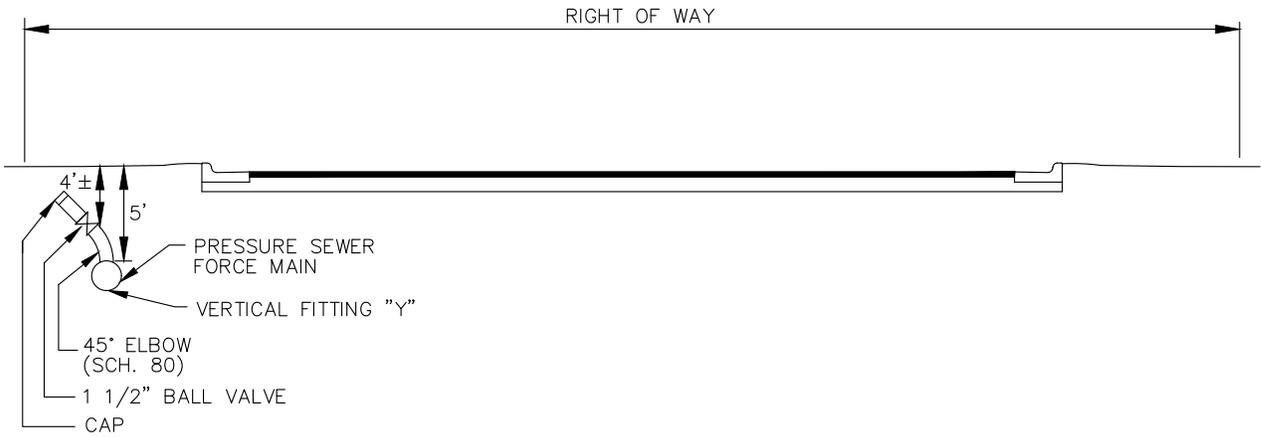
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209

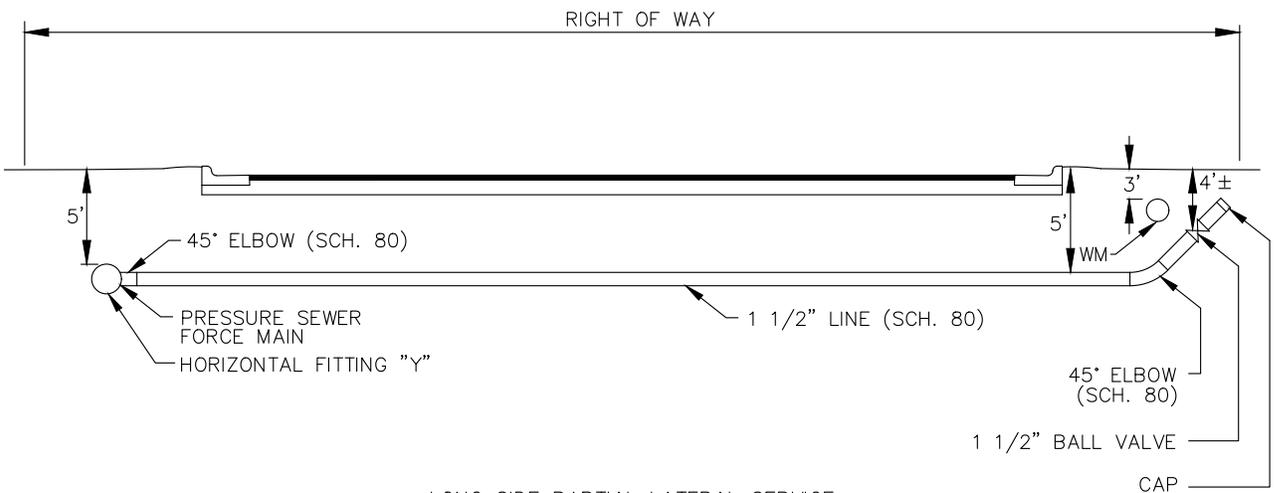
3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



SHORT SIDE PARTIAL LATERAL SERVICE



LONG SIDE PARTIAL LATERAL SERVICE

NOTE:

1. A PVC ENCAPSULATED MAGNET SHALL BE ATTACHED TO THE VALVE FOR MAGNETIC LOCATION PURPOSES.

NOT TO SCALE



LOW PRESSURE SEWER
PARTIAL LATERAL SERVICE

STD. NO.

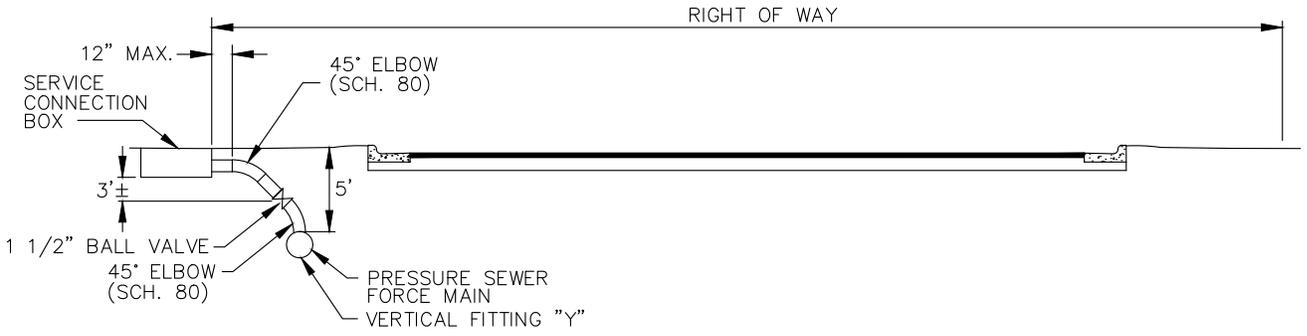
210

DATE

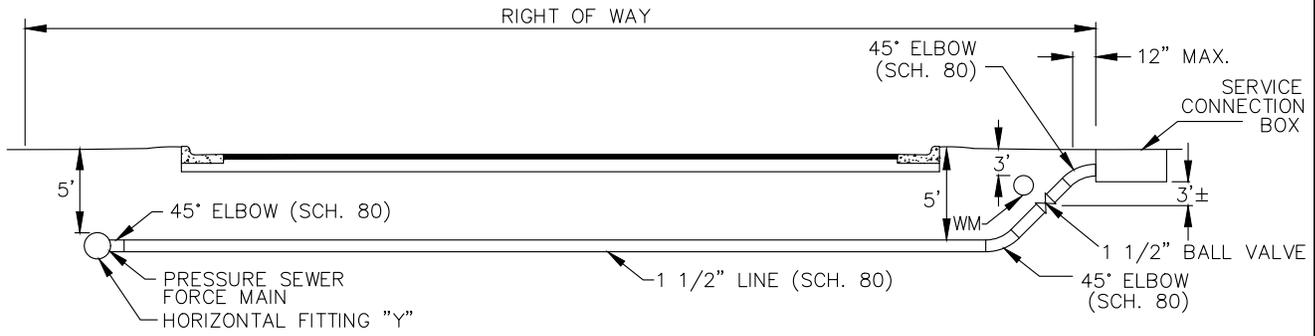
3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



SHORT SIDE LATERAL SERVICE



LONG SIDE LATERAL SERVICE

NOT TO SCALE



LOW PRESSURE SEWER
LATERAL SERVICE

STD. NO.

