

MARIPOSA PUBLIC UTILITY DISTRICT

STANDARD

SPECIFICATIONS

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STANDARD SPECIFICATIONS

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**STANDARD SPECIFICATIONS
MARIPOSA PUBLIC UTILITY DISTRICT**

SECTION 1 - GENERAL

1.01 Introduction and Purpose

The following Standards shall govern, guide and control planning, construction, modification and extension of:

Sanitary sewer collection system, or domestic water supply and distribution system which will be granted or dedicated to, accepted by, and operated and maintained under any applicable jurisdiction of the Mariposa Public Utility District.

The Owner, Developer, or his Agent, and/or Contractors shall keep themselves fully informed of all current State, National, County, or Municipal laws, ordinances, resolutions, or regulations which in any manner affect the development or work contemplated. Strict compliance with these Standards is required in order to insure the orderly expansion of utilities to the highest practical standards with a maximum efficiency and for the greatest public benefit.

1.02 Definitions and Abbreviations

The following terms and abbreviations, when used herein, or any document or plan which these Improvement Standards govern shall have the following meanings:

- A. "MPUD" shall mean the Mariposa Public Utility District.
- B. "Board" shall mean the Board of Directors of MPUD.
- C. "State" shall mean the State of California.
- D. "State Standard Drawings" shall mean the current Standard Drawings and Plans Of the State of California, Department of Public Works, Division of Highways.
- E. "State Specifications" shall mean the Standard Specifications of the State of California, Department of Public Works, Division of Highways, current editions.
- F. "Manager" shall mean the person or persons appointed by the Board to Administer and enforce the rules and regulations of MPUD.
- G. "Consulting Engineer" shall mean any person, firm or corporation legally authorized to practice civil engineering in the State of California who prepares improvement plans and specifications (usually for an owner or developer).

- H. "Permit" shall mean any written authorization required pursuant to this or any other regulation of MPUD for the installation of any sewage works and/or water works.
- I. "Contractor" shall mean any individual, firm, corporation, partnership or association duly licensed by the State of California to perform the type of work to be done under the permit.
- J. "Standard Drawings" shall mean current Standard Drawings of MPUD.
- K. "Applicant" shall mean the person making application for a permit for a sewer and/or water plumbing installation and shall be the owner of premises to be served by the sewer and/or water for which a permit is requested or his authorized agent.
- L. "Inspector" shall mean the inspector acting for the Board, the Manager, the District Engineer or Inspector appointed by the Board.

Abbreviations:

ASCE:	American Association of Civil Engineers
ACI:	American Concrete Institute
ASTM:	American Society of Testing Materials
ASA:	American Standards Association
AWWA:	American Water Works Association
H&S:	California State Health and Safety Code
Federal Specs:	Federal Specifications
State Specs:	Same as (e) above, latest edition
psi:	Pounds per square inch

Pipe Types:

ACP:	Asbestos Cement Pipe
PVC:	Polyvinyl Chloride
CIP:	Cast Iron Pipe
CL & CP:	Concrete Lined & Coated Cylinder Pipe
S.P.:	Steel Pipe
D.I.P.:	Ductile Iron Pipe

NOTE: All specifications shall be latest edition.

1.03 Engineering and Construction *

- A. All plans, specifications, reports and documents required by MPUD shall be

either signed or stamped with the seal of a Registered Civil Engineer, currently licensed to practice in the State of California.

B. All facilities covered by these Improvement Standards shall be constructed by:

Contractors holding a currently valid license issued by the Contractors State License Board, Department of Professional and Vocational Standards, State of California in one of the following classifications:

1. General engineering Class 1A, or
2. Specialty license covering specialty work performed.

* Manager may waive this section for installation and connection of private laterals.

SECTION 2 - MAPS, PLANS, ETC

2.01 General Requirements

Complete plans and specifications for all proposed sewage collection and water supply and distribution systems including necessary dedications and easements shall be submitted to the Manager for approval. Approval must be substantiated by the signature of the Manager prior to the beginning of construction of any proposed water or sewer development.

All required dedications and easements are to be granted to and accepted by MPUD prior to commencement of construction. Easements shall be extended to provide service for future development beyond the proposed project area.

Location of water and sewer lines in easements shall be kept to a minimum. Whenever possible, mains shall be placed in the public roadway. Where water and sewer lines are located in easements, the easements shall be:

- A. Granted with subdivision Map, or
- B. Be dedicated to and accepted by MPUD.
- C. The minimum width of any easement for sanitary sewer or water main shall be twenty (20) feet wide. In special cases of terrain, depth of sewer line, etc., the required easement width may be increased. All easements shall be “public utility easements” and include right of ingress and egress over adjoining property for maintenance, replacement and operation.

2.02 Procedure

Plans and specifications complete and in accordance with these Standards shall be submitted in duplicate, including computations, test data and any other pertinent supporting information as required. Non-conforming submittals will be returned to the Applicant for corrections and re-submittal. This procedure will continue until the plans have final approval by the Manager.

Any major changes which may become necessary during construction must be approved by the Manager and noted on the plans. Minor changes which do not affect the basic design may be approved by the MPUD Inspector, but must be shown on the final "As Built Plans" when the contract is completed.

2.03 Map Plan Detail Shall Include the Following

A. Title Sheet:

All improvement and/or construction plans shall include a title sheet with dimensions of 24" x 36". The following information shall appear on the title sheet:

1. Vicinity Map. Scale 1" = 1000' or larger
2. Name of development or subdivision.
3. Name and address of owner and applicant, if different.
4. Name, address and signature of person responsible for field work and preparation of plans.

B. Plan and Profile:

1. Plans. All improvement plans shall be prepared on the plan and profile sheets the dimensions of which shall be 24" x 36", drawn to a scale of 1" = 50' or larger.

A complete set of plans shall consist of the following:

- (a) Title sheet with vicinity map. Scale 1" = 1000' or larger.
- (b) Overall layout sheets showing complete sanitary sewer system and water distribution system to a scale of 1" = 100' or larger. The layout sheet shall show all line sizes, structures, valves, blow-offs, loops, crossovers, tanks, wells, drop inlets, rodding inlets, etc. Each system shall be shown on a separate sheet.
- (c) All pertinent construction data such as:
 1. Elevation data and bench marks.
 2. Horizontal alignment, right of way lines, easements, boundary lines, sewer lines, water lines and all appurtenant structures.
 3. All horizontal curve information.

2. Profile. Profile shall show:
 - (a) Finish sewer centerline elevations at fifty foot intervals and rate of grade. Vertical scale shall be 1" = 10' (maximum).
 - (b) Invert elevation of all sewer manholes, rodding inlets and sewer line slopes.
 - (c) Depth of all water lines.
3. Stationing and Orientation. Stationing on plans shall read (increase) from left to right.

Plans shall be so arranged so that the north arrow points toward the top of the sheet or away from the viewer insofar as possible.
4. Approval of these plans does not release the applicant of the responsibility for correction of mistakes, errors or omissions contained therein.
5. In addition to the reproducible set of as-built drawings, the complete as-build drawings shall also be submitted on a digital format compatible with "Auto-Cad" 2000.

SECTION 3 - INSPECTION, COMPLIANCE & ACCEPTANCE

3.01 Inspection

Any improvement constructed to MPUD standards which is to be granted or dedicated to MPUD for operation and maintenance must be inspected during construction by a representative of MPUD. Any requirement of these standards, missed or over looked by the MPUD field inspector during construction does not relieve the applicant of his responsibility to meet a MPUD Improvement Standard requirement.

3.02 Compliance

All material and workmanship that is to become a permanent part of any improvement covered by these Standards, shall conform to the requirements for the particular material or workmanship as set forth in these Standards. The applicant shall supply any and all certificates of compliance, certified test results, or shall perform tests as required to assure MPUD that the material being incorporated into the work has met the requirements as specified.

3.03 Acceptance

Prior to final acceptance by MPUD of any improvement constructed in compliance with these Standards the following requirements shall be completed:

- A. The Applicant shall by letter request a final inspection by the Manager or his representative.
- B. Any deficiencies noted during the final inspection shall be corrected.
- C. A complete and accurate reproducible set of "As Built" plans, approved by MPUD shall be filed with MPUD as a permanent record.
- D. When all of the above requirements have been executed, the Manager by letter will inform the Applicant that the improvements have been approved by MPUD as complete.

NOTE: MPUD will hold the owner responsible for completeness of MPUD requirements for the whole project until final acceptance by MPUD. The owner shall also guarantee the correction of faulty workmanship and the replacement of defective materials for a period of one (1) year after the date of acceptance of the work. A Maintenance Bond or Performance Bond is required and shall remain in full force and effect through the guarantee period.

3.04 INDEMNIFICATION:

The contractor will indemnify and hold harmless the Mariposa Public Utility District and its agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the work, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use therefrom; and is caused in whole or in part by any negligent or willful act or omission of the contractor, and subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

In any and all claims against the Mariposa Public Utility District, or any of its agents or employees, by any employee of the contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for those acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the contractor or any subcontractor under worker's compensation acts, disability benefit acts or other employee benefit acts.

GUARANTEE:

The contractor shall guarantee all materials and equipment furnished and work performed for a period of one (1) year from the date of substantial completion. The contractor warrants and guarantees for a period of one (1) year from the date of substantial completion of the system that the completed system is free from all defects due to faulty materials or workmanship and the contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of the damage of other parts of the system resulting from such defects. The Mariposa Public Utility District will give notice of observed defects with reasonable promptness. In the event that the contractor should fail to make such repairs, adjustments, or other work that may be made necessary by such defects, the Mariposa Public Utility District may do so and charge the contractor the cost thereby incurred. A Performance or Maintenance Bond is required.

SECTION 4 - TRENCHING AND BACKFILLING

4.01 Work Included:

- A. Excavate trenches for utilities.
- B. Shoring and bracing of utility trenches.
- C. Prepare the trench bed to receive utilities.
- D. Backfill and compact utility trenches using select and common fill materials.
- E. Compaction requirements.

4.02 References:

- A. ANSI/ASTM C1 36 - Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D698 - Tests for Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 5.5 lb (2.49 kg) Hammer and 12-inch (305 mm) Drop.
- C. ANSI/ASTM D1556 - Density of Soil in Place by Sand-Cone Method.
- D. ANSI/ASTM D1557 - Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10lb (4.54 kg) Hammer and 18-inch (457 mm) Drop.
- E. Section 26 - Aggregate Bases, Caltrans Standard Specifications, July 2002

4.03 Tests:

- A. Tests and analysis of fill materials will be performed in accordance with ANSI/ASTM D1557. Contractor shall submit Certificate of Compliance for import fill materials.
- B. Initial compaction testing shall be scheduled and paid for by the Owner. Retesting of areas failing initial tests shall be paid for by Contractor.

4.04 Protection:

- A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cavern or loose soil from falling into excavation. All trenches and jacking pits shall conform to Construction Safety Orders Sections 1504, 1539-1547 of Title B of the California Code of Regulations.
- B. Grade excavation top perimeter to prevent surface water run-off into excavation.

4.05 Products:

A. Select Bed and Fill Materials:

1. Type I - Type I material shall meet the quality requirements of Section 26-1.02B for Class 2 aggregate base of the Cal-Trans Specifications. No material shall be used as Type 1 bedding unless approved by MPUD. Grading of Type 1 bedding shall be as follows:

<u>U.S. Standard Sieve</u>	<u>Percent Passing</u>
1-1/4"	100%
3/4"	5%

2. Type II - Bedding: Material with sand equivalent of at least 35 per test method 217-E Caltrans Standards. The grading of Type II material shall be as follows:

<u>Sieve Size</u>	<u>Percent Passing</u>
No. 3/4"	100
No. 200	Not more than 10%

Decomposed granite meeting this gradation will be acceptable as Type II material. No material shall be used as Type II material without approval by M.P.U.D.

3. Concrete Slurry Backfill - Concrete slurry Shall be aggregate, cement and water proportioned either by mass or by volume. 186 pounds of cement shall be used for each cubic yard of material produced. The water content shall be sufficient to produce a fluid workable mix and be placed without segregation of aggregate. Evaporation of bleed water shall not result in shrinkage of more than 1/8" inch per foot (10.4 mm per m) The grading of aggregate material shall be as follows:

<u>Sieve Sizes</u>	<u>Percentage Passing</u>
37.5-mm {1-1/2"}	100
25-mm {1"}	80-100
19-mm {3/4"}	60-100
9.5-mm {3/8"}	50-100
4.75-mm {No. 4}	40-80
150-um {No. 100}	10-40

B. Common Fill Materials:

Native material free of debris and rock larger than 3 inches.

4.06 Execution:

A. Inspection:

1. Verify stockpiled fill to be reused is approved.
2. Verify areas to be backfilled are free of debris, snow, ice, or water, and surfaces are not frozen.

B. Excavation & Bedding:

1. Excavate uniformly to 4" to 6" below the bottom of pipe.
2. Cut trenches sufficiently wide to enable installation of utilities and allow inspection. A minimum of 6" on each side of mains and 2" each side of 1" and 2" water service pipe shall be required.
3. Hand trim excavation and leave free of loose matter. Hand trim for bell and spigot pipe joints.
4. Remove lumped subsoil, boulders, and rock.
5. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
6. Correct unauthorized excavation at no cost to Owner.
7. Place bedding material and grade bedding to provide continuous contact with pipe bottom. Provide 2" clearance beneath pipe couplings and joints. Type II material compacted to 90 percent of maximum density per California Test method 216 shall be used for bedding. If groundwater is encountered, an additional 6" of Type I material shall be placed prior to the placement of Type II bedding.

C. Backfilling (Common Fill Materials):

1. Backfill trenches to contours and elevations. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, or spongy subgrade surfaces. Backfill shall consist of Type II material compacted to 90% of maximum density to at least 12" above the top of the pipe. Backfill from 12" above the pipe to finish grade shall be as shown in the trench detail drawings. No rocks larger than 3" shall be allowed when native material is used for backfill. This material shall be compacted to 90% of maximum density.
2. Place and compact select fill materials in continuous layers not exceeding 6" loose depth.
3. Place and compact common fill material in continuous layers not exceeding 8" loose depth.
4. Employ a placement method so not to disturb or damage pipe or utilities.

5. Maintain optimum moisture content of backfill materials to attain required compaction density. Compaction of pipe bedding and backfill material by ponding or jetting will not be permitted.

6.

6. Leave stockpile areas completely free of excess fill materials.

D. Backfilling (Concrete Slurry):

1. Backfill trenches to contours and elevations. Backfill systematically, after compaction of bedding material (type II) over pipe is complete.
2. Concrete slurry backfill shall be placed in a uniform manner that will prevent voids in, or segregation of, backfill

E. Backfilling (Type I and type II Materials):

1. Backfill trenches to contours and elevations. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet or spongy subgrade surfaces. Backfill shall consist of Type II material compacted to 90% of maximum density to within 24" of final surface grade. Backfill from 24" below surface grade to 10" below surface grade shall be Type II material compacted to 95% of maximum density. Backfill from 12" below surface grade to the asphalt section shall be Type I material compacted to 95% of maximum density. Asphalt replacement shall be per Section 9.
2. Place and compact select fill materials in continuous layers not exceeding 6" loose depth.
3. Employ a placement method so as not to disturb or damage pipe or utilities
4. Maintain optimum moisture content of backfill materials to attain required compaction density. Compaction of pipe bedding and backfill material by ponding or jetting will not be permitted.
5. Remove surplus backfill materials from site. It is the contractor's responsibility to dispose of excess trench material.
6. Leave stockpile areas completely free of excess fill materials.

F. Field Quality Control:

1. Compaction testing will be performed in accordance with Section 6-3 Caltrans Standard Specifications, July 1002. Or "California Test" 216 or 231.
2. If tests indicate work does not meet specified requirements, remove work, replace, and retest.

