PALO ALTO PARK MUTUAL WATER COMPANY

STANDARD SPECIFICATIONS & DETAILS
FOR
WATER MAIN INSTALLATION

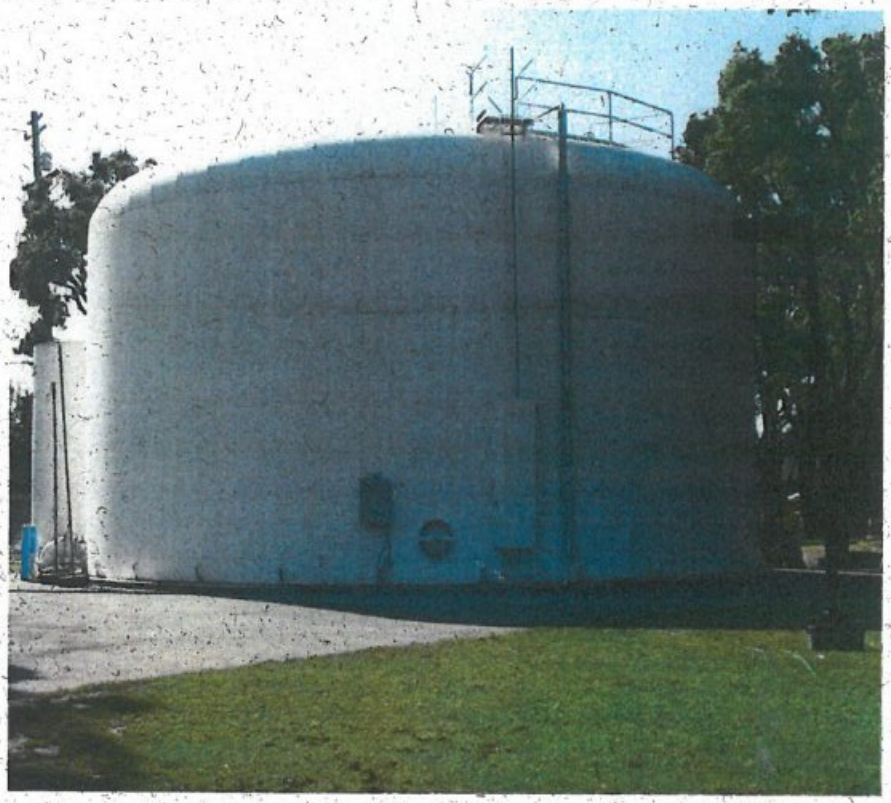

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TABLE OF CONTENTS

INTRODUCTION AND SCOPE

The Palo Alto Park Mutual Water Company Standard Specifications have been prepared by the Water Company to aid all persons engaged in the design or construction of water facilities for the Water Company. These Specifications are periodically updated to reflect changes in the technology affecting the Water Company facilities.

The information contained herein is not intended to be used as a contract document either for contracts between the Water Company and a Contractor or for contracts between a sub-divider or private individual and a contractor. *Rather, separate contract documents must be prepared for each project, with each such contract containing a "Special Provisions" section applicable to that particular project.* In such contracts, Standard Details included herein may be included by reference.

The Water Company reserves the right to amend these documents, issue clarifications, and grant variances as appropriate for actual field conditions encountered.

All components in contact with potable water shall conform to NSF 61 requirements and shall be cleaned and disinfected prior to being placed in service.

TERMS AND DEFINITIONS

Whenever in these Standard Specifications the following abbreviations and terms or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical engineers
ASTM	American Society for Testing Materials
AWS	American Welding Society
AWPA	American Wood-Preservers' Association
AWWA	American Water Works Association
NACE	National Association of Corrosion Engineers
NSF	National Science Foundation
NFPA	National Fire Protection Association
NEMA	National Electrical Manufacturers Association
U/L	Underwriters Laboratories

Whenever the above abbreviations are used in reference to specifications, codes or standards published by the society, association or organization for which the abbreviation is given, the current edition of the specification, code or standard shall apply, unless otherwise expressly stated. If referenced, tentative standards shall be construed as current unless otherwise noted.