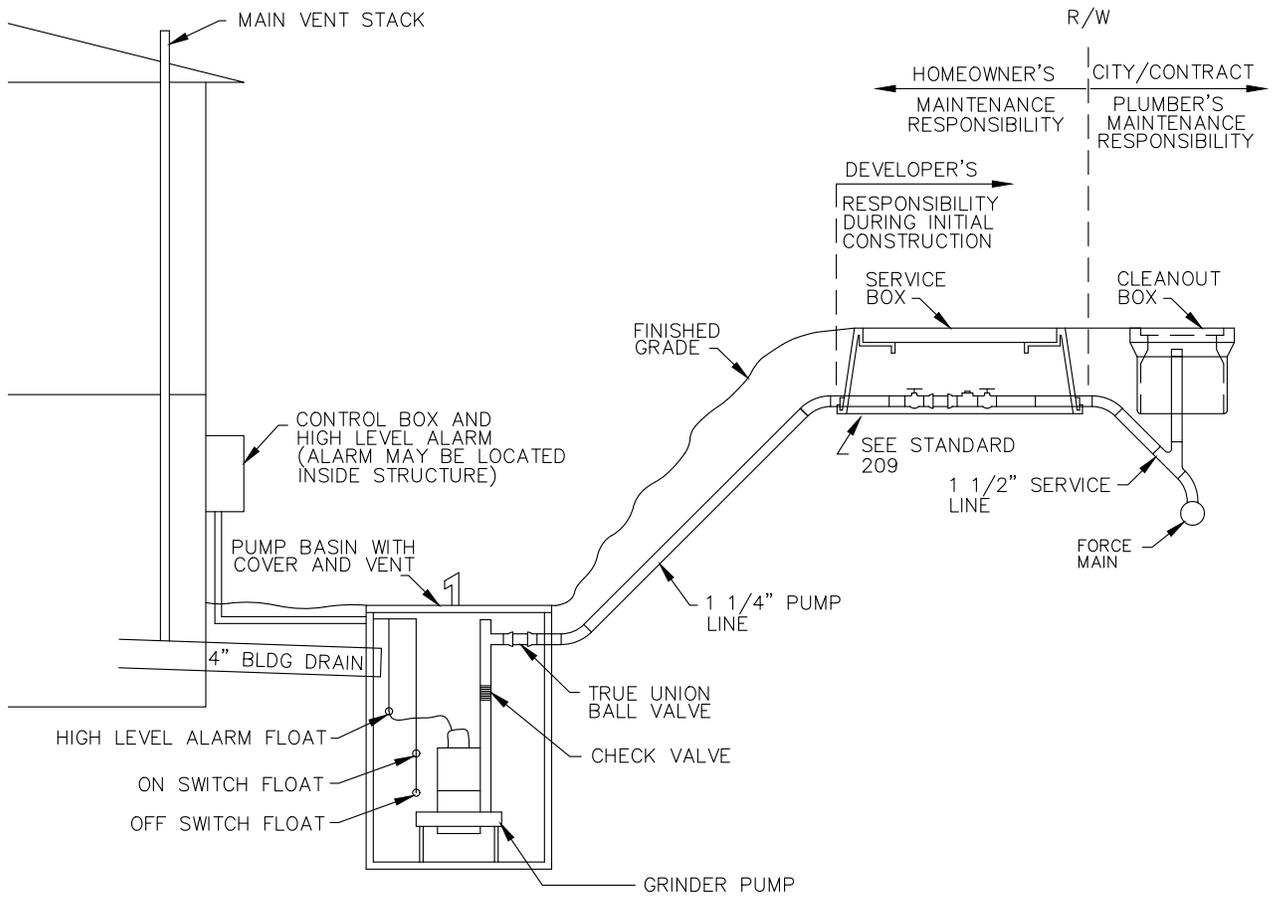
DATE

211

3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



NOTES:
 SEE ALSO CITY OF MORGANTON STANDARD
 SANITARY SEWER SPECIFICATIONS. IN
 THE EVENT OF A CONFLICT BETWEEN THE
 DRAWINGS AND SPECIFICATIONS, THE MORE
 STRINGENT SHALL APPLY.

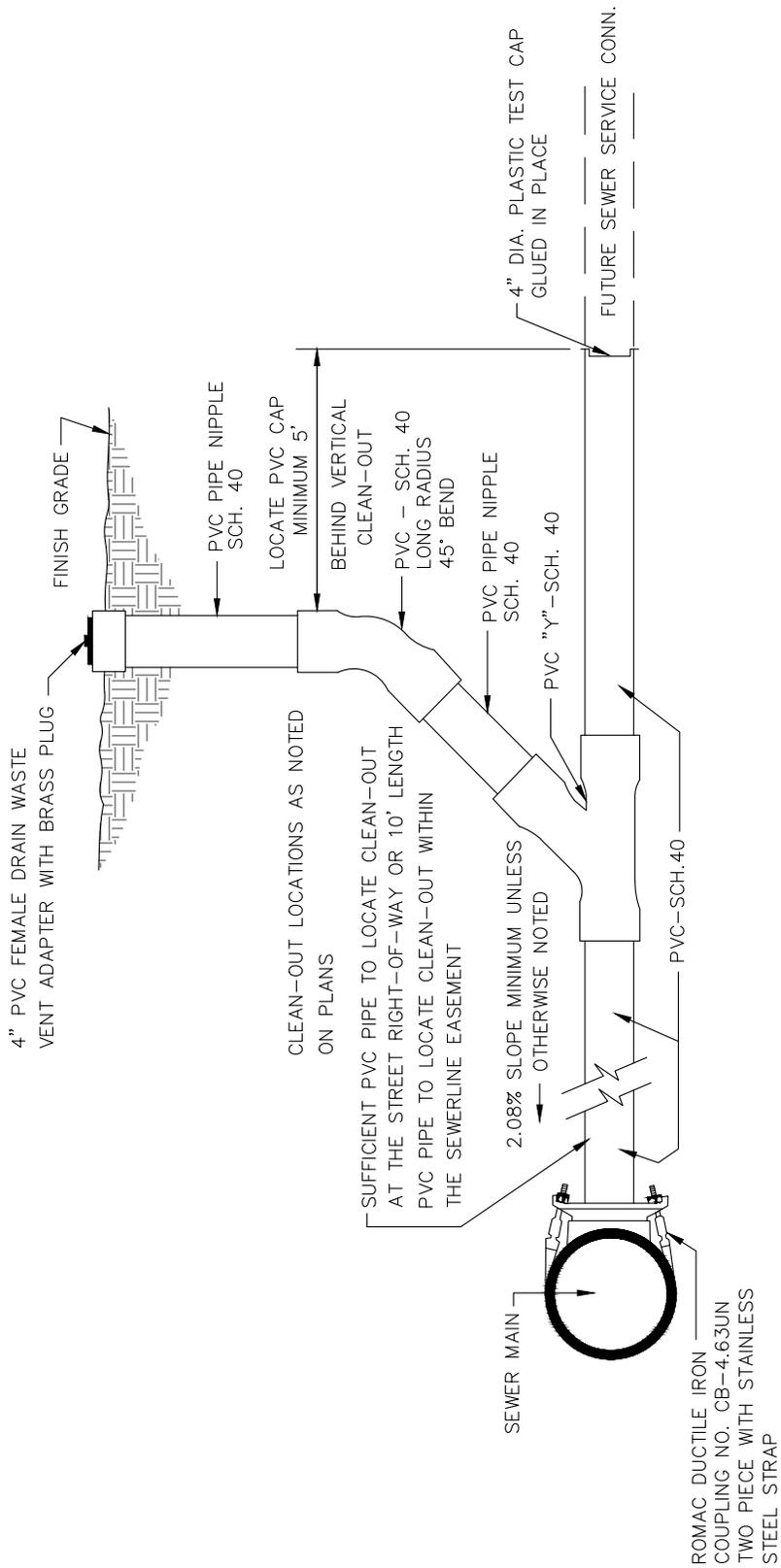
NOT TO SCALE



LOW PRESSURE SEWER
 INDIVIDUAL SYSTEM

STD. NO.	DATE
212	3-7-11
SHEET 1 OF 1	

CITY OF MORGANTON



NOT TO SCALE



SEWER SERVICE CONNECTION
WITH CLEANOUT
(RESIDENTIAL APPLICATION)

STD. NO.

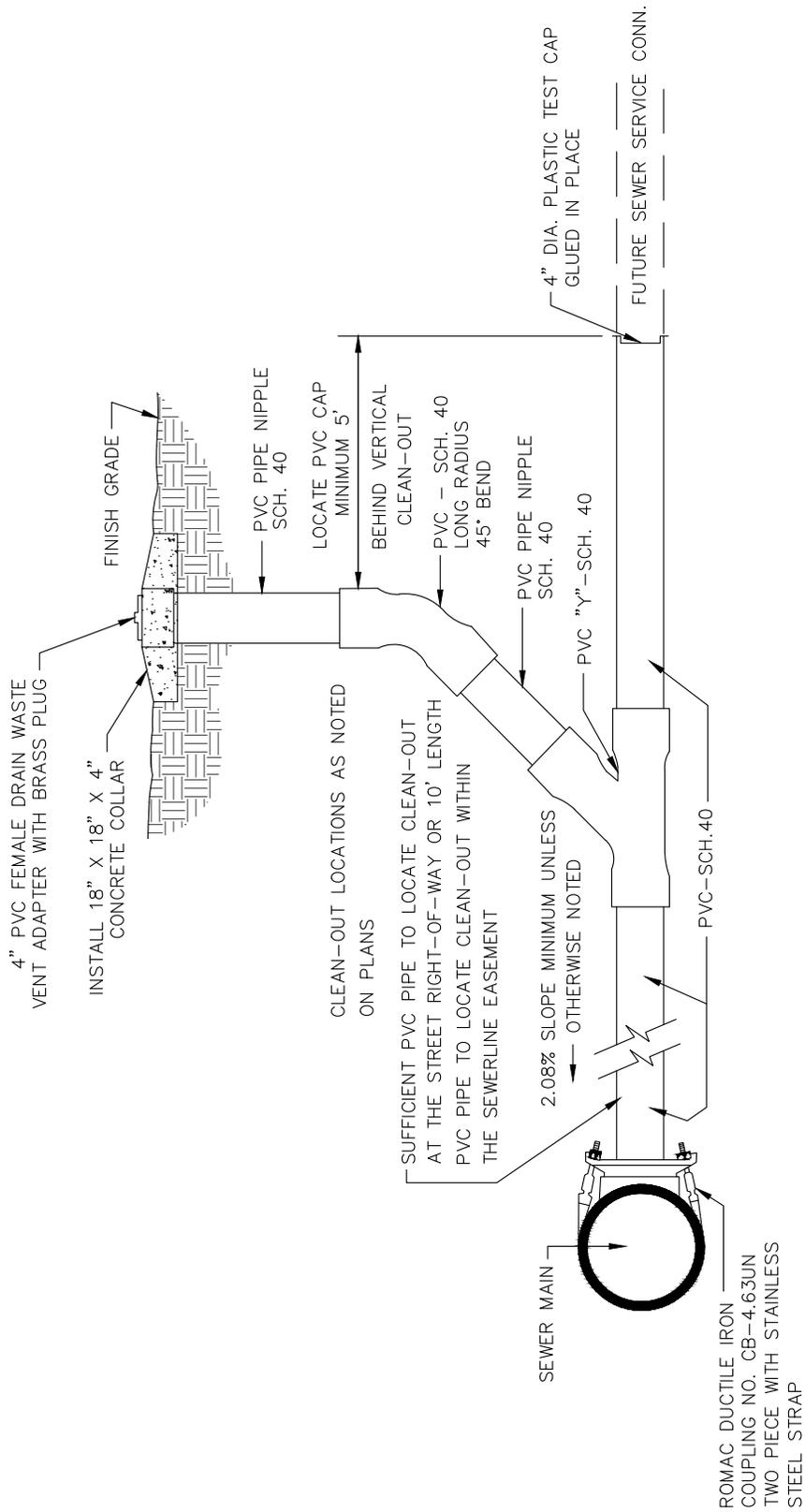
DATE

213 R

3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



NOT TO SCALE



SEWER SERVICE CONNECTION WITH CLEANOUT (COMMERCIAL APPLICATION)

STD. NO.