SECTION 5 - MATERIALS (GENERAL)

5.01 Portland Cement Concrete, Mortar and Grout

- A. All Portland cement shall be Type II conforming to ASTM Designation: C 150.
- B. Portland Cement Concrete
 - 1. All grading of aggregate, proportioning, mixing, placing, finishing and curing of Portland cement concrete shall comply with Section 90 of the State Specs. Classification as to class of concrete shall comply with Section 90-1.01 of State Specs.
 - 2. Combined aggregate grading limits shall be the one and one-half (1-1/2) inch maximum, or the three quarter (3/4) inch maximum as listed in Section 90-3.04 of the State Specs.
 - 3. No admixture of any nature shall be used in the mixing of Portland cement concrete without the expressed approved of the Manager.
- C. Mortar and Grout
 - 1. Mortar shall be composed of one part Portland cement and two parts sand by volume.
 - 2. Grout shall be composed of one part Portland cement and one and one-half (1-1/2) parts sand by volume.
 - 3. All mortar and/or grout shall be proportioned and mixed so as to comply with Section 65-1.06A of the State Specs. No admixtures of any nature shall be used in the mixing of the mortar and/or grout without the expressed approved of the Manager.

5.02 Reinforcing Steel and Wire Mesh

- A. Steel reinforcement and/or mesh reinforcement shall be of size shown and be placed in concrete structures in accordance with the details as shown on the plans or Standard Drawings, or as directed.
- B. Bar reinforcement shall be intermediate grade or hard grade billet steel as specified in ASTM Designation: A615 or rail steel as specified in ASTM Designation: A616. Tie wire shall be No. 14 or No. 16 steel wire.

- C. Mesh reinforcement shall be a standard type of electrically welded wire fabric as specified in ASTM Designation: A185.
- D. All reinforcement steel and/or wire mesh shall be designed, fabricated, placed and supported in the forms, all in accordance with ACI 318 and ACI 315.

5.03 Grey Iron Castings

Cast iron used in the manufacture of manhole frames and covers, rodding and flushing inlets, curb inlets, grates, etc. shall comply with ASTM Designation: A48 Class 30. All cast iron castings shall be coated in accordance with Paragraph 9 ASTM Designation: A74. Covers and frame seats shall be machined to provide a true even fit, provide firm support and prevent rattling.

5.04 Miscellaneous Iron and Steel

All steel used in the manufacture of grates, frames, plates, anchors, etc. shall conform to ASTM Designation: A36. All metal castings and fabrications shall be constructed in accordance with the details on the plans or Standard Drawings. Finished members shall be true to line and free from twists, bends and open joints.

All welding shall be done in accordance with the requirements of the American Welding Society.

5.05 Galvanizing

Metal work which is to be galvanized shall be galvanized by the hot zinc dipped process after complete fabrication. Welding of members after galvanization will not be permitted. All galvanizing shall be in accordance with ASTM Designation: A153.

SECTION 6 - STRUCTURES

6.01 Reinforced Concrete Structures

- A. All reinforced concrete structures shall be constructed to line and grade and detail as shown on the plans or the Standard Drawings.
- B. Forms, Ties and Joints
1. All forms shall conform to the shape, lines, and dimensions of the members as called for on the plans or drawings. Forms shall be adequately braced, tied and supported to support all of the imposed loads due to the placing of concrete.
 2. All concrete structures shall be formed on both sides. All reinforcing steel or embedded steel anchors or castings shall be firmly and accurately placed and supported in place with metal hangers, chairs or other satisfactory metal supports.
 3. Joints. Expansion and construction joints shall be located where shown on the drawings or approved by the Manager. Expansion joint filler material shall be preformed, non-extruding bituminous fiber conforming to ASTM Designation: D1751.
 4. Consolidation (vibration). All concrete shall be consolidated to the maximum density so that it is free from pockets of coarse-aggregate and voids around embedded material and form corners.
 5. Removal of forms. Concrete finish and repair forms shall be removed in such a manner as to insure the complete safety of the structure and cause a minimum of damage to the finish. All transition channels, inverts or any area over which water is to flow shall be smooth finished so as to cause a minimum of resistance to flow.

All repair of concrete structures such as rock pockets, voids or deformations shall be completed within twenty-four hours after form removal. All material and methods of concrete repairs shall be in accordance with the procedures of Chapter VII of the sixth edition of the Bureau of Reclamation Concrete Manual.

SECTION 7 - SANITARY SEWERS

7.01 Design Standards:

A. Sanitary Sewers

1. The following guide lines shall be followed in computing contributing sewage.
 - (a) The average family unit shall be four (4) persons per residential unit.
 - (b) The average daily discharge of domestic sewage shall be one hundred (100) gallons per day per person. Design discharge shall be one and one-half (1-1/2) times this or one hundred fifty (150) gallons per day per person for peak discharge.
 - (c) Infiltration allowances will be six hundred (600) gallons/acre served/day, or between two hundred fifty (250) and five hundred (500) gallons/day/inch diameter/mile of sewer.
 - (d) Depth of flow in main and trunk sewers:

Main sewers up to fifteen (15) inches inside diameter shall be designed to flow five tenths (0.5) full. Trunk or main sewers over fifteen (15) inches inside diameter may be designed to flow seven tenths (0.7) full.

NOTE: Under no condition is a gravity sewer ever to be designed to flow under a head.

2. Sewer Velocity and Quantities

Minimum design velocity for any sanitary sewer shall be two (2) feet per second for pipes flowing full or half full.

Except in extreme cases, maximum design velocities for sanitary sewers shall not exceed ten (10) feet per second. Velocities in sanitary sewers shall be computed using Manning's formula with a constant "N" value depending upon type of pipes used.

3. Maximum Discharge

Since sanitary sewers are to be designed with no head on the inlet, the maximum design discharge shall not exceed the flow at critical slope and velocity, due to the unstable flow conditions at critical slope and critical velocity sanitary sewers should not be designed for these conditions, but a maximum design discharge shall not exceed flow under these conditions regardless of greater slope.

B. Manholes

1. Manholes shall be placed at the intersections of all main sewer lines.
2. Manholes shall be placed at all changes of alignment either vertical or horizontal.
3. The maximum distance between manholes shall be three hundred fifty (350) feet.
4. A one tenth (0.1) foot energy drop shall be allowed for flow through manholes.
5. Invert elevations of varying size pipes leading into and out of manholes shall be set by matching the total energy gradients of the pipes.

C. Drop Manholes

Whenever the vertical distance between the inverts of lines connection of a manhole exceed eighteen (18) inches, a standard drop manhole shall be constructed.

D. Rodding and Flushing Inlets

Rodding and flushing inlets shall be constructed at the end of all sewer mains.

E. Sewer Line, Location, Alignment, Cover and Size

1. Location

All sanitary sewers and appurtenant structures shall be located as close to the roadway center line as practical. In no case shall a sanitary sewer line be located closer than two (2) feet from an existing or proposed

gutter lip. Sanitary sewer lines shall be laid out on the opposite side of the roadway centerline from the water lines. The entire sanitary system shall be located as mentioned above and shall be designed to clear all other existing or proposed utilities by twelve (12) inches.

2. Cover

Minimum and maximum cover for any sewer line shall be three (3) feet and eight (8) feet, respectively. Any deviation from this cover shall require special design and approval by the Manager.

3. Size

Minimum line size for any sewer main shall be eight (8) inches inside diameter.

F. Laterals and/or Side Sewers, Cleanouts, Backflow Preventers.

Minimum size of any sanitary lateral or side sewer to serve individual residences, commercial structures, etc., shall be four (4) inches. Actual size of laterals larger than four inches shall be determined by fixture unit requirements as per the current edition of the Uniform Plumbing Code.

Each sanitary sewer lateral shall have a cleanout at the property line, or roadway or sewer main easement, as per Standard Drawings.

Each structure with installed plumbing at an elevation such that there could be a backflow of sewage from the main, in case of a main stoppage, shall be equipped with a backflow preventer or an overflow device installed in the lateral behind the property line.

G. Special Design

Special structures, such as pump stations, pressure lines and sags, etc., shall require special considerations and approval by the Manager.

7.02 Materials and Installation

A. General

All material that is to become a permanent part of any sanitary sewer or appurtenant structure shall conform to the requirements for the particular material as set forth in these Specifications. The contractor shall supply any and

all certificates of compliance, certified test results or shall perform tests as required to assure the Manager that the material being incorporated into the work has met the requirements as specified. Request to use materials not listed in these Standards shall require special consideration and approval by the Manager.

B. Pipe and Pipe Joining Material

All pipe or conduits shall be of the size, material and strength as shown on the plans. All pipe fittings shall be marked or stamped with the trade brand name of the manufacturer, and strength or class of pipe. All pipe shall be designed to withstand all internal or external loads applied.

Supporting strength of conduits as installed to safely carry imposed gravity loads and superimposed loads (including a suitable factor of safety) shall be determined by use of Marston's formula as per Chapter IX (Structural Requirements) ASCE Manual of Engineering Practice No. 37. All pipe or conduits shall be of the same material between structures.

1. Cast Iron Pipe and Fittings

- (a) All cast iron pipe and fittings for main sewers shall be at least Class 150 and conform to AWWA Standards C 106-75. Joints shall be approved type mechanical joints. No lead joints will be allowed.
- (b) Cast iron pipe and fittings for laterals within the public right of way shall be new first quality and conform to AWWA Standards C 106-75, Cast Iron Soil Pipe and Fittings.
- (c) Concrete Lined and Ductile Iron Pipe CL and DI shall be cement mortar lined in accordance with AWWA Standards C 104-74.

2. Polyvinyl Chloride Pipe and Fittings

PVC pipe and fittings shall conform to ASTM Designations: D3034, D2564, D2665, D2729 and F679 and to SDR 35 or SDR 26. Pipe installed at greater than eight foot requires special engineering submittal and MPUD approval. Pipe showing signs of sunburn and/or discoloration will not be accepted.

C. Manholes

All manholes shall be water tight structures and shall have Polypropylene steps from top to bottom. Manholes shall be constructed to grade as shown on the

plans and shall be constructed to detail as shown on the Standard Drawings. Pre-cast reinforced concrete manhole risers and tops shall conform to ASTM Designations: C478. Pre-cast tops shall be the eccentric cone type. All cement used in the construction of concrete manholes shall be Type II and conform to ASTM Designation: C150. All joints in manhole sections shall be sealed with Bentonite Clay Waterstop then grouted smooth.

7.03 Final Acceptance:

A. Cleaning

Prior to acceptance of any sewer line by MPUD the contractor shall clean all lines with a Wayne-type sewer cleaning ball under hydrostatic pressure. Any stoppage, dirt or foreign matter shall be removed from the lines. All cleaning and testing of sewer lines shall take place after all construction work is completed, up to but not including the final paving. The system will be inspected after final paving is completed and any damage to the system during final paving and cleanup will be corrected before acceptance.

B. Testing Sewer Mains

Mandrell Test

A rigid eight-vane mandrell shall be pulled through all line segments that have an upstream and downstream manhole or flushing inlet. A line segment which has a deflection equal to or greater than 7-1/2% of the base inside dimension shall be replaced. The base inside diameter and maximum 7-1/2% deflection is as follows:

<u>Nominal Size</u>	<u>Base Inside Diameter</u>	<u>7-1/2% Deflection</u>
6"	5.742"	5.31"
8"	7.665"	7.09"
10"	9.563"	8.84"
12"	11.361"	10.51"

Prior to final acceptance all sewer lines shall be tested for leakage by use of the low pressure air test. The test shall be performed using the following procedures and under the observation of an MPUD representative. Prior to testing, all pipe shall be flushed clean or other approved cleaning methods shall be used to assure pipe contains no debris of any nature (see A above).

After a manhole-to-manhole reach of pipe has been backfilled and cleaned, the pneumatic plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig. At least two minutes shall be allowed for the air to stabilize.

After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of the line being tested shall be termed acceptable if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig minutes is not less than the time shown for the given diameters in the following table:

Pipe Diameter* Lengths (Inches)	Minimum Length for Time Min. Time* (Min. Sec.)	(Feet)	Addl. Time for Longer Pipe Sections (Seconds)
6	2:50	0-398	0.427 x Length in feet
8	3:47	0-298	0.760 x Length in feet
10	4:43	0-239	1.187 x Length in feet
12	5:40	0-199	1.709 x Length in feet

* Main line pipe diameter and main line length (manhole-to-manhole). Main line sections of pipe being tested shall also include all house service laterals for each section, but no additional length or time will be allowed for the house service lines.

All testing and cleaning equipment shall be supplied by the contractor.

A. Testing Manholes

Completed manhole structures shall be tested by the contractor for water tightness before acceptance by the District.

Exfiltration from manholes in excess of one-half (1/2) gallon per twenty-four hours will not be permitted and any such seepage shall be repaired by the contractor at his expense.

SECTION 8 - DOMESTIC WATER SUPPLY AND DISTRIBUTION SYSTEM

8.01 General

The intent of these Standards is to provide a water supply and a distribution system that will safely convey the required amount of high quality water throughout the distribution system for peak domestic demand in conjunction with an emergency fire flow demand. These Standards will govern the design and installation of any water system which will be granted or dedicated to MPUD for operation and maintenance.

8.02 Distribution System

A. Requirements for Domestic Use

1. For design purpose the daily per capita use shall be two hundred (200) gallons per day, and the average family or residential unit shall be four (4) persons per unit.
2. Distribution mains shall be designed so that the normal working pressure will not exceed 100 psi.

B. System Layout

The distribution system shall be laid out in a grid form wherever possible, so as to attempt to equalize the pressures within the system under use. Sizes and depth of lines shall be in accordance with Title 22 H&S.

1. Layout and Location

Mains shall be laid out in the dedicated roadway wherever possible so as to keep easement requirements to a minimum. Mains shall be laid out on the opposite side of the roadway centerline from the sanitary sewer lines - preferably within five (5) feet of the roadway centerline. Mains shall be laid out a minimum of ten (10) feet from sanitary sewer lines and ' from gravity storm drains which run parallel.

2. Line Size

Minimum size of any main supplying both domestic and fire demand shall be size (8) inches inside diameter. Short runs, to serve courts or cul de sacs under five hundred (500) feet in length, may be six (6) inch inside diameter with approval from the District.

3. Depth

Minimum cover for water mains shall be thirty-six (36) inches. Minimum cover for services shall be twenty-four (24) inches. Any variations from these minimums shall have special approval of the Manager. Wherever a water main crosses a sewer line, the water main shall be at least one foot above the sewer line.

4. Valves, Hydrants, Blow-Offs, etc.

- (a) Shutoff Valves - At least three (3) valves shall be placed at crosses. At least two (2) valves shall be placed at tees. The system shall be designed and valves placed so that not more than eight hundred (800) feet of line will have to be removed from service for repairs, maintenance, etc.
- (b) Pressure Reducing Valves (PRV) - Whenever pressure reducing valves are installed within the system, they shall:
 - (1) Be located within a concrete vault. Plan submittal is required.
 - (2) Include two parallel pressure reducing valves – one to meet normal demand flow and one to meet peak design flow including fire flow.
 - (3) The pressure reducing valves must be supplied as a pre-assembled pre-tested package system from the valve supplier.

(c) Fire Hydrants and Blow Offs.

Fire hydrants shall be located at street intersections wherever possible and shall be spaced along the street frontage at maximum intervals of five hundred (500) feet. The minimum size main serving a fire hydrant shall be six (6) inches. Fire hydrants shall be installed as per Standard Drawings. Blow offs or fire hydrants shall be installed on all permanent dead ends.

C. Service Lines

Service lines from the water main to the property line shall normally be installed when the distribution system is constructed. Services shall be installed with a corporation stop at the main and a curb stop at the property line. Services shall be installed as per Standard Drawings.

