City of Montgomery, Texas

Design Criteria Manual

Prepared by:

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October 2013

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Section I: Streets

Section I. Streets

1.01 General Requirements:

1. The purpose of this manual is to establish basic guidelines and certain minimum criteria for the design of streets and thoroughfares in the City. It is intended to be used by the city staff and private consulting engineers for all new street construction and improvements to existing streets. Unusual circumstances or special designs requiring exception from the standards in this manual must be approved by the City Engineer.
2. The geometric design policies contained in this manual are intended to provide a reasonable degree of safety to users of the public rights-of-way in normal weather and traffic conditions. The minimum design criteria for pavement structure are intended to produce streets having a useful life expectancy of at least 20 years with reasonable expenditures for maintenance and repair.
3. Variance Procedure
   (a) The City Council may, upon request, approve an alternative design, unusual circumstance, or construction methodology that differs from the requirements in this manual on a case by case basis if the City Council determines that the alternative design or construction methodology is sufficient to ensure public health and safety.
4. Street locations must conform to the City's Major Thoroughfare Plan.
5. Street Classifications:
   (a) Major Streets:
      1) Minimum Pavement Width – Dual 34' lanes, 12 foot' esplanade.
      2) ROW Width – 100 feet or per Thoroughfare Plan.
   (b) Secondary Streets:
      1) Minimum Pavement Width – 41' w/ access; 36' w/o access.
      2) ROW Width – 80'.
   (c) Commercial Streets:
      1) Minimum Pavement Width – 36'
      2) ROW Width – 80'.
   (d) Residential Streets:
      1) Minimum Pavement Width – 28'
      2) ROW Width – 60'.
   (e) Minor Residential Streets:
      1) Curbed Pavement – 28'
      2) ROW Width – 50'.
6. Minimum face of curb radii at intersections shall be 25 feet.

1.02 Submittal Requirements:

1. The design engineer shall submit the following information with all street designs:

   (a) Plan and profile sheets containing all information necessary to review, construct and inspect the proposed improvements. This includes, but is not limited to, pavement markings and signs on non-residential streets. Provide topographical information outside of right-of-way where the information is available. For non-residential streets, indicate the design speed for all horizontal and vertical curves.

   (b) Drainage report in accordance with the Section IV: Storm Water Conveyance.

   (c) Geotechnical report to support the proposed street design.

   1) Soil samples of 10' depth at a minimum of 200' intervals.

   2) Provide at least two samples for streets less than 200 feet in length.

   3) Provide the treatment application rate for each 200' section.

   4) Provide the proposed pavement section.

   5) Show the type and depth of subgrade treatment on the drawings, specifically under the cross-section of the pavement.

   (d) Traffic Control Plans detailing the safe and efficient operation of traffic through the work zone during construction. Prepare the plan in accordance with the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

   (e) Certification that plans meet all requirements except where noted.

1.03 Requirements for Roadway Pavement with Open Ditch Sections:

1. This section applies to modifications of existing open ditch roadway sections only.
2. The minimum grade for ditch flow lines shall be 0.10 percent.
3. Design ditch capacities to exceed run-off as determined by the City Drainage Requirements.
4. Standard side slope of ditches shall be at least 3:1, except for major streets with speed limits over 50 mph. Then, slopes shall be as called for in the Texas Roadway Design Manual.
5. Size culverts to carry the ditch discharge, but not less than 18 inches in diameter.
6. Driveway Culverts may be RCP (Reinforced Concrete Pipe) or HDPE (High Density Polyethylene), Smooth Interior Pipe. In instances where driveway culvert pipe cover is less than one foot (from top of pipe to top of pavement), RCP is required.
7. Roadway Culverts shall be RCP (Reinforced Concrete Pipe)

1.04 Requirements for Roadway Pavement with Curb and Gutter Sections:

1. Construct major, secondary, and commercial streets with concrete pavement and 6 inch curbs
2. Construct residential and minor residential streets with concrete pavement and 4-inch roll-over curbs.
3. Minimum gutter grade shall be 0.25 percent.

4. When a curb and gutter intersect a drainage ditch, the grade of the gutter shall be above the designed water surface of the ditch.
5. Minimum 1 percent fall around intersection turnout for a maximum radius of 35 feet. Grades for larger radii shall be determined on an individual basis.
6. Provide a minimum grade of 0.40 percent around the longest radius on an L type street intersection.
7. Use vertical curves, minimum 100' in length, when the algebraic difference in grades exceeds one percent. Show elevations at 10 foot intervals through vertical curves. Maintain a minimum of 0.03 foot elevation change at 10 foot intervals by altering the calculated elevations.
8. Use a minimum 40 MPH deign speed to determine length of crest vertical curves for secondary, commercial, residential and minor residential streets.
9. Use a minimum 50 MPH design speed to determine length of crest vertical curves for Major streets.
10. Label top of curb grades on drawings.
11. Radius of cul-de-sac pavement:
    (a) Residential -- 40 feet face to face of curb.
    (b) Commercial -- 50 feet face to face of curb.
12. Minimum grade for cul-de-sacs shall be 0.60 percent.
13. Super elevate Major Streets in accordance with AASHTO whenever the center line radius of lanes or rights-of-way are less than 2000 feet.
14. Show the cross slope of the pavement section on the drawings.
    (a) The standard cross slope is 1/4 inch per foot from the face of curb to center line
    (b) 1/8 inch per foot may be used for left turn lanes.
15. Provide a minimum ¼ inch per foot slope from the finished grade at the ROW boundary to the top of curb.
16. Maximum cut from finished grade at property line to top of curb shall be 1.75 feet.

1.05 Requirements for Miscellaneous Items:

1. If driveways are to be constructed with the paving project, show locations and typical sections on the drawings including a center line for the driveway at the property line, driveway width and driveway radii.
2. Construct private streets to the same specifications and requirement as city streets.
3. Place paving headers at the end of all concrete pavements.
4. Place Type III barricades, per the most recent edition of the Texas Manual on Uniform Traffic Control Devices, at the end of all dead end streets not terminating in a cul-de-sac.
5. Obtain Texas Department of Transportation approval before City approval if the design involves Texas Department of Transportation drainage, ROW, or roadway modifications, including driveways and utilities.

6. Obtain a letter of no objection to the construction plans when paving is placed over a transmission pipeline.
7. Remove concrete to either an existing or a sawed joint.
8. When meeting existing concrete pavement, use horizontal dowels if no exposed reinforcing steel for interconnection with new pavement exists. Horizontal dowels shall be Grade 60, #6 smooth rebar, 24 inches long, drilled and embedded 8 inches into the center of the existing slab. Dowels shall be 24 inches center to center and have plastic sleeves, unless otherwise specified.
9. When concrete is removed from interconnections, saw cut the pavement and remove existing concrete to expose a minimum of 15 inches of reinforcing steel. If no reinforcing steel exists, use horizontal dowels per Paragraph 8 above.
10. Adjust manhole frames and covers within the limits of the pavement to meet the proposed final top of pavement.
11. Adjust manhole frames and covers outside the limits of the pavement to conform to the final grading plan. Standard rim elevations are 3 to 6 inches higher than final grade.
12. Street Lights
    (a) Install and show on the drawings street lights at all proposed intersections and cul-de-sacs, and at no greater than 300 foot intervals along the streets.
    (b) Provide 100 watt, high-pressure sodium fixtures.
    (c) Locate poles inside the street right-of-way or a dedicated public utility easement and at a minimum of three (3) feet off the back of curb.
    (d) These guidelines do not relieve the developer from also meeting the street lighting design standards required by the electrical utility provider. If the design standards of the City and the electrical utility provider are in conflict, the developer shall be required to follow the power company's design standards upon approved variance from the City Council.
13. Sidewalks
    (a) Construct sidewalks and curb ramps in conformance with the Texas Accessibility Standards (TAS) and the Americans with Disabilities Act (ADA)
    (b) Provide 5 foot minimum width concrete sidewalks on both sides of the street for residential and minor residential streets.
    (c) Provide 8 foot minimum concrete sidewalks on both sides of the street for major, commercial, and secondary streets.
    (d) Connect recreational areas with sidewalks regardless of the type of street.
    (e) Locate sidewalks a minimum of 3 feet from the back of curb.
    (f) Do not place sidewalk over parallel utility lines.
    (g) At driveways, align a minimum 5 foot wide sidewalk section meeting TAS and ADA as the sidewalk crosses the driveway.
    (h) Sidewalks shall be constructed by the developer prior to approval of the Final Plat.
14. Refer to the United States Postal Service's guidelines for mailbox location requirements. Deign new subdivisions for central delivery (cluster mailboxes).

1.06 Material Requirements (HMAC):

1. Hot Mix Asphalt Concrete (HMAC) used for new commercial and residential streets shall require approval from the City Engineer and variance from the City Council.
2. The developer shall submit a geotechnical report prepared by a Geotechnical Engineer licensed in the State of Texas and employed by a company that is accredited by the American Association for Laboratory Accreditation (A2LA). The geotechnical report shall include subgrade treatment recommendations including the type of stabilizer and anticipated application rate (lb/yd2) to develop a modulus of subgrade reaction of no less than 200 pci for all roadway classifications.
3. Flexible base materials shall consist of crushed stone, crushed concrete, or asphalt stabilized base. The base thickness shall be a minimum of 8 inches except for asphalt stabilized base which shall have a minimum thickness of 6 inches.
4. Crushed stone base shall comply with Item 247 of the Standard Specifications for Construction of Highways, Streets, and Bridges, TxDOT, 2004 for Type A, Grade 1 or 2 materials.
5. Crushed Concrete base shall comply with Item 247 of the Standard Specifications for Construction of Highways, Streets, and Bridges, TxDOT, 2004 and shall meet Grade 1 physical requirements.
6. asphalt stabilized base shall comply with Item 345 of the Standard Specifications for Construction of Highways, Streets, and Bridges, TxDOT, 2004 and shall meet Grade 1 or 2 Master Grading requirements.
7. Compact all flexible bases to 95% standard proctor density (ASTM D-698) except for asphalt stabilized base which shall be compacted to 91% of the maximum theoretical density as determined according to Test Method Tex-227-F and Test Method Tex-207-F.
8. Hot-mix asphaltic concrete (HMAC) shall be designed to meet the requirements for Type D asphalt as indicated in Item 340 of the Standard Specifications for Construction of Highways, Streets and Bridges, TxDOT, 2004.
9. Hot mix asphaltic concrete shall be placed such that no core is less than two inches for residential streets or less than 2.5 inches for commercial, secondary, and major streets.

1.07 Material Requirements (Concrete):

1. The developer shall submit a geotechnical report prepared by a Geotechnical Engineer licensed in the State of Texas and employed by a company that is accredited by the American Association for Laboratory Accreditation (A2LA). The geotechnical report shall include subgrade treatment recommendations including the type of stabilizer and anticipated application rate (lb/yd2) to develop a modulus of subgrade reaction of no less than 200 pci for all roadway classifications.
2. Minimum thickness shall be 6" uniform thickness for residential streets and 8” for commercial, secondary, and major streets.
3. Joints

   (a) Expansion joints.

   1) Provide an acceptance load transmission device at each expansion joint,

   2) Place expansion joints at approximately sixty (60') foot intervals.

3) Place expansion joints at all structures and at curb return at street intersections.

4) Material for expansion joints shall be redwood or equal material.

(b) Sawcut contraction joints (dummy joints) with a maximum spacing of twenty (20') feet.

(c) Place transverse construction joints at least ten (10') feet from an expansion or contraction joint, when not placed at an expansion or contraction joints.

(d) Place longitudinal construction joints at the center-line of 28' pavements and at approved locations for greater width pavements.

4. Reinforce concrete pavements with a minimum of #4 round deformed steel bars spaced not more than twenty-four (24") inch center to center each way.

5. Construct curbs monolithic with the concrete pavement and not doweled to the pavement.

6. Use hot-poured asphaltic-joint sealing compound or equivalent to seal all expansion joints, construction joints and contraction joints.

7. Expansion joints made with 3/4 inch (Crowned Section) asphalt saturated fiberboard shall have hot poured asphaltic joint sealing or its equivalent in top 1-inch.

1.08 Testing Requirements:

1. All construction materials shall be tested and monitored by an A2LA or AASHTO accredited laboratory.

2. The laboratory shall identify all test locations based on the stations and offsets established in the approved construction plans.

3. Subgrade

(a) Compact subgrade to a minimum of 95% of the Standard Proctor Density.

(b) Test subgrades a minimum of every 250 feet alternating lanes for density and P.I with a minimum of one test per street.

(c) Proof roll all paving subgrade after the roadway has been cut to grade. The geotechnical engineer, testing laboratory, or their designated representative shall monitor proof-rolling operations and determine whether remediation of weak areas is required before subgrade treatment. If remediation is required, the geotechnical engineer or testing laboratory shall provide recommendations for remediation. The City shall be invited to observe proof rolling 24 hours prior.

4. Base Materials

(a) Test bases material a minimum of three tests every 250 feet for density, thickness, and gradation with a minimum of one group of three tests per street.

(b) Take samples at the center line and one foot in from each edge of the base.

(c) Test gradation each day that base material is placed.

5. Hot Mix Asphalt Concrete

(a) Meet the requirements for Type D asphalt as indicated in Item 340 of the Standard Specifications for Construction of Highways, Streets and Bridges, TxDOT, 2004.

(b) Test asphalt every 250 feet alternating lanes for thickness and density with a minimum of one test per street.

6. Concrete

(a) Meet the requirements indicated in Item 360 of the Standard Specifications for Construction of Highways, Streets and Bridges, TxDOT, 2004.

(b) Test concrete every 250 feet alternating lanes for thickness and job-control testing with a minimum of one test per street per day.

1.09 Quality Assurance:

1. Notify the City 48 hours prior to commencement of any construction within the City.
2. All construction drawings and specifications shall be prepared by or under the supervision of a currently Registered Professional Engineer of the State of Texas, and all documents shall be sealed, signed and dated by the engineer responsible for the preparation.
3. All geotechnical work shall be performed by or under the supervision of a currently Registered Professional Engineer of the State of Texas who is disciplined in the geotechnical field with a lab which is A2LA (American Association for Laboratory Accreditation) or AASHTO(American Association of State Highway & Transportation Officials) accredited. All reports and documents shall be sealed, signed, and dated by the engineer responsible for the preparation.

(End of Section)

Section II: Sanitary Sewer Collection

Section II. Sanitary Sewer System

2.01 General Requirements:

1. Design, test and construct the sanitary sewer collection system in accordance with the latest rules and regulations published by the Texas Commission on Environmental Quality (TCEQ).
2. The Developer of the subdivision shall provide sanitary sewer lines that are adequate to carry the expected load.
3. Refer to the Sanitary Sewer Master Plan prior to design of the proposed subdivision.
4. Construct any improvements, including sanitary sewer lines and lift stations on the Master Plan that either cross or are affected by the proposed development of the property.
5. Variance Procedure

   (a) The City Council may, upon request, approve an alternative design, unusual circumstance, or construction methodology that differs from the requirements in this manual on a case by case basis if the City Council determines that the alternative design or construction methodology is sufficient to ensure public health and safety.

2.02 Manholes:

1. Construct manholes a maximum of four hundred (400) feet apart.
2. All changes of direction in the sanitary sewer line shall take place at a manhole.
3. Use pre-cast concrete manhole, no brick manholes shall be allowed.
4. Provide manholes in accordance with City of Montgomery Standard Details.

2.03 Service Leads:

1. For developments with more than 5,000 gallons-per-day flow in single service, connect the service directly to a proposed or existing manhole.
2. For single residential service, provide a service lead with a minimum 4-inch diameter and a minimum slope of 1%.
3. Double service leads are only allowed with an approved variance by the City Council.
4. If the length of the service lead exceeds 100-feet or the width of the public right-of-way by more than 20-feet, the minimum diameter shall be 8-inches .

2.04 Line Depth:

1. Construct sewer pipe with the top of pipe a minimum of 3 feet below natural ground.
2. Sewers laid in street right-of-ways with curb and gutter paved streets shall have a minimum cover of 4-feet from the top of pipe to top of curb.
3. Sewers laid in street right-of-ways with open ditches shall have a minimum cover of 6-feet from the average ground line at the adjacent street right-of-way to the top of pipe.

2.05 Lift Stations:

1. Comply with the requirements set forth by the TCEQ.
2. Use a peaking factor of 4 in the design calculations.
3. Provide the City of Montgomery with a copy of the Engineering Design Report satisfying TCEQ criteria.
4. The City of Montgomery shall approve the brand of pump used in the lift station.
5. Construct all lift stations of concrete, no fiberglass lift stations shall be allowed.

2.06 Pipe Materials:

1. The following types of sanitary sewer pipe materials are not allowed:
   (a) plastic “truss” pipe.
   (b) clay pipe.

(End of Section)

Section III: Water Distribution

Section III. Water Distribution System

3.01 General Requirements:

1. Design and construct the water distribution system in accordance with the latest rules and regulations published by the Texas Commission on Environmental Quality (TCEQ).
2. The Developer of the subdivision shall provide water distribution lines that are adequate to carry the expected load.
3. Refer to the Water System Master Plan prior to design of the proposed subdivision.
4. Construct any improvements, including water distribution lines on the Master Plan that either cross or are in some way affected by the development of the property.
5. Variance Procedure
   (a) The City Council may, upon request, approve an alternative design, unusual circumstance, or construction methodology that differs from the requirements in this manual on a case by case basis if the City Council determines that the alternative design or construction methodology is sufficient to ensure public health and safety.
6. Provide a blow off valve at the end of an un-looped water line.
7. Lay water lines so that the top of pipe is a minimum of 4-feet below the top of curb or 5-feet below the edge of pavement for an open ditch section.
8. Provide water valves at a maximum of 1000 feet apart. The total number of valves at any water line intersection shall equal the total number of lines leading out from the intersection point minus one (three valves for a cross and two for a tee).
9. Provide properly designed thrust blocks for each fitting.

3.02 Fire Hydrants:

1. Provide fire hydrants at a maximum spacing of 400 feet.
2. No more than 1 fire hydrant on an unlooped 6-inch line
3. The maximum number of fire hydrants on a looped 6-inch line is three (3).

3.03 Water Services:

1. Size water tap connections based on peak design flow, with a minimum 1-inch size and a maximum of one (1) connection per lot.
2. Set service leads on the lot lines.
3. Provide separate meters for domestic usage and for irrigation usage.
4. The developer shall be responsible for installing service leads with the construction of the public infrastructure. The home builder shall be responsible for coordinating installation of taps with the City and the City shall be responsible for supplying and installing all water meters.

(End of Section)

Section IV: Storm Water Conveyance

Section IV.Storm Water Conveyance

4.01 General Requirements:

1. The Developer shall prepare a storm water pollution prevention plan (SWPPP) that complies with the Texas Commission on Environmental Quality's (TCEQ) regulations for preventing downstream erosion.
2. Unless otherwise noted below, comply with the requirements of the latest editions of the "Montgomery County Drainage Criteria Manual" or the Texas Department of Transportation (TxDOT) "Hydraulic Design Manual."
3. Variance Procedure
   (a) The City Council may, upon request, approve an alternative design, unusual circumstance, or construction methodology that differs from the requirements in this manual on a case by case basis if the City Council determines that the alternative design or construction methodology is sufficient to ensure public health and safety.