Where the words "as shown," "as detailed," "as indicated" or words of like import are used, reference is to the project drawings unless the context clearly indicates a different meaning. Where the words "required," "approve," "satisfactory," "suitable," "determined," "acceptable" or words of like import are used in the project drawings or project specifications, action by the Water Company is indicated unless the context clearly indicates otherwise. Such action, or failure to act, shall not relieve the Contractor of its responsibilities to perform the work in accordance with the requirements of the project.

If obsolete specifications have been referenced, they shall be replaced by a current specification covering the same subject matter.

Backfill

That portion of the trench backfill which is above the bedding of the water main.

Bedding

That portion of the trench backfill which is 6-inches above, below, and around the water main.

Board of Directors

The governing body of Palo Alto Park Mutual Water Company.

Caltrans

See definition of "Department of Transportation."

City

The word "City" when used herein shall mean the City of East Palo Alto, California, unless otherwise specifically stated.

Company or Water Company

Palo Alto Park Mutual Water Company; owner.

Contractor

The individual or individuals, firm, partnership, corporation, joint venture or combination thereof, acting as an Independent Contractor in performing work.

County

County of San Mateo, State of California.

Cut Sheets

Cut sheets are sheets of tabulated data, indicating stationing, structures, fittings, angle points, slopes, offsets, elevations and water main depths or materials of construction.

Department of Transportation

State of California,, Department of Transportation.

Division of Drinking Water (DDW)

The regulatory authority for drinking water in California is the State Water Resources Control Board, Division of Drinking Water (DDW).

Dust Control

Reasonable means shall be provided to prevent a nuisance occurring due to dust from areas under construction. Such means shall include watering and sweeping, and in cases of extreme nuisance, light oiling of the affected surface.

Encroachment Permits

Before any construction commences, the Contractor shall obtain and provide the Water Company with a copy of a valid Encroachment Permit from the jurisdiction in which the work is located. All work done in City and County streets shall be subject to the requirements of the City and/or County as included in the Encroachment Permit.

Engineer

The person, firm, company or corporation named as "Engineer" in the contract documents.

Inspector

The inspector is a field representative of the Water Company, acting within the scope of the particular duties entrusted to him/her.

Manufacturer

Any individual, partnership, corporation, association or other legal relationship which fabricates or assembles materials by hand, machine or other means, into a product suitable for use within a public water system and approved for use by the Water Company.

Owner or Company

Palo Alto Park Mutual Water Company.

Paved Surface

Any form of pavement used on street, sidewalk or other areas composed of concrete, asphalt, oil, brick or treated crushed rock

or any combination of above forms of pavement having a dense, cohesive, stable surface.

Permits or Licenses

Clearances from other agencies to perform specific work under specific conditions at specific locations.

Plans (Drawings)

Those parts of the Project Plans containing the Water Company drawings, which show the locations, character, dimension and details of the work to be done.

Pipe Types

PVC	Polyvinyl Chloride Pipe
DIP	Ductile Iron Pipe

Right of Way

All land or interest therein which by deed, conveyance, agreement, easement, implication, dedication, usage or process of law is reserved for or dedicated to the use of the general public, or the Water Company, within which the Water Company has the right to install, maintain and operate its facilities.

Service Connection

The pipeline used to convey water from the main to the meter box.

Shop Drawings

Drawings produced by the shop fabricator for the purpose of showing details, dimensions, sizes of material, joints and all information and data necessary for the fabrication of the work.

Standard Details

Standard Details, appended hereto, which shall be considered a part of these Specifications.

State

The State of California.

State Specifications

The Standard Specifications of the State of California, Department of Transportation, current issue.

Subcontractor

An individual or individual, firm, partnership, corporation, or combination thereof, which will perform work for the Contractor.

Uniform Plumbing Code

The Uniform Plumbing Code adopted by Western Plumbing Officials Association, current edition as of the time of construction.