SECTION 9 - PIPES AND FITTINGS

9.01 Work Included:

- A. Furnish, install, and test all water main, fittings, and appurtenances as shown and as specified. Pipe material may be Ductile Iron or PVC at contractors option, unless shown otherwise on plans.

9.02 Submittal Requirements:

- A. Three (3) copies of shop drawings, manufacturer's literature, and guarantees shall be submitted for review.
- B. Three (3) copies of shop drawings of mechanical restrained joint assemblies when used in lieu of concrete thrust blocks.
- C. Thrust block design criteria with soil types identified.
- D. Contractor shall submit an Affidavit of Compliance with AWWA Standards.

9.03 References:

- A. Uniform Plumbing Code published by the International Association of Plumbing and Mechanical Officials, latest revision.
- B. American Water works Association Standards published by the American Water Works Association, latest revision.

9.04 Products:

- A. Ductile Iron Pipe
 - 1. General: Ductile iron pipe shall conform to ANSI A21.51 (AWWA C151) for pressure Class 250 and shall be Thickness Class 50 minimum unless shown otherwise. Pipe lengths shall be no less than 5 feet.
 - (a) Concrete encased ductile iron pipe shall be polyethylene encased. Polyethylene encasement shall meet requirements specified in AWWA C105.

2. Joints:
 - (a) Buried pipe and pipe fittings shall have push-on joints or mechanical joints conforming to AWWA C111. Flanged joints, sleeve-type mechanical couplings, and restrained-type couplings shall be used when shown.
 - (b) For push-on joints, shape of pipe ends shall conform to ANSI A21-11 (AWWA C111).
 - (c) For mechanical joints, dimensional and material requirements for pipe ends, glands, bolts, nuts and gaskets shall conform to ANSI A21.11 (AWWA C111).
 - (d) For flanged joints, ends of pipe and fittings shall be provided with cast iron flanges conforming to ANSI A21.10 (AWWA C115) except that the flanges for pipe shall be screwed-on type with threads conforming to ANSI B16.1 for 150 lb. Class. Bolts, nuts and washers shall be stainless steel. Gaskets for flanged connections shall conform to ANSI B16.1. Gaskets shall be plain rubber gaskets, 1/8 inch in thickness.
3. Fittings: Fittings with mechanical joints shall conform to ANSI A21.53 (AWWA C153) or ANSI A21.10 (AWWA C110) flanged ends shall conform to ANSI A21.10 (AWWA C110). Fittings shall have pressure rating at least equivalent to that of the pipe. Fittings shall have cement mortar lining.
4. Coating and Lining: Piping shall be bituminous seal-coated and cement mortar lined. The lining shall conform to AWWA C104.

B. POLYVINYL CHLORIDE WATER MAIN PIPE (PVC)

1. General: PVC pipe 4-inches and larger in diameter shall conform to AWWA C900, unless otherwise specified. The pipe shall be pressure Class 235 or 305 (PSI) unless shown otherwise. Each standard or random length shall have been factory tested to four times the service pressure rating of the pipe. Each length of pipe shall be marked with the manufacturer's name, nominal size, pressure classification and date of manufacture. Pipe must be installed within 12 months of the date of manufacture. Pipe with signs of sunburn and/or discoloration of material will not be accepted. Pipe lengths shall be no less than 5 feet. PVC pipe installed on the low pressure side of a pressure reducing valve must be pressure class 305.

2. Joints: Joints shall be push-on type couplings or integral socket bell PVC pipe unless otherwise shown with rubber gaskets conforming to ASTM D3139 and ASTM F477. Integral socket bells of PVC pipe or separate couplings shall meet the same strength requirements as that of the pipe. All component parts of each joint including gaskets and coupling shall be clearly marked for use with the pipe for which they are intended. Pipe joint restraints shall be used as necessary and when shown on the plans.
3. Fittings: Fittings shall be of ductile iron conforming to ANSI A21.10 (AWWA C110) with mechanical joint to fit the particular make of pipe furnished. All mechanical joints shall be installed with thrust joint restraints. Fittings shall have a pressure rating of at least equivalent to that of the pipe used and shall be cement-mortar lined in accordance with ANSI A21 and AWWA C104.

C. COUPLINGS

1. Couplings shall be ductile iron mechanical joint sleeves.

D. TRACER WIRE FOR BURIED PIPING

1. For all buried piping, including mains and service lines, install #10 copper wire taped to pipe at 6 foot intervals, 2 foot on service lines, and brought up in valve box as shown on the plans. Tracer wire on service lines are to be connected to the main tracer wire. Tracer wire splices and connections are to be provided with a brass or copper threaded style clamp.

E. CONCRETE FOR THRUST BLOCKS

1. Concrete shall have a minimum compressive strength of 2500 psi after 28 days.
2. Thrust blocks will be required at all bends, tees, crosses, fire hydrants and dead ends. Must conform to UNI-B-13.

F. THRUST JOINTS RESTRAINT

1. Joint restraints shall be EBBA Iron Megalug 1100 series with "Mega-Bond" coating or approved equivalent for mechanical joint pipe. US Pipe TR-FLEX pipe and fittings may be used in lieu of mechanical joint pipe fittings and separate thrust restraints.

G. POLYETHYLENE SERVICE PIPE

1. Polyethylene pipe for services shall be 1" and 2" diameter shall conform to AWWA C901 pressure class 200 unless otherwise specified. 1" pipe shall be iron pipe size (IPS). 2" pipe shall be copper tube size (CTS).

9.05 Execution:

A. HANDLING AND DISTRIBUTION OF MATERIALS

1. No more than four week's supply of material shall be distributed in advance of pipe laying operations, unless otherwise approved or required.
2. Before laying, pipe shall be inspected for cracked, broken, sunburned or defective pieces. Pipe shall be carefully lowered into the trench to prevent damage. All dirt or other foreign matter shall be removed from inside the pipe before lowering into the trench.
3. Pipe with less than two feet of cover or exposed shall be ductile iron with joint restraints..

B. INSTALLATION OF BURIED PRESSURE PIPING (DOMESTIC WATER SYSTEM.)

1. General: Pipe, fittings, and appurtenances shall be installed in accordance with the manufacturer's instructions and in accordance with the following references as appropriate:
 - Ductile Iron Pipe - AWWA C600
 - Polyvinyl Chloride Pipe - AWWA C605
2. Handling: The pipe shall be protected to prevent entrance of foreign materials during laying operations. When laying is not in progress, and at the end of each day, open pipe ends shall be protected with a watertight plug or other approved means to exclude water or foreign material.
3. Alignment:
 - (a) Mains shall be installed to the grades and elevations shown and shall have a minimum cover of 36" from the top of the pipe to existing ground or paved surface unless otherwise shown.
 - (b) The allowable angle of deflection at any joint shall not exceed the amount recommended by the pipe manufacturer for the particular pipe size used. Deviation of any pipe section from the line and grade shown shall not exceed 1".
 - (c) Pipe shall be installed with lettering on top (12:00 O-Clock position).

- (d) Pipe shall be installed with consistent slope to provide proper operation of air reliefs.
 - (e) Pipe bedding and backfill shall be in accordance with Section 4.
4. Proximity to Public Sewer
- (a) Under normal conditions: New water mains and new water service lines shall be installed more than 10' horizontally from parallel sanitary sewer mains. When crossing perpendicular to a sewer main the new water main shall be installed at least one foot above the sewer main. No connection joints shall be made in the new water main crossing a sanitary sewer main within eight feet of the sanitary sewer main.
 - (b) In special conditions: New water mains installed 10' or less from a parallel sanitary sewer main shall be 200 psi rated pipe and installed one foot vertically above the parallel sanitary sewer main. In no case shall new water mains be installed less than 4' horizontally from a parallel sewer main. New water mains crossing perpendicular to and underneath sanitary sewer mains shall have no joints within 10' either side of the sanitary sewer main and shall have at least 4" vertical separation below the sanitary sewer main. The water main shall be pressure class 200 psi.
 - (c) Minimum separation distances to sanitary sewer mains shall be measured from the nearest outside edge of each pipe barrel.
5. Joints:
- (a) Pipe shall be assembled and joined in accordance with the manufacturer's published instructions for the type of pipe and joint used. All portion of the joints shall be thoroughly cleaned before the sections of pipe are put together. The ends of each pipe shall abut against the next pipe section in such a manner that there shall be no unevenness of any kind along the bottom half of the interior of the pipe. Where mechanical joints are used, the pipe shall be marked in such a manner that it can be determined after installation that the pipe is properly seated. In no case shall individual pipe lengths less than 5' be used in the installation of new water mains.
 - (b) All mechanical joints shall be assembled with joint restraints.

C. THRUST BLOCKS AND/OR MECHANICAL RESTRAINED JOINTS

1. Place concrete thrust blocks at all tees, elbows, plugs, and other locations where unbalanced forces exist in underground pipe in accordance with details shown. Place blocks between undisturbed ground and fitting to be anchored. Place blocking so that pipe and fittings will be accessible for repairs. Fittings including bolts shall be protected from concrete by wrapping with polyethylene meeting thickness and physical tests specified in AWWA standard C105. Thrust blocks shall be of such size as to give bearing against undisturbed vertical earth banks sufficient to absorb the thrust from line pressure, allowing a maximum earth bearing pressure of 500 pounds per square foot per foot of depth below natural grade or as shown. Preparation for thrust blocks must be inspected by an MPUD representative before placement of concrete.
2. U.S. Pipe TR-FLEX or approved equivalent pipe and fittings or restrained joint fittings may be used in-lieu of thrust blocks where thrust blocks are not suitable if approved by pipe manufacturer and Engineer. Contractor shall submit shop drawings showing methods of joint restraint for each type of restrained joint fitting to be used including the length of pipe having restrained push-on joints on all pipes which connect to the restrained fitting.

The restraint mechanism shall consist of individually activated gripping surfaces to maximize restraint capability. Twist-off nuts, sized the same as the tee-head bolts, shall be used to insure proper activating of restraining devices. The gland shall be manufactured of ductile iron conforming to ASTM A536-80. The retainer-gland shall have a pressure rating equal to that of the pipe on which it is used through 14" with a minimum safety factor of 2:1. Gland shall be Megalug Mega-Bond by EBAA Iron, Inc., or approved equivalent. When it is necessary to restrain push-on joints adjacent to restrained fittings, a harness restraint device shall be used. All harnesses shall have a pressure rating equal to that of the pipe on which it is used through 14-inch. Harness assemblies including tie bolts shall be manufactured of ductile iron conform to ASTM A536-80. Harness shall be manufactured by EBAA Iron, Inc.

D. ACCEPTANCE TESTS FOR BURIED PRESSURE PIPING

1. All newly installed sections of buried pressure piping shall be pressure and leakage tested as described herein and AWWA C600 & C605.

2. For buried pressure pipelines, tests shall be made on two or more valved sections not to exceed 2,500 feet in length. All necessary equipment, material and labor required shall be furnished by the Contractor.
 3. Tests shall be made after the trench has been backfilled and compacted, and just prior to permanent paving but not until at least 5 days have elapsed since any thrust blocks in the section have been placed.
 4. The pipe shall be filled with water and all air expelled from section being tested. A test pressure not less than 1.5 times the working pressure of the pipe at the point of testing is required. A minimum of 150 psi at the highest elevation of the pipe in the test section shall be applied.
 5. The test pressure in the line shall be maintained for a period of at least 2 hours. Test pressure shall be maintained within ± 5 psi during the test period by adding water as required. The water required to maintain test pressure shall be measured by means of a graduated barrel, drum, or similar device at the pump suction or through a meter.
 6. Allowable leakage at the specified test pressure shall not exceed the amounts allowed by the manufacturer and in accordance with the following references as appropriate.
 - a. Ductile Iron Pipe- AWWA C600, Table 6.
 - b. Polyvinyl Chloride Pipe- AWWA C605, Table 3
 7. Should testing disclose any visible leaks or leakage greater than that allowed, the defective joints or pipe shall be located, repaired, and retested until satisfactory.
- E.
1. All buried piping shall be disinfected before placed into operation.
 2. Disinfection shall meet the requirements of AWWA C651.
 3. Disinfectant must remain in the pipe for at least 24 hours before flushing.
 4. Disinfected pipes shall be flushed until normal distribution system disinfectant residuals are present.

5. After flushing, bacteriological samples will be collected by MPUD staff. Pipe sections failing to meet bacteriological requirements shall be re-chlorinated and re-tested. Re-tests shall be at the contractor's expense.

F. REPAIR OF SANITARY SEWER SERVICES

- 1 Care shall be exercised during trenching in order to avoid damage to existing sanitary sewer services. Each building along the pipeline alignment has a sanitary service. The approximate location of services will be marked based on record information, however the owner does not guarantee the accuracy of the record information or field markings.
- 2 Any services damaged during pipeline construction shall be promptly repaired according to MPUD current standards before proceeding with pipeline construction. Each repair must be inspected by MPUD before backfill.

SECTION 10 - VALVES AND APPURTENANCES

10.01 Work Included:

- A. Furnish, install, and test valves, fittings, and appurtenances as shown and as specified.

10.02 Submittal Requirements:

- A. Three (3) copies of shop drawings, manufacturer's literature, assembly/disassembling drawings, and guarantees shall be submitted for review.
- B. An AWWA Affidavit of Compliance shall be furnished for each size and type of valve.

10.03 References:

- A. Uniform Plumbing Code published by the International Association of Plumbing and Mechanical Officials, latest revision.
- B. AWWA C509 Latest Revision

10.04 Products:

- A. Valves:
 - 1. Gate valves 4" and larger shall be epoxy coated resilient wedge gate valves (manufacturer Mueller 2360 SERIES or approved equivalent) conforming to AWWA C509. Buried valves shall be non-rising stem with 2" operating nut.
 - 2. Valve boxes and covers for gate valves shall be Christy G5, Brooks, or approved equivalent furnished with traffic lids. Valve boxes and appurtenances shall be considered incidental to valve installation. Boxes and covers shall be designed to support H2CM4 loads unless otherwise shown on plans. Valve box riser shall be minimum 8" diameter. The word "WATER" shall be cast in the valve box cover.
 - 3. Water main air release valves shall be CLA-VAL Model 362CAV332 combination valve or approved equivalent for maximum 300 psi operating pressure.

- (a) The air release vent shall be fitted with a bronze body, stainless steel screen, Flow-Matic part no. 4304 or equivalent.
 - (b) Valve box shall be Christy B40 with 10" extension and B40-61D cover. The cover shall be modified to accommodate the vent pipe.
4. Corporation stops and saddles. Refer to section 12.
5. End of main blow offs shall be 2" inlet with 2 ½ inch outlet. Outlet shall be 2 ½ NST with Iron or brass nozzle cap. Blow offs shall be "Mainguard Hydrant" manufactured by the Kupferle foundry company or approved equivalent.
- (a) Access boxes and covers shall be Christy B40 with 10" extension and B40-61D cover.
6. Hydraulic control valves including pressure reducing valves shall be diaphragm actuated by line pressure and shall be manufactured by Cla-Valve Company. No substitutions.

10.05 Execution:

A. Valves:

- 1. Buried valves shall be set with valve box extension to finished grade.
- 2. Air Release valves shall be installed with the corporation stop mounted on top of the pipe. The piping shall slope up from the main to the valve.

B. Valve Box:

- 1. Valve box shall be set approximately at finished grade.
- 2. Valve box shall be adjusted to final pavement grade and completed in accordance with Plans, immediately prior to paving.

SECTION 11 - FIRE HYDRANT ASSEMBLIES

11.01 Work Included:

- A. Furnish, install, and test all hydrants, valves, water piping to main and appurtenances as shown and as specified.

11.02 Submittal Requirements:

- A. Three (3) copies of manufacturers literature, assembly/disassembly drawings and guarantees shall be submitted for review.