4.02 Methods

1. For drainage areas of less than 50 acres, use the Rational Method
2. For drainage areas of 50 acres to 640 acres, use either the Montgomery County Runoff Rate Curves, or a computer modeling method approved by the City Engineer.
3. For drainage areas greater than 640 acres use a computer modeling method approved by the City Engineer.

4.03 Design Flood and Check Flood Standards

1. Size inlets and storm sewers for a minimum 5-Year Storm Event, check that the 100-Year Storm Event is conveyed within the Right-of-Way or an Easement.
2. Size cross culverts for a minimum 10-Year Storm Event, check that the 100-Year Storm Event will not overtop the roadway.

4.04 Requirements for Inlets with Curb and Gutter Sections:

1. Use standard curb inlets on all curb and gutter sections, sized to carry the calculated runoff.
2. Place inlets to intercept run-off prior to intersections.
3. Place inlets at a maximum spacing of 300 feet for major, secondary or commercial streets, and 400 feet for residential and minor residential streets.
4. Place inlets to intercept concentrated runoff from outside of the right-of-way.
5. Place inlets at the end of curbed pavement to eliminate direct drainage from gutter to open ditch.

(End of Section)

Details

DETAILS
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CITY OF MONTGOMERY

DIVIDED ROADWAY CROSS SECTION

PAVING

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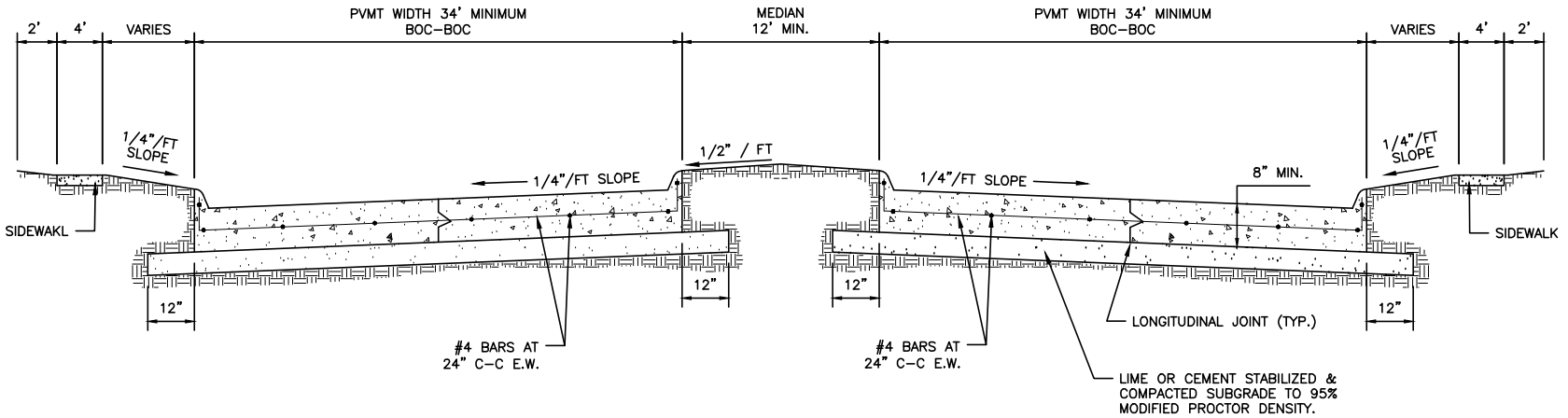
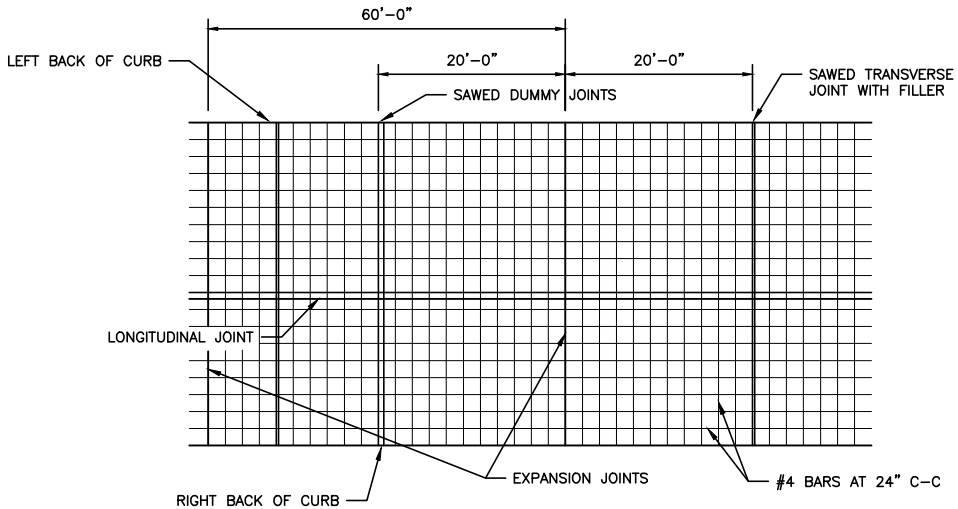




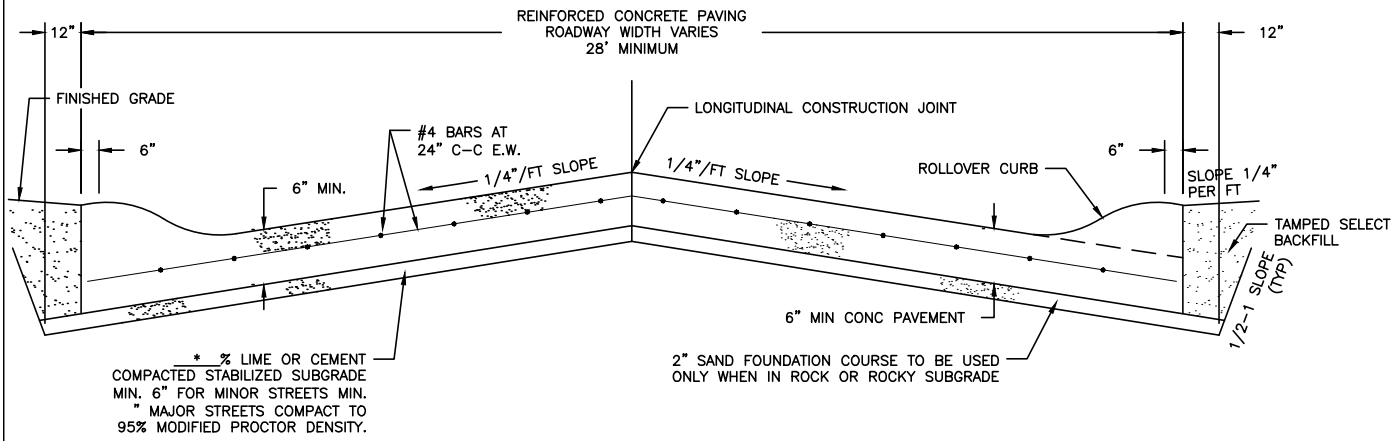
STEEL LAYOUT PLAN

A MANUALLY OPERATED SCREED EQUIPPED WITH A POWER VIBRATOR MAY BE USED IN COMBINATION WITH READY-MIXED CONCRETE.

PAVING FULL WIDTH SECTION SHALL BE PERMISSIBLE WHEN USING READY-MIX CONCRETE.

NOTES:

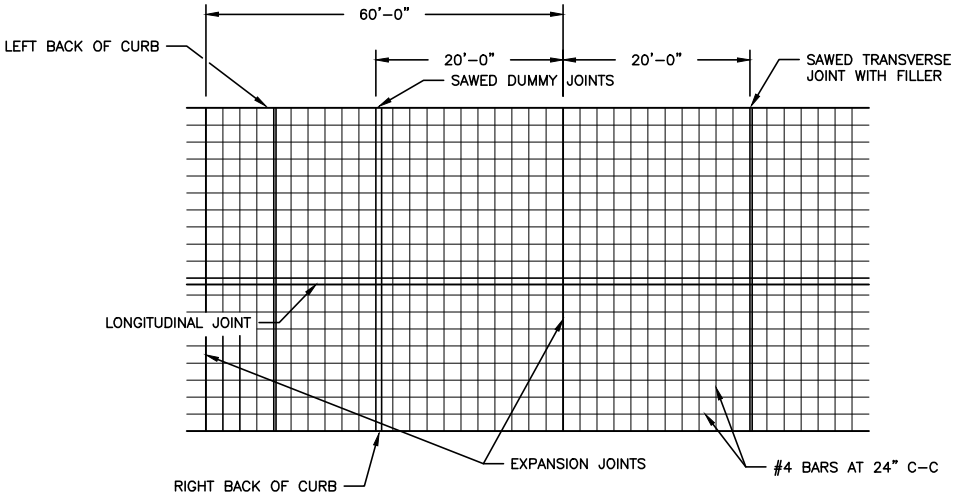
1. PAVEMENT BASE, & SUBGRADE THICKNESS TO BE IN ACCORDANCE WITH PROJECT-SPECIFIC GEOTECHNICAL INVESTIGATION.
2. STREET WIDTH SHALL CONFORM TO CITY OF MONTGOMERY DESIGN CRITERIA MANUAL.
3. EXPANSION JOINT TO BE AT BRIDGES, INTERSECTIONS, AND OTHER STRUCTURES, AND AT SPACING NOT TO EXCEED 60 FEET WITH SAWED JOINTS EVERY 20 FEET BETWEEN EXPANSION JOINTS. ALL JOINTS TO BE PROPERLY SEALED.



REINFORCED CONCRETE PAVEMENT

(N.T.S.)

*MUST BE FILLED OUT BASED ON A GEOTECHNICAL REPORT SUBMITTED WITH THE PLANS FOR APPROVAL. THE GEOTECHNICAL REPORT SHALL INDICATE THE PERCENTAGE OF LIME OR CEMENT REQUIRD EVERY 200 FEET AT THE SUBGRADE DEPTH.



NOTE:

FOR PLASTICITY > 20 – USE LIME STAB.
FOR PLASTICITY < 10 – USE CEM. STAB.
FOR SILTY CLAYS – USE LIME – FLY ASH

FOR P.I. BETWEEN 10 AND 20, THE LAB CERTIFICATION IS REQUIRED IF NO STABILIZATION IS USED.

CONSTRUCT SAWED JOINTS AT 20' CENTERS. EXPANSION JOINS TO BE AT INTERSECTIONS, BRIDGES AND OTHER STRUCTURE AND AT SPACINGS NOT TO EXCEED 60'. ALL JOINTS TO BE PROPERLY SEALED. A MANUALLY OPERATED SCREED EQUIPPED WITH A POWER VIBRATOR MAY BE USED. HAND FINISH SHALL BE USED WHEN NECESSARY.

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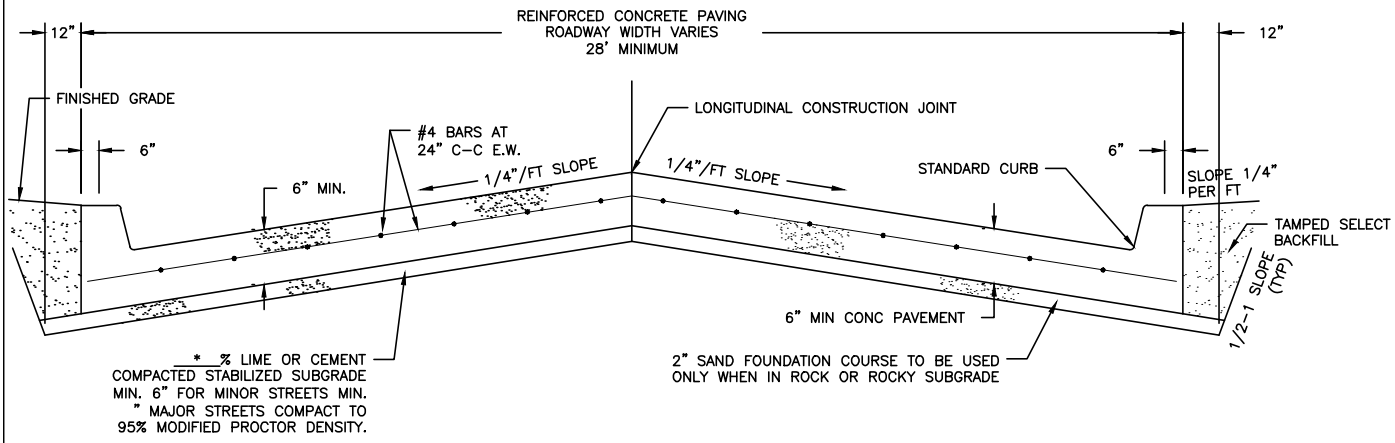

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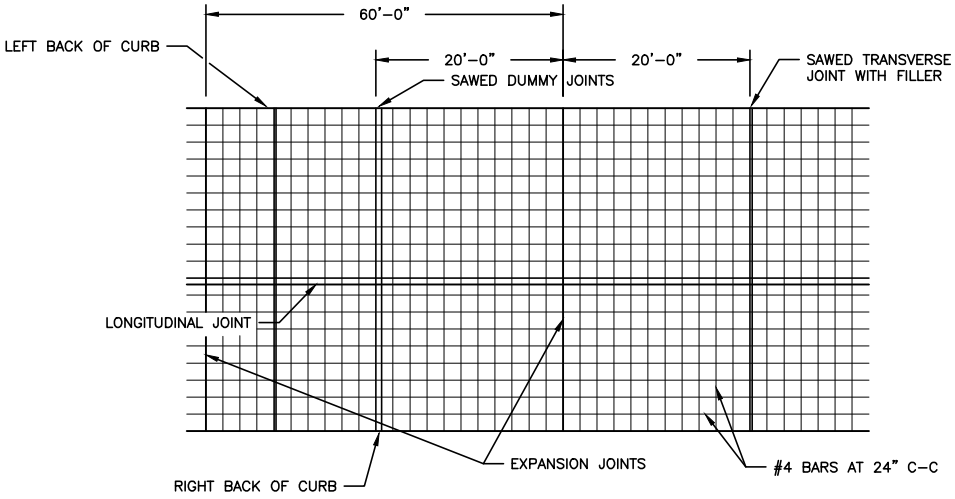

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REVISIONS	CITY OF MONTGOMERY TYPICAL NON-RESIDENTIAL CONCRETE PAVING WITH STANDARD CURB	PAVING
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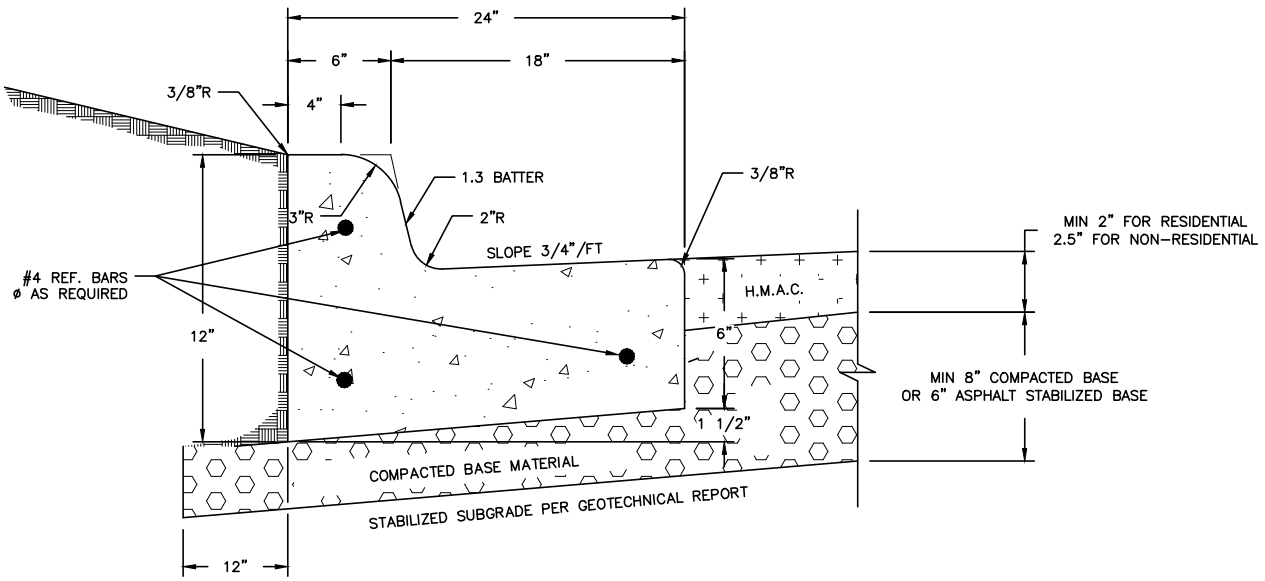

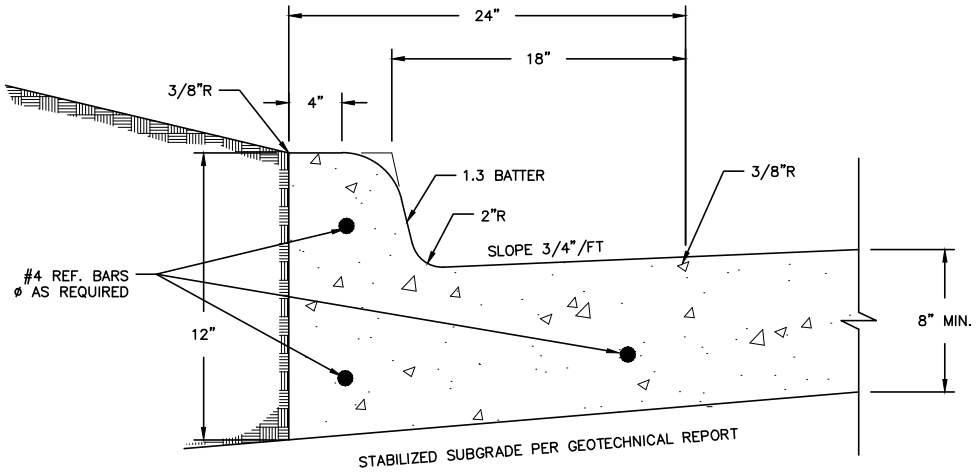

NOTES:

1. ALL HONEYCOMBING SHALL BE GROUTED TO PROVIDE A UNIFORM SURFACE.
2. WHEN HONEYCOMBING IS EXCESSIVE AS DETERMINED BY THE INSPECTOR, CURB AND GUTTER SHALL BE REPLACED.
3. BACKFILL BEHIND CURBS SHALL BE ACCOMPLISHED WITHIN 7 DAYS.
4. CURB AND GUTTER CONCRETE SHALL BE CLASS "A" (3000 PSI). CURB POURED WITH PAVEMENT SHALL MATCH PAVEMENT.
5. REINFORCING STEEL AS SHOWN.
6. EXPANSION JOINTS AT A MAXIMUM LENGTH OF 60 FEET.
7. SAWED CONTRACTION JOINTS EVERY 20 FEET BETWEEN EXPANSION JOINTS.
8. ALL JOINTS ARE TO BE PROPERLY SEALED.