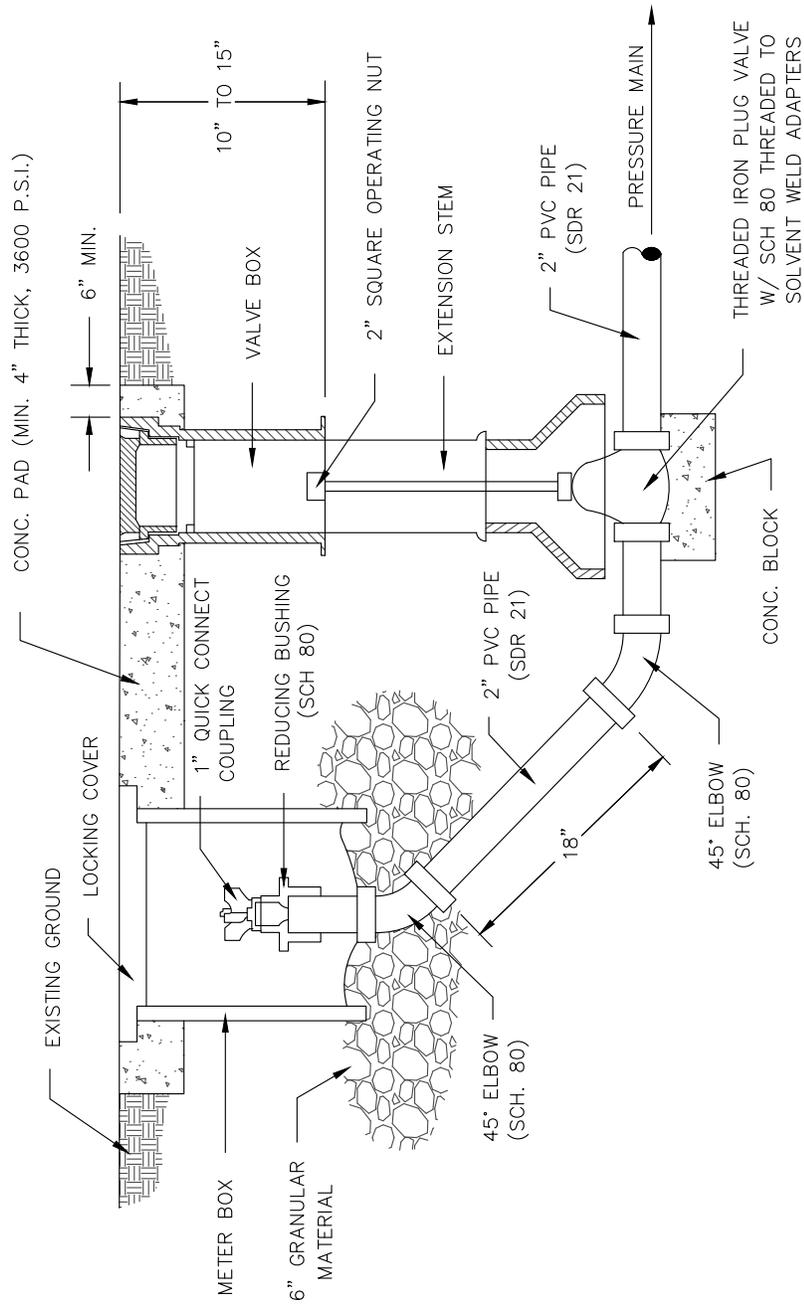
DATE

213 C

3-4-13

SHEET 1 OF 1

CITY OF MORGANTON



ALL PLUG VALVES SHALL BE CAST IRON DEZURIK VALVES WITH 2" OPERATING NUT & EXTENSION DEZURIK PART # FIG. 13

NOTE: ALL COVERS TO BE MARKED EITHER "PRESSURE SEWER OR SEWER"

NOT TO SCALE



LOW PRESSURE SEWER
CLEANOUT AT END OF MAIN

STD. NO.

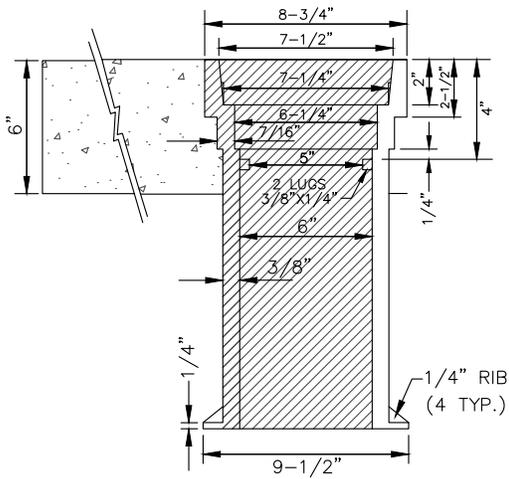
214

DATE

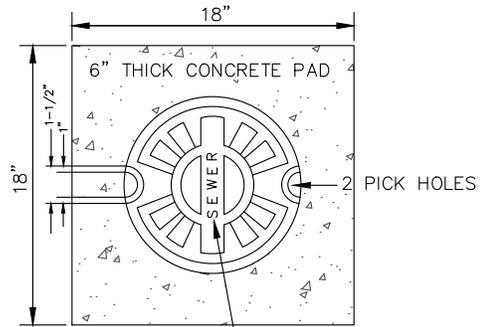
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CITY OF MORGANTON

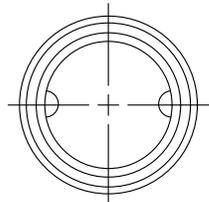


VALVE BOX-SECTION VIEW

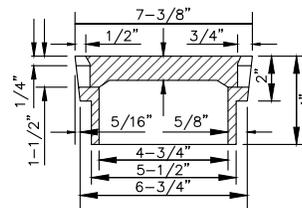


CAST IRON COVER SHALL READ
"WATER" FOR WATER LINES AND
"SEWER" FOR SEWERLINES

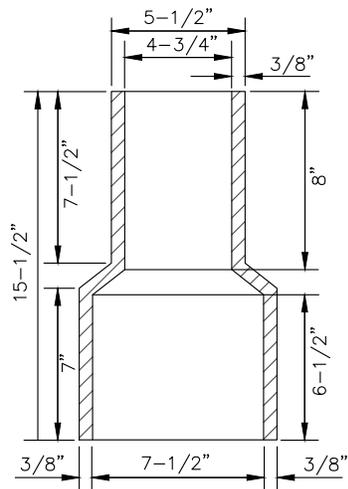
COVER-TOP VIEW



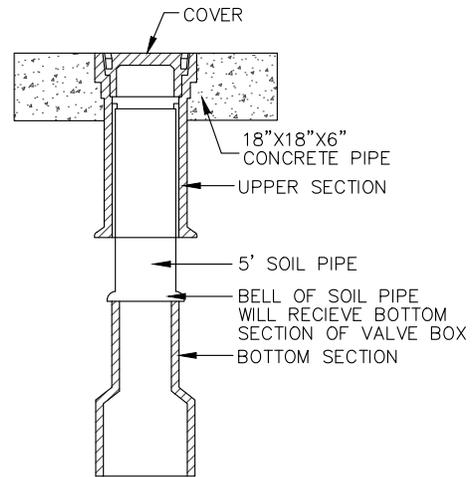
COVER-BOTTOM VIEW



COVER-SECTION VIEW



NO. 2 BOTTOM SECTION



EXTENSION USING SOIL PIPE

NOTE:

1. BOTTOM SECTION TO BE CENTERED OVER NUT, NOT TO BEAR ON VALVE BODY
2. CASTING TO BE OF GRAY IRON CONFORMING TO A.S.T.M. SPECIFICATIONS A-48-60T CLASS COATED IN ACORDANCE WITH STANDARD PRACTICE
3. VALVE BOX SHALL BE A SCREW TYPE BOX

NOT TO SCALE



VALVE BOX & EXTENSION
DETAIL

STD. NO.

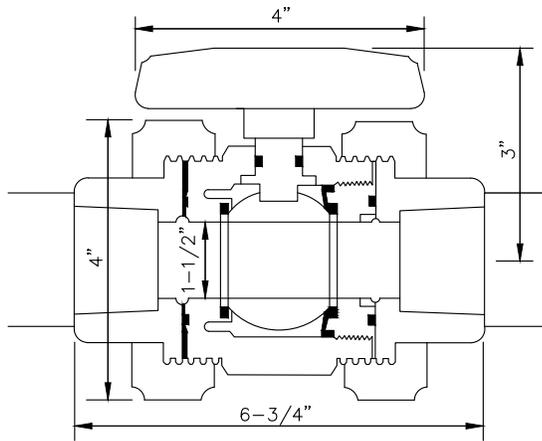
215

DATE

3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



NOT TO SCALE



1-1/2" HAYWARD TRUE
UNION BALL VALVE

STD. NO.

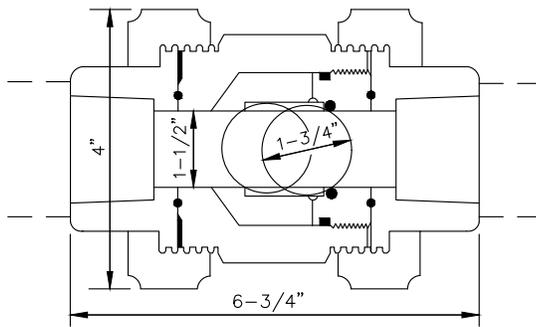
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3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



NOT TO SCALE



1-1/2" HAYWARD BALL CHECK VALVE

STD. NO.