11.03 References:

- A. Uniform Plumbing Code published by the International Association of Plumbing and Mechanical Officials, latest revision.
- B. AWWA C502 latest revision.
- C. Section 90, "Portland Cement Concrete", Caltrans Standard Specifications, July 1992.

11.04 Products:

- A. Hydrant: (NO SUBSTITUTIONS)
 - 1. Hydrant shall be suitable for a minimum working pressure of 175 psi and a test pressure of 300 psi. Hydrant shall conform to AWWA C502.
 - 2. Hydrant shall be dry barrel, Mueller Super Centurion 250, A-423 5 ¼ main valve opening three way dry barrel with mechanical Joint or "Mueller Aquagrip". Nozzle connections shall be two (2) 2-1/2" connections and one (1) 4-1/2" connection, N.S. thread.
 - 3. Valve opening shall be 5-1/4inch minimum with 1-1/2" pentagon operating nut. Hydrant shall be factory painted red. One repair kit to fit all hydrants shall be supplied. Paint damage from shipping and installation shall be repaired by the contractor.
 - 1. Hydrant valves shall open left.
- B. Valve:
 - 1. Valve shall be 6 inch resilient wedge gate valve conforming to Section 10, "Valves and Appurtenances".

11.05 Execution:

A. Hydrant:

1. Hydrant shall be installed according to details shown in Plans.
2. Installation shall be made with mechanical joint fittings or "Mueller Aquagrip".
3. Remove barrel drain plugs or confirm drains are open.

B. Valve:

1. Valve shall be installed in accordance with Section 5 "Valves and Appurtenances".

SECTION 12 - NEW WATER SERVICE

12.01 General:

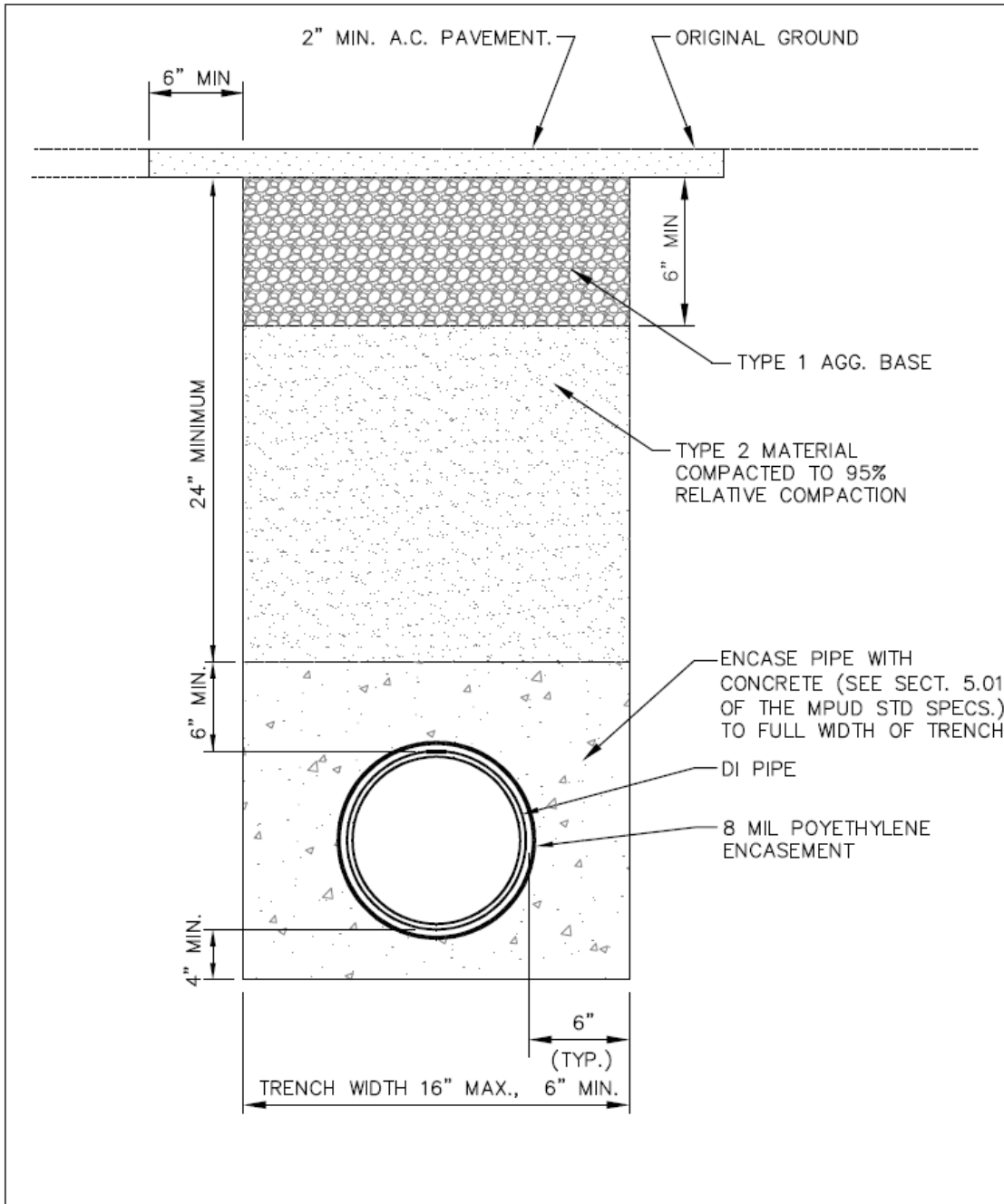
- A. A new water service connection shall consist of the saddle, tap, corporation stop, meter stop, and appurtenances as shown in Plans and specified herein. New service shall end in existing meter box with meter stop.
- B. Water service from main to water meter are to be 1", 2", 4" or 6". 4" and 6" service requests require engineered drawing submittal.

12.02 Products:

- A. Service line shall be 1" Polyethylene iron pipe size or 2" copper tube size as shown on plan. Material shall be 200 psi., ASTM D-2239, SDR 17, PE 3408, AWWA 901. Connections shall be Mueller Instatite for 1" services, pack joint for 2" services.
- B. 1" corp stop shall be Ford F-400-4 with 1" Mueller Instatite.
- C. 1" angle meter stop shall be Ford KV13-342W with 1" Mueller Instatite coupling.
- D. 2" corp stop shall be Ford FB1100-7.
- E. 2" angle meter stop shall be Ford BFA43-777W.
- F. Service saddle shall be epoxy coated ductile iron body double stainless steel strap, Smith Blair Style 317 with iron pipe thread.
- G. All 1" and 2" miscellaneous fittings not specified above shall be brass. All fittings must be suitable for contact with drinking water in accordance with AWWA C800 and ANSI/NSF Standard 61, Drinking Water Systems Components Health Effects.

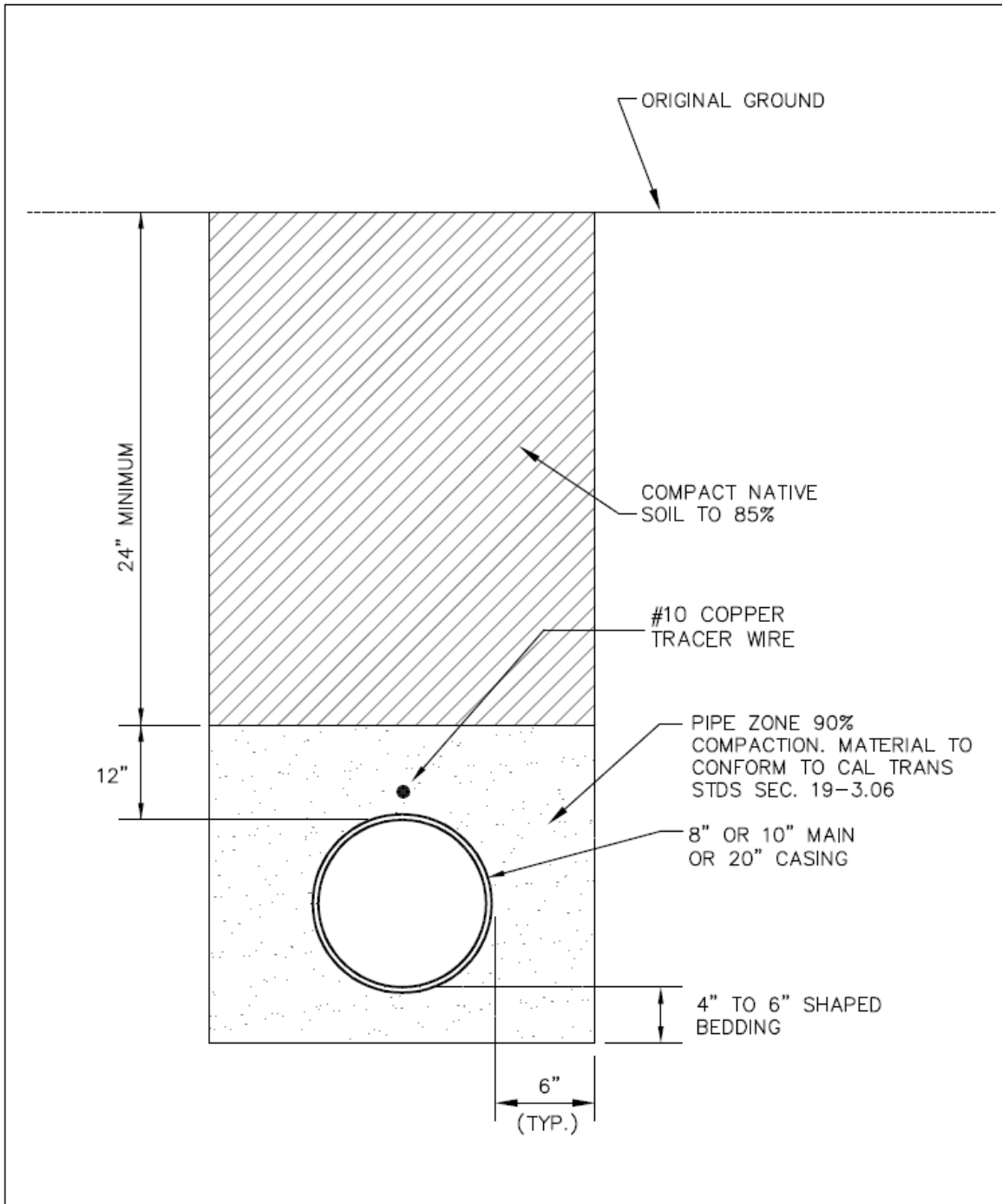
12.03 Execution

- A. Service connection shall be in accordance with the details shown on plans.
- B. Service line shall be installed in Class II bedding.
- C. Asphalt pavement shall be per Section 9 Asphalt Concrete Pavement.
- D. A 10 gauge tracer wire shall be installed for the entire length of the service line and connected to the main line tracer wire. Wire shall be taped to pipe at 4' intervals.
- E. Meter stops and corporation stops shall be installed so that they can be easily moved in alignment and plumb with the water meter or service, when installed.
- F. 1" polyethylene pipe shall be beveled with a beveling tool made for that purpose for all joints and connections.
- G. Service saddles installed on water mains must maintain a minimum of 2 feet separation between saddles.

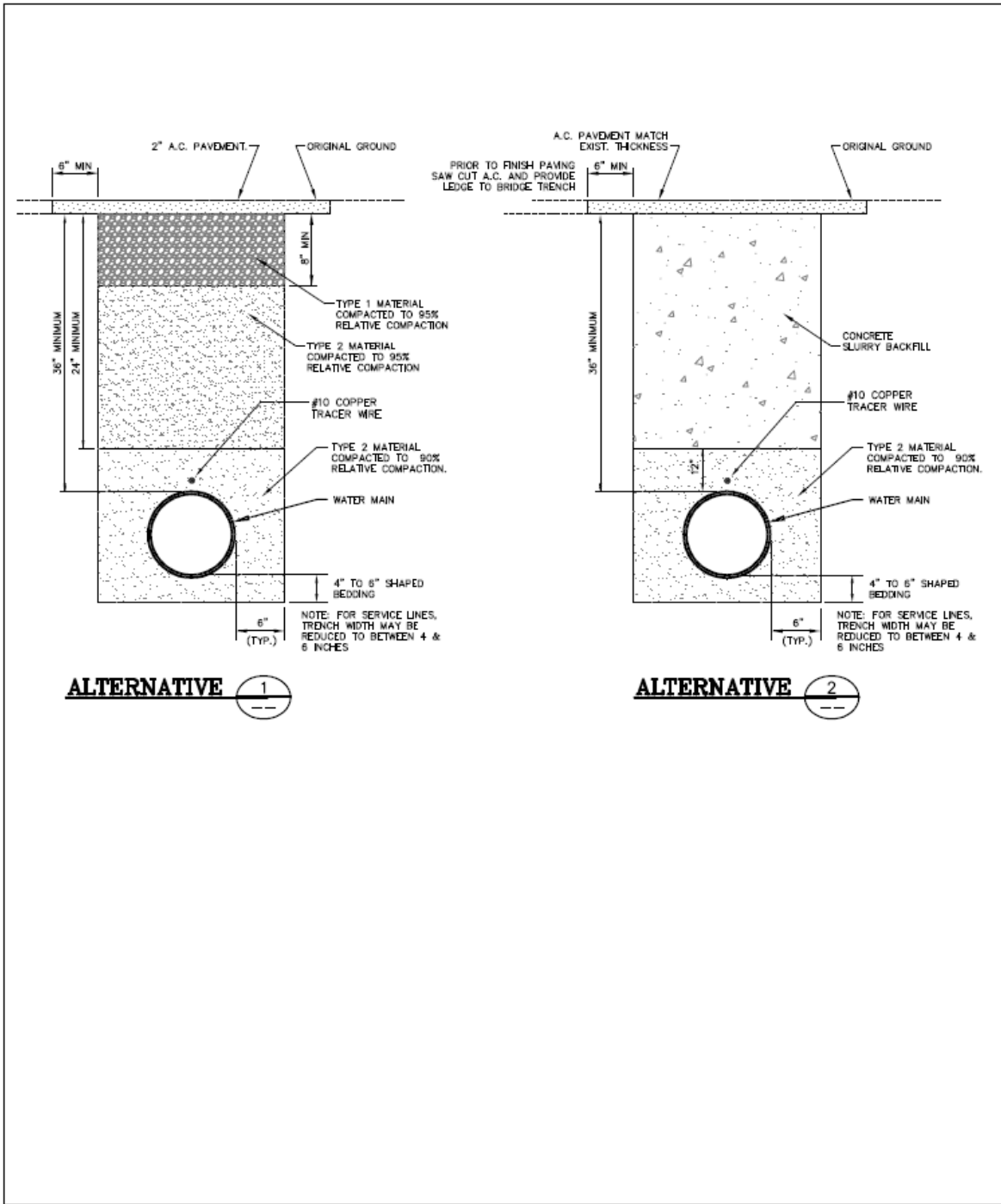


MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		TYP. TRENCH SECTION OF CONC. ENCASED PIPE	1