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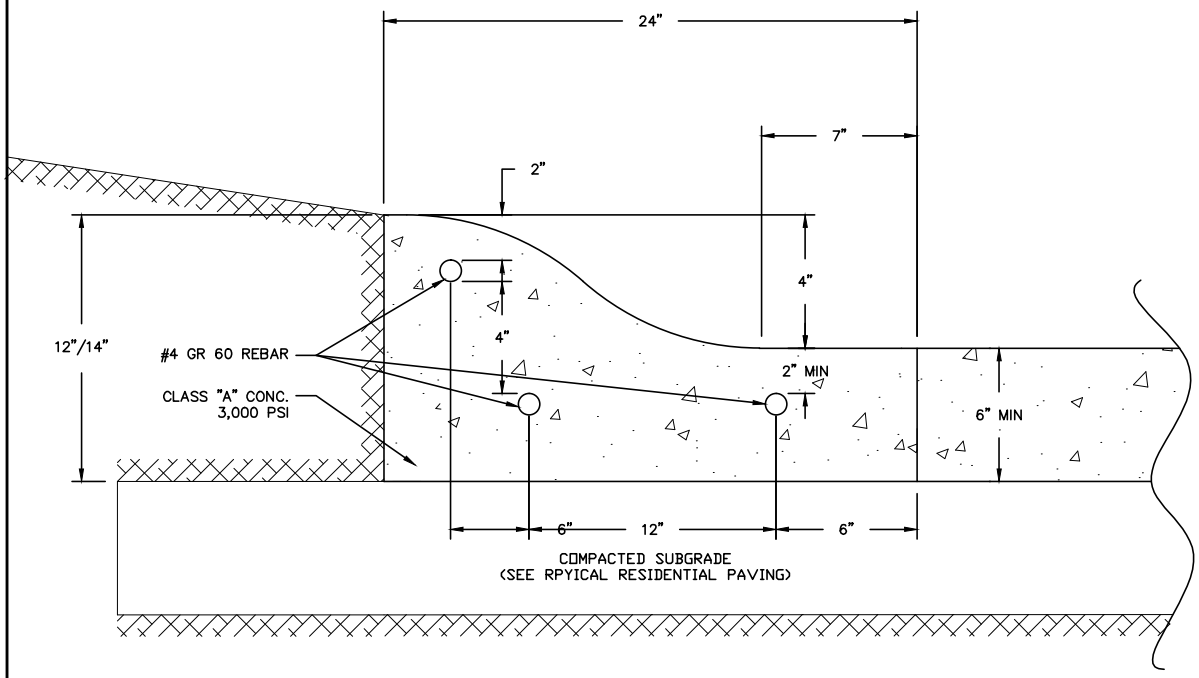

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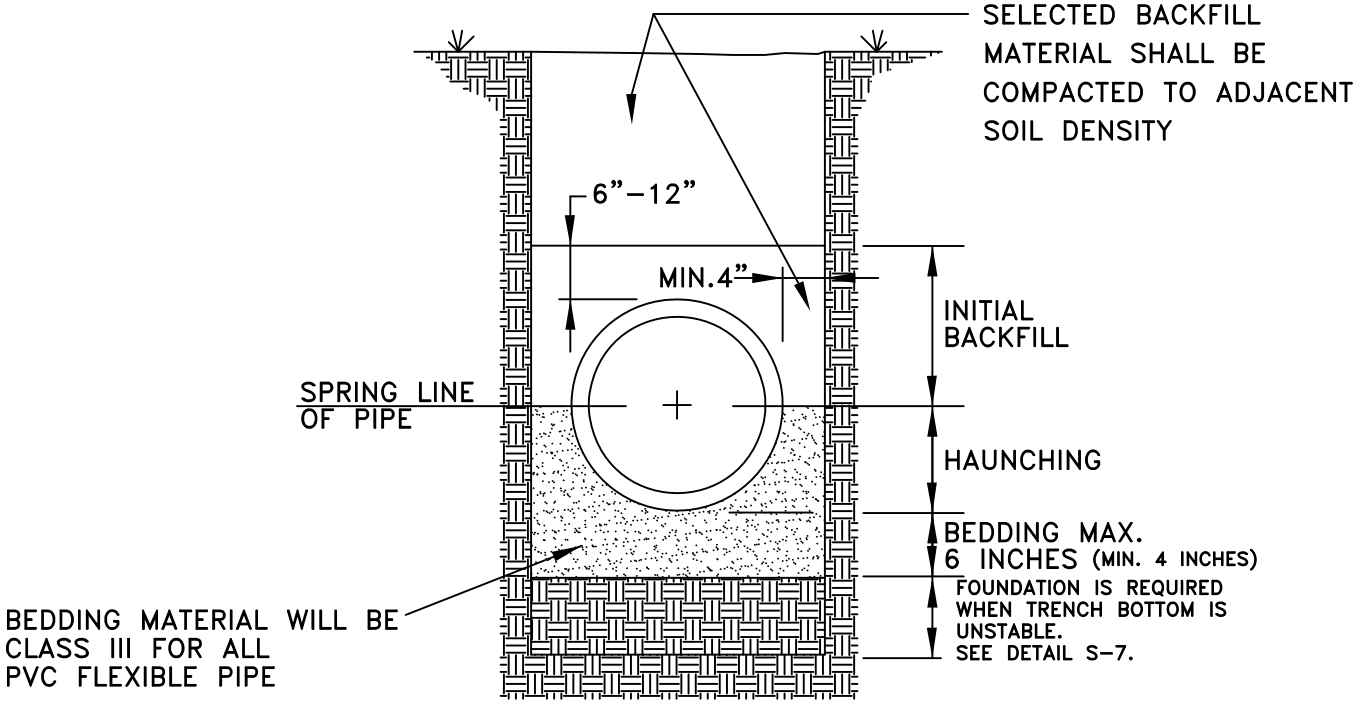
3. BACKFILL BEHIND CURBS SHALL BE ACCOMPLISHED WITHIN 7 DAYS.
4. CURB AND GUTTER CONCRETE SHALL BE CLASS "A" (3000 PSI). CURB POURED WITH PAVEMENT SHALL MATCH PAVEMENT.
5. REINFORCING STEEL AS SHOWN.
6. EXPANSION JOINTS AT A MAXIMUM LENGTH OF 60 FEET.
7. SAWED CONTRACTION JOINTS EVERY 20 FEET BETWEEN EXPANSION JOINTS.
8. ALL JOINTS ARE TO BE PROPERLY SEALED.

REVISIONS	CITY OF MONTGOMERY	PAVING
10–2013 REVISED NOTES	ROLLOVER CURB & GUTTER	P–5



BEDDING DETAIL

NOTE: BACKFILL AND BEDDING MUST MEET ALL MINIMUM ASPECTS OF ASTM D–2321

Foundation
A foundation is required when the trench bottom is unstable. Any foundation that will support a rigid pipe without causing loss of grade or flexural breaking will be more than adequate for PVC pipes.

Bedding
The bedding directly underneath the pipe is required only to bring the trench bottom up to grade. It should not be so thick or soft that the pipe will settle and lose grade. The purpose of the bedding is to provide a firm, stable and uniform support of the pipe. A layer of material sufficient to establish line, grade, and support should be placed. Bell holes should be excavated to insure uniform bearing.

Haunching
The haunching area is the most important in terms of limiting the deflection of a flexible pipe. This is the area that should be compacted to the required or specified density.

ASTM D–2321
DESCRIPTION OF EMBEDMENT MATERIALS

Class I
Angular, 1/4" to 1–1/2" graded stone, including a number of fill materials that have regional significance, such as coral, slag, cinders, crushed stone and crushed shells.

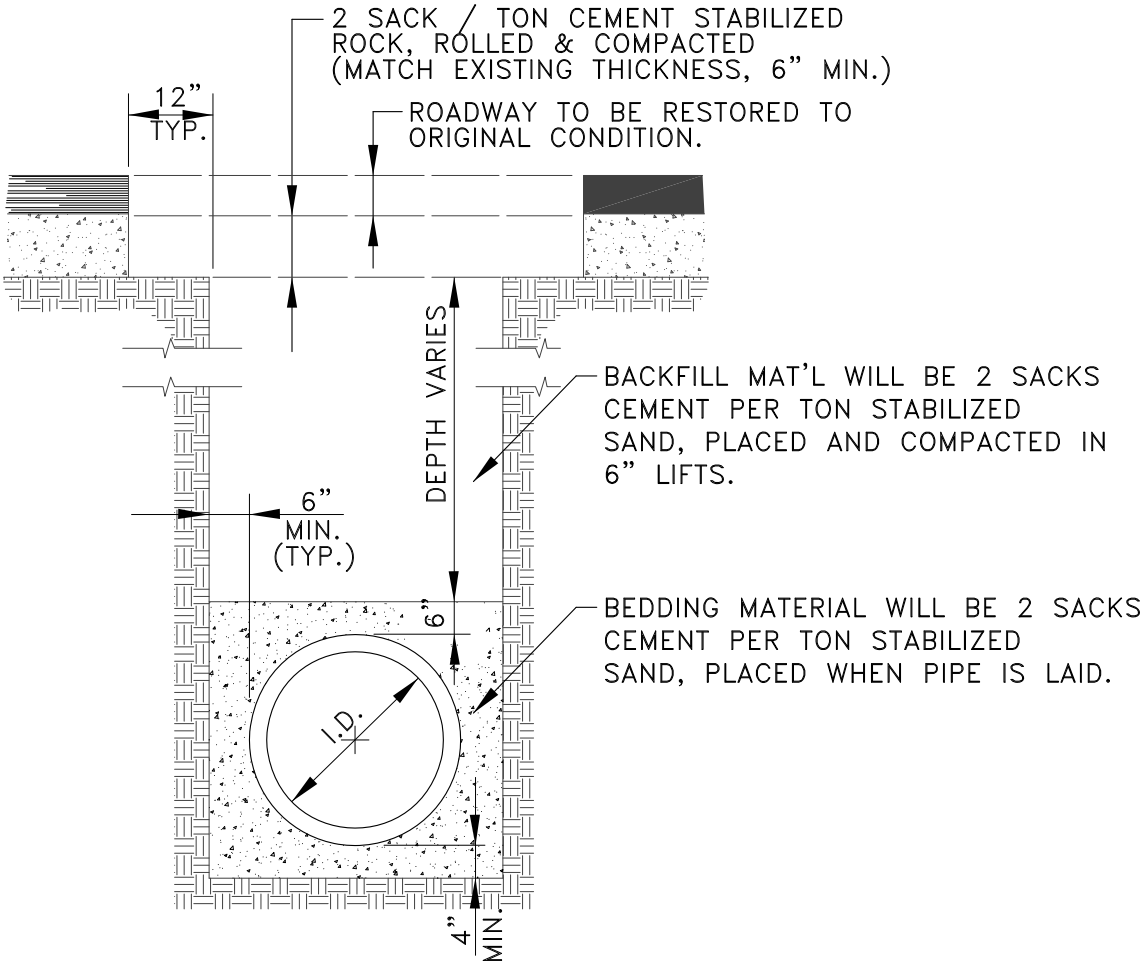
Class II
Coarse sands and gravels with maximum particle size of 1–1/2", including variously graded sands, and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil types GW, GP, SW, and SP are included in this class.

Class III
Fine sand and clayey gravels, including fine sands and sand–clay mixtures, and gravel clay mixtures. Soil types GM, GC, SM and SC are included in this class.

Class IV
Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH, and CL are included in this class.

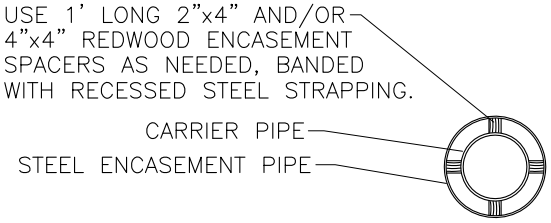
Class V
This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 1–1/2" in diameter, and other foreign materials. These materials are not recommended for bedding, haunching, or initial backfill.

REVISIONS	CITY OF MONTGOMERY TYPICAL SANITARY SEWER BEDDING AND TRENCH DETAIL	SEWER S–1

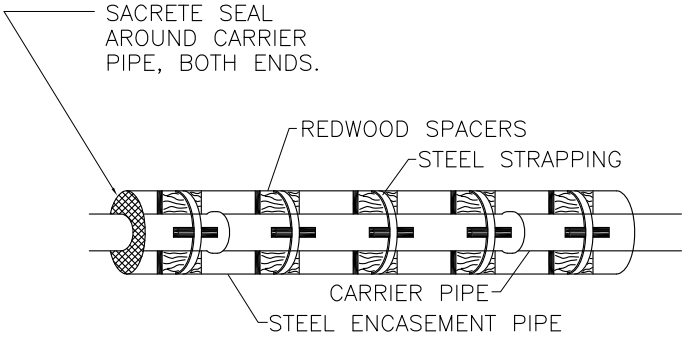


NOTE: BACKFILL AND BEDDING MUST MEET ALL MINIMUM ASPECTS OF ASTM D-2321

REVISIONS	CITY OF MONTGOMERY TYPICAL ROADWAY TRENCH BEDDING AND BACKFILL DETAIL	SEWER S-2



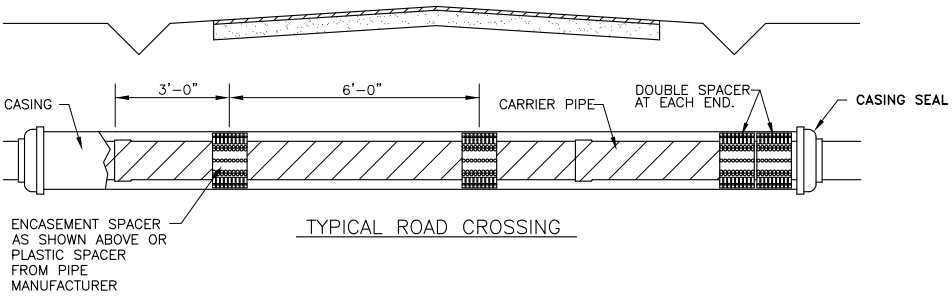
CARRIER SIZE	MINIMUM ENCASEMENT STEEL PIPE
4" C 900	10" – .25 WALL
6" C 900	12" – .25 WALL
8" C 900	16" – .25 WALL
10" C 900	18" – .25 WALL
12" C 900	20" – .25 WALL
14" C 905	24" – .25 WALL
16" C 905	26" – .25 WALL
18" C 905	30" – .25 WALL
20" C 905	36" – .375 WALL
24" C 905	42" – .375 WALL



NOTE: LOCATE REDWOOD SPACERS ON EITHER SIDE OF CARRIER PIPE BELLS, THEN ONE SET CENTERED ON EACH JOINT.

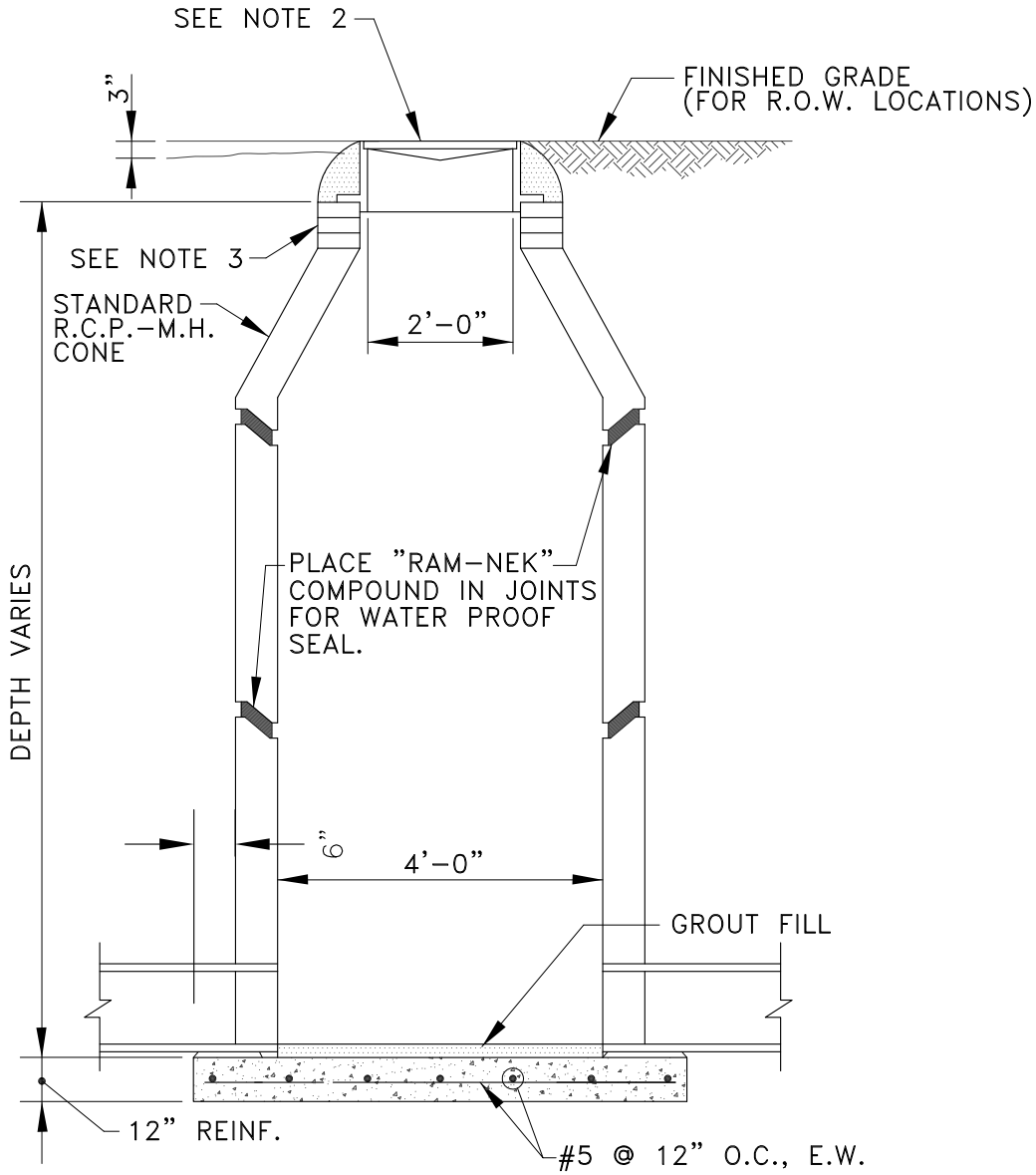
NOTES:

1. Steel casing shall have totally welded joints.
2. Steel casing shall be used in all bores.
3. Contractor to obtain permits prior to any construction at these crossings.