Existing Utilities

The Contractor shall maintain in service all water and sewer lines, drainage facilities, lighting, power and telephone conduits, structure, house connection lines, and other surface or subsurface structures of any nature that may be affected by the work. Should it be necessary in the performance of the work to disconnect or reroute any underground utility, or should any such utility be damaged during construction, all expenses of whatever nature arising from such disconnection, rerouting, maintaining continuity of service, damage and replacement shall be borne by the Contractor.

Work

The required work of physical improvement shown and defined by the Project, including all written changes thereto.

PIPE

POLYVINYL CHLORIDE MATERIALS PIPE AND FITTINGS

This section applies to the materials, manufacture, fabrication and testing of polyvinyl chloride pressure (PVC) pipe used within the Water Company facilities.

PVC 6-inch to 12-inch shall be Class 200 DR 14, unless otherwise indicated on the plans and shall conform to the latest edition of AWWA C900 except as may be herein modified.

All PVC shall be twenty (20) foot laying lengths. PVC, C900 shall have ductile iron outside diameters (D.I.O.D.'s).

JOINT FITTINGS FOR POLYVINYL CHLORIDE PIPE

All fittings for use with PVC pipe shall be "push-on" epoxy coated ductile iron classified as "Compact ductile iron fittings" of material specified in ANSI 21.53 (AWWA C153), unless otherwise specified or approved. Joints shall be rubber gasket per AWWA C-111.

Hub ends shall be designated as "push-on" fittings designed to accept (cast iron O.D.) PVC. Closure shall be facilitated by a rubber ring retained in an internal groove inside the hub. The surface of the hub in the ring area shall be cast free of pits or burrs, smooth and accurate, in order to meet the requirement for water-tightness. The rubber rings shall be furnished by the manufacturer of the fitting.

INSPECTION AND TESTING

The Water Company or its designated representative, at their sole discretion, may inspect the plant facilities, materials, manufacture and testing of the pipe to be furnished by Contractor.

Testing of the pipe to ensure compliance with these Specifications shall be made in accordance with the latest edition of AWWA C900 and ASTM D618.

The Water Company may elect to waive any of the above testing and inspection requirements, in which event the Water Company may require the manufacturer to submit affidavits stating that all pipe has been manufactured and tested in accordance with this specification.

DUCTILE IRON PIPE

Ductile iron pipe shall conform to ANSI A21.51 (AWWA C151), and shall be of the Class shown on the drawings, pipe wall thickness shall not be less than that required for Class 52.

JOINTS

Buried pipe and pipe fittings shall have push-on joints unless specified otherwise or shown in the drawings. Mechanical joints conforming may be substituted for push-on joints for buried piping. Flanged joints and sleeve-type mechanical couplings shall be used when specified or when shown on the drawings.

For push-on joints, the shape of pipe ends shall conform to the requirements specified . Ends for fittings shall conform to ANSI A21.11 (AWWA C111). Gaskets and lubricant for pipe and fittings shall conform to ANSI A21.11 (AWWA C111). With Water Company approval, thrust resistant gaskets or retainers may be used in lieu of thrust blocks.

For mechanical joints, dimensional and material requirements for pipe ends, bolts, nuts and gaskets shall conform to ANSI A21.11 (AWWA C111)..

For flanged joints, ends of pipe and fittings shall be provided with cast iron flanges conforming to ANSI A-21.10 (AWWA C110), except that the flanges for pipe shall be screwed-on type with threads conforming to ANSI B16.1 for 125-lb. class. Bolts, nuts and gaskets for flanged connections shall conform to ANSI B16.1. Gaskets shall be plain rubber gaskets, 1/8-inch in thickness.

FITTINGS

Fittings shall be of the push-on or mechanical joint type unless shown otherwise on the drawings. Flanged ends shall conform to ANSI A21.10 (AWWA C110). Fittings shall have a pressure rating at least equivalent to that of the pipe.

THRUST BLOCKS

Concrete thrust blocks shall be placed at tees and changes of direction of all pipe buried in the ground, unless Water Company approved mechanical restrainers are used, or the pipe is joined with Water Company approved thrust-resistant gaskets. Thrust blocks shall be of such size as to give bearing against the undisturbed vertical trench wall sufficient to absorb the thrust from line pressure, allowing an earth bearing pressure of 2000 pounds per square foot per foot of depth below natural grade. Thrust blocks shall be constructed of Class B concrete as specified in Section 90 of the Caltrans Standard Specification in accordance with Standard Detail W-7.