MARIPOSA PUBLIC UTILITY DISTRICT			
REVISION:		STANDARD TITLE:	DWG No:
DATE:		TRENCH DETAIL OUTSIDE TRAFFIC AREAS	2

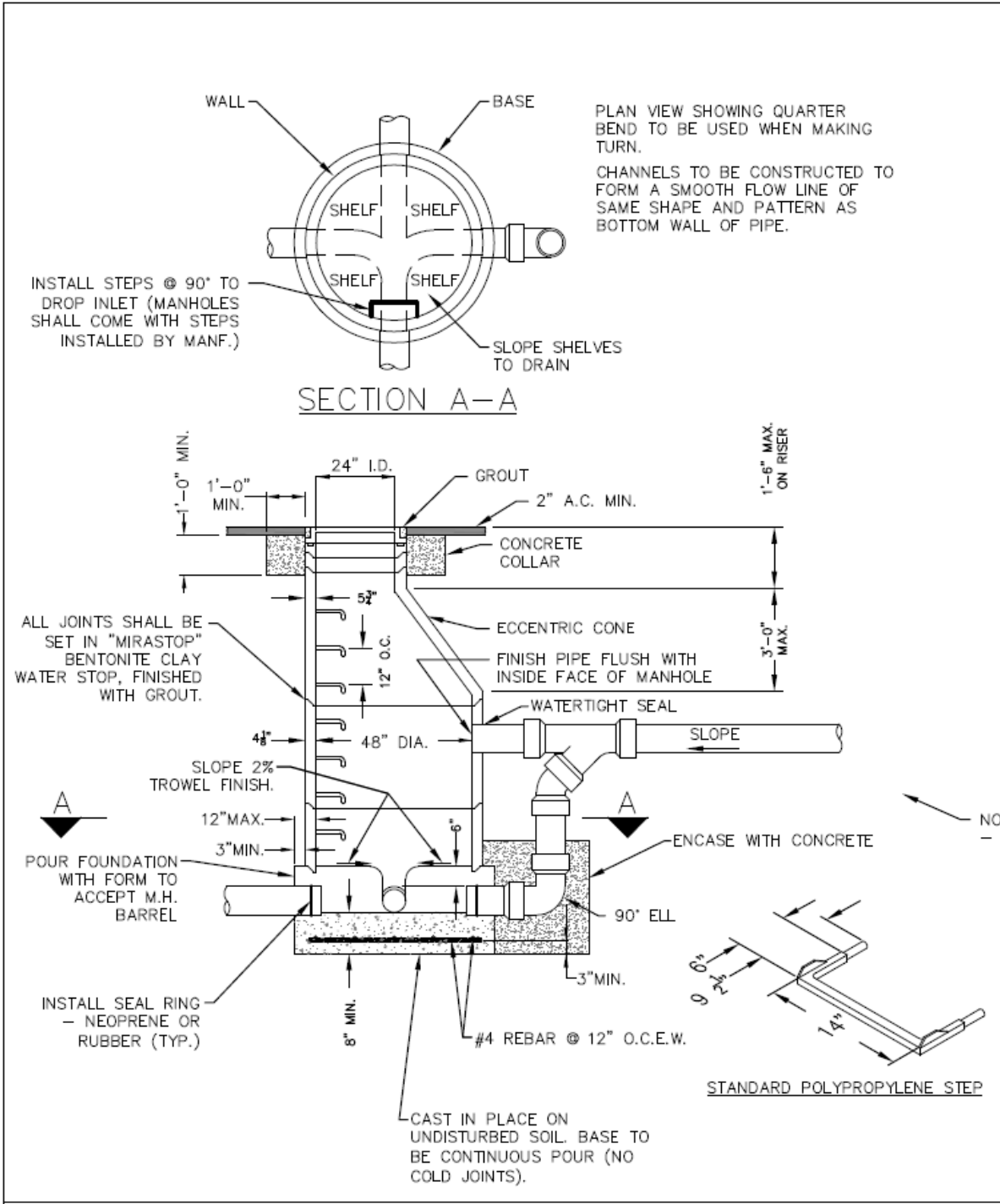


ALTERNATIVE 1

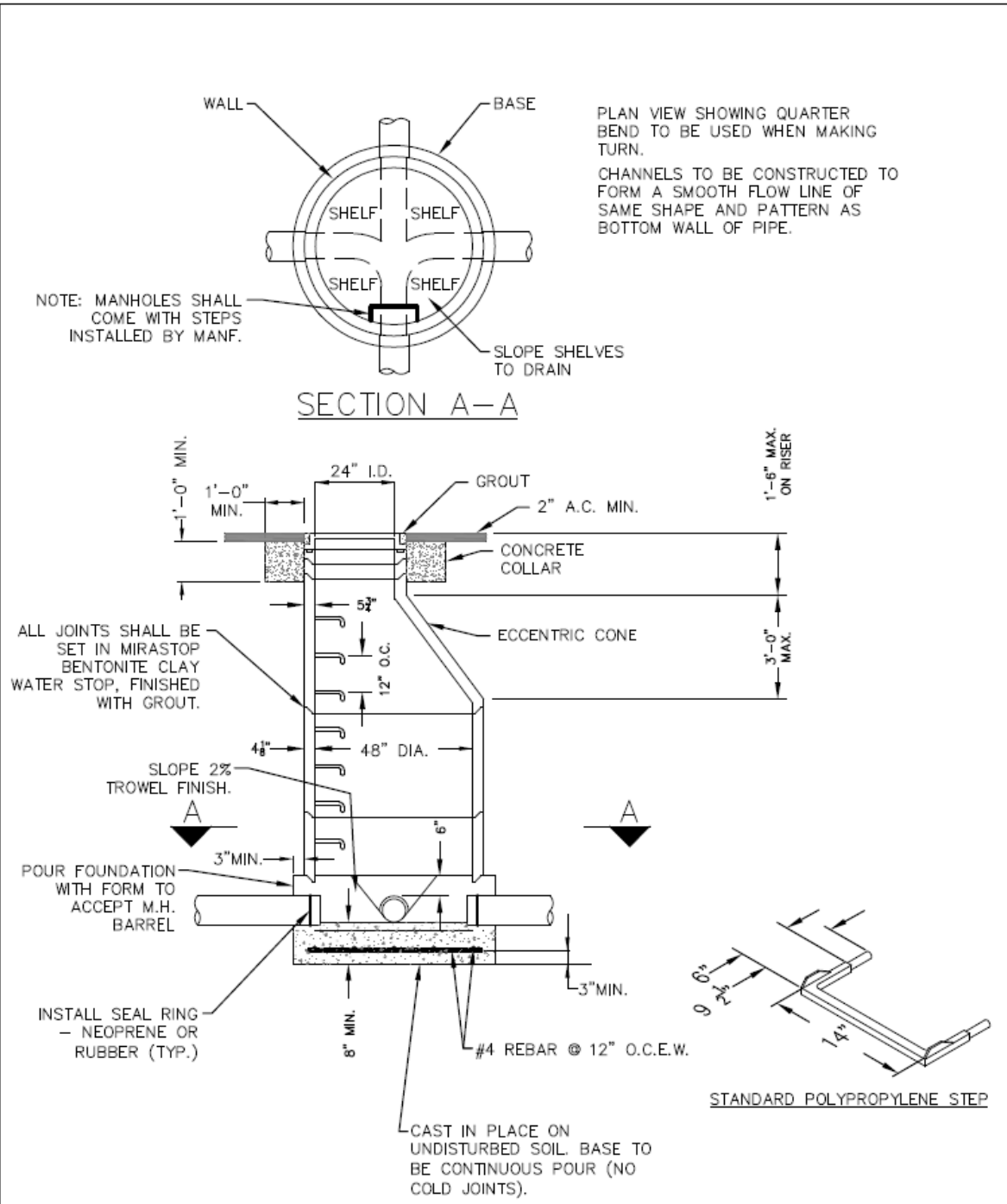
ALTERNATIVE 2

MARIPOSA PUBLIC UTILITY DISTRICT

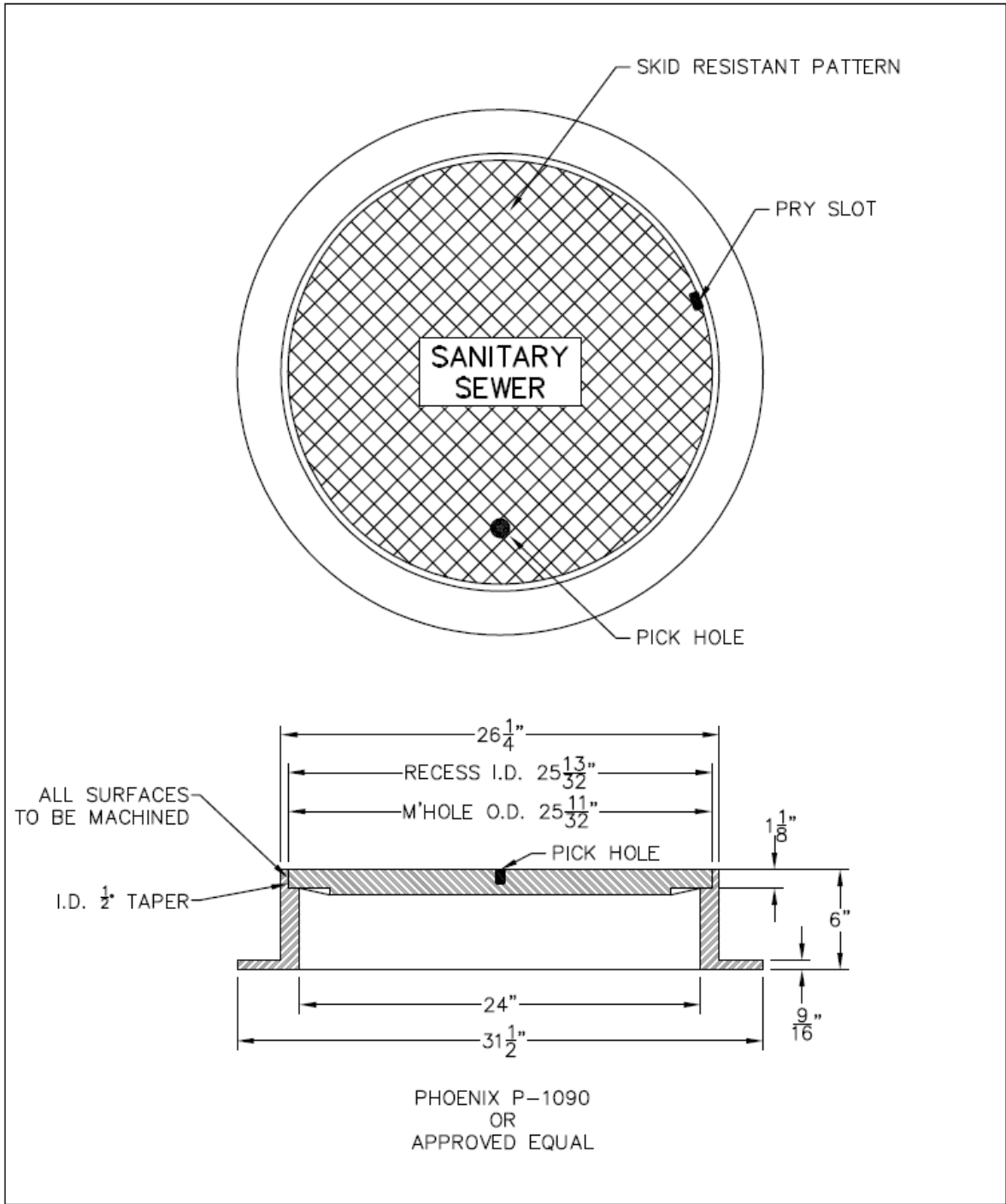
REVISION:				STANDARD TITLE:	DWG No:
DATE:				ALTERNATIVE TRENCH DETAILS - PAVED AREAS IN COUNTY R.O.W.(CHECK LOCAL ROAD AUTHORITY)	3