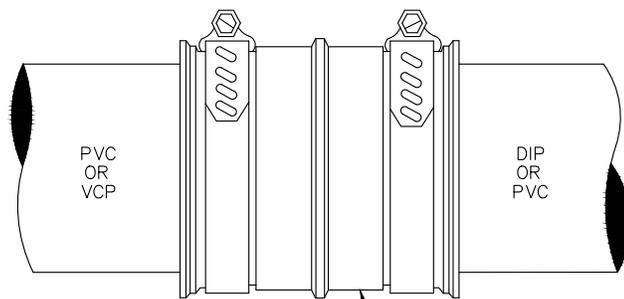
DATE

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SHEET 1 OF 1

CITY OF MORGANTON



FERNCO FLEXIBLE TRANSITION
COUPLING OR APPROVED
EQUAL OF APPROPRIATE
DIAMETER

NOTE: USE ROCKWELL SERIES 413 STEEL TRANSITION
COUPLING TO CONNECT DIP TO STEEL SEWER PIPE OR
APPROVED EQUAL. EPOXY PAINT COUPLING INTERIOR

NOT TO SCALE



TRANSITION COUPLING

STD. NO.

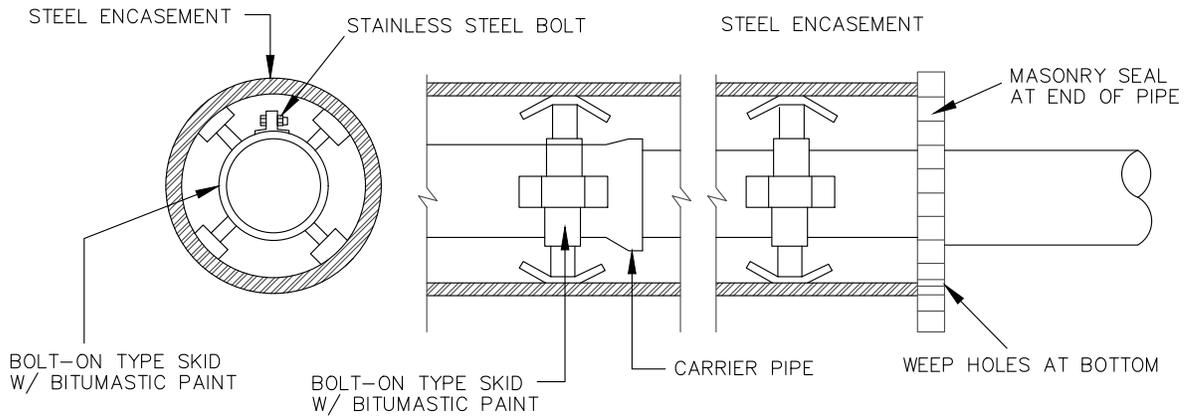
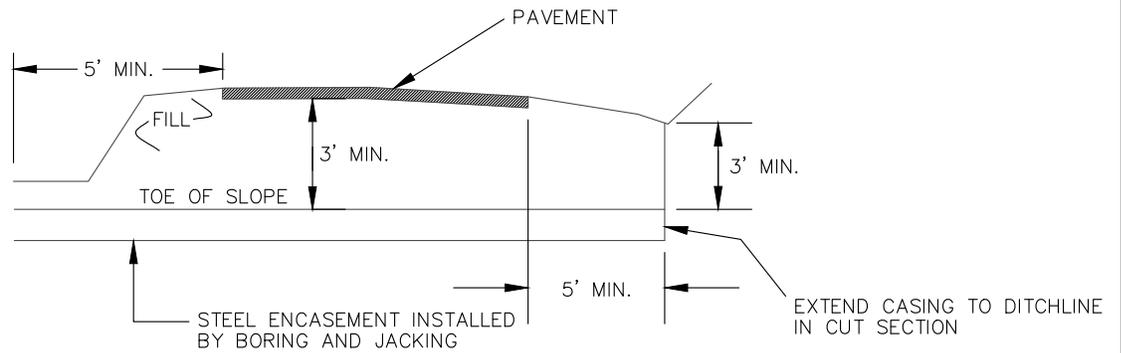
DATE

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3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



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



BORE ENCASEMENT

STD. NO.

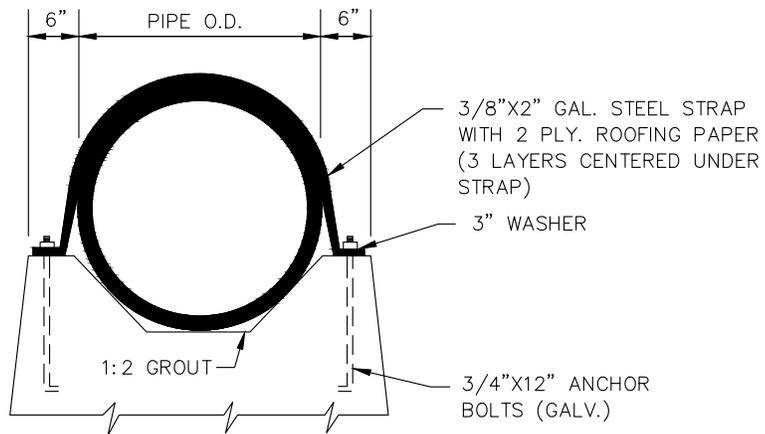
DATE

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SHEET 1 OF 1

CITY OF MORGANTON



NOT TO SCALE



SADDLE DETAIL

STD. NO.

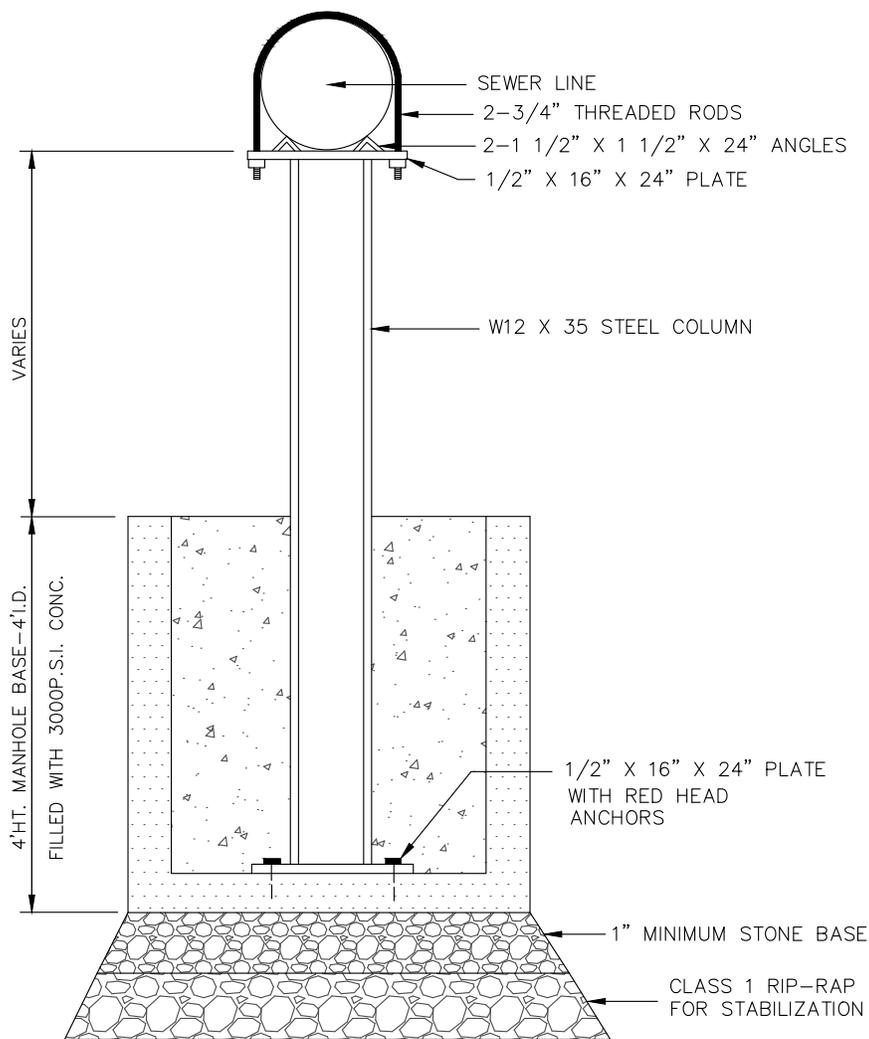
DATE

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CITY OF MORGANTON



NOT TO SCALE



MANHOLE BASE PIER

STD. NO.