TYPICAL ROAD CROSSING

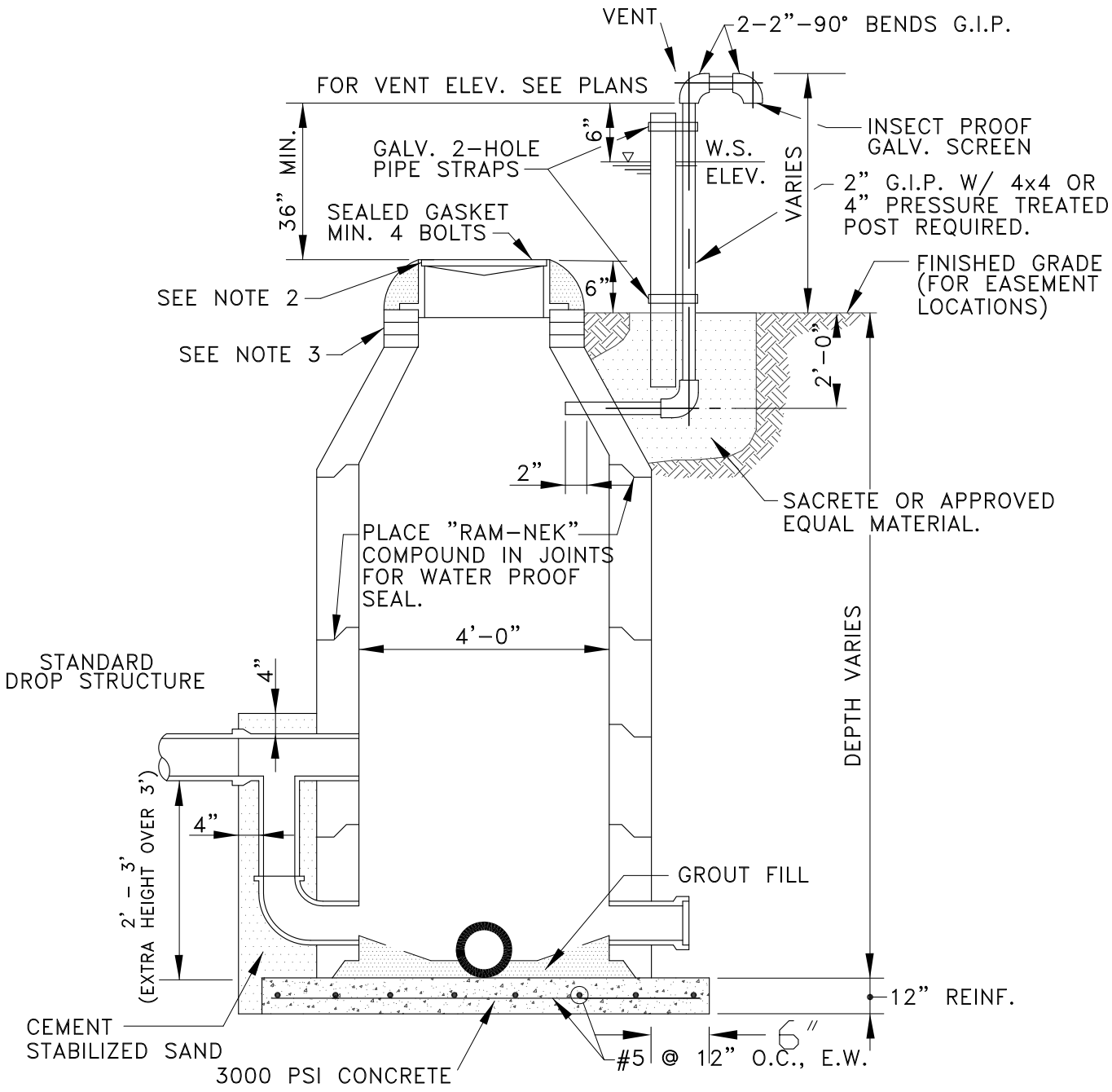
REVISIONS	CITY OF MONTGOMERY STANDARD BORED CROSSING WITH STEEL CASING FOR SEWER LINES (OR WATERLINES)	SEWER S–3



NOTE:

1. All R.C.P. Manholes shall be in accordance A.S.T.M. C–478.
2. Vulcan Foundry V–1418–2 Frame and Cover (or equal) with the City of Montgomery logo embedded in lid.
3. For adjustment of Manhole Lid use standard concrete rings. No brick adjustment allowed.
4. Precast bottom section of manhole to be securely attached to reinforced concrete slab with waterproof sealer.

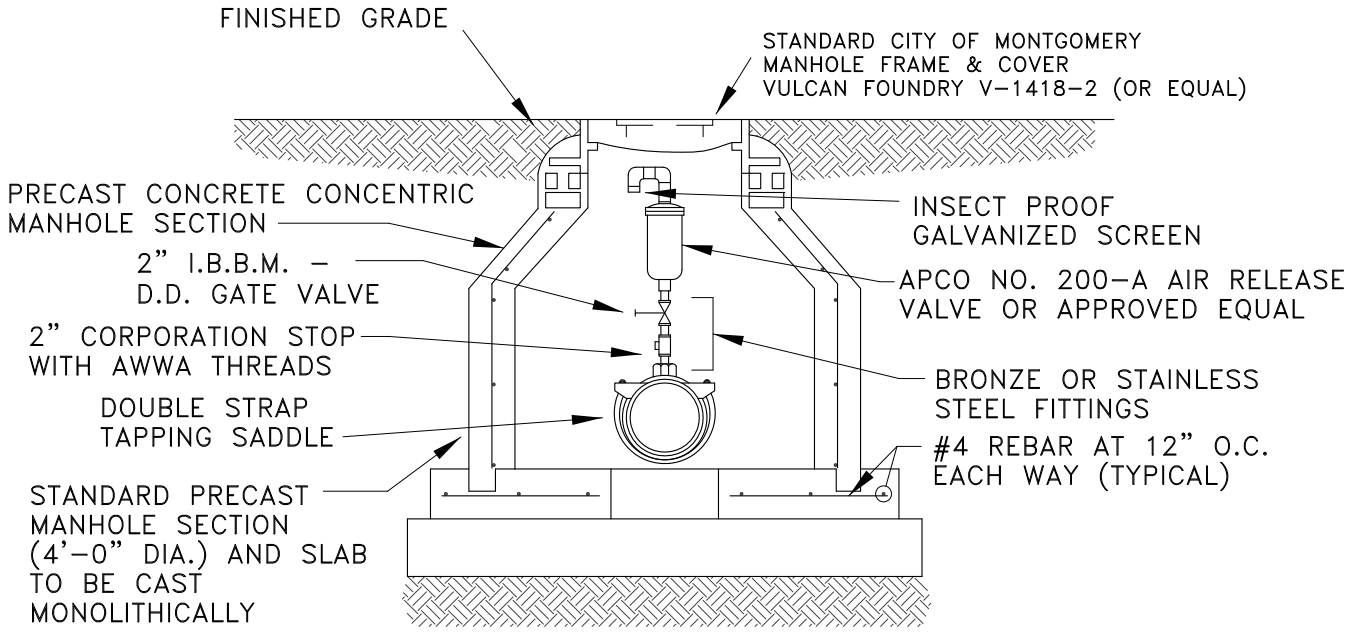
REVISIONS	CITY OF MONTGOMERY STANDARD PRECAST MANHOLE	SEWER S–4



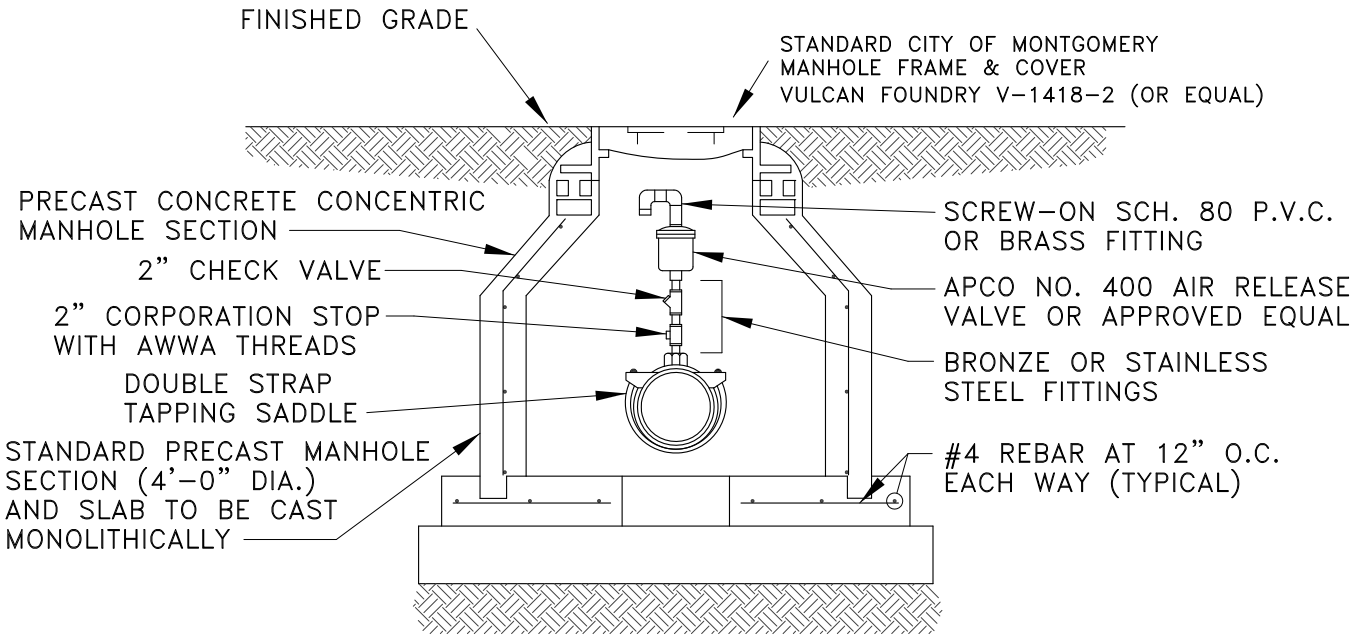
NOTE:

1. All R.C.P. Manholes shall be in accordance with A.S.T.M. C–478.
2. Vulcan Foundry V–2418–2 watertight manhole ring & cover (or equal) with the City of Montgomery logo embedded in lid.
3. For adjustment of Manhole Lid use standard concrete rings. No brick adjustment allowed.
4. Precast bottom section of manhole to be securely attached to reinforced concrete slab with waterproof sealer.

REVISIONS	CITY OF MONTGOMERY STANDARD PRECAST MANHOLE W/ DROP CONNECTION & VENT	SEWER S–5

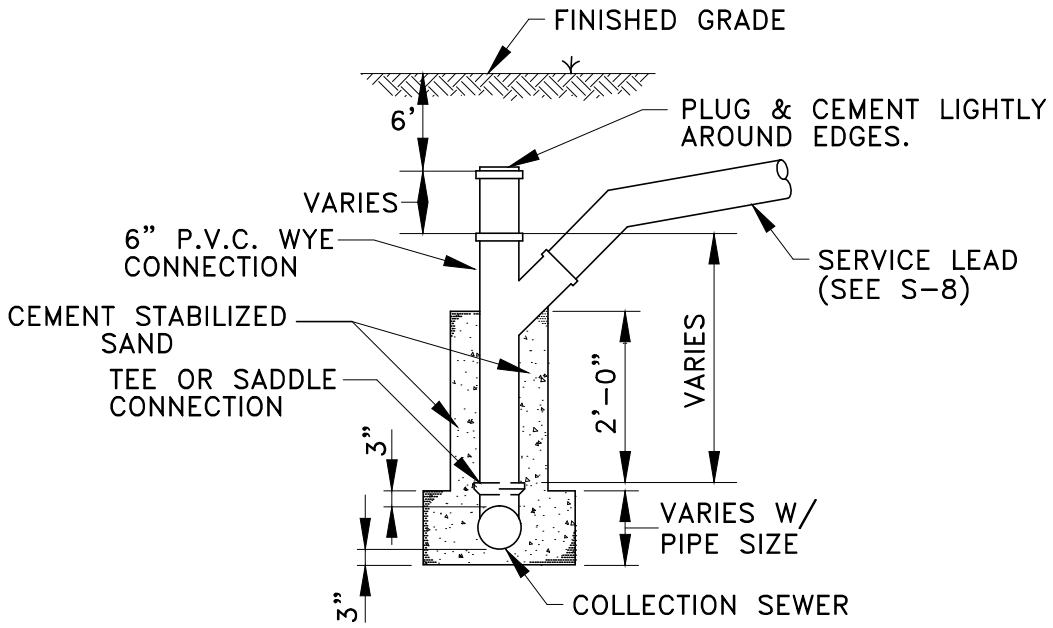


MANUAL AIR RELEASE VALVE

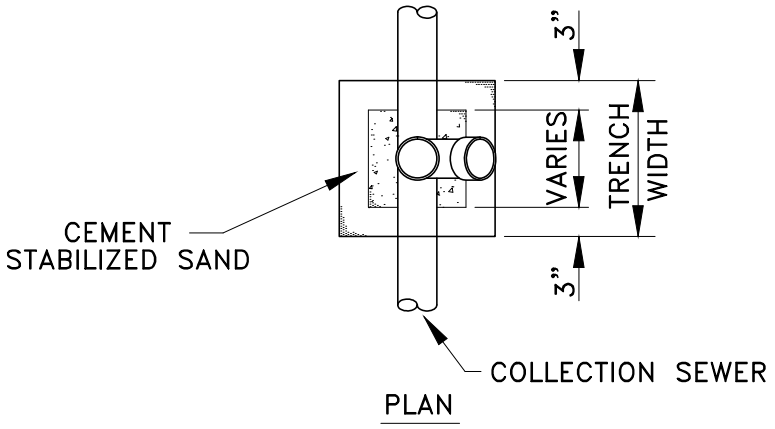


AUTOMATIC AIR RELEASE VALVE

REVISIONS	CITY OF MONTGOMERY AIR RELEASE VALVES	SEWER S-6

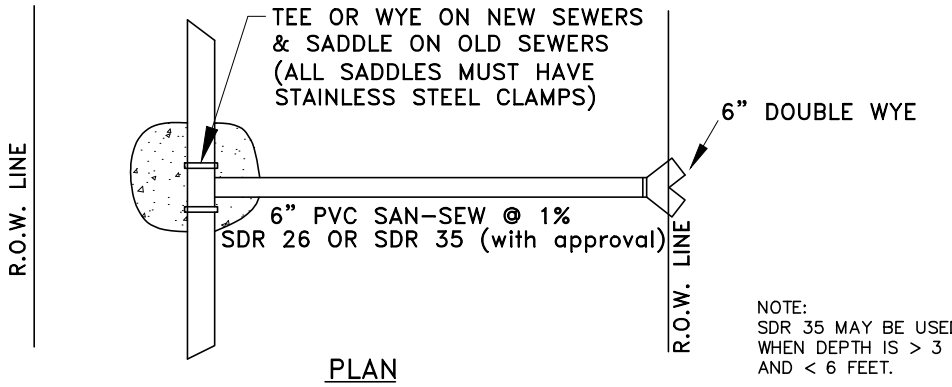


ELEVATION



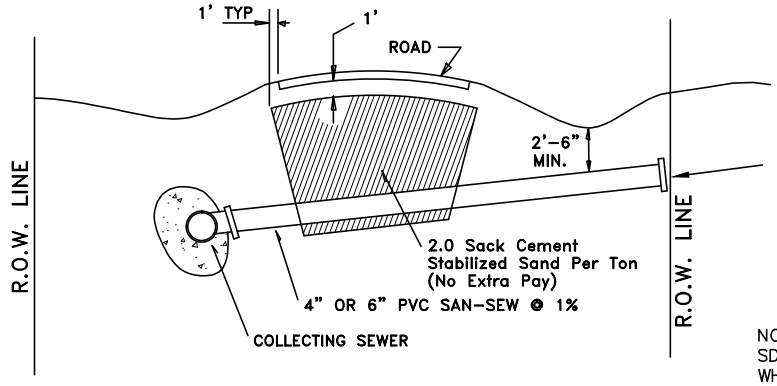
PLAN

REVISIONS		
10-2013 - REVISED NOTES	CITY OF MONTGOMERY SANITARY SEWER STACK DETAIL	SEWER S-7



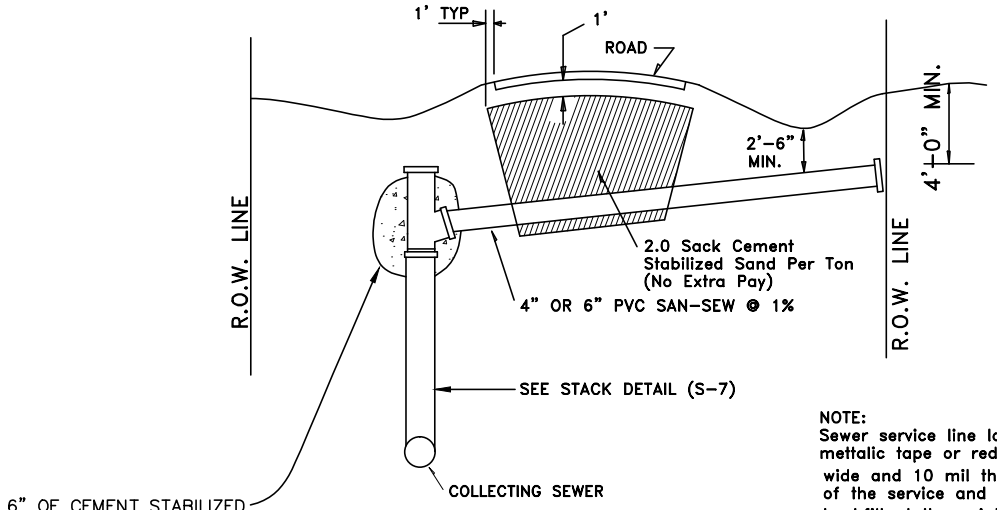
NOTE:
SDR 35 MAY BE USED
WHEN DEPTH IS > 3 FEET
AND < 6 FEET.

PLAN



NOTE:
SDR 35 MAY BE USED
WHEN DEPTH IS > 3 FEET
AND < 6 FEET.

PROFILE
OFF COLLECTING SEWER



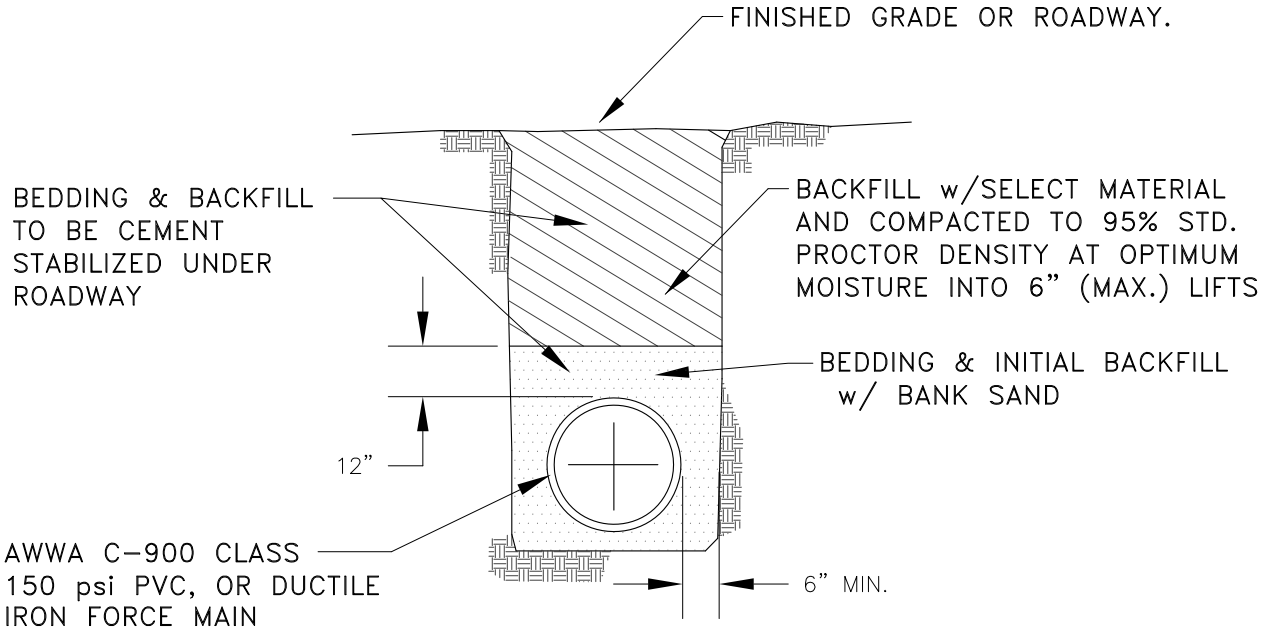
NOTE:
Sewer service line location to be marked with mettalic tape or red vinyl tape at least 3" wide and 10 mil thick attached to the end of the service and extending through the backfill at the point of house service connection behind the proposed curb.