MARIPOSA PUBLIC UTILITY DISTRICT			
REVISION:		STANDARD TITLE:	DWG No:
DATE:		STANDARD DROP MANHOLE	4

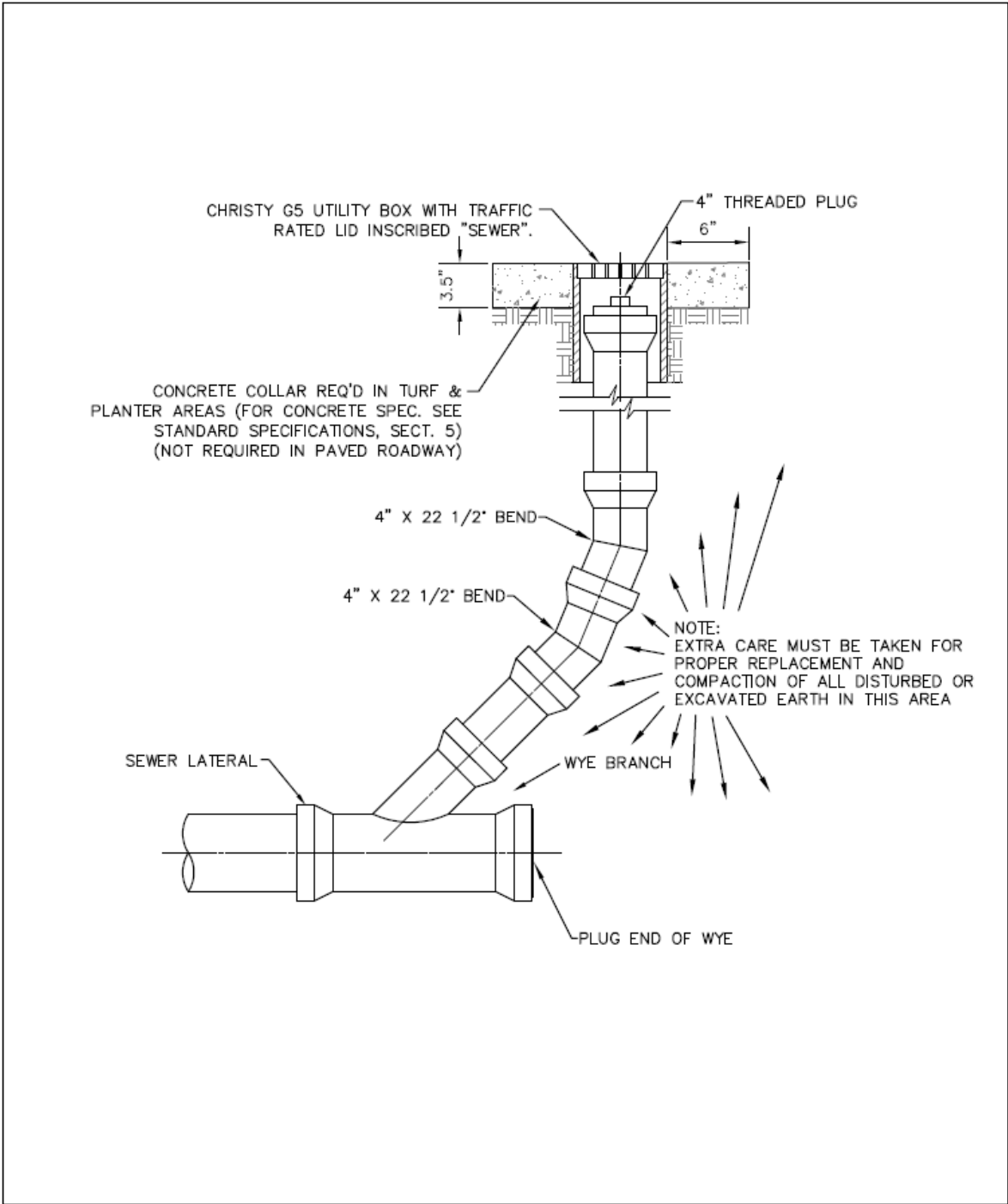


MARIPOSA PUBLIC UTILITY DISTRICT			
REVISION:		STANDARD TITLE:	DWG No:
DATE:		STANDARD PRECAST MANHOLE INSTALLATION	5



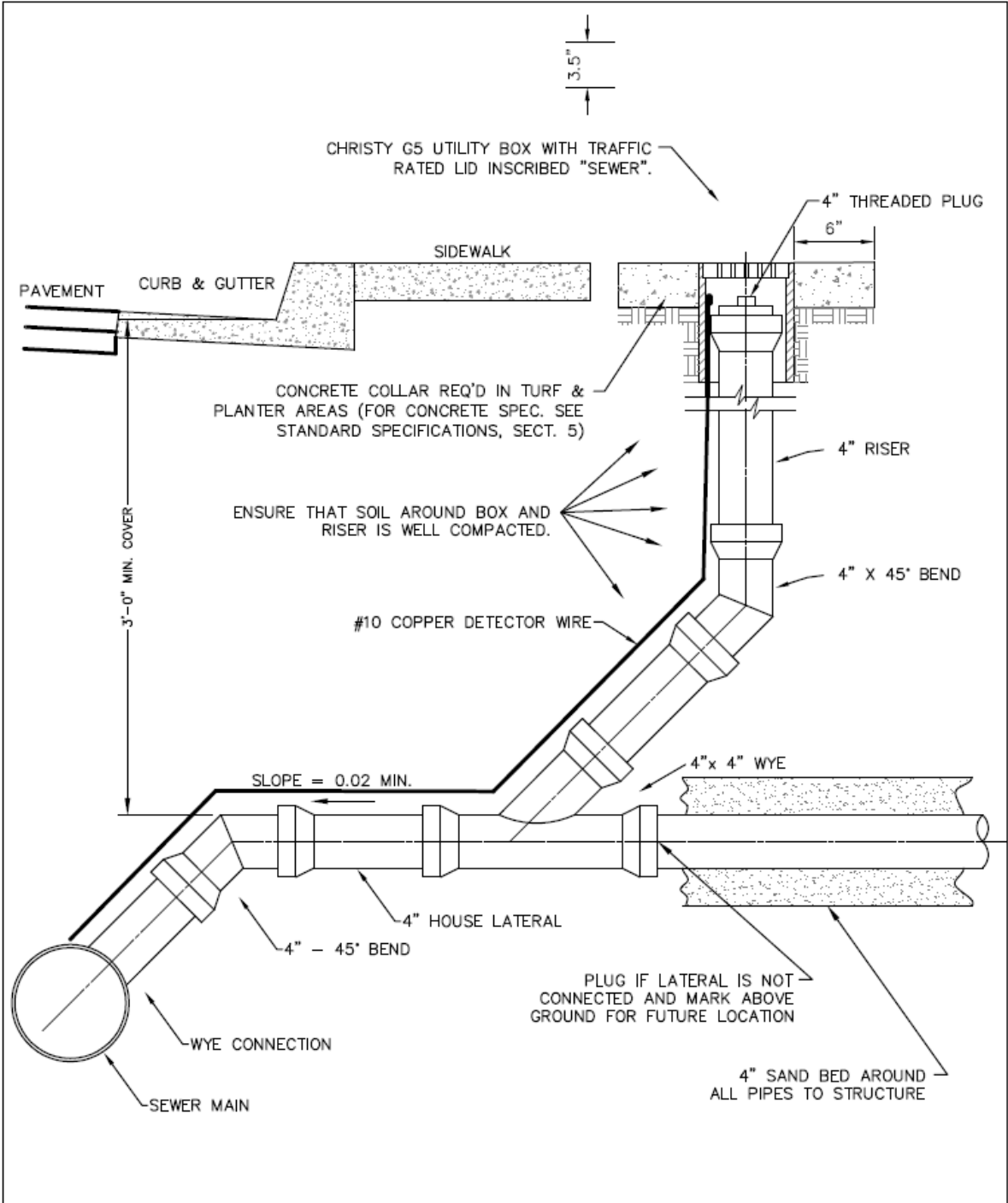
MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		CAST IRON MANHOLE FRAME AND COVER	6



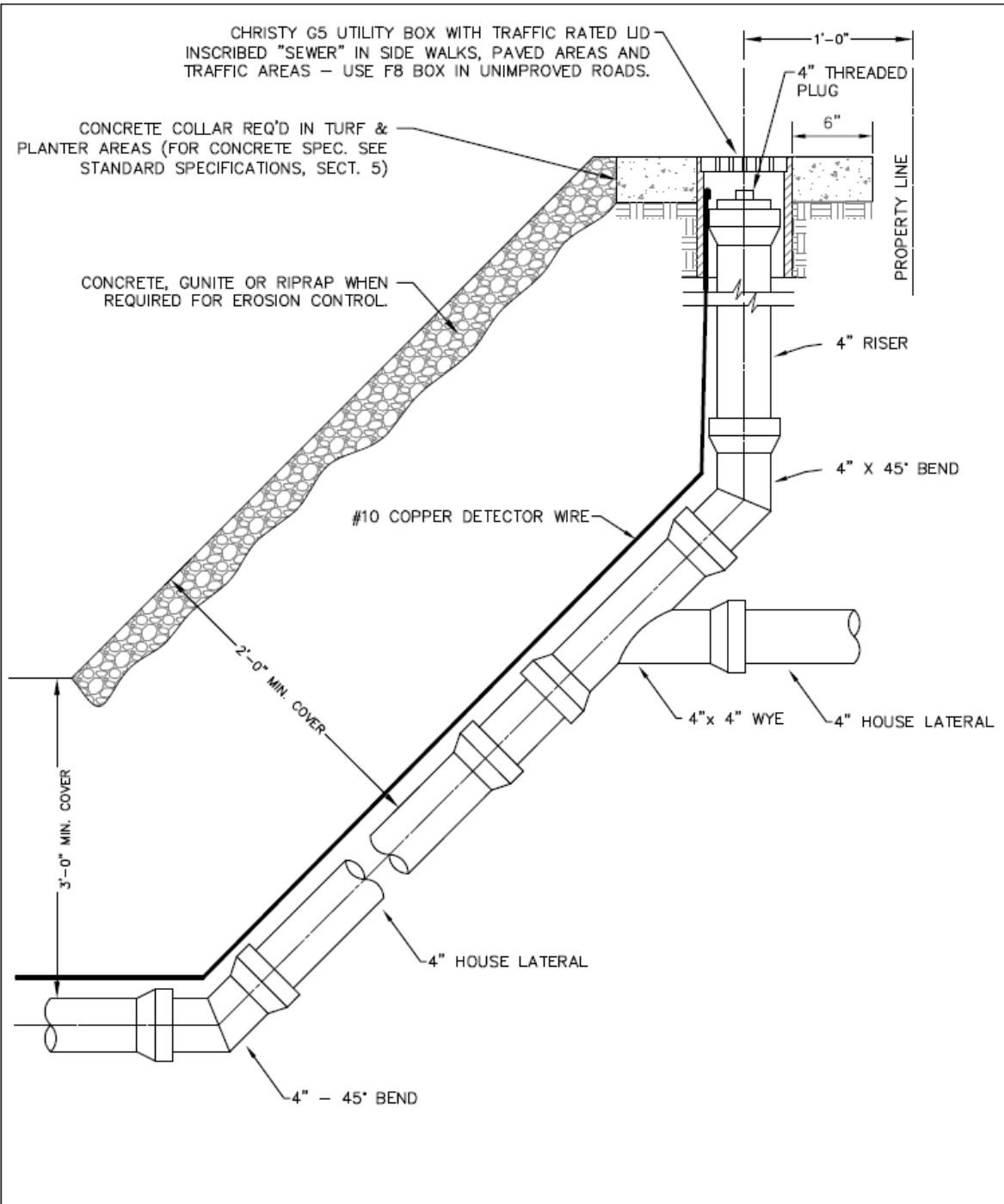
MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		SEWER CLEANOUT (6" OR 8" MAIN)	7

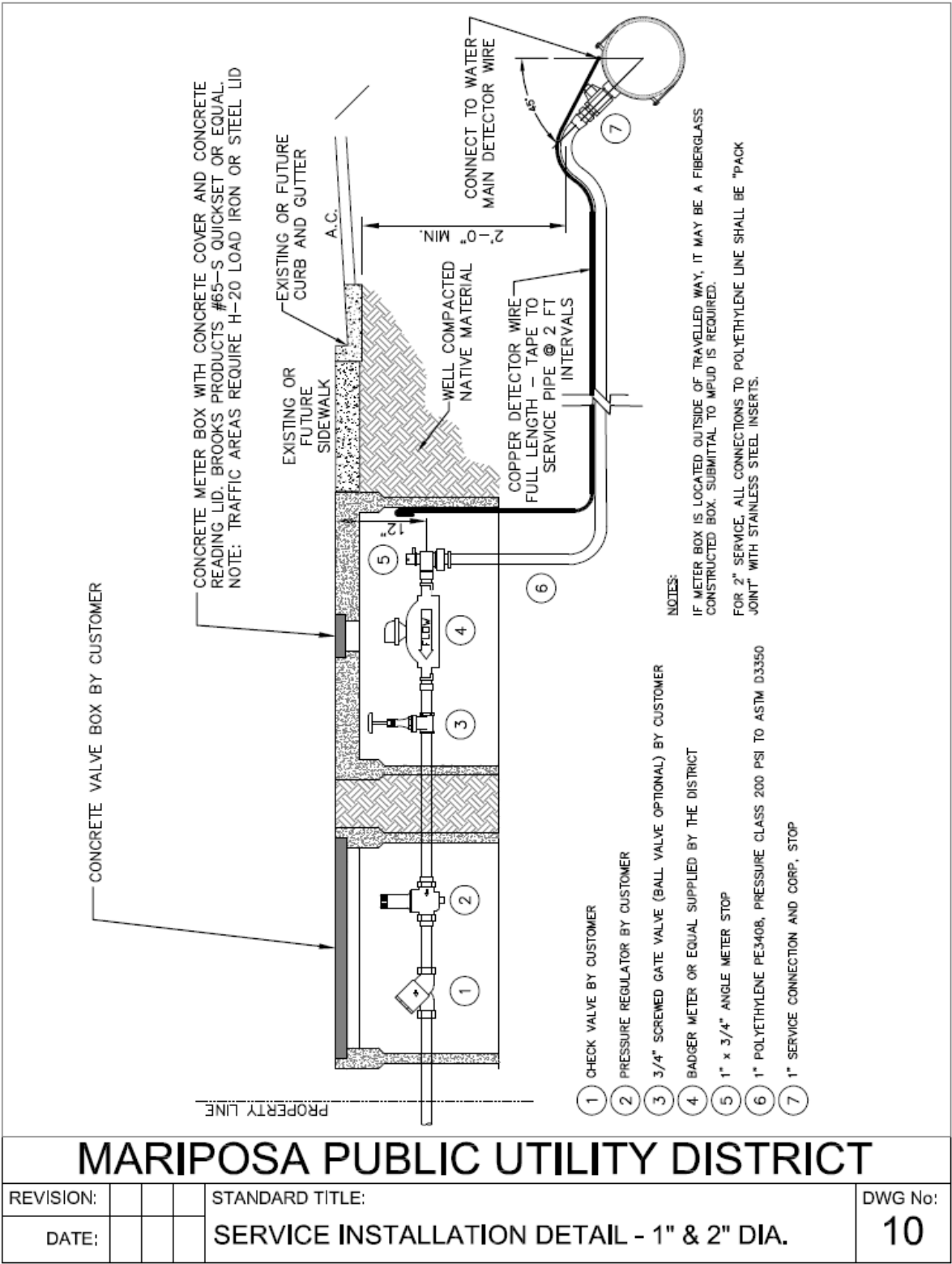


MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		HOUSE LATERAL CLEANOUT	8



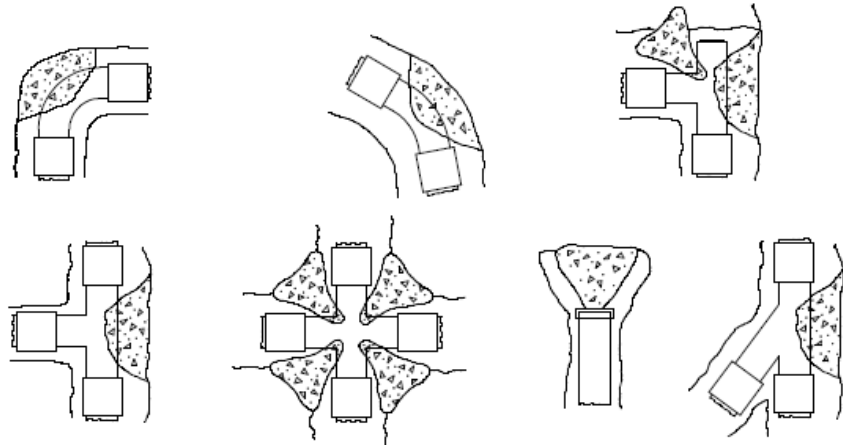
MARIPOSA PUBLIC UTILITY DISTRICT			
REVISION:		STANDARD TITLE:	DWG No:
DATE:		TYPICAL LATERAL INSTALLATION IN CUT AREA	9



SUBMITTAL REQUIRED PER SECTION 12
OF THE STANDARD SPECIFICATIONS

MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:			STANDARD TITLE:	DWG No:
DATE:			TYPICAL WATER SERVICE CONNECTION 4" AND OVER	11



ALL FITTINGS TO BE WRAPPED IN 4 MIL. VISQUEEN

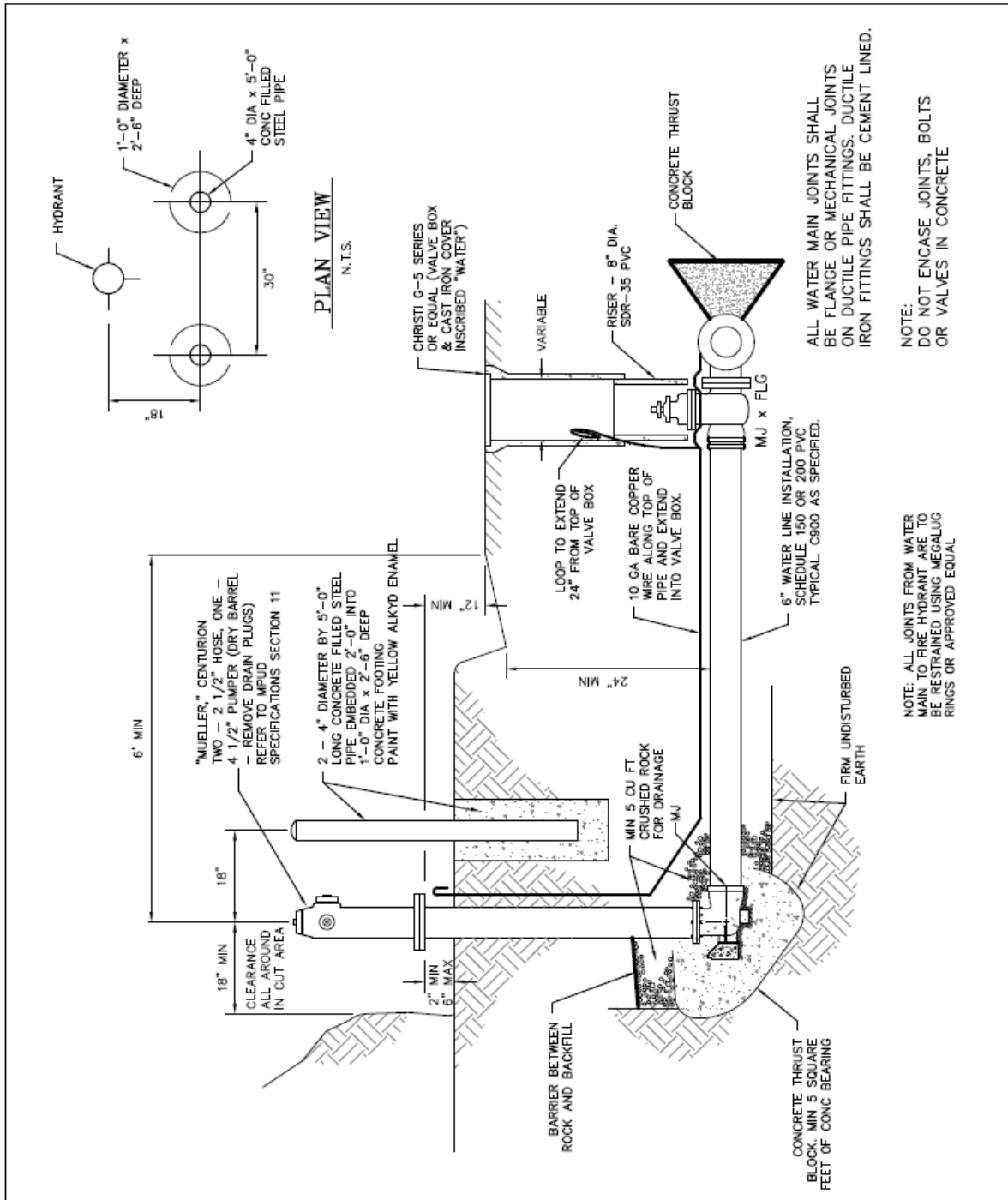
TYPICAL THRUST BLOCKS

AREA OF CONCRETE BEARING AGAINST UNDISTURBED SOIL SQUARE FEET

<u>PIPE SIZE</u>	<u>DEAD END OR TEE</u>	<u>90° BEND</u>	<u>45° BEND</u>	<u>22 1/2° BEND</u>	<u>11 1/4° BEND</u>
6	1.8	2.5	1.4	0.7	0.3
8	3.1	4.4	2.4	1.2	0.6
10	4.9	6.9	3.8	1.9	1.0
12	7.0	10.0	5.4	2.8	1.4
14	9.5	13.6	7.4	3.8	1.9
16	12.4	17.8	9.6	4.9	2.5
18	15.8	22.5	12.2	6.2	3.1
20	19.4	27.8	15.0	7.7	3.9
24	28.0	40.0	21.7	11.0	5.5

BASED ON 2000 P.S.F. SOIL BEARING CAPACITY AND 125 P.S.I. STATIC PRESSURE – SPECIAL DESIGN REQUIRED FOR SOIL LESS THAN 2000 P.S.F. CONCRETE TO HAVE ULTIMATE STRENGTH OF 2500 P.S.I. @ 28 DAYS.