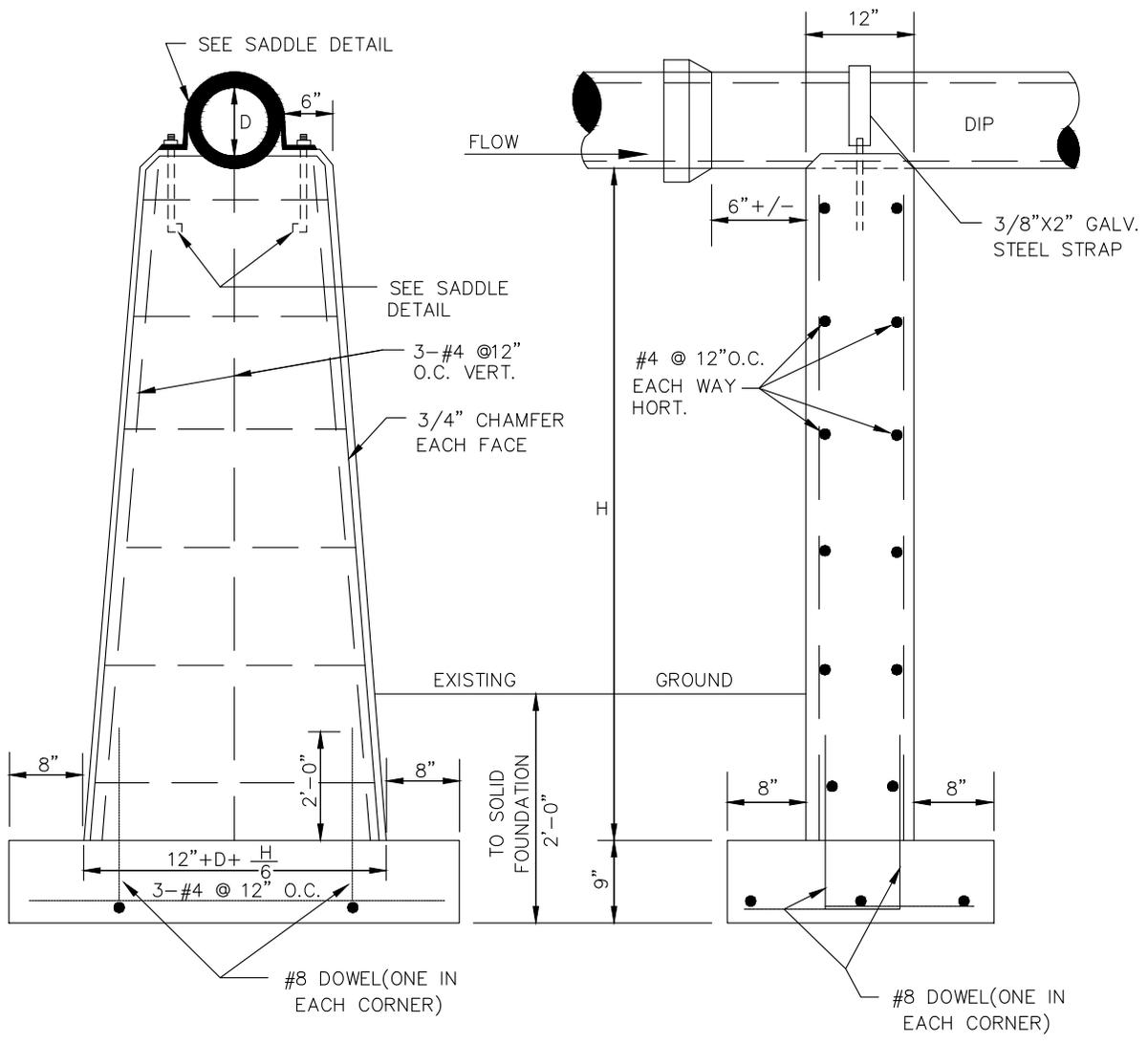
DATE

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3-7-11

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CITY OF MORGANTON



NOTE: ALL HARDWARE TO BE HOT DIPPED GALVANIZED

NOT TO SCALE



CONCRETE PIER

STD. NO.

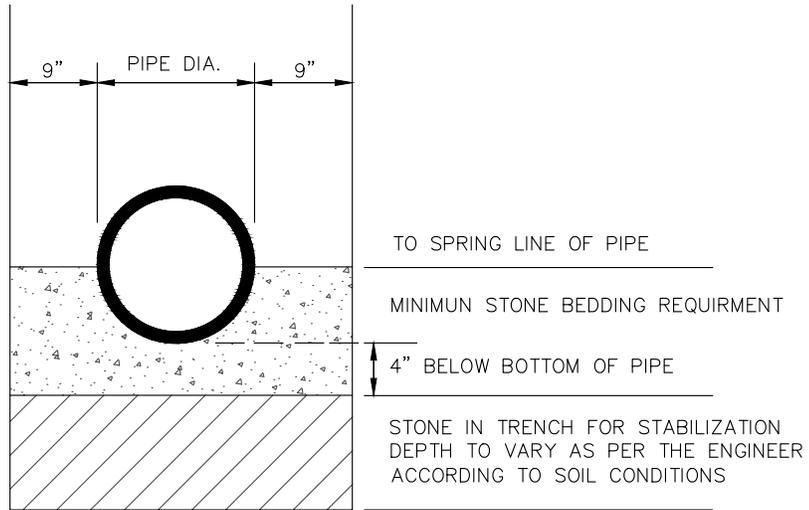
DATE

222

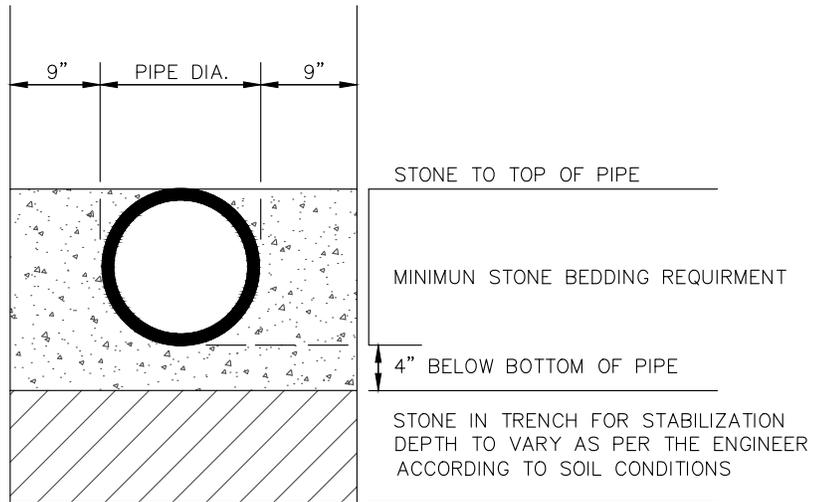
3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



DRY CONDITIONS



WET CONDITIONS

NOTE: STONE IN TRENCH FOR STABILIZATION AND BEDDING STONE IS TO BE PAID FOR BY THE TON AS PER THE CONTRACTOR'S BID

NOT TO SCALE



SEWER PIPE BEDDING

STD. NO.

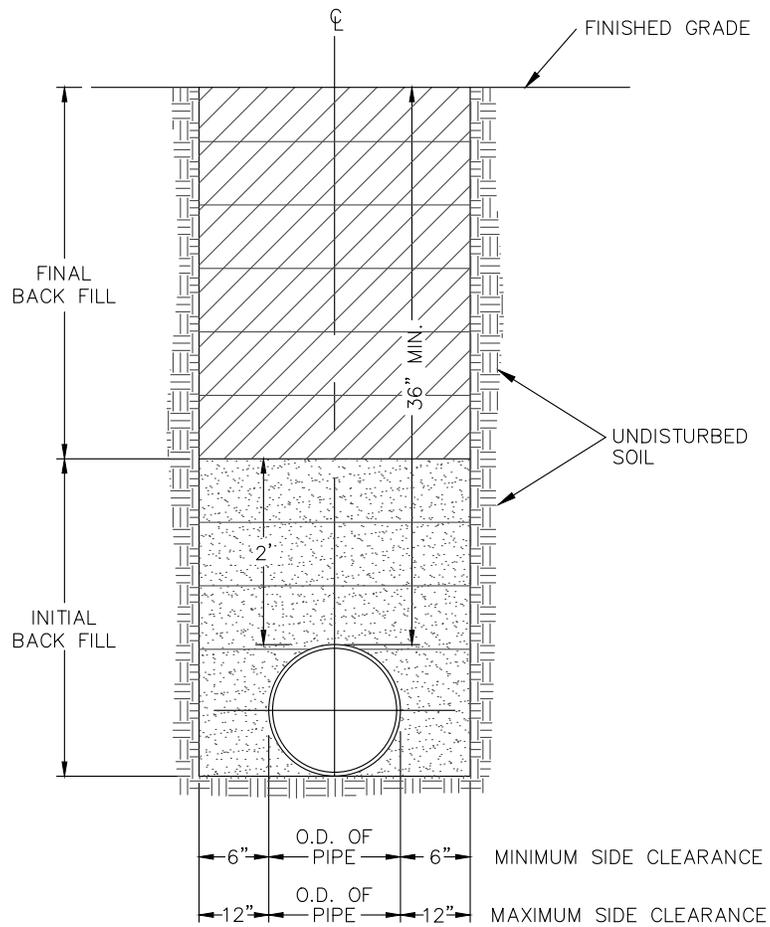
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DATE

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CITY OF MORGANTON



TYPICAL TRENCH BOTTOM DIMENSIONS FOR:
DUCTILE IRON, 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.
5. ALL BACKFILL TO A HEIGHT OF 12" OVER PIPE TO BE COMPACTED BY MANUAL MEASURES.

DEPTH OF BEDDING
MATERIAL BELOW PIPE

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

NOT TO SCALE



SEWER LINE TRENCH BOTTOM
DIMENSIONS AND BACKFILLING
REQUIREMENTS

STD. NO.

224

DATE

3-7-11

SHEET 1 OF 1

CITY OF MORGANTON

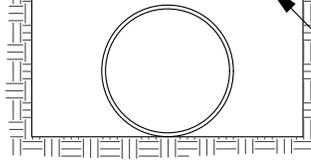
2" ASPHALT SURFACE COURSE
TYPE S 9.5 B OR S 9.5 C

11" B 25.0B OR B25.0C BASE COURSE

EXISTING

1.0' 1.0'

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



UTILITY ROADWAY PATCH
AND REPAIR

STD. NO.