PROFILE
OFF SANITARY STACK

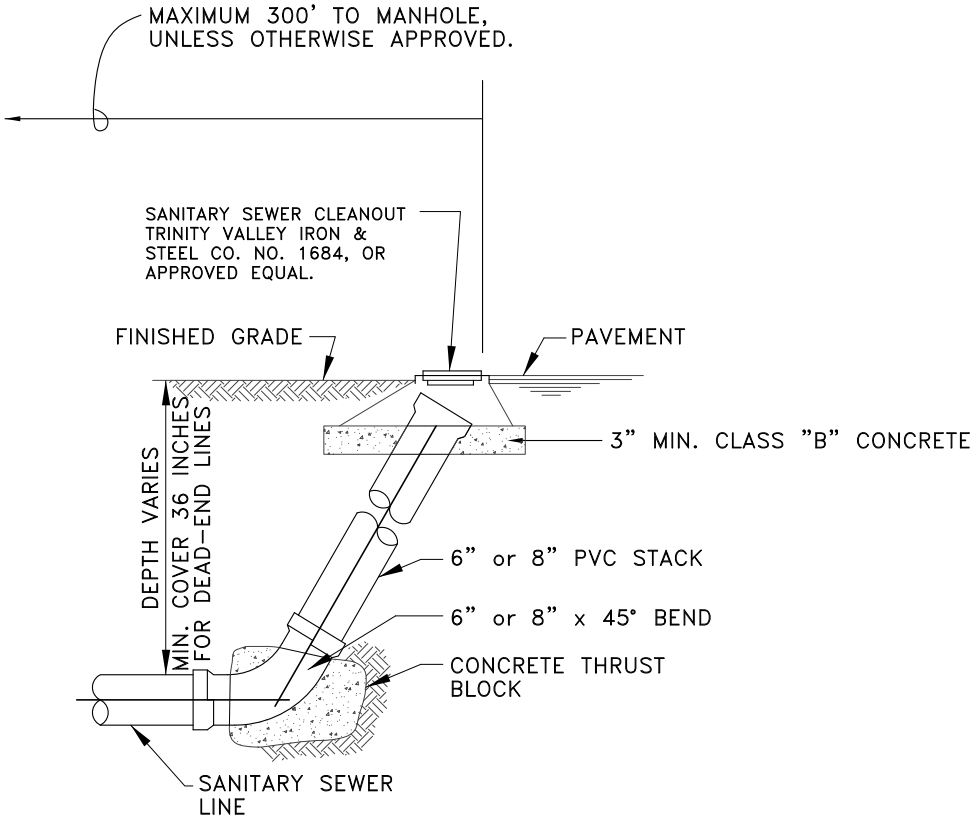
SANITARY SEWER SERVICE CONNECTION

4" FOR SINGLE SERVICE
6" FOR DOUBLE SERVICE

REVISIONS		
10-2013 REVISED SERVICE GRADE & NOTES	CITY OF MONTGOMERY RESIDENTIAL SANITARY SEWER SERVICE CONNECTION	SEWER S-8

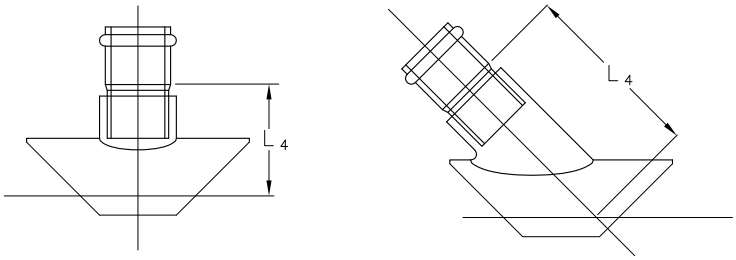


REVISIONS	CITY OF MONTGOMERY PVC FORCE MAIN BEDDING AND BACKFILL	SEWER S-9



REVISIONS	CITY OF MONTGOMERY CLEAN OUT DETAIL	SEWER S-10

SADDLES FOR FIELD CUT–IN CONNECTIONS



TEE SADDLE			WYE SADDLE		
D	L_4	Wt. lbs.	D	L_4	Wt. lbs.
6 x 4	6.0	2.3	6 x 4	7.1	5.9
8 x 4	7.0	2.3	8 x 4	7.9	5.9
8 x 6	7.8	4.5	8 x 6	9.7	5.4
10 x 4	9.0	2.3	10 x 4	9.3	5.9
10 x 6	9.8	4.5	10 x 6	11.1	5.4
12 x 4	10.0	2.3	12 x 4	10.8	5.9
12 x 6	10.8	4.5	12 x 6	12.5	5.4

The base of the saddle is curved to fit the size for which it was made.

PROCEDURE FOR PLACING SADDLE CONNECTION

1. Place saddle in position on pipe. Mark hole guide for cut in pipe using saddle as a template. Remove saddle from pipe.
2. Auger a hole into pipe wall on hole guide mark.
3. The hole should be 1/2" outside the hole guide mark.
4. Wipe clean and dry both the underside of the saddle and the mating surface of the pipe.
5. Apply primer to both mating surfaces. Check the PVC surfaces while still wet with primer to see that the surfaces have been etched.
6. While the surfaces are still wet with primer, liberally brush cement base on mating surface of saddle and pipe.
7. Immediately position the saddle over the hole in the pipe and draw down with stainless steel straps. The saddle must not be moved once it makes contact with the pipe.

REVISIONS	CITY OF MONTGOMERY TEE & WYE SADDLES FOR PVC PIPE	SEWER S–11

REVISIONS

CITY OF MONTGOMERY

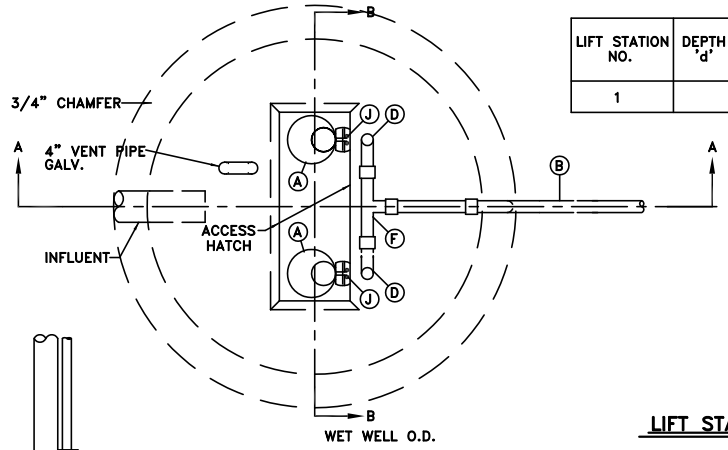
TYPICAL LIFT STATION DETAIL

SEWER

LS-01

LIFT STATION NO.	DEPTH 'd'	DIA. 'w'	INFLUENT FL ELEV.	LEAD PUMP ON ELEV.	LAG PUMP ON ELEV.	PUMP(S) OFF ELEV.	WARNING ON ELEV.	BOTTOM ELEV.	PUMP DISCHARGE SIZE	TOP ELEV.	PUMPS	T.D.H.
1												

NOTE: PUMPS TO ALTERNATE



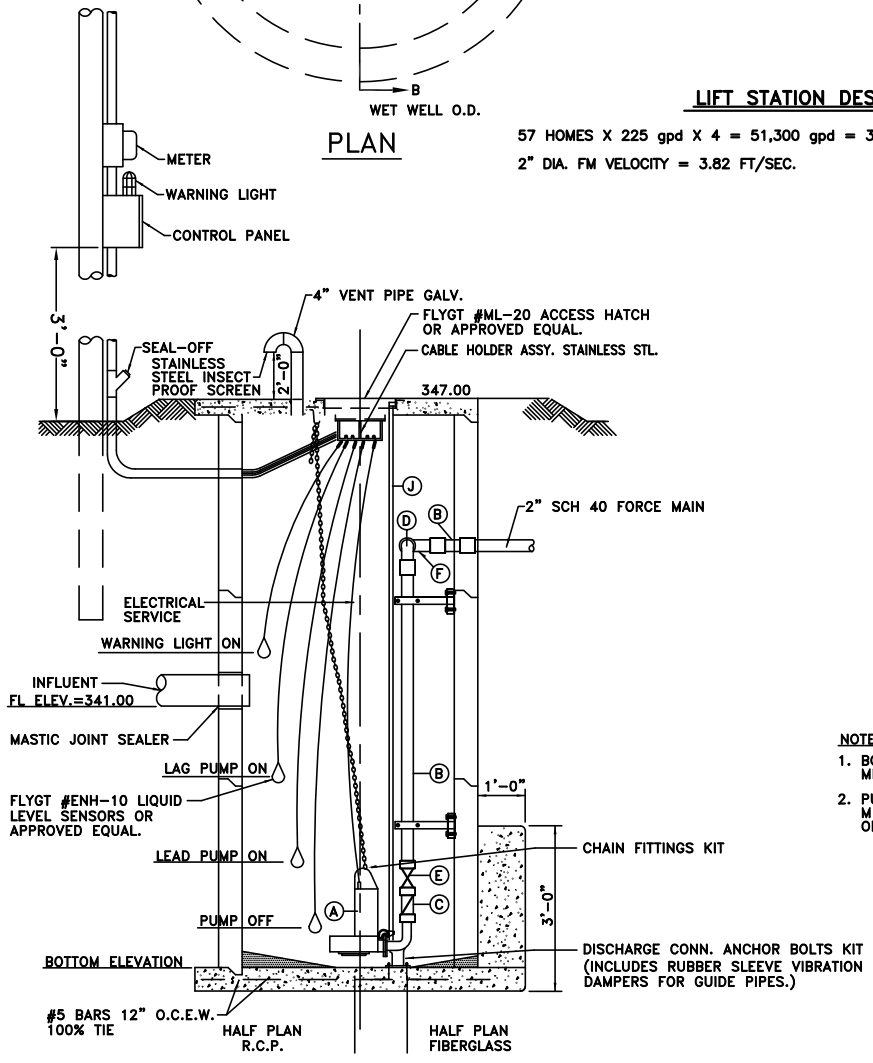
PLAN

LIFT STATION DESIGN

57 HOMES X 225 gpd X 4 = 51,300 gpd = 35 gpm (use 40 GPM)

2" DIA. FM VELOCITY = 3.82 FT/SEC.

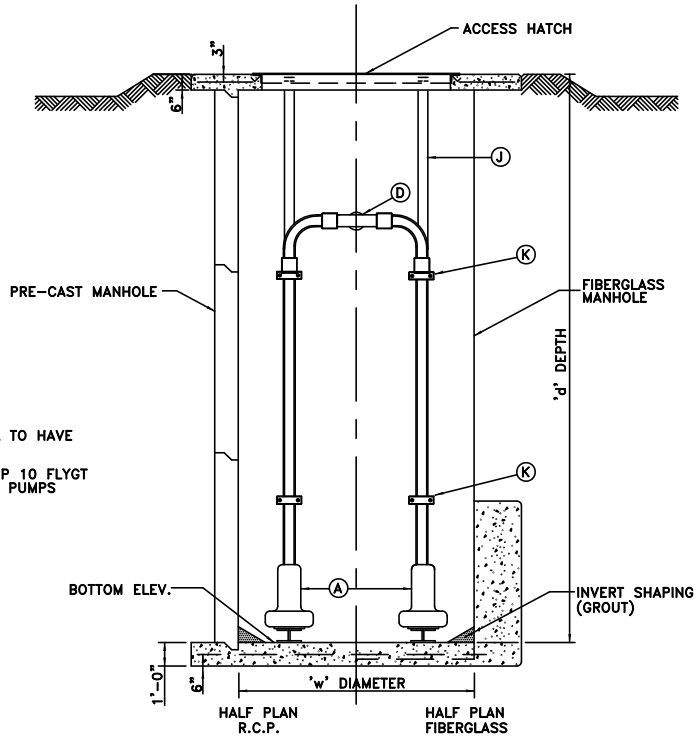
LIFT STATION PIPE, VALVE, AND FITTING SCHEDULE		
ITEM NO.	DESCRIPTION	QTY.
A	SUBMERSIBLE PUMP	
B	2" HDG STEEL PIPE (LENGTH VARIES)	
C	2" THREADED CHECK VALVE	
D	2" THREADED 90° ELBOW	
E	2" THREADED GATE VALVE	
F	2" THREADED TEE	
G	2" D.I. TO 2" P.V.C. C-900 TRANS. SLEEVE	
H	2" THREADED 45° ELBOW	
J	PUMP GUIDE RAILS (STAINLESS STEEL)	
K	PIPE SUPPORT	



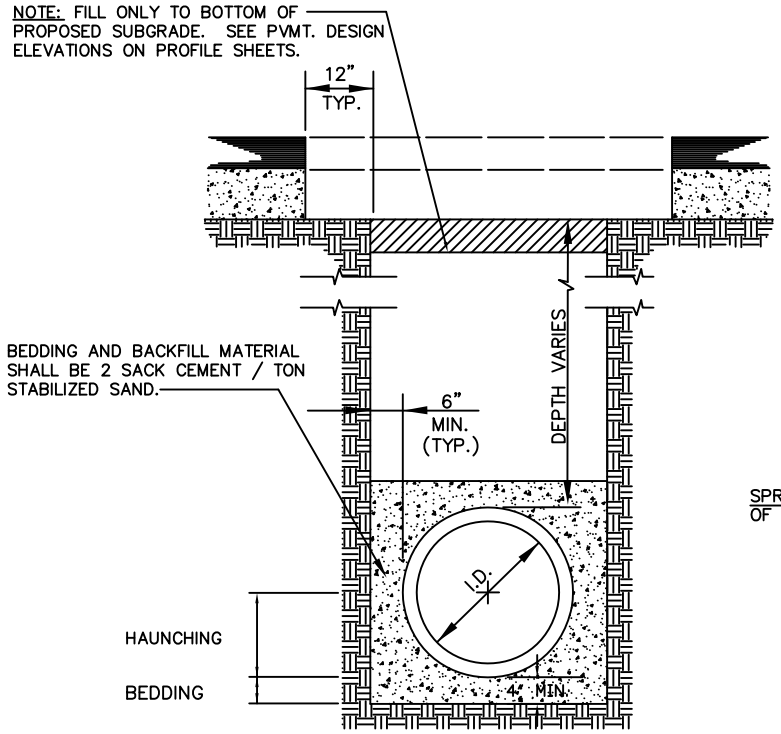
SECTION A-A

NOTE:

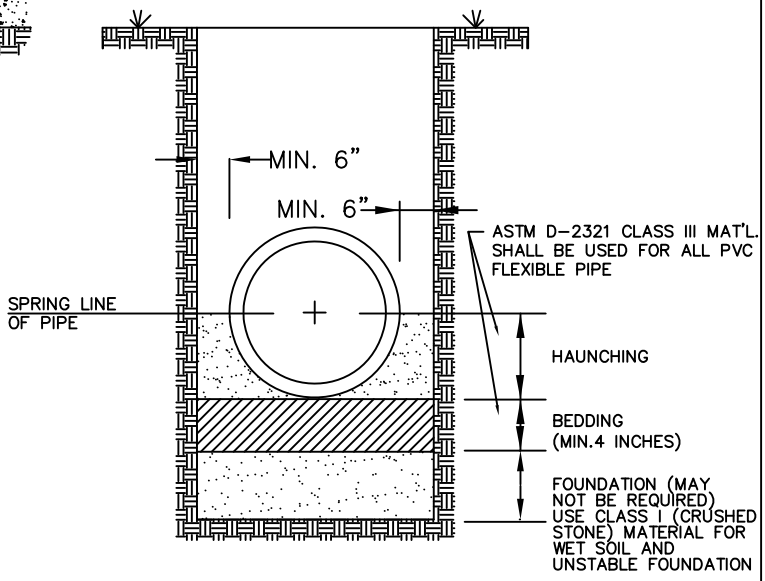
1. BOTTOM OF WET WELL TO HAVE MIN. OF 10% SLOPE.
2. PUMPS SHALL BE 3 HP 10 FLYGT M 3085-258 GRINDER PUMPS OR APPROVED EQUAL.



SECTION B-B



TYPICAL ROADWAY TRENCH BEDDING



TYPICAL TRENCH BEDDING

Foundation
A foundation is required when the trench bottom is unstable. Any foundation that will support a rigid pipe without causing loss of grade or flexural breaking will be more than adequate for PVC pipe.

Bedding
The bedding directly underneath the pipe is required only to bring the trench bottom up to grade. It should not be so thick or soft that the pipe will settle and lose grade. The purpose of the bedding is to provide a firm, stable and uniform support of the pipe. A layer of material sufficient to establish line, grade, and support should be placed. Bell holes should be excavated to insure uniform bearing.

Haunching
The haunching area is the most important in terms of limiting the deflection of a flexible pipe. This is the area that should be compacted to the required or specific density.

ASTM D 2321

Description of embedment materials

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Angular, 1/4" to 1 1/2" graded stone, including a number of fill materials that have regional significance, such as coral, stag, cinders, crushed stone and crushed shells.

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Coarse sands and gravels with maximum particle size of 1 1/2", including variously graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class.