MARIPOSA PUBLIC UTILITY DISTRICT			
REVISION:		STANDARD TITLE:	DWG No:
DATE:		TYPICAL THRUST BLOCKS	12

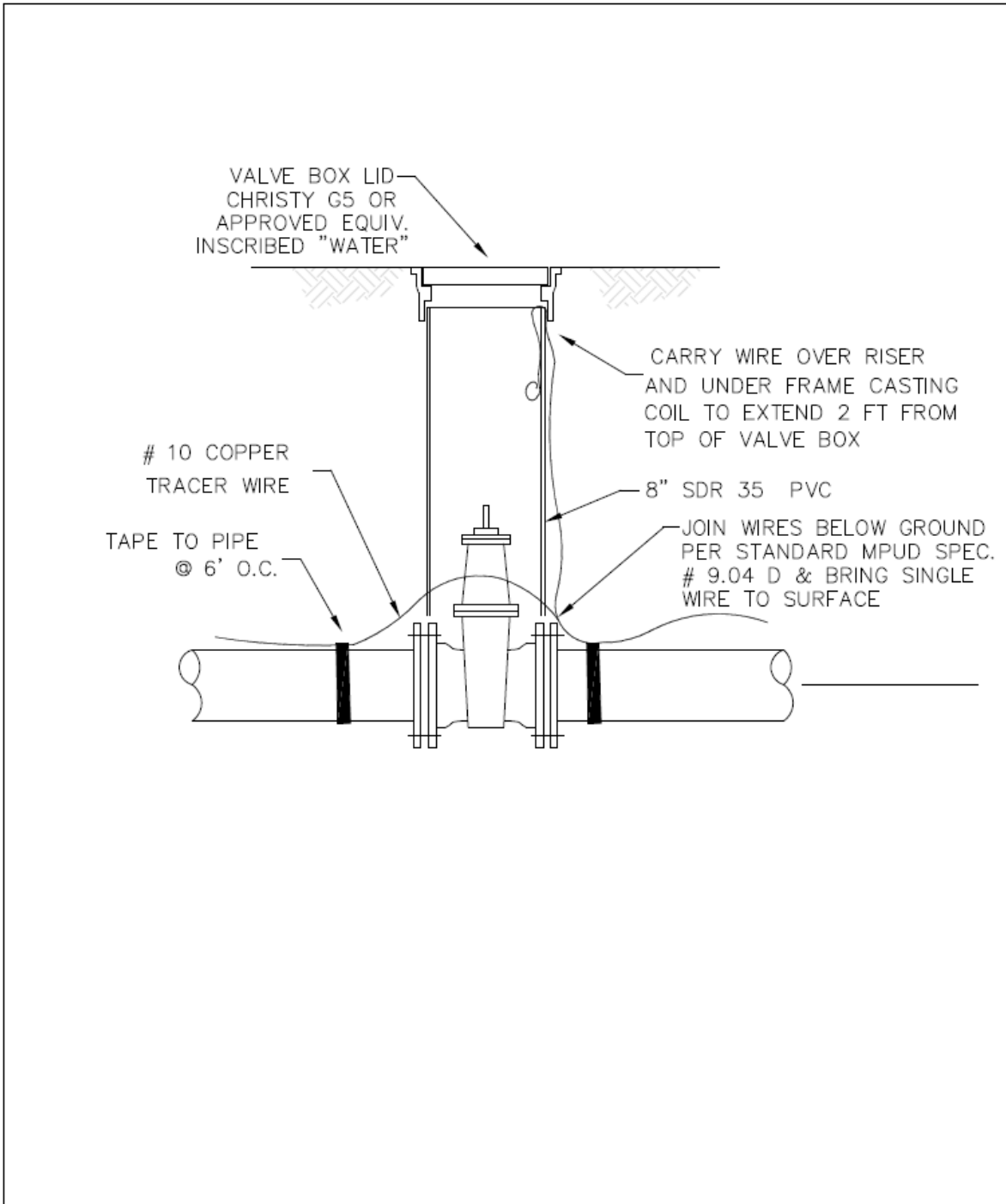


MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		
DATE:		

STANDARD TITLE:
TYPICAL FIRE HYDRANT

DWG No:
13



MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		WATER MAIN VALVE & VALVE BOX INSTALLATION	14

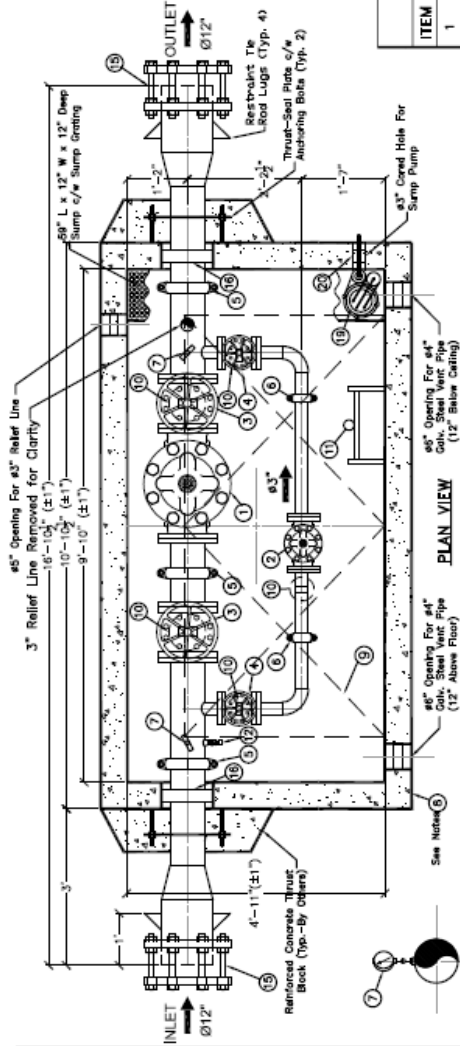
GENERAL NOTES:

1. THE SIZES SHOWN ARE TYPICAL ONLY - STATIONS ARE CUSTOM MADE TO SUIT THE APPLICATION.
2. PRV STATIONS SHALL BE MANUFACTURED BY HYDREC OR BY AN ALTERNATIVE APPROVED MANUFACTURER.
3. CHAMBERS #10565 (H-20 LOADS) INSIDE DIMENSIONS APPROX. 10' L x 5' W x 8'-6" H

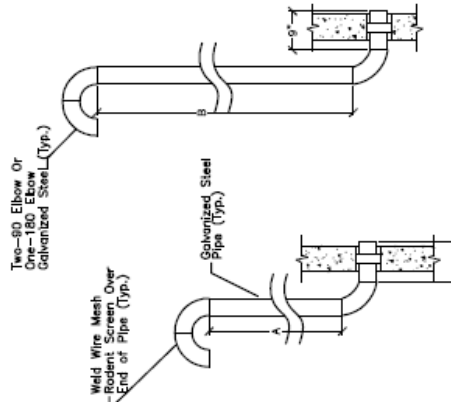
STANDARD FABRICATION & FINISHING SPECIFICATION

FABRICATED STEEL PIPE & FITTINGS TO BE SCHEDULE 40 STEEL PIPE FOR SIZES TO 10", AND 3/8" WALL FOR 12" AND LARGER.

ALL 3" AND LARGER, INSIDE WELDED SURFACES TO BE FINISHED TO BE SMOOTH AND WELDED TO AWWA C-201 AND NSF-61 SPECIFICATION. FINISH COATING WILL BE PURPLE ENAMEL.

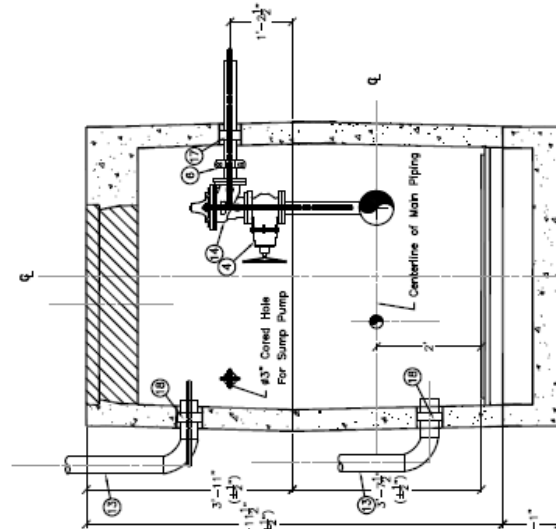


GUAGE DETAIL



A	46"
B	101"

Pipe Diameter = 4" Ø



RELIEF LINE AND VENT PIPE DETAIL

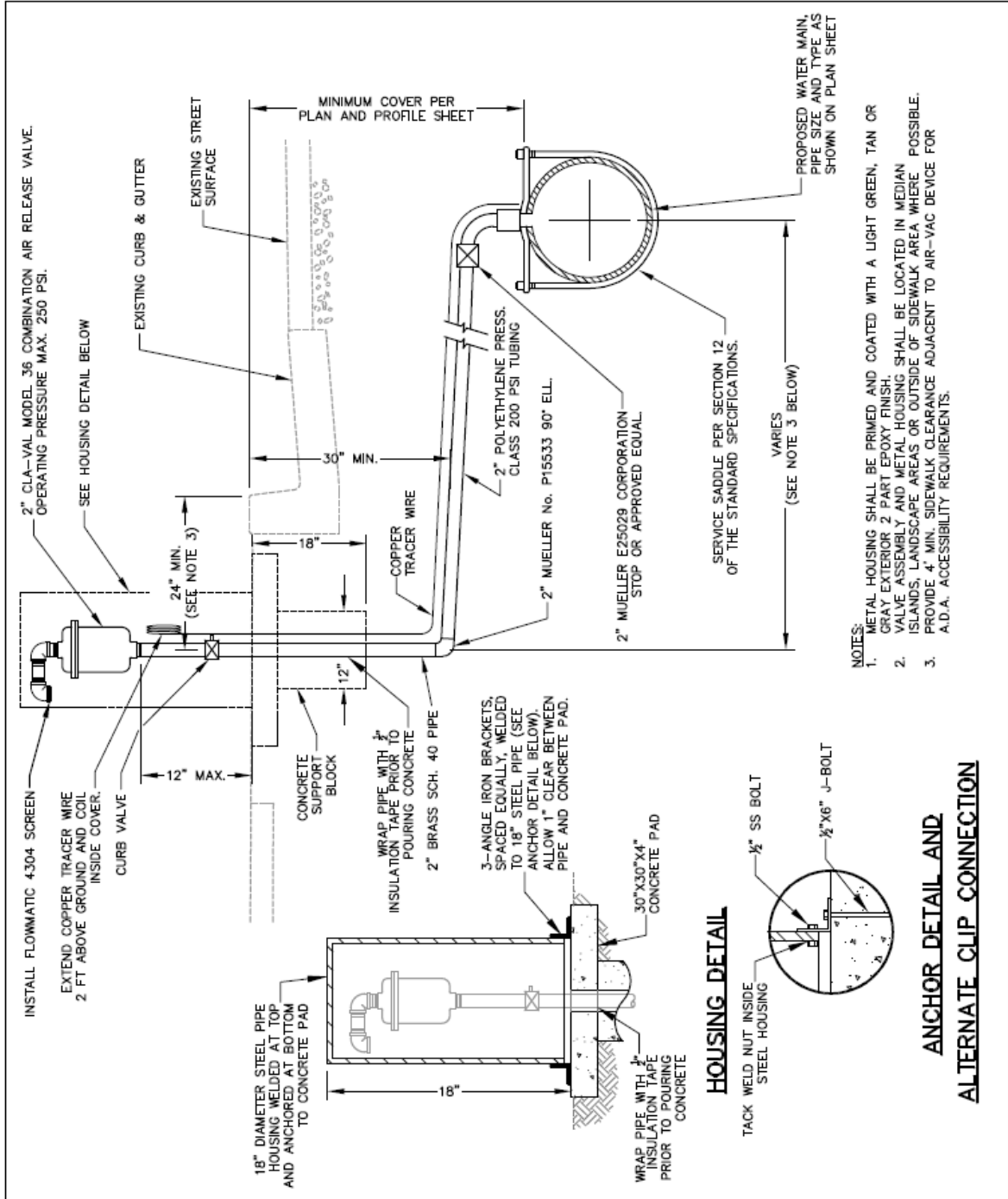
ITEM	QTY	DESCRIPTION
1	1	8" CLA-VAL 900-01YBCKCX PRV c/w X101 Position Indicator, SS Tubing & Fittings
2	1	DI Body, SS Trim, Epoxy - #150. Flgd
3	1	3" CLA-VAL 900-01YBCKCX PRV c/w X101 Position Indicator, SS Tubing & Fittings
4	2	DI Body, SS Trim, Epoxy - #150. Flgd
5	3	8" MUELLER A2360-6W41 Gate Valve c/w Handwheel - #150 Flgd
6	3	8" MUELLER A2360-6W41 Gate Valve c/w Handwheel - #150 Flgd
7	2	8" VICTAULIC #07 Coupling
8	2	4" WKA D-200Psi Pressure Gauge c/w Isolation Valve And Snubber
9	1	#10565 Precast Concrete Chamber c/w White Interior, Black Exterior, Sealant
10	5	Hydrec Aluminum 48" x 96" Double Door Hatch Adjustable Pipe Supports
11	1	10" Aluminum Ladder Assembly c/w Brackets
12	1	3/4" Hose Bib Assembly c/w Vacuum Breaker
13	2	Hydrec 4" Standard Vent Pipe
14	1	3" CLA-VAL 50A-01Y9KCX Angle Pressure Relief Valve, DISST, c/w SS Tubing & Fittings - #150 Flgd
15	2	12" Smith Blair 441 Transition Coupling
16	2	Adapter c/w Gaskets
17	1	8" Link Seal Assembly
18	2	3" Link Seal Assembly
19	1	4" Link Seal Assembly
20	1	Zoeller Sump Pump-Shipped Loose, Installed By Others.
20	2	1-1/4" Link Seal Assembly