THRUST-RESISTANT RETAINERS FOR DUCTILE IRON PIPE

Thrust-resistant retainers may be used in lieu of thrust blocks with the approval of the Water Company. Retainer components shall be ductile iron, ASTM A536 Grade 65-45-12. Bolts, nuts, washers and tie rods shall be type 316 stainless steel.

Retainers for mechanical joint fittings shall be EBAA Iron "Megalug" or equivalent.

Retainers for bell joint shall be EBAA Iron Series 1000 or equivalent.

HARDWARE

All bolts, nuts and washers used with flanged fittings and appurtenances shall be Type 316 stainless steel with hexagonal or square heads and semi-finished hexagonal nuts. Dimensions of all heads and nuts shall be not less than those required for the American Standard regular, and the height shall be sufficient to break the bolt in the body portion when tested. Threads shall be American Standard screw threat, coarse thread series.

Mechanical joint hardware shall be Cor-Ten or ductile iron.

PIPE CONNECTORS

Flexible couplings shall be Smith-Blair 411, Smith-Blair 441 or approved equal. Reducing couplings shall be Smith-Blair R441 or approved equal Couplings shall not have pipe stops, shall be long-barrel, and shall be properly sized to fit the pipe and fittings shown on the drawings. The thickness of the middle ring shall not, in the case of metal pipe, be less than the thickness of the pipe on which it is used, and in no case shall it be less than 1/4 of an inch in thickness. Bolts, nuts and washers shall be Type 316 stainless steel. Pressure rating shall be greater than or equal to the associated pipe rating, but not less than 150 psi. Gaskets shall be nitrile (BUNA-N) conforming to NSF Standard No. 61.

FLANGED COUPLING ADAPTERS

Flanged coupling adapters for connecting plain end pipe to flanged adapters shall be Series 2100 by EBBA Iron or approved equal and the bolts, nuts and washers shall be Type 316 stainless steel. The flange coupling adaptors including bolt assembly shall be catholically protected using the Petrolatum Tape System.

PLASTIC TUBING

Plastic tubing used for service connections shall be manufactured from Polyethylene conforming to AWWA C901, Polyethylene (PE)

pressure pipe, tubing (copper tube size), ASTM D2737 except as may be modified hereinafter.

Plastic tubing shall conform to the following:

Material Designation Code. PE3408

Standard Pipe Dimension Ratio (SDR). . 9

Plastic Extrusion Compound . . . . . Type III, Class C, Category 5, Grade P34 as defined in ASTM D 1248)

Pressure rating. . . . . 200 psi (min.)

Plastic tubing shall be approved for use with potable water by the National Sanitation Foundation Testing Laboratories, Inc. or other accredited laboratory acceptable to the State of California Department of Public Health.

All tubing shall be clearly marked at intervals of not more than two (2) feet with the nominal size (3/4"), type of material, Standard Dimension Ratio (SDR 9), pressure rating, ASTM designation (ASTM D 2737), manufacturer's trade name and production code, and the seal of approval of an accredited testing laboratory.

INSPECTION

Duly authorized Water Company inspectors shall have access at all times to all places of production, fabrication and testing for purposes of inspection or observation. Whether or not inspection is made at the plant, pipe will be "spot inspected" upon delivery for condition, quality of workmanship and compliance with these Specifications.

VALVES AND APPURTENANCES

RESILIENT-SEATED GATE VALVES

This section of the Specifications covers iron-body, bronze mounted resilient-seated gate valves, twelve (12) inches or smaller, intended for ordinary water works service. The resilient-seated gate valves specified herein shall conform to the latest edition of AWWA Specification and C509, Resilient-Seated Gate Valves, except as otherwise amended herein.