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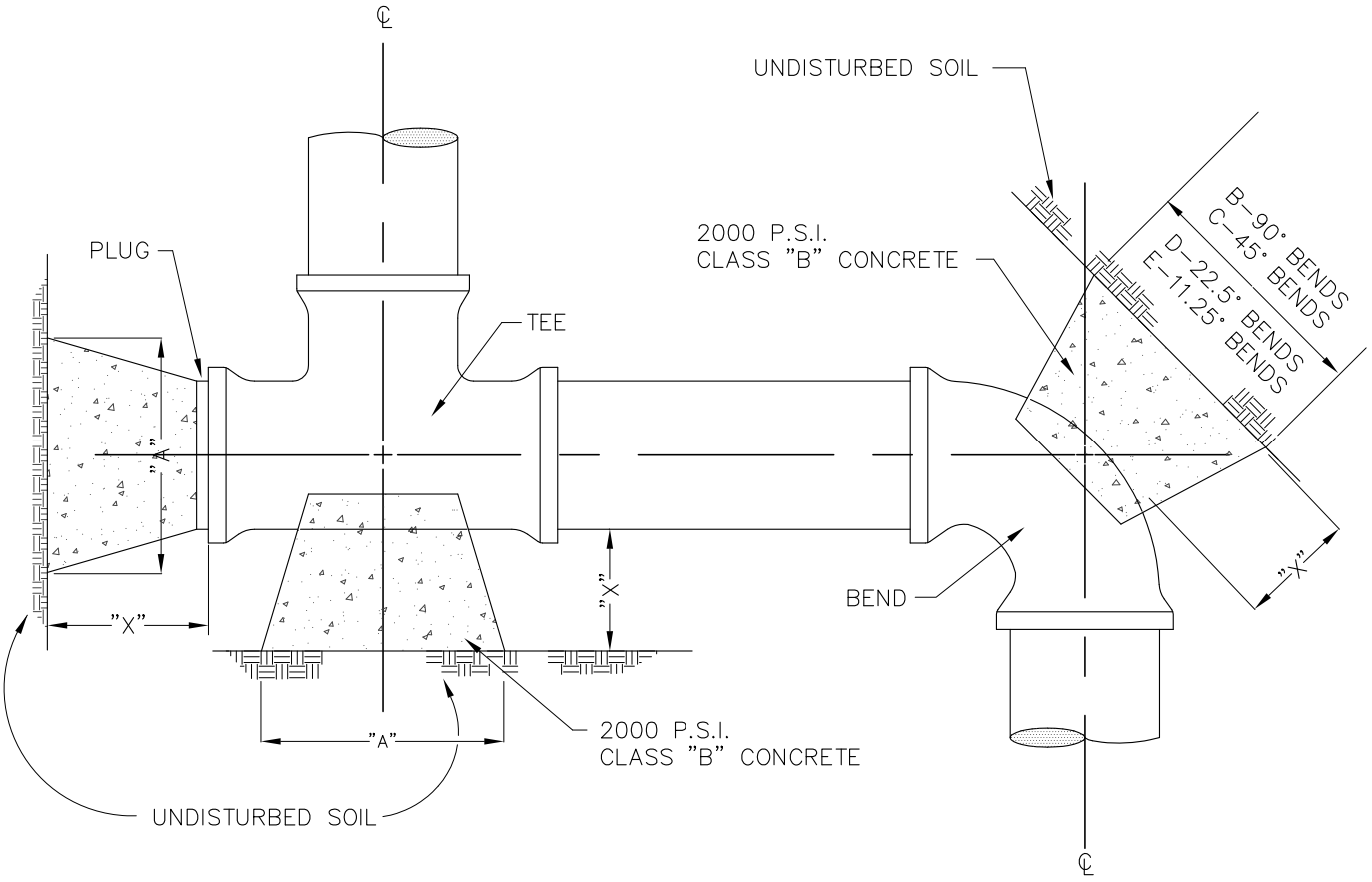
Class IV
Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil Types MH, ML, CH and CL are included in this class.

Class V
This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 1 1/2" in diameter, and other foreign materials. These materials are not recommended for bedding, haunching, or initial backfill.

NOTE: BACKFILL ABOVE THE BEDDING SHALL CONFORM TO "TYPICAL WATERLINE BACKFILL AND TRENCH REPAIR" STANDARD DRAWING W–5.

REVISIONS	CITY OF MONTGOMERY TYPICAL WATERLINE BEDDING AND TRENCH DETAIL	WATER W–1



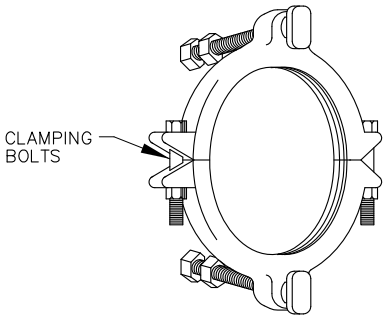
H O R I Z O N T A L B L O C K I N G T A B L E

Dimension 'X' to be a minimum of (1) foot, but is to be increased where necessary to provide bearing against undisturbed trench wall.

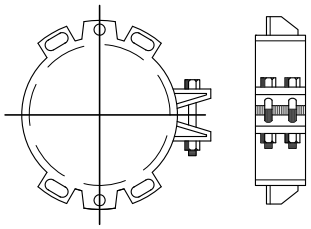
PIPE SIZE	'X' DIM.	PLUGS & TEES			90° BENDS			45° BENDS			22.50° BENDS			11.25° BENDS		
		'A'	MIN. AREA	MIN. VOL.	'B'	MIN. AREA	MIN. VOL.	'C'	MIN. AREA	MIN. VOL.	'D'	MIN. AREA	MIN. VOL.	'E'	MIN. AREA	MIN. VOL.
4"	1'-0"	1'-0"	0.88	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05
6"	1'-6"	1'-0"	1.06	0.06	1'-2"	1.50	0.09	1'-0"	0.83	0.05	1'-0"	0.83	0.05	1'-0"	0.83	0.05
8"	1'-6"	1'-3"	1.89	0.11	1'-6"	2.66	0.15	1'-3"	1.44	0.08	1'-0"	0.83	0.05	1'-0"	0.83	0.05
10"	1'-6"	1'-3"	2.95	0.17	2'-0"	4.17	0.24	1'-6"	2.26	0.13	1'-3"	1.15	0.07	1'-0"	0.83	0.05
12"	1'-6"	2'-0"	4.25	0.24	2'-3"	6.00	0.34	1'-9"	3.25	0.18	1'-3"	1.65	0.10	1'-0"	0.83	0.05
16"	2'-0"	2'-7"	7.34	0.56	3'-0"	10.65	0.79	2'-3"	5.76	0.43	1'-8"	2.94	0.22	1'-2"	1.48	0.11
18"	2'-0"	2'-11"	7.70	0.57	3'-5"	10.89	0.82	2'-6"	5.89	0.44	1'-10"	3.01	0.22	1'-5"	1.51	0.11
20"	2'-0"	3'-3"	7.86	0.59	3'-9"	11.12	0.84	2'-9"	6.01	0.45	2'-0"	3.07	0.23	1'-7"	1.54	0.12
24"	2'-6"	3'-8"	11.33	0.84	4'-3"	16.00	1.20	3'-2"	8.65	0.65	2'-6"	4.42	0.33	1'-10"	2.22	0.17

NOTE: Calculations in Minimum Area column are in square feeet.
Calculations in Minimum Volume column are in cubic yards.

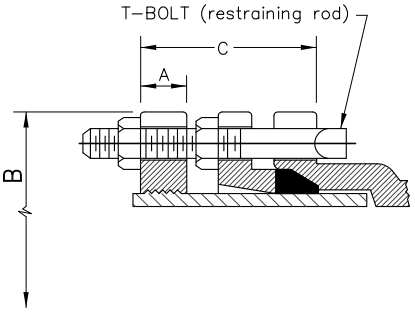
REVISIONS	CITY OF MONTGOMERY HORIZONTAL BLOCKING FOR WATERLINE	WATER W-2

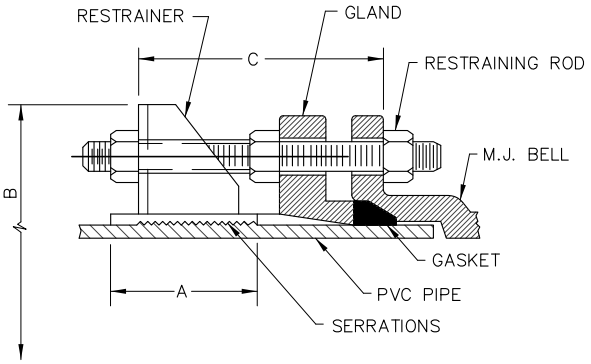


SERIES 1300 2"–12"



SERIES 1300 14"–24"





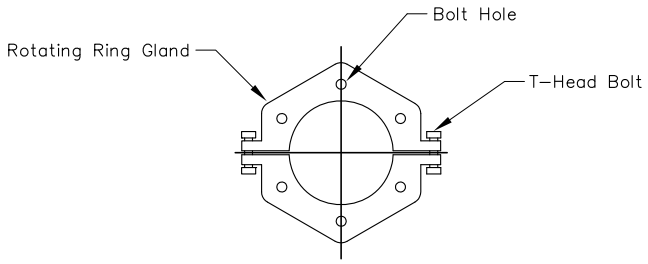
RESTRAINER CHART

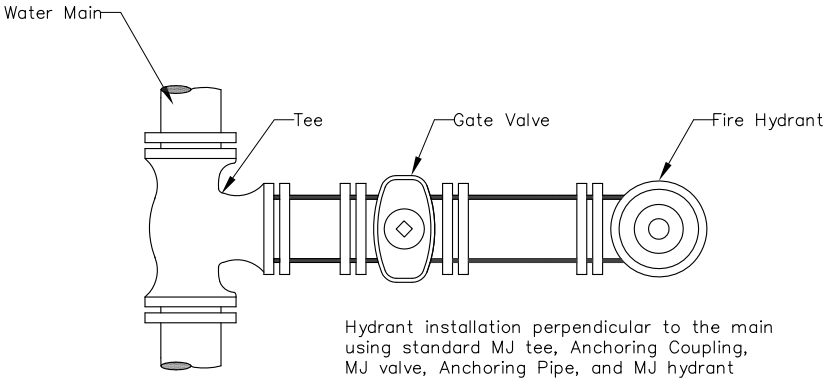
NOM. PIPE SIZE	PVC PIPE W/STEEL PIPE O.D. No.1300–S	PVC PIPE W/D.I. PIPE O.D. No.1300–C	A	B approx.	C max.	RESTRAINING RODS		CLAMPING BOLTS		APPROX. WGT. (lbs.)
						NO.	SIZE	NO.	SIZE	
2	2.375	N/A	1–1/8	6–1/4	4.0	2	5/8 x5	2	5/8 x4	4
3	3.500	N/A	1–1/8	7–11/16	4.0	2	5/8 x5	2	5/8 x4	5
4	4.500	4.80	1–1/8	9–1/8	6.0	2	3/4 x7	2	5/8 x4	6.5
6	6.625	6.90	1–1/8	11–1/8	6.0	2	3/4 x7	2	5/8 x4	8.5
8	8.625	8.05	1–1/4	13–7/8	6.0	2	3/4 x7	2	3/4 x5	13
10	10.750	11.10	1–3/8	16–5/8	6.0	4	3/4 x7	2	7/8 x6	23
12	12.750	13.20	1–3/8	19–1/4	6.0	4	3/4 x7	2	7/8 x6	25
14	N/A	15.30	4.0	22.0	15.0	6	3/4 x17	2	7/8 x7	50
16	N/A	17.40	4.0	24.2	15.0	6	3/4 x17	2	7/8 x7	65
18	N/A	19.50	5.0	26.5	15.0	8	3/4 x17	2	1 x 7	65
20	N/A	21.60	7.0	28.6	22.0	8	3/4 x24	3	1 1/8 x9	125
24	N/A	25.80	7.0	32.8	22.0	12	3/4 x24	3	1 1/8 x9	143

Weights include Restraining rods, clamping bolt and nuts and special "T" bolts and nuts.
N/A PIPE not manufactured in this size.
Dimensions in inches.

REVISIONS	CITY OF MONTGOMERY WATERLINE RESTRAINER	WATER
		W–3

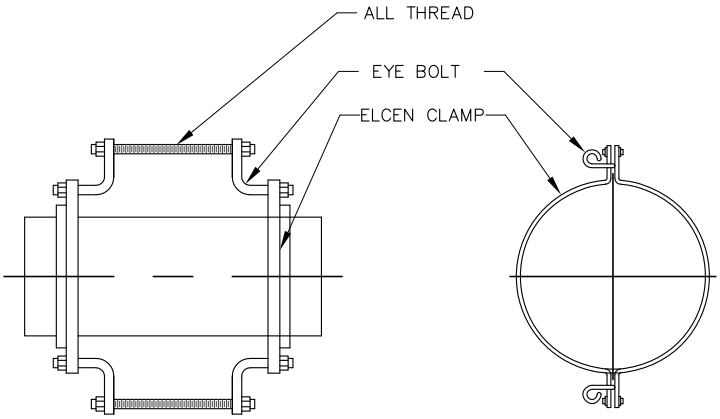
TYPICAL INSTALLATIONS USING MJ ANCHORING FITTINGS



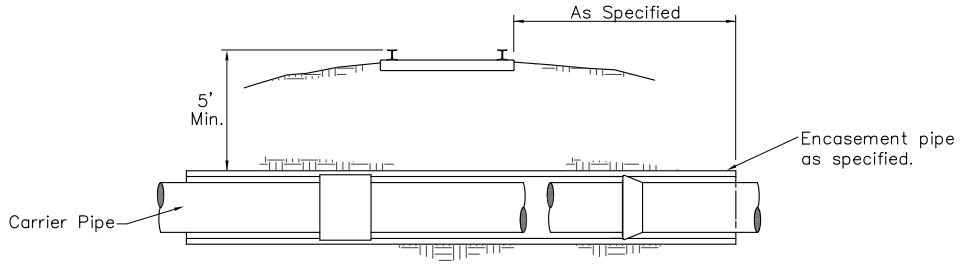


Hydrant installation perpendicular to the main using standard MJ tee, Anchoring Coupling, MJ valve, Anchoring Pipe, and MJ hydrant

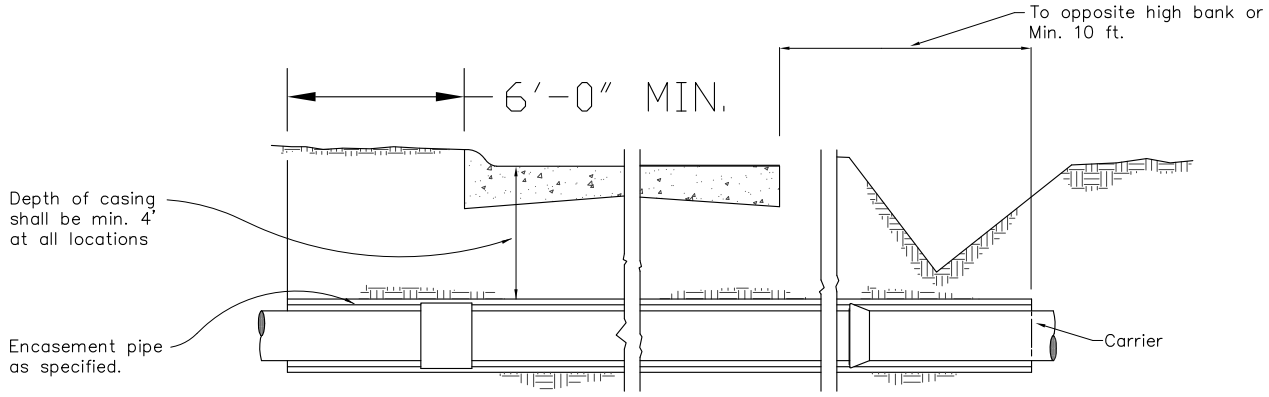
TYPICAL INSTALLATIONS USING ELCEN CLAMPS



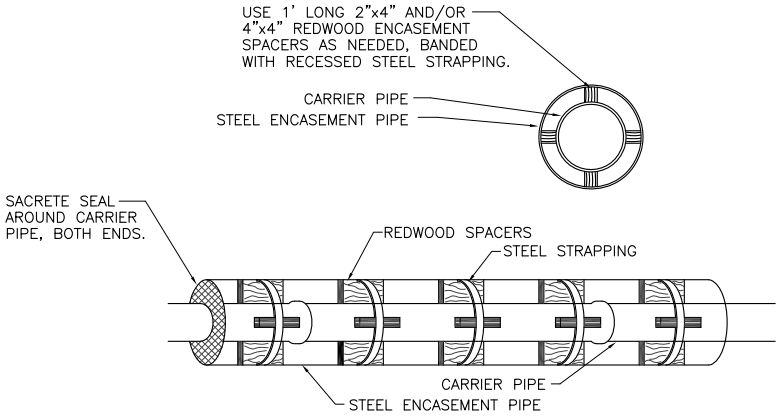
REVISIONS	CITY OF MONTGOMERY MECHANICAL JOINTS AND ELCEN CLAMPS FOR WATERLINES	WATER W–4



RAILROAD CROSSING



ROADWAY CROSSING

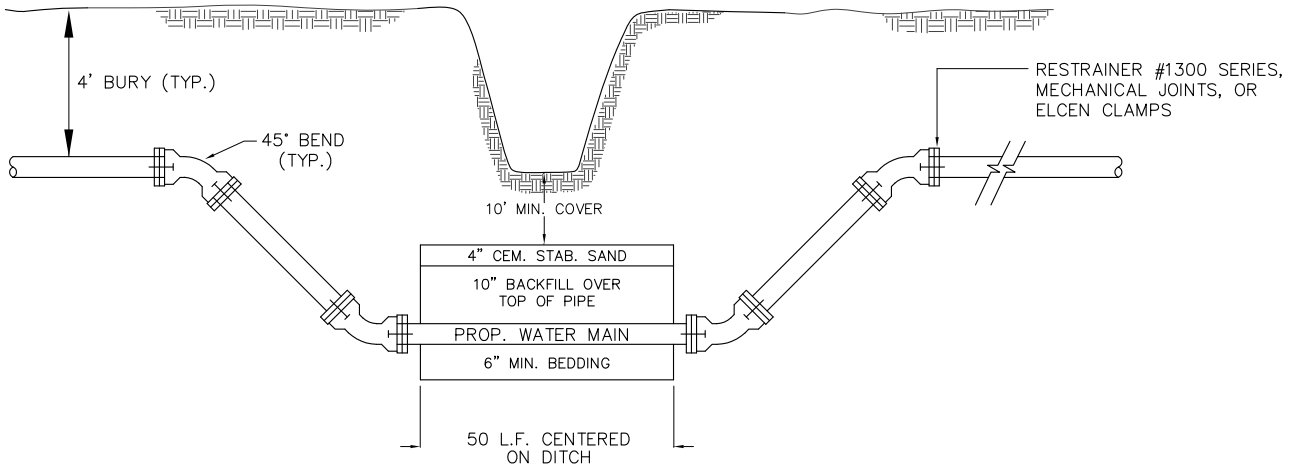


NOTE: LOCATE REDWOOD SPACERS ON EITHER SIDE OF CARRIER PIPE BELLS, THEN ONE SET CENTERED ON EACH JOINT.