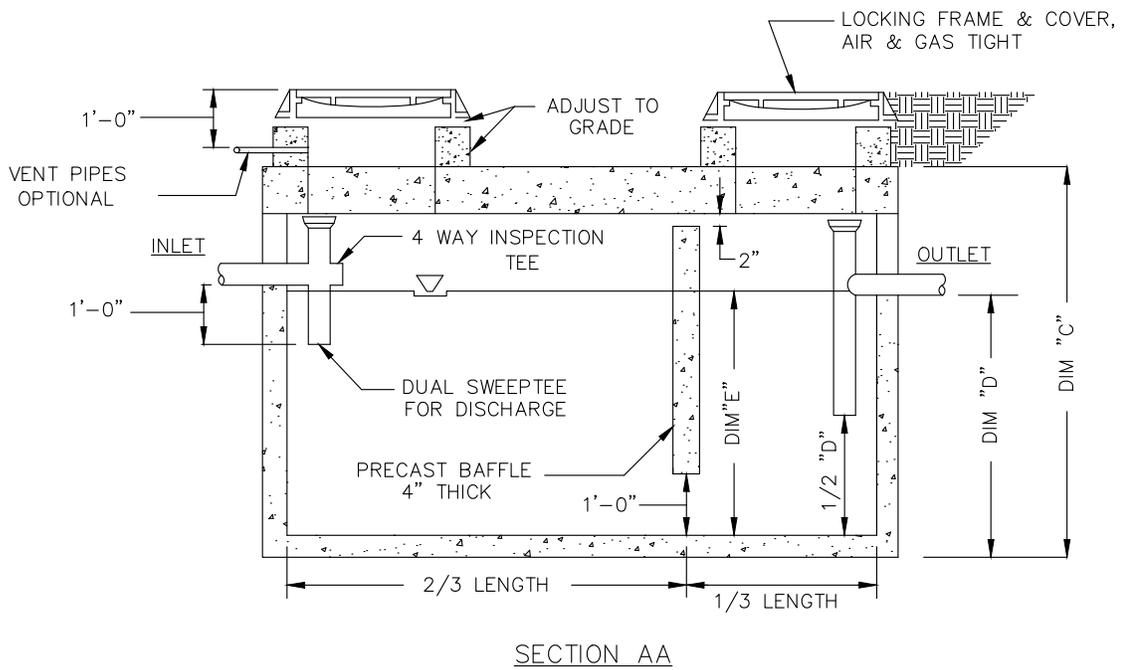
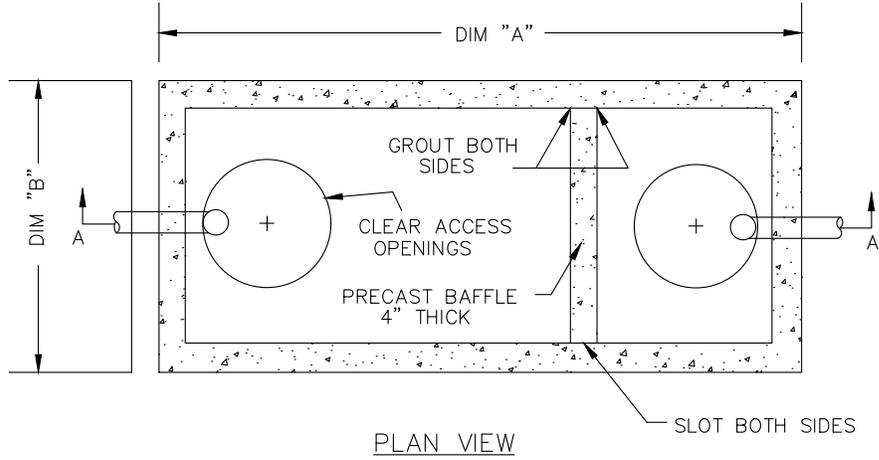
DATE

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SHEET 1 OF 1

CITY OF MORGANTON



NOT TO SCALE



GREASE TRAP

STD. NO.

DATE

226.1

3-7-11

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CITY OF MORGANTON

SIZING CHART					
GALLON CAPACITY	DIM"A"	DIM"B"	DIM"C"	DIM"D"	DIM"E"
600	7' - 0"	4' - 8"	7' - 0"	3' - 6"	3' - 2"
750	7' - 0"	4' - 8"	7' - 0"	4' - 3"	3' - 11"
1000	7' - 0"	5' - 0"	7' - 2"	4' - 2"	3' - 10"
1250	9' - 0"	5' - 0"	7' - 2"	5' - 2"	4' - 10"
1500	9' - 0"	5' - 8"	7' - 2"	4' - 4"	4' - 0"
1750	11' - 2"	5' - 8"	7' - 2"	4' - 11"	4' - 7"
2000	11' - 2"	6' - 8"	8' - 0"	4' - 7"	3' - 10"
2500	12' - 8"	6' - 8"	8' - 0"	5' - 6"	4' - 9"
2750	12' - 8"	6' - 8"	8' - 0"	6' - 0"	5' - 3"
3000	15' - 7"	9' - 7"	8' - 6.5"	6' - 3"	3' - 9"
4000	15' - 7"	9' - 7"	8' - 6.5"	6' - 3"	5' - 0"
5000	19' - 11"	9' - 11"	8' - 11"	6' - 2"	4' - 9"
6000	19' - 11"	9' - 11"	10' - 5"	7' - 2"	5' - 9"

NOTES

1. CONCRETE: 28 DAYS $f_c = 4500\text{psi}$
2. REBAR: ASTM A515 GRADE 60
3. MESH: ASTM A-155 GRADE 65
4. DESIGN: ACI318-83 BUILDING CODE
ASTM C-857 MINIMUM STRUCTURAL DESIGN
LOADING FOR UNDERGROUND PRECAST
CONCRETE UTILITY STRUCTURES
5. LOADS:H-20 TRUCK WHEELS W/30% IMPACT PER AASHTO
6. FILL W/ CLEAN WATER PRIOR TO START UP OF SYSTEM
7. CONTRACTOR TO SUPPLY AND INSTALL ALL PIPING
AND SANITARY TEES, 4 CLEAN OUTS, FOR CLEANING
TOWARD TRAP AND FOR CLEANING AWAY FROM TRAP
ON BOTH THE INLET AND OUTLET/ ALT, DUAL SWEEP
CLEANOUTS.
8. GRAY WATER ONLY, BLACK WATER SHALL BE CARRIED
BY SEPERATE SEWER.
9. EFFLUENT FILTER REQUIRED: ZABEL A300-12 OR EQUAL



GREASE TRAP

STD. NO.

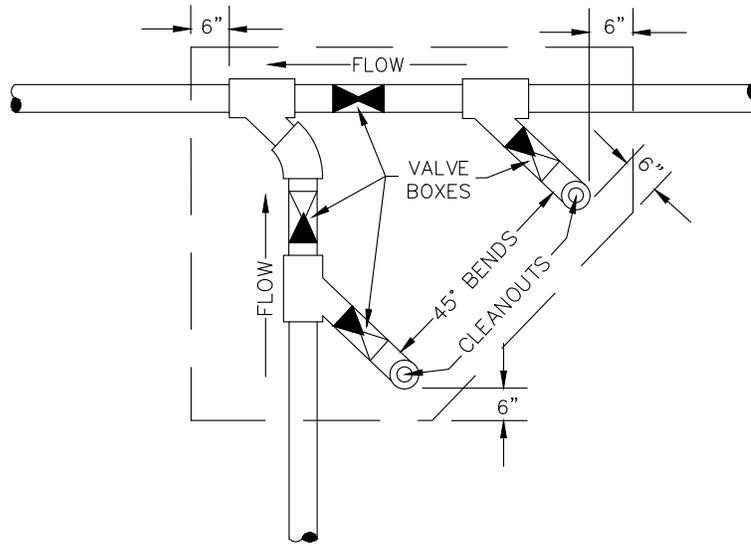
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226.2

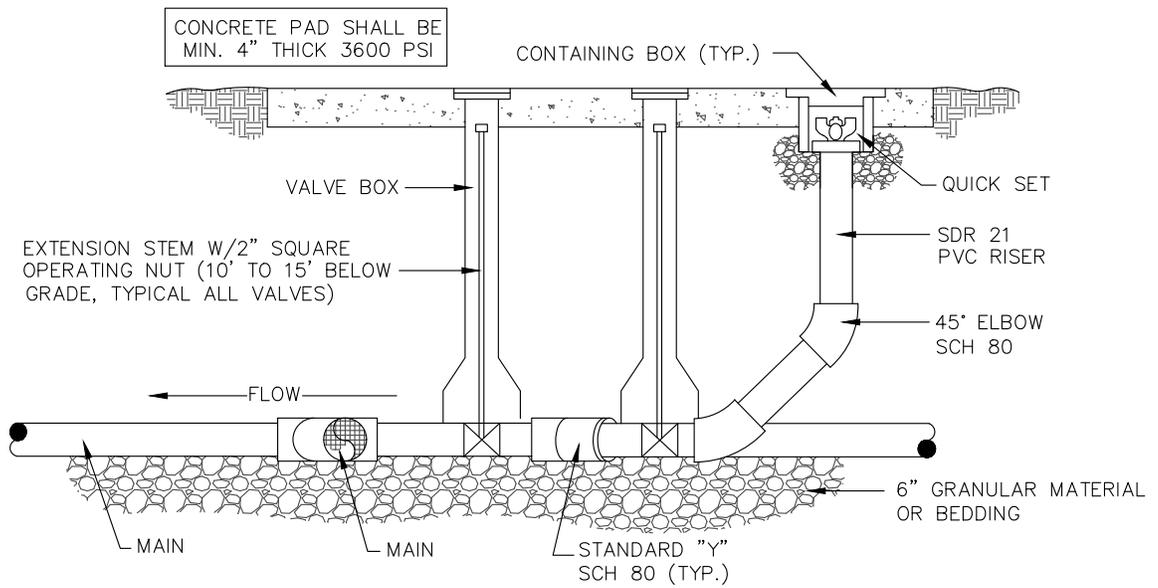
3-7-11

SHEET 1 OF 1

CITY OF MORGANTON



PLAN VIEW



ELEVATION

NOT TO SCALE



VALVE DETAIL AT INTERSECTION

STD. NO.