AWWA C509 SECTION 1.5 AFFIDAVIT OF COMPLIANCE

When requested by the Water Company, the manufacturer and vendor shall each furnish an affidavit stating that all valves furnished for the Water Company do comply with these Specifications. The Water Company, at its option, may select at random from the valves furnished, a valve or valves to be disassembled for inspection.

Failure to conform to these Specifications after certification by the manufacturer and vendor will justify rejection of all valves of this manufacturer in future installations for a period of not less than one (1) year. The valve may then be reevaluated after sufficient evidence is presented to the Water Company of this manufacturer's compliance to these Specifications.

AWWA C509 SECTION 3 GENERAL DESIGN

The construction of the valves shall be such there are no working parts that have rubbing contact of iron on iron.

AWWA C509 SECTION 4.10 WRENCH NUT AND HANDWHEELS

Change to read as follows: The wrench nut will be securely held in place by a retaining nut of such size as to permit the operation of the valve with Water Company valve operating tools. Water Company valve operating tool inside measurement is as follows:

2-1/8" x 2-1/8" x 2-1/2" deep

Wrench nut to turn counter-clockwise to open.

Stem extensions shall be installed to bring the operating nut to within two (2) feet of finish grade where the depth from finished grade to operating nut exceeds four (4) feet.

APPURTENANCES

This section of the Specifications covers the appurtenances used in the water distribution system. Appurtenances include, but are not limited to, fire hydrants, blow-offs, valves, meter and valve boxes, brass items, saddles, flanges, tees, gaskets, bolts, flexible couplings and other miscellaneous items.

FIRE HYDRANTS

All fire hydrants shall be of the dry-barrel type; Mueller A-423 or equal with break-off bolts.

Fire hydrants to be installed shall be of a type and make acceptable to the fire department, for use within the City of East Palo Alto.

Hydrant bury shall have a ring-tite/fluid-tite hub inlet or "push-on" hub inlet when used on PVC C900. A flanged inlet bury shall be used on steel pipe hydrant runs.

A break-off spool with two cast score marks or one machined score mark shall be provided between the hydrant head and the hydrant bury. The top score mark shall be provided between the hydrant head and the hydrant bury. The top score mark shall be located within three (3) inches of the flange which connects to the hydrant head. The maximum length of the break-off spool shall be twelve (12) inches. Where more than one extension riser is required between the bury and the hydrant head, the maximum length of the break-off spool immediately below the hydrant head shall be not greater than twelve (12) inches.

BLOW-OFFS

Blow-offs shall be constructed of the materials indicated on the Water Company's Standard Detail W-4.

VALVE BOXES AND VALVE BOX RISERS

Valve boxes and valve box risers shall be provided for all valves and fire hydrant valves unless otherwise indicated on the plans or approved by the Water Company. The material used for valve box risers shall be as shown on the Water Company's Standard Detail W-11.

BRASS ITEMS

Brass items include saddles, corporation stops, curb stops, which include angle meter stops, coupling nuts and tail pieces.

All material used in the manufacture of this equipment shall be NSF approved for use in potable water system.

SADDLES (SERVICE CLAMPS)

Saddles or service clamps used on PVC C900 shall be double strap and as indicated on the plans or approved by the Water Company.

GASKETS

All gaskets shall be full-faced type, made of cloth impregnated with rubber one-eighth (1/8) inch thick.

Where indicated on the plans or required by the Water Company, flange insulation kits with neoprene-faced phenolic insulating gaskets and special sleeves shall be used.

BOLTS AND NUTS

Unless otherwise indicated, bolts shall be of stainless steel with ASNI regular unfinished square or hexagon heads and the nuts shall be of stainless steel with ASNI regular hexagonal dimensions, as specified on ASNI BBB.2 for Wrench Head Bolts and Nuts and Wrench Openings.

All bolts and all nuts shall be threaded in accordance with ASNI B1.1 for Screw Threads, Coarse-Thread Series, Class 2A and 2B fit.

LOCATOR WIRE

Locator wire shall be #8 AWG stranded copper wire with U.S.E. rated insulation, color blue and installed with all PVC C900 and polybutylene service connections which are installed at other than 90 degrees to the main, where called for on the plans or required by the Water Company. The locator wire shall be installed in accordance with the Water Company's Standard Detail W-9.