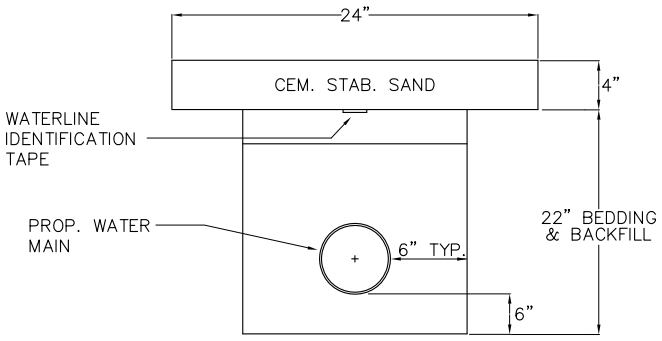
CARRIER SIZE	MINIMUM ENCASEMENT STEEL PIPE
4" C 900	10" – .25 WALL
6" C 900	12" – .25 WALL
8" C 900	16" – .25 WALL
10" C 900	18" – .25 WALL
12" C 900	20" – .25 WALL
14" C 905	24" – .25 WALL
16" C 905	26" – .25 WALL
18" C 905	30" – .25 WALL
20" C 905	36" – .375 WALL
24" C 905	42" – .375 WALL

NOTES:
1. Steel casing shall have totally welded joints.
2. Steel casing shall be used in all bores.
3. Contractor to obtain permits prior to any construction at these crossings.

REVISIONS	CITY OF MONTGOMERY STANDARD BORED CROSSING FOR WATERLINE	WATER W–5

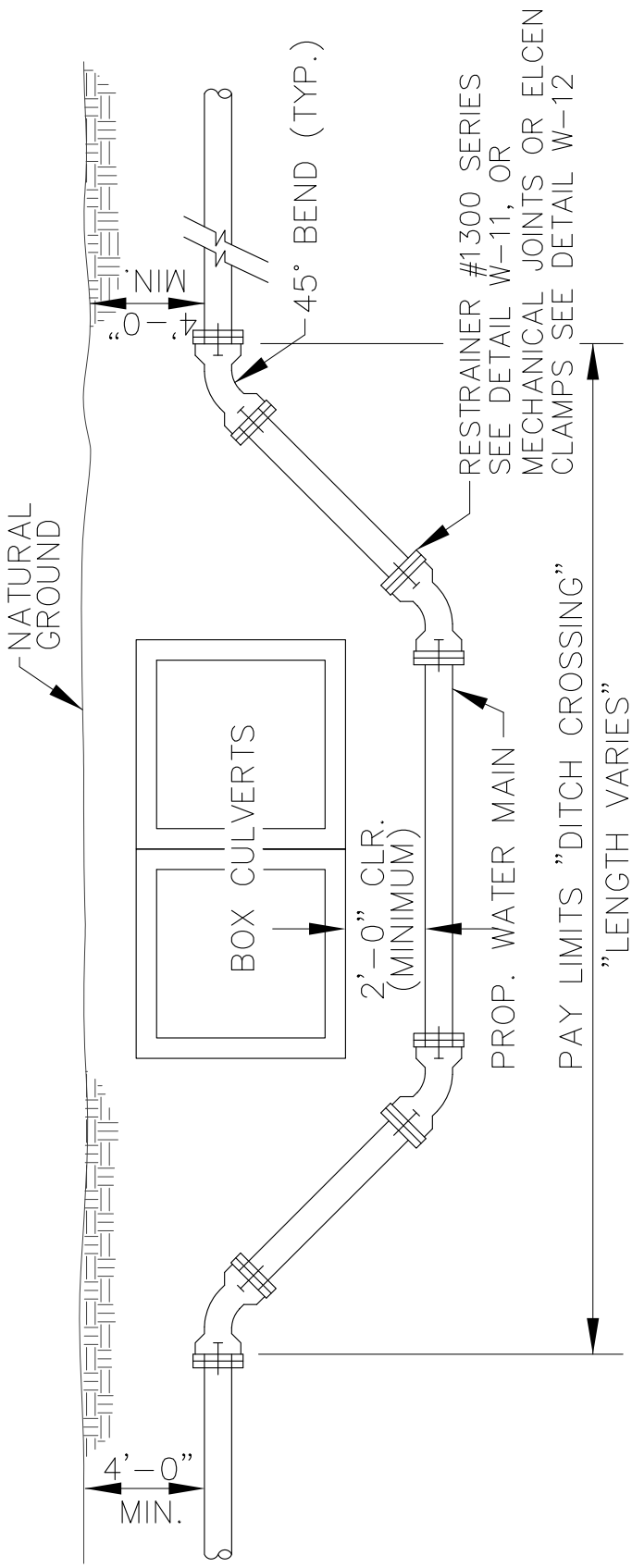


NOTE: ALL BEDDING AND BACKFILL SHALL BE BANK SAND



CROSS–SECTION

REVISIONS	CITY OF MONTGOMERY DITCH CROSSING DETAILS FOR WATERLINE	WATER W–6



REVISIONS	CITY OF MONTGOMERY CULVERT CROSSING DETAIL FOR WATERLINE	WATER W-7

REVISIONS

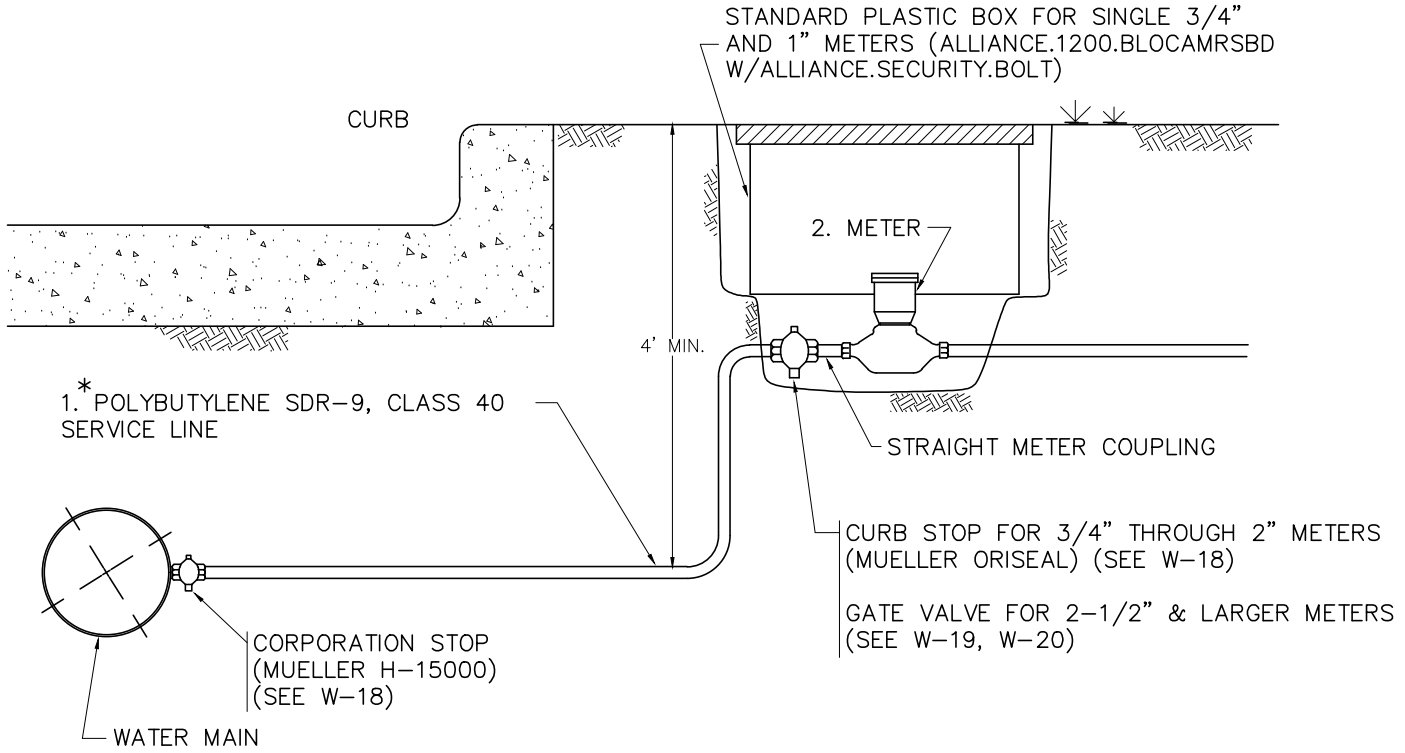
10-2013 REVISED NOTES
SERVICE SIZE

CITY OF MONTGOMERY
WATER SERVICE CONNECTION

WATER

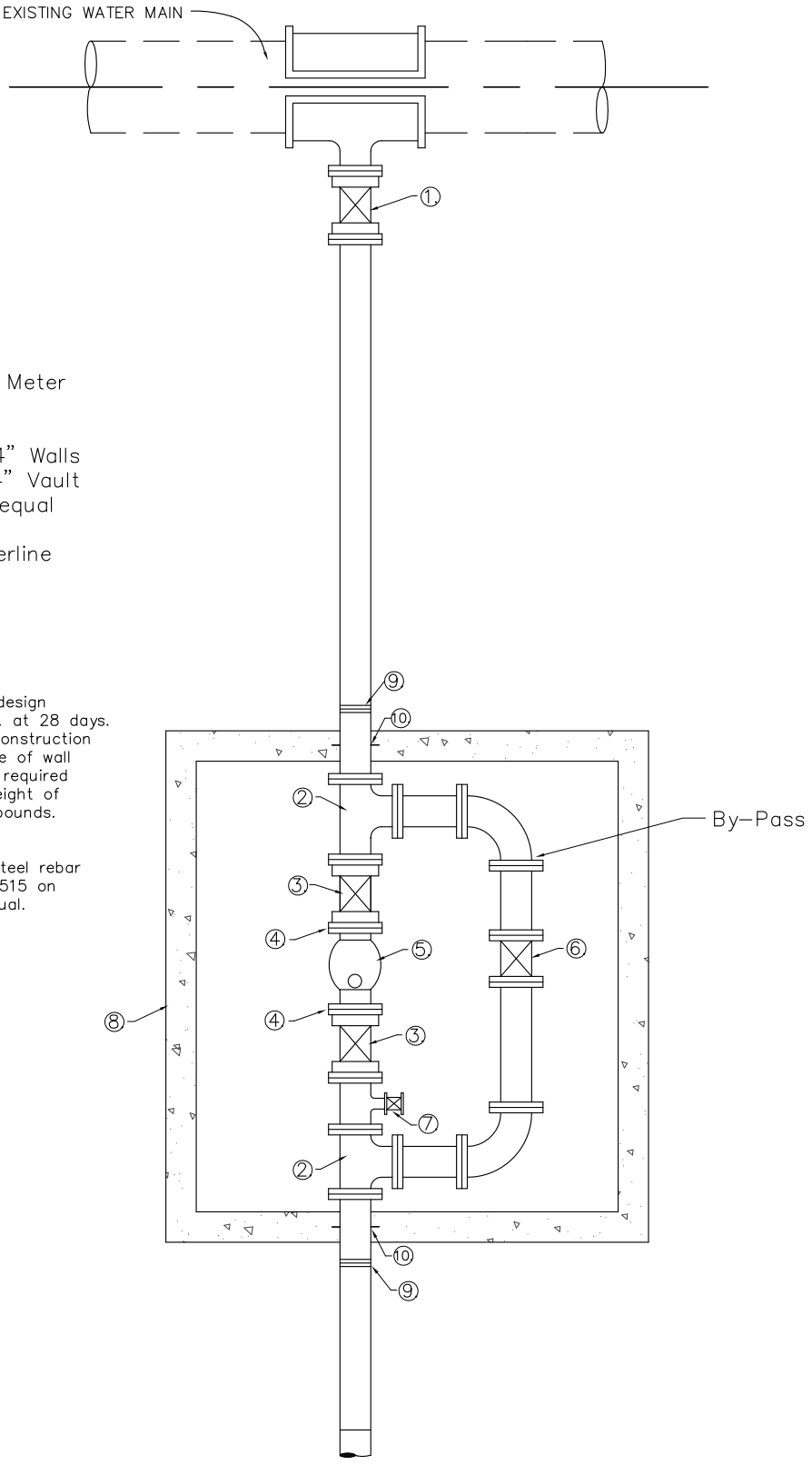
W-8

1. SDR-9 service lead by contractor, with standard plastic meter box.
2. Meter installed by the City of Montgomery.



* 3/4" POLY TUBING FOR 3/4" X 5/8" METER INSTALLATION FOR SINGLE SERVICE TAP.

* 1" POLY TUBING FOR 1" METER INSTALLATION FOR DOUBLE SERVICE TAP.



① Tapping Tee & Gate Valve
② Two Tee
③ Two Gate Valves
④ Two Flg. Coup. Adapt's.
⑤ 2" to 10" Turbine Compound Meter
⑥ One 2" Gate Valve
⑦ 2" Test Tee (Corp. Stop)
⑧ Reinforced Conc. Vault with 4" Walls and 4" Top Slab with 24"X24" Vault Frame & Cover or approved equal
⑨ Flex Coupling as Required
⑩ Water Tight Seal Around Waterline Entering and Exiting Vault

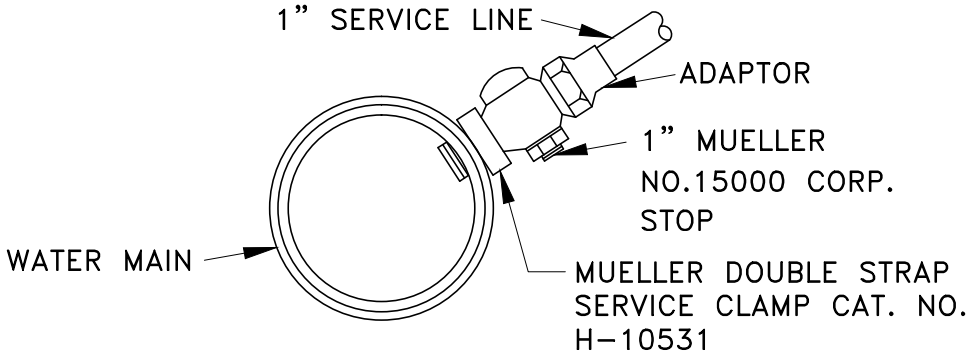
SPECIFICATIONS:

CONCRETE: Class I concrete with design strength of 4500 P.S.I. at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth. Gross empty weight of approximately 12,000 pounds.

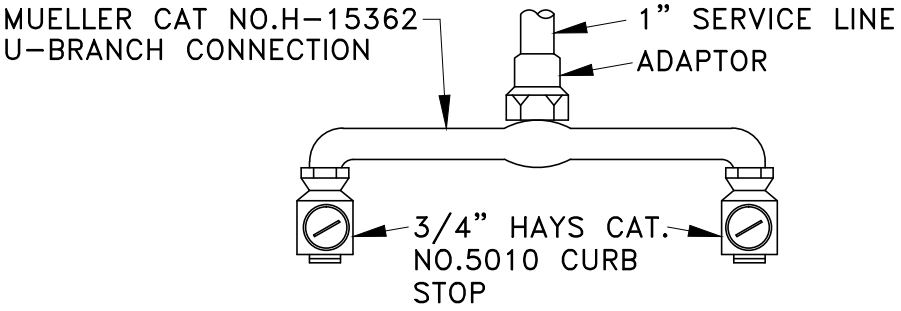
REINFORCEMENT: Grade 60 reinforced. Steel rebar conforming to ASTM A515 on required centers or equal.

Typical water meter service. 2" or larger meter installation will require concrete vault and a by–pass assembly.