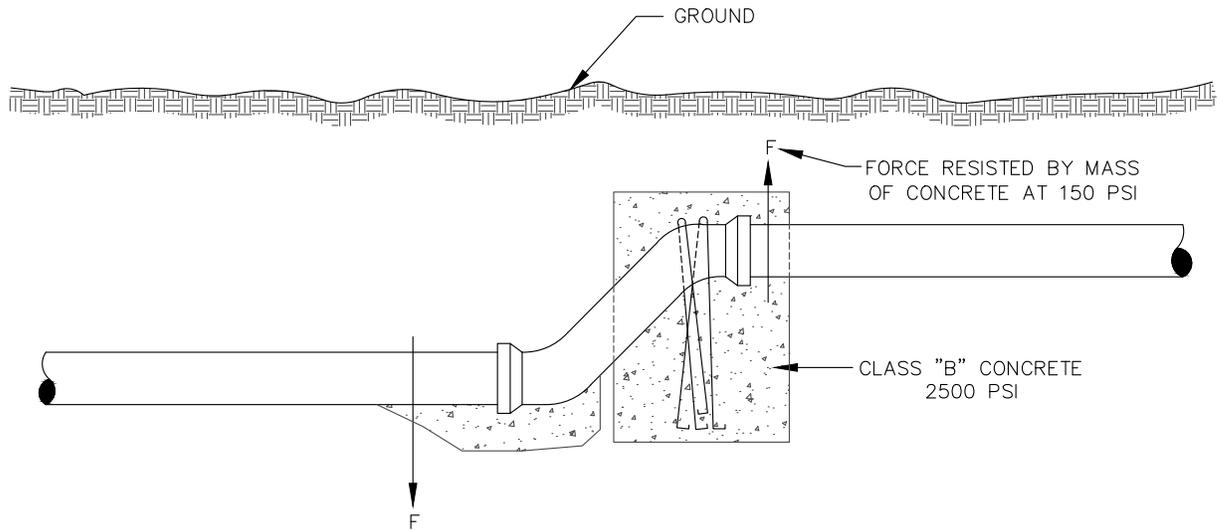
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CITY OF MORGANTON



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#	3/4 CY.	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.

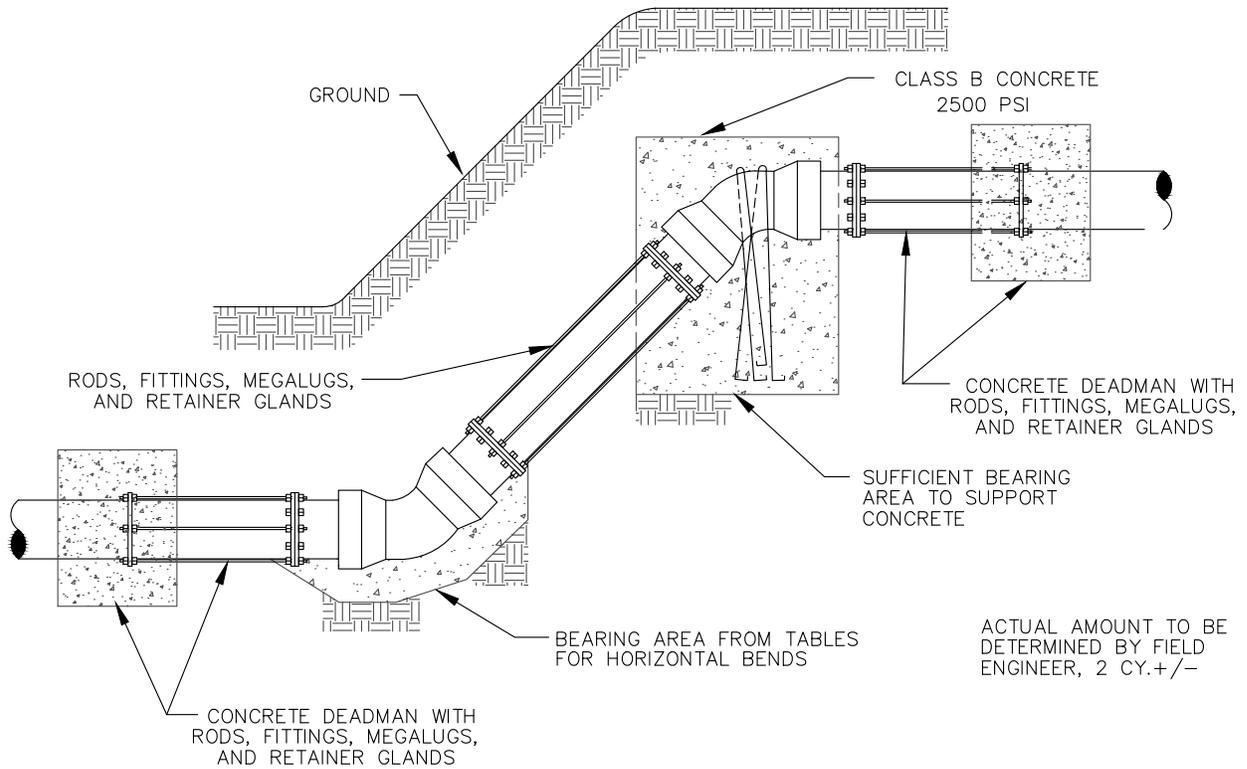
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CITY OF MORGANTON



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.

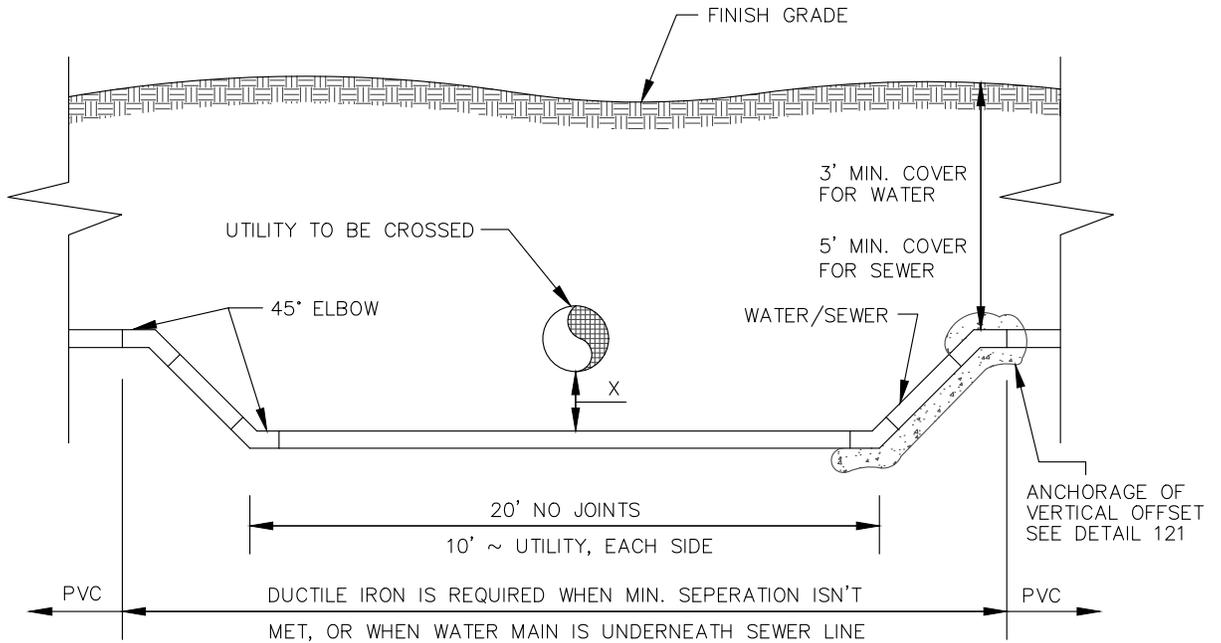
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CITY OF MORGANTON



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:

- 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.
- 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.
- 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.

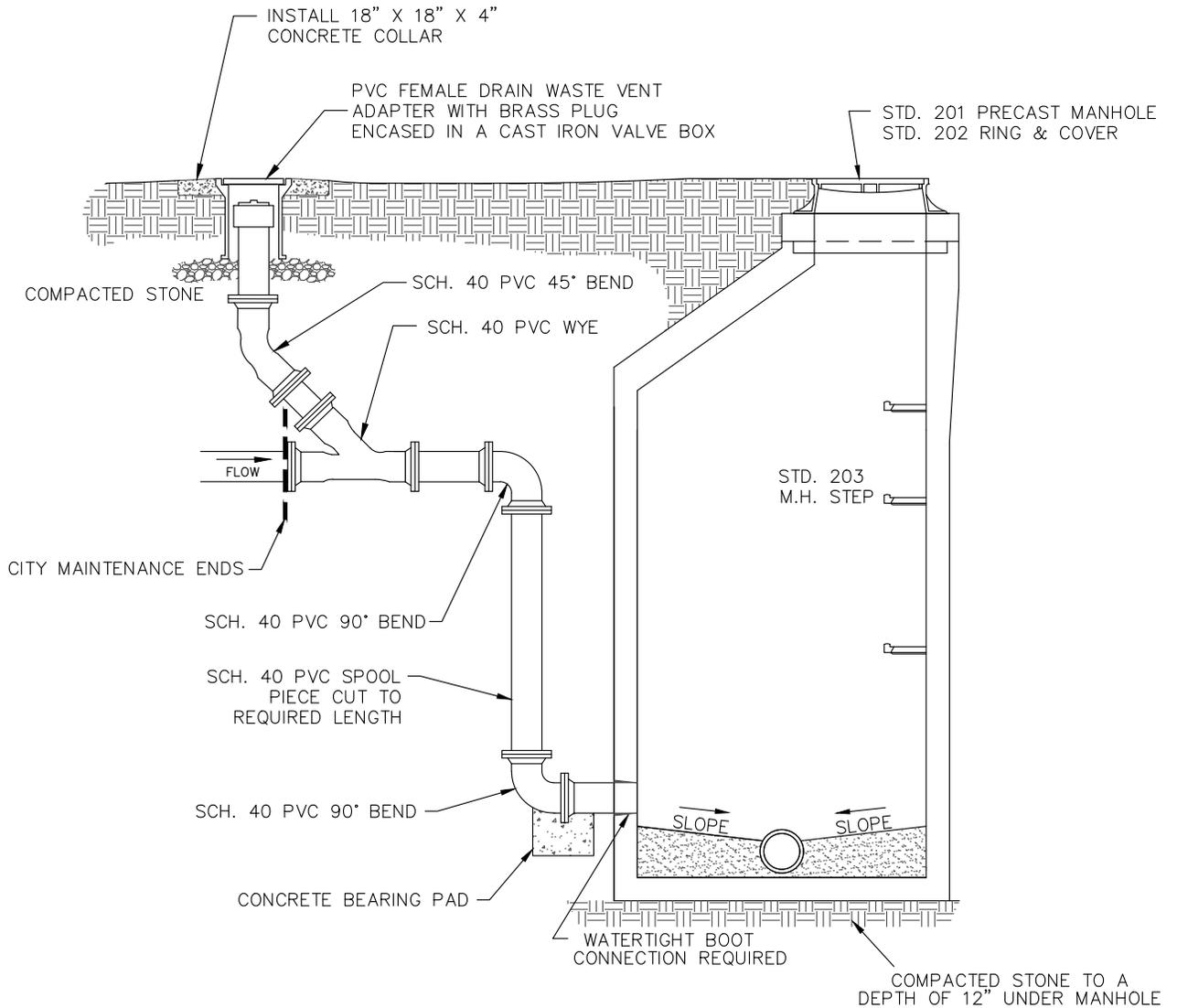
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CITY OF MORGANTON



NOTES:

1. CLEAN OUT SIZES MUST BE 4 INCH OR 6 INCH AS SPECIFIED BY THE CITY ENGINEER.
2. INVERT SHALL HAVE 0.20' OF FALL UNLESS OTHERWISE SPECIFIED.