MARIPOSA PUBLIC UTILITY DISTRICT

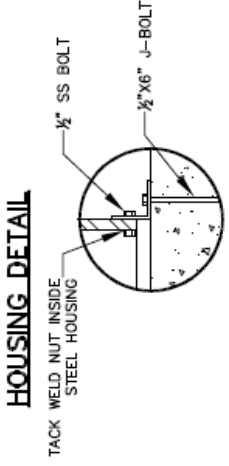
REVISION:	
DATE:	

STANDARD TITLE:	PRE-ASSEMBLED & PRE-TESTED PRV STATION
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DWG No:	15
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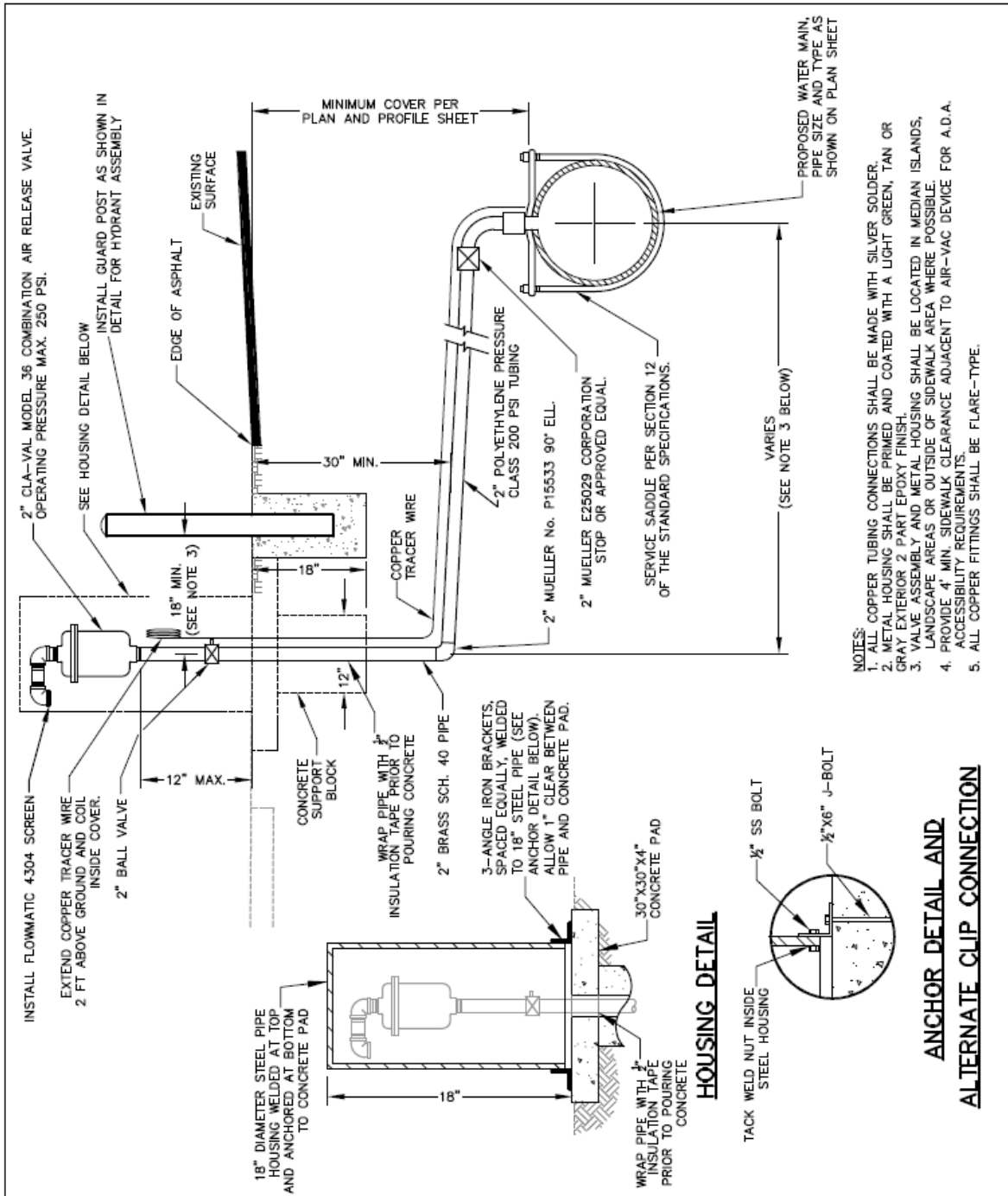


- NOTES:
- METAL HOUSING SHALL BE PRIMED AND COATED WITH A LIGHT GREEN, TAN OR GRAY EXTERIOR 2 PART EPOXY FINISH.
 - VALVE ASSEMBLY AND METAL HOUSING SHALL BE LOCATED IN MEDIAN ISLANDS, LANDSCAPE AREAS OR OUTSIDE OF SIDEWALK AREA WHERE POSSIBLE. PROVIDE 4" MIN. SIDEWALK CLEARANCE ADJACENT TO AIR-VAC DEVICE FOR A.D.A. ACCESSIBILITY REQUIREMENTS.
 - VARIES (SEE NOTE 3 BELOW)



MARIPOSA PUBLIC UTILITY DISTRICT

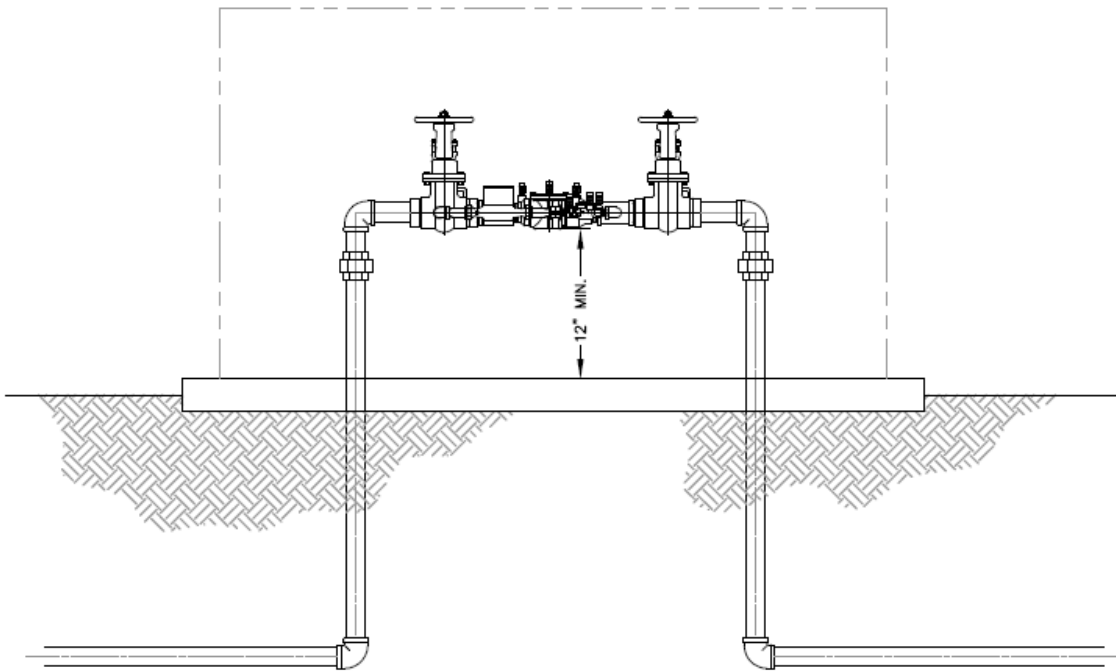
REVISION:		STANDARD TITLE:	DWG No:
DATE:		WATER MAIN COMBINATION AIR RELEASE VALVE IN PAVED AREA	16



- NOTES:
1. ALL COPPER TUBING CONNECTIONS SHALL BE MADE WITH SILVER SOLDER
 2. METAL HOUSING SHALL BE PRIMED AND COATED WITH A LIGHT GREEN, TAN OR GRAY EXTERIOR 2 PART EPOXY FINISH.
 3. VALVE ASSEMBLY AND METAL HOUSING SHALL BE LOCATED IN MEDIAN ISLANDS, LANDSCAPE AREAS OR OUTSIDE OF SIDEWALK AREA WHERE POSSIBLE.
 4. PROVIDE 4 MIN. SIDEWALK CLEARANCE ADJACENT TO AIR-VAC DEVICE FOR A.D.A. ACCESSIBILITY REQUIREMENTS.
 5. ALL COPPER FITTINGS SHALL BE FLARE-TYPE.

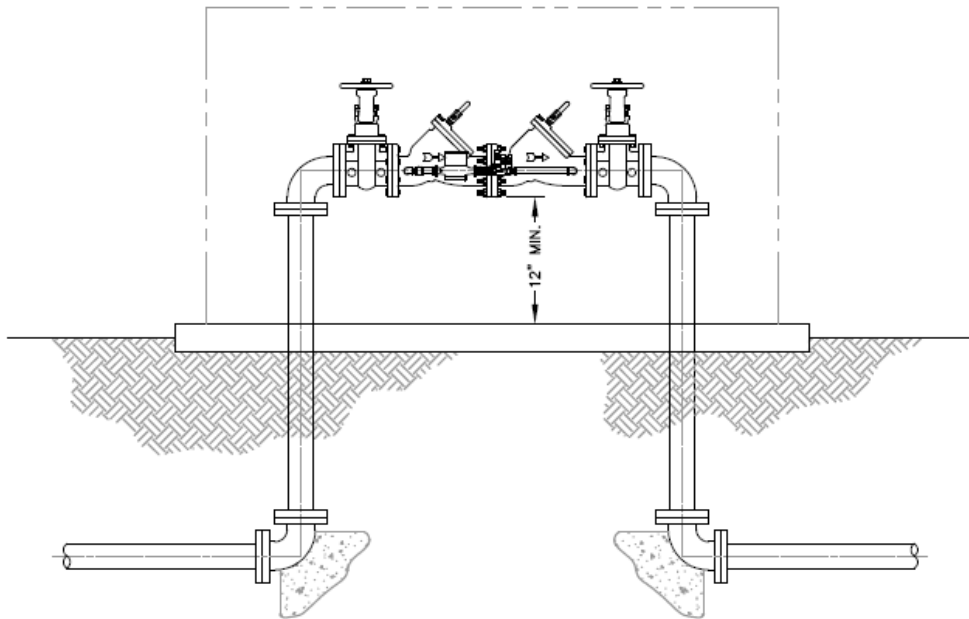
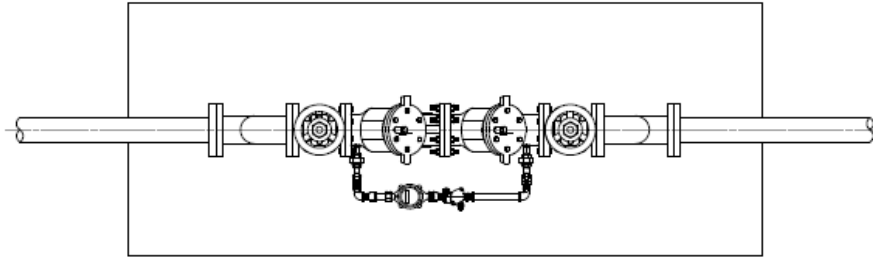
MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		WATER MAIN COMBINATION AIR RELEASE VALVE IN AREA WITHOUT CURB & GUTTER	17



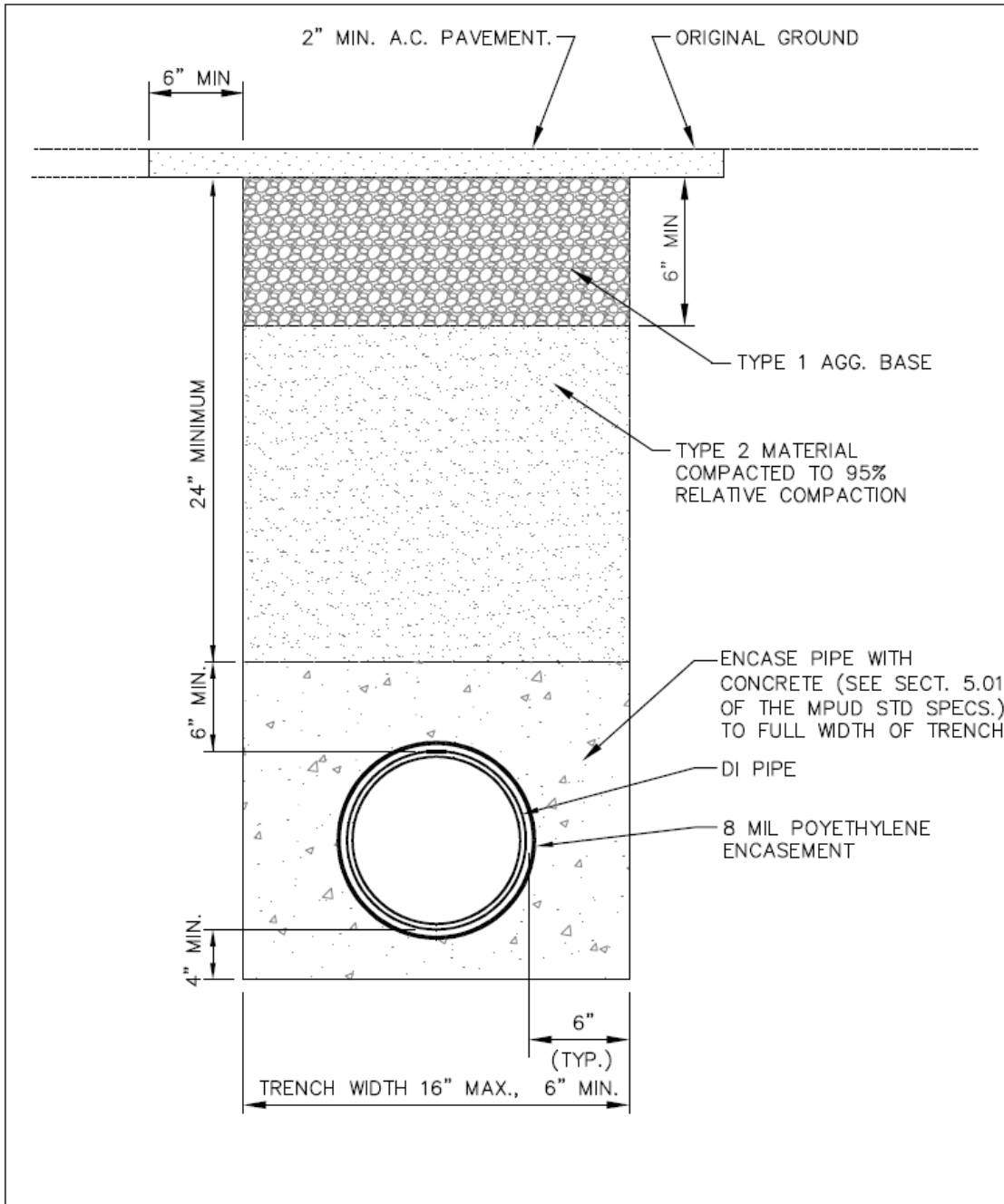
MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		TYPICAL BACK FLOW PREVENTER - $\frac{1}{2}$ " TO 2"	18



MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		TYPICAL BACK FLOW PREVENTER - 2 ¹ / ₂ " TO 10"	19



MARIPOSA PUBLIC UTILITY DISTRICT

REVISION:		STANDARD TITLE:	DWG No:
DATE:		TYP. TRENCH SECTION OF CONC. ENCASED PIPE	1