AIR-RELEASE VALVES

Combination air release valves shall be Cla-Val Series 36, equivalent by Apco or equal. Valves shall have cast-iron body, Buna-N seal, stainless steel float and plug and stainless steel operating parts. Body shall be bonded epoxy coated and lined, 8 to 10 mil minimum thickness. Operating pressure shall be 20 to 150 psi.

Air-release valves shall be installed as shown on Water Company's Standard Detail W-2.

INSTALLATION

INSTALLATION OF POLYVINYL CHLORIDE PRESSURE PIPE AND APPURTENANCES

This section covers the installation of polyvinyl chloride pressure pipe (PVC Pipe) and appurtenances, including the handling, unloading, stringing of pipe and appurtenances along the trench, making connections to existing mains, cutting of the pipe, inspection, installation of service connections, fittings, valves, fire hydrants, blow-offs, air release valves, thrust blocks, curb markings or marker posts, and other miscellaneous work required by the Water Company for the installation of the water system.

All work shall comply with AWWA Manual M23, PVC Pipe-Design and Installation, except as may be modified by the approved plans, the Water Company's Standard Details and/or these Specifications or manufacturer's installation recommendations. Contractor shall furnish the Water Company with a copy of the pipe manufacturer's installation guidelines.

Contractor shall notify the Water Company not less than twenty-four (24) hours in advance of the time of unloading or installation of pipe, valves, and appurtenances so that arrangements may be made for inspection of the unloading or installation of the pipe and appurtenances.

UNFIT OR REJECTED MATERIAL

All material shall be inspected for defects and conformity to the Specifications prior to lowering into the trench. Any pipe, valve or appurtenance, whether installed or not, which in the opinion of the Water Company, does not meet the requirements of these Specifications or is otherwise found unfit, shall be rejected as being unfit and shall be immediately removed from the jobsite.

HANDLING AND UNLOADING PIPE AND APPURTENANCES

All pipe and appurtenances shall be loaded for delivery in such a manner as to avoid damage to the pipe or appurtenance.

Delivery of pipe and appurtenances to the site of the work shall not take place until immediately prior to the installation thereof.

Unless otherwise indicated on the plans or required by the Water Company, pipe and appurtenances shall be distributed along the trench by Contractor opposite or near the place where it is to be laid.

All pipe and appurtenances shall be handled with care to avoid damage. Whether moved by hand, skidways or hoists, the pipe shall not be dropped or bumped against other pipe, accessories or other objects.

The Contractor shall replace any pipe section, fitting or appurtenance which has been damaged during loading, transporting, unloading, installation, or as a result of faulty support while stored on the site of the work.

LINE, GRADE AND PREPARATION OF TRENCH BOTTOM

All pipe and appurtenances shall be laid and maintained to the lines and grades shown on the plans.

The trench bottom shall be of even grade, prepared to receive the pipe and appurtenances, shall be free of clods, rock and excess spoil material and shall be "crumbed" to an even stable grade prior to the installation of the pipe and appurtenances.

INSTALLATION OF WATER MAIN AND APPURTENANCES

All water mains and appurtenances shall be cleanly lowered into the trench by means of a crane, ropes or other suitable equipment consistent with safety, in a manner to prevent damage to the pipe or appurtenance. Under no circumstances shall any material be dropped or dumped into the trench.

All foreign matter or dirt shall be removed from the interior of all water mains and appurtenances before lowering into the trench. The interior of all water mains and appurtenances shall be kept clean by approved means before, during and after laying. When required by the Water Company, the inside of the main shall be swabbed to remove all dirt prior to installation. Open ends of the mains and appurtenances within the trench shall be closed by approved means to prevent entrance of trench water, animals or other foreign matter when the laying operation is not in progress.

No main or appurtenance shall be laid in water, or when, in the opinion of the Water Company, the trench conditions or the weather are unsuitable for construction. Any water main which has floated shall be removed from the trench and be relaid in accordance with these Specifications.