MANHOLE DIAMETER VS. PIPE DIAMETER

- 4'-0" = 27" PIPE MAXIMUM
- 5'-0" = 36" PIPE MAXIMUM
- 6'-0" = ABOVE 36" PIPE

NOT TO SCALE



SANITARY SEWER MANHOLE
TAP WITH CLEAN OUT

STD. NO.

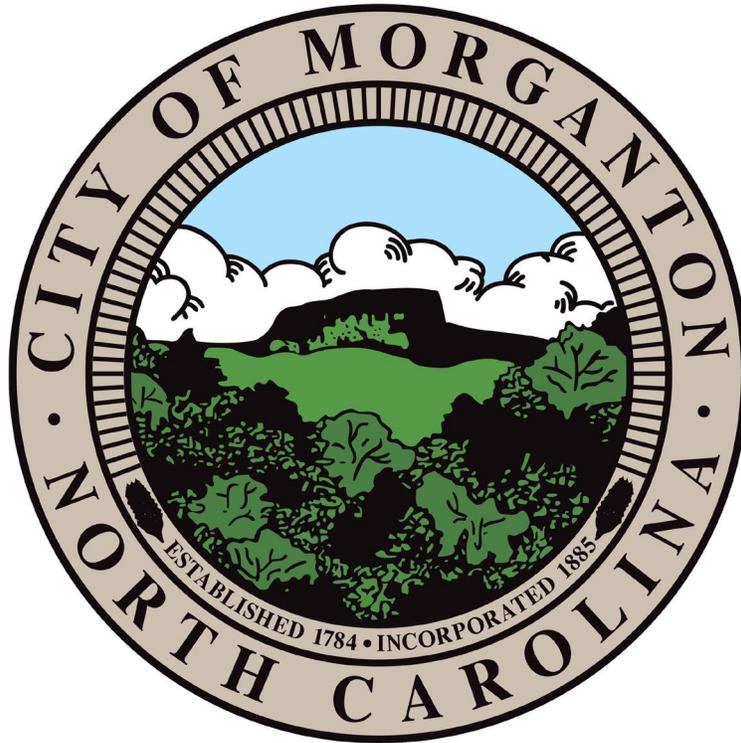
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CITY OF MORGANTON



City of Morganton
Utility Construction Erosion Control
Specifications 2016

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 2016

CITY OF MORGANTON SEEDING SPECIFICATIONS

- 1. SCOPE**
- 2. SEEDING SPECIFICATIONS FOR AREAS GREATER THAN 3:1 SLOPE**
- 3. SEEDING SPECIFICATIONS FOR AREAS LESS THAN 3:1 SLOPE**
- 4. SEEDBED PREPARATION**
- 5. SUMMER TEMPORARY SEEDING SPECIFICATIONS**
- 6. WINTER TEMPORARY SEEDING SPECIFICATIONS**

1. SCOPE

- a. The guidelines contained within this section are aimed at providing the general public and design community the minimum standards and procedural requirements for temporary seeding and permanent seeding for disturbed areas during construction and after construction.
- b. Temporary Seeding is the use of rapid growing annual grasses, small grains to provide initial, temporary cover for erosion control on disturbed areas for less than twelve (12) months. Seed bed preparations and soil amendments shall be in accordance with the method described under "Seedbed Preparation". Seeding and Mulching shall be done immediately behind construction.
- c. Permanent Ground Cover is the establishment of perennial vegetation cover for periods longer than twelve (12) months. As a part of permanent seeding, maintenance may be required to maintain vegetative growth for twelve (12) months. This maintenance shall be considered a part of establishing permanent ground cover.
- d. After construction is complete, all points of stormwater release shall be protected by a riprap dissipation device designed to reduce discharge velocities to nonerosive levels.

2. SEEDING SPECIFICATIONS FOR AREAS GREATER THAN 3:1 SLOPE

SEEDING MIXTURE

<u>Species</u>	<u>Rate(lb./ac.)</u>
Tall Fescue	100
Sericea Lespedeza*	30
Kobe Lespedeza	10

- 1. In eastern piedmont add 25lb./ac. Pensacola Bahia grass or 10lb./ac. common Bermuda grass. Use common Bermuda grass only where it is unlikely to become a pest.
- 2. After August 15, use unscarified Sericea seed,
- 3. Where a neat appearance is desired, omit Sericea and substitute 40lb./ac. Bahia grass or 155lb./ac. Bermuda grass.
- 4. To extend spring seeding dates into June, add 15lb./ac. hulled Bermuda grass. However, it is preferable to seed temporary cover and seed fescue in September.

NURSE PLANTS

Between May 1 and August 15, add 10lb./ac. German Millet or 15lb./ac. Sudan grass. Prior to May 1 or after August 15, add 40lb./ac. Rye (Grain).

<u>SEEDING DATES</u>	<u>BEST</u>	<u>POSSIBLE</u>
Fall	Aug. 25 - Sept. 15	Aug. 20 - Oct. 25
Late winter	Feb. 15 - Mar. 21	Feb. 1 - Apr. 15

Fall is best for tall Fescue and late winter for Lespedezas. Over seeding of Kobe Lespedeza over fall seeding tall Fescue is very effective. Use unhulled Bermuda grass seed in fall

SOIL AMENDMENTS

Apply lime and fertilizer according to soil test, or apply 4000lb./ac. ground agricultural limestone and 1000lb./ac. 5-10-10 fertilizer.

MULCH

Apply 4000 - 5000 lb./ac. straw. Anchor by tacking with asphalt, netting or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

MAINTENANCE

Refertilize in the second year unless growth is fully adequate. May be mowed once or twice a year, but mowing is unnecessary. Reseed, fertilize and mulch damaged areas immediately.

3. PERMANENT SEEDING SPECIFICATIONS FOR AREAS LESS THAN 3:1 SLOPE

SEEDING MIXTURE

<u>Species</u>	<u>Rate(lb./ac.)</u>
Tall Fescue	100
Sericea Lespedeza*	20
Kobe Lespedeza	10
Redtop	5
Kentucky Bluegrass	5
*After August 1, use unscarified seed for Sericea Lespedeza	

NURSE PLANTS

Between May 1 and August 15, add 10lb./ac. German Millet or 15lb./ac. Sudan grass. Prior to May 1 or after August 15, add 40lb./ac. Rye (Grain). It may be beneficial to plant the grasses in late summer and overseed the Lespedezas in March.

<u>SEEDING DATES</u>	<u>BEST</u>	<u>POSSIBLE</u>
Below 2500ft.	Aug. 15 - Sept. 1 Mar. 1 - Apr. 1	July 25 - Sept. 15 Mar. 1 - May 10
Above 2500ft.	July 25 - Aug 15 Mar. 20 - Apr. 20	July 15 - Aug 30 Mar. 5 - May 15

*Complete seeding earlier in fall and start later in spring on north and east facing slopes.

SOIL AMENDMENTS

Apply lime and fertilizer according to soil test, or apply 4000lb./ac. ground agricultural limestone and 1000lb./ac. 5-10-10 fertilizer.

MULCH

Apply 4000 - 5000 lb./ac. straw. Anchor by tacking with asphalt, netting or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

MAINTENANCE

Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.

4. 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, roots, 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 reseed within the planting season, if possible. If stand should be over 60% damaged, reestablish 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 - 1,000lb./acre of 10-10-10
Superphosphate - 500lb/acre - 20% analysis
Mulch - 2 tons/acre of small grain straw
Another - asphalt emulsion @ 300gal./acre

5. SUMMER TEMPORARY SEEDING SPECIFICATIONS

Seeding Mixture

<u>Species</u>	<u>Rate(lb./ac.)</u>
German Millet	40

In the piedmont and mountains, a small-stemmed sudan grass may be substituted at a rate of 50lb./ac.

SEEDING DATES

Mountains, May 15th through August 15th

SOIL ADMENDMENTS

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

MULCH

Apply 4,000lb./ac. straw. Anchor straw by tacking with asphalt, netting or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

MAINTENANCE

Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.

6. WINTER TEMPORARY SEEDING SPECIFICATIONS

Seeding Mixture

<u>Species</u>	<u>Rate(lb./ac.)</u>
Rye (Grain)	120
Annual Lespedeza (Kobe in piedmont and coastal plain, Korean in mountains)	50

Omit annual Lespedeza when duration of temporary cover is not to exceed June.

SEEDING DATES

Mountains, above 2500ft. February 15TH through May 15th
below 2500ft. February 15TH through May 15th

SOIL ADMENDMENTS

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

MULCH

Apply 4,000lb./ac. straw. Anchor straw by tacking with asphalt, netting or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

MAINTENANCE

Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.