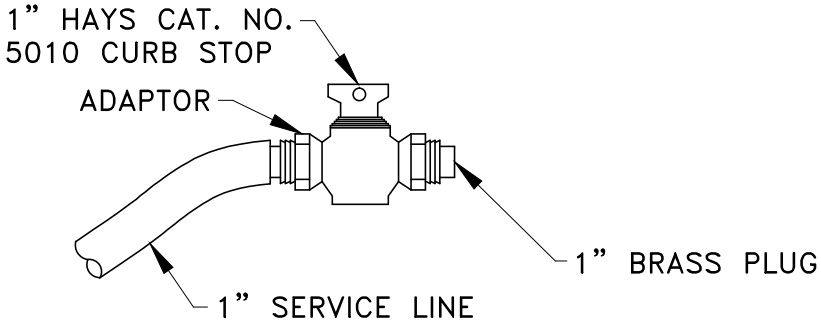
REVISIONS	CITY OF MONTGOMERY 2" & LARGER WATER SERVICE CONNECTION	WATER W–9



TAP DETAIL

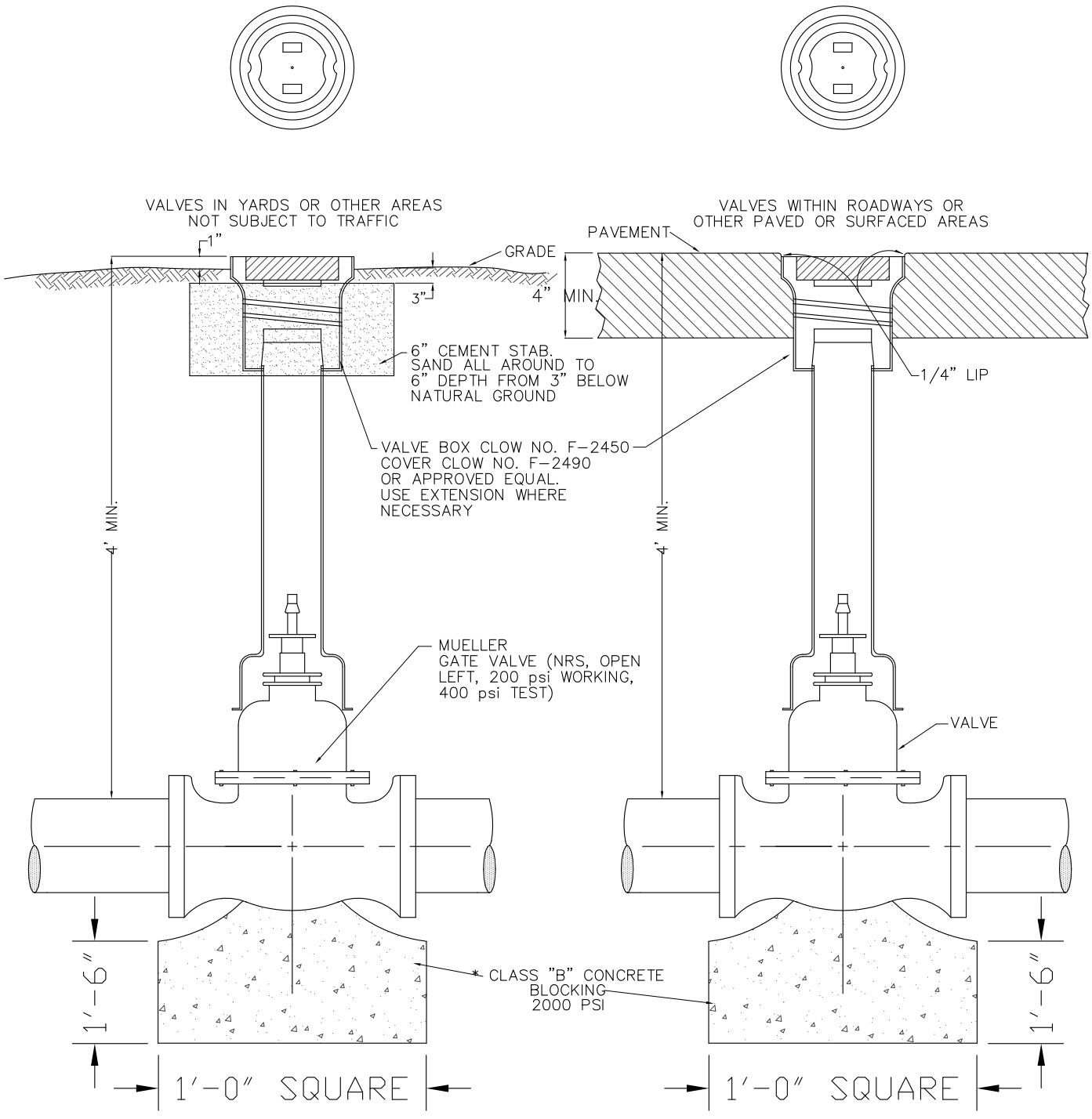


DOUBLE SERVICE LINE CURB STOP DETAIL



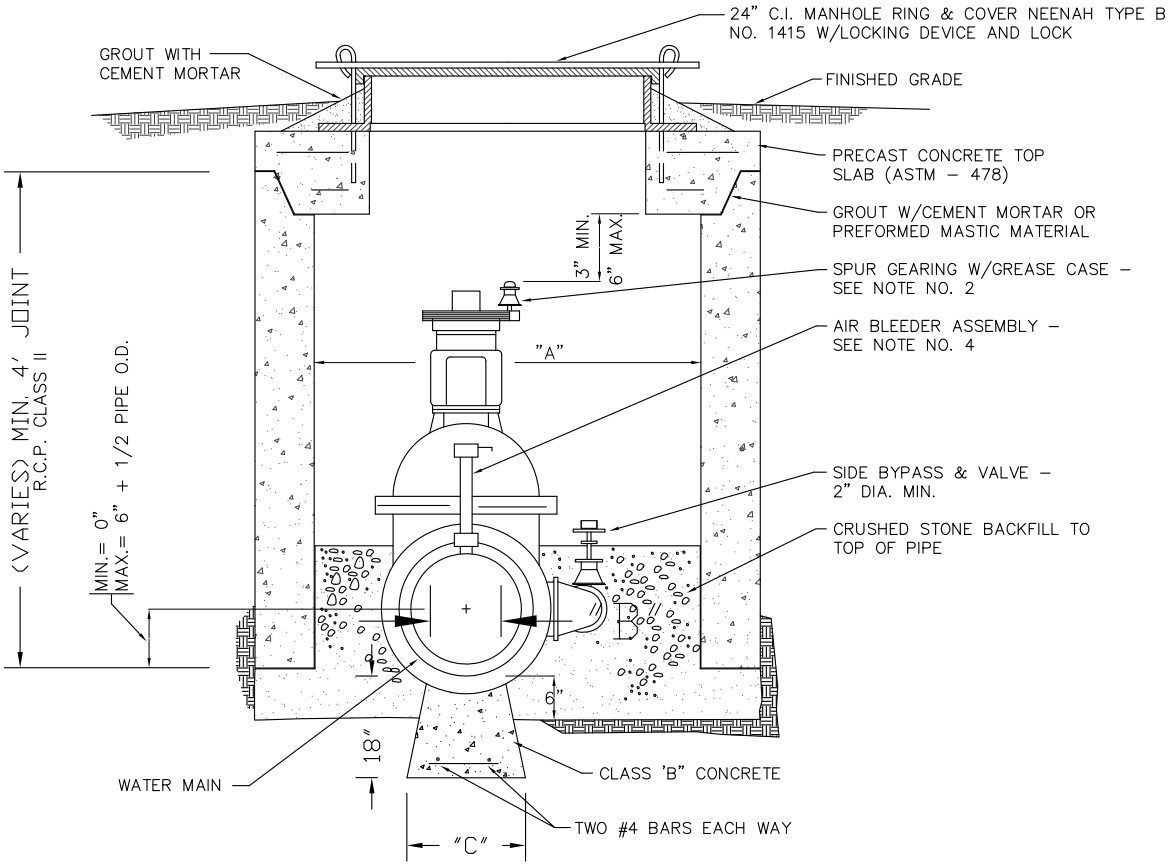
SINGLE SERVICE LINE CURB STOP DETAIL

REVISIONS		
10-2013 REVISED SERVICE LINE SIZE	CITY OF MONTGOMERY CURB STOP & TAP FOR WATERLINE	WATER W-10



* BLOCK GATE VALVES WITH COMPRESSION JOINT FITTINGS ON 8" & LARGER LINES

REVISIONS	CITY OF MONTGOMERY GATE VALVE & BOX INSTALLATION 14" AND SMALLER WATERLINE	WATER W-11



PIPE SIZE	"A"	"B"	"C"
16"	48"	10" SQ.	16" SQ.
18"	48"	12" SQ.	18" SQ.
20"	54"	12" SQ.	20" SQ.

NOTES

1. PLACE 1/2" EXPANSION JOINT MATERIAL AROUND WATER PIPE WHERE IT PASSES THROUGH CONCRETE VAULT.

2. VALVES 18" AND LARGER SHALL HAVE SPUR GEARING WITH GREASE CASE.

3. NOTE: LARGER DIAMETER R.C.P. MAY BE REQUIRED DEPENDENT UPON MANUFACTURER'S STANDARD SIZE FOR GATE VALVE.

4. PROVIDE CORPORATION WITH COPPER RISER AND CURB STOP AT A MAXIMUM OF 12" FROM EACH END OF GATE VALVE AS SHOWN. CORPORATION AND CURB STOP SIZES SHALL BE 1". EXTEND RISER TO WITHIN 24" OF TOP OF MANHOLE.

5. VALVES, BYPASS, CORPORATION STOP AND PIPING SHALL BE DESIGNED TO OPERATE AT THE MAXIMUM PRESSURES AS DESCRIBED IN THE SPECIFICATIONS.

REVISIONS	CITY OF MONTGOMERY GATE VALVE & VAULT INSTALLATION 16" AND LARGER WATERLINE	WATER W–12

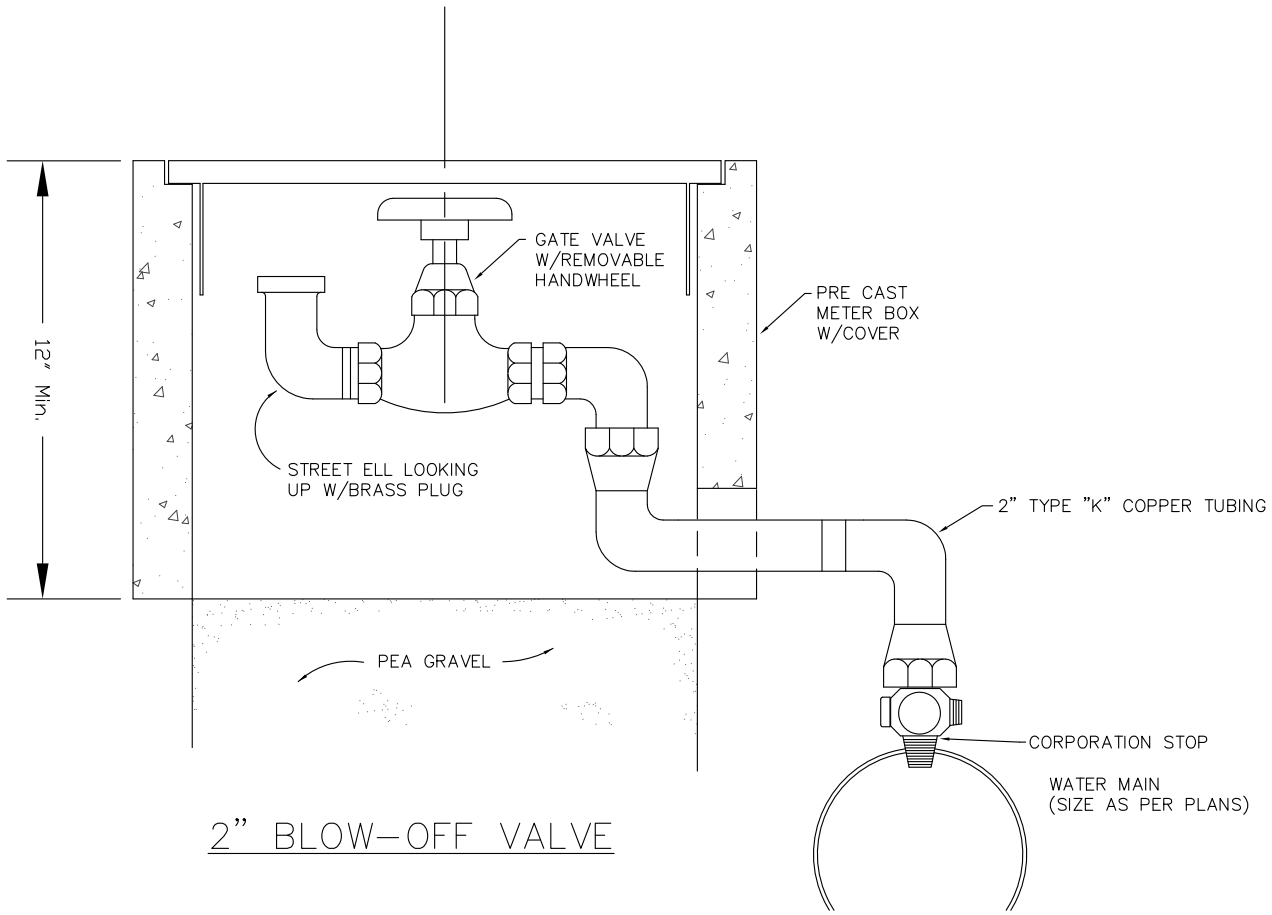
REVISIONS

CITY OF MONTGOMERY

2" BLOW-OFF VALVE FOR WATERLINE

WATER

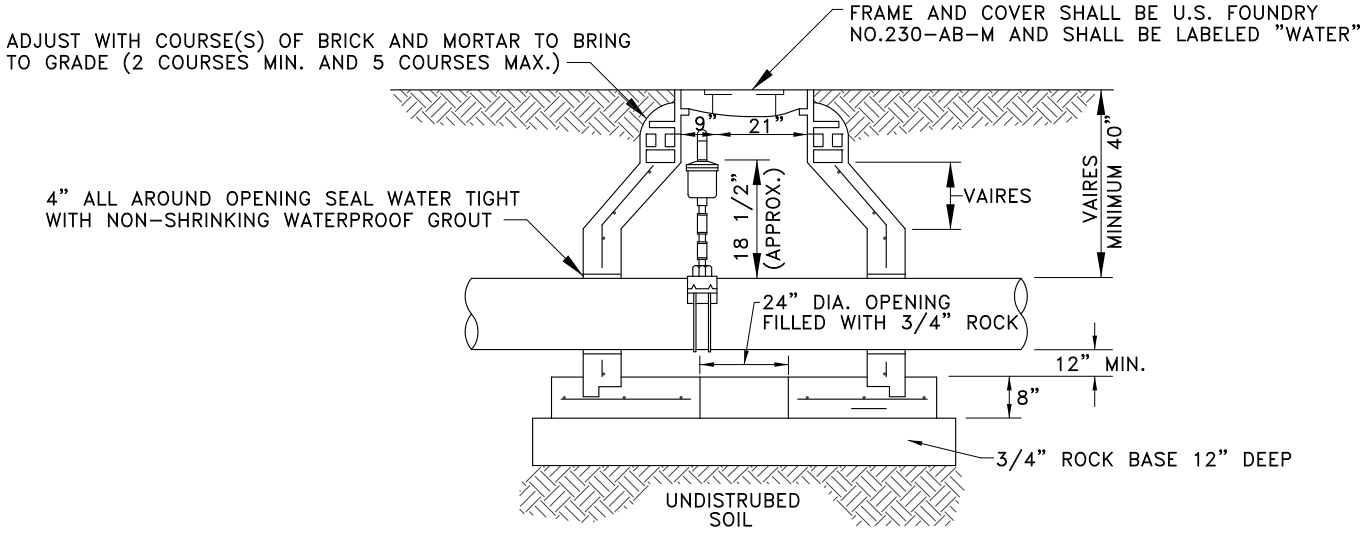
W-13

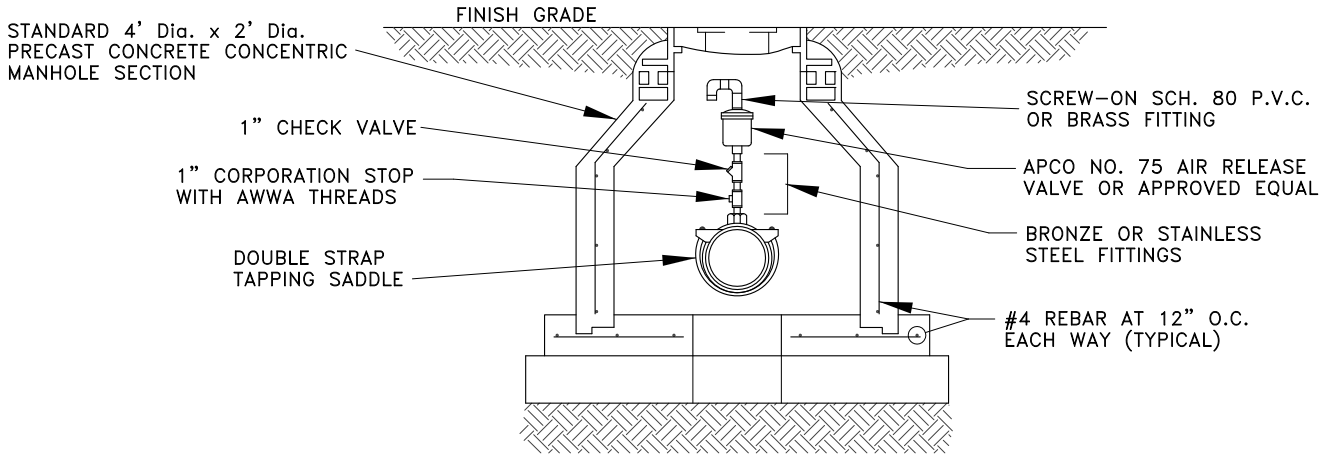


2" BLOW-OFF VALVE

NOTES:

1. THE VALVE AND FEMALE FITTING (STREET ELL) SHOULD BE ENCLOSED IN A METER BOX BELOW GROUND LEVEL.
2. ALL PIPING AND FITTINGS SHOULD BE THE SAME SIZE AS CORPORATIONS.
3. FOR 2" BLOW-OFF PROVIDE 2" X 90° BEND (LOOKING UP) AND FEMALE ADAPTER.





WATER MAIN
AUTOMATIC AIR RELEASE VALVE
ELEVATION DETAIL

NOTE: FOR LOCATION OF INSTALLATION SEE PLAN AND PROFILE SHEETS.

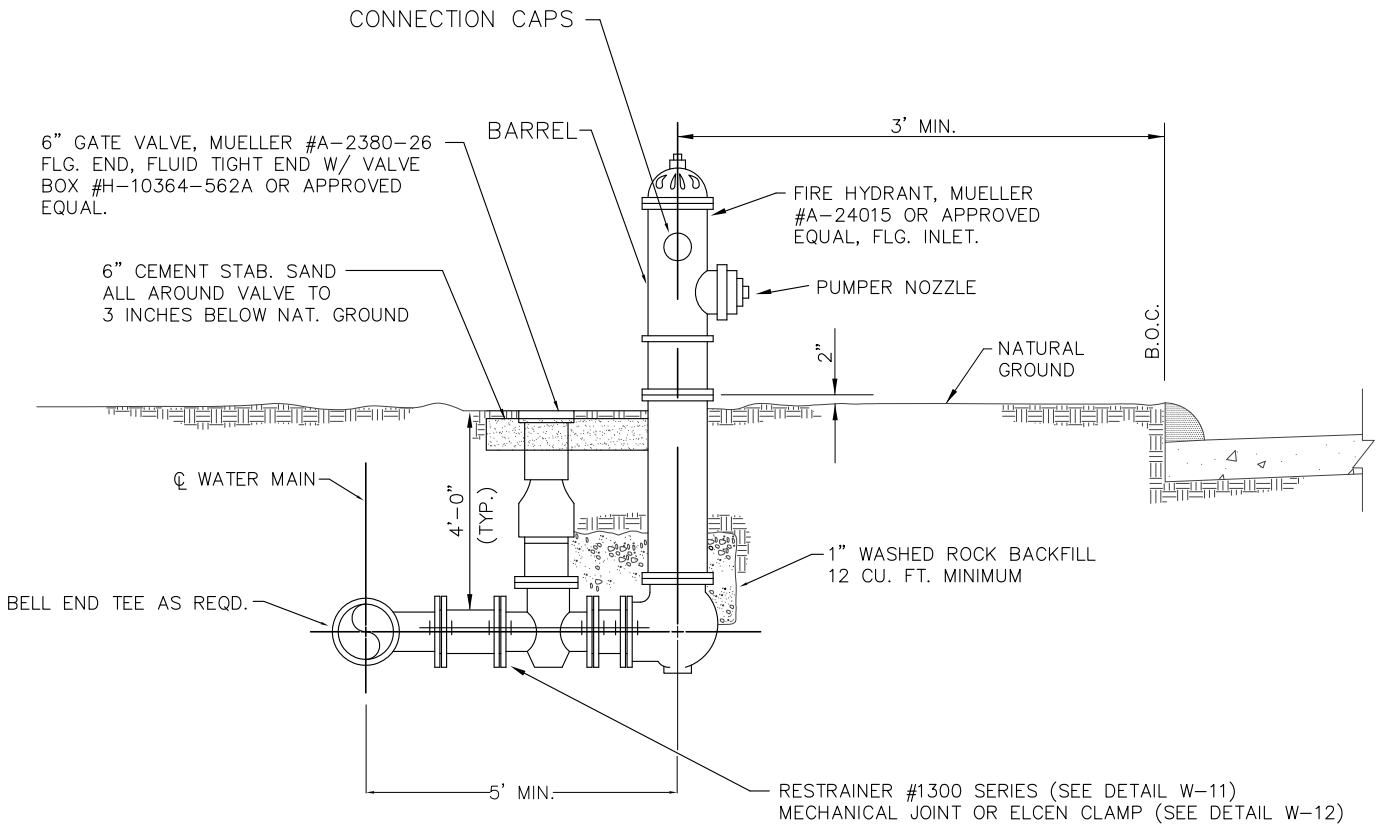
REVISIONS	CITY OF MONTGOMERY WATER MAIN AUTOMATIC AIR RELEASE VALVE	WATER W-14

REVISIONS

CITY OF MONTGOMERY
FIRE HYDRANT INSTALLATION

WATER

W–15



NOTES:

(1) Hydrants shall be shop coated with a suitable primer and finish painted to City of Montgomery specifications. Bonnet is to be painted white, caps blue, and the barrel red. Below ground line to and including the inlet shoe, the outside of the barrel and shoe shall be coated with a coal–tar enamel or asphalt base bituminous coating material not less than one (1) mil thickness.

(2) Fire hydrants in open ditch roadways shall be 3–ft. off R.O.W..

(3) Mechanical joints and/or elcen clamps are to be rodded together using 5/8" all thread (See W–12).