INSTALLATION OF POLYVINYL CHLORIDE PRESSURE PIPE (PVC)

PVC Pipe shall be installed in accordance with AWWA Manual M23, PVC-Pipe Design and Installation, except as modified herein.

Field-cut lengths of PVC may be used for making connections to valves, fittings, appurtenances and closures where necessary.

The cutting and beveling of the main for inserting into the bells of valves and fittings, or for closures, shall be done by the use of a tool approved by the Water Company and manufactured for this purpose and without damage to the pipe. The bevel of the pipe

shall be the same as required for the fitting (normally requires a shorter and steeper cut). The cutting tool shall ensure a square cut and simultaneously produce a bevel if desired.

No deviations shall be made from the line or grade shown on the plans, except with the approval of the Water Company.

Where it is required that the pipe be connected to another pipe, valve or fitting of different manufacture or joint design, appropriate adapters approved by the Water Company shall be used to make the connection.

MINIMUM COVER AND CLEARANCE

The minimum depth of cover listed below shall be provided between the top of the main and the finished grade, unless indicated on the plans.

TOP OF PIPE TO FINISHED GRADE	PIPE SIZE
3'0"	6" and 8" diameter
3'6"	12" diameter

A minimum vertical clearance of twelve (12) inches shall be maintained between the water main and all pipes and/or foreign structures, and a minimum horizontal clearance of five (5) feet shall be maintained between utilities other than sanitary or storm sewers unless otherwise indicated on the plans or approved by the Water Company. The clearance between the waterline and storm and/or sanitary sewers shall be a minimum or 10 feet. Variations may be permitted at the Water Company's discretion provided that DDW separation requirements are met.

If structures, pipes, manholes, etc. are encountered such that the water main must be relocated horizontally, the relocation shall be made as approved by the Water Company.

If foreign structures are encountered such that the water main must be raised, the minimum cover shall be as hereinabove indicated unless otherwise approved by the Water Company. Where required by the Water Company, a six (6) inch thick concrete pad, twelve (12) inches wider than the trench width, reinforced longitudinally and transversely with #4 bars at twelve (12") inch centers shall be installed over the pipe.

JOINTS IN PVC PIPE

Joining of PVC pipe shall be with rubber rings for integral bell ends. All rubber rings shall be furnished by the pipe manufacturer.

PVC pipe shall not be deflected or bent for horizontal or vertical deflection unless permitted by the pipe manufacturer.

Joints shall not be deflected more than three (3) degrees, for a minimum curve radius of three-hundred-eighty-two (382) feet for twenty (20) feet pipe lengths unless permitted by the pipe manufacturer

INSTALLATION OF APPURTENANCES

The installation of appurtenances shall be in accordance with the following paragraphs and the Water Company Standard Details referred to herein.

All ferrous metal fittings, such as tee, crosses, bends, reducers, fire hydrant buries, plugs, flanges, valve bodies, flexible couplings, etc. shall be fusion bonded epoxy-coated, unless otherwise noted herein.

INSTALLATION OF VALVES AND FITTINGS

Valves and fittings having hub ends shall be connected to the main by means of rubber rings supplied by the manufacturer. Valves and fittings having flanged ends shall be connected to PVC pipe by means of a flange by hub adaptor unless other means are approved by the Water Company.

Unless otherwise indicated on the plans or approved by the Water Company, fittings shall be provided with thrust blocks.

Valve fittings which are required to be bolted together to form a single unit shall be assembled and coated prior to lowering into the trench.

INSTALLATION OF AIR RELEASE VALVES

Air release valves shall be installed where indicated on the plans or at high points in the mains as approved by the Water Company.

INSTALLATION OF BLOW-OFFS

All permanent and temporary blow-offs shall be installed where indicated on the plans or dead ends as required by the Water Company.

Temporary blow-offs may be used upon approval of the Water Company for disinfecting and/or pressure testing the main. Contractor shall remove the temporary blow-offs at the completion of the work.

FIRE HYDRANT INSTALLATIONS

All fire hydrant service runs shall be PVC CL200 pressure pipe as herein specified and shall be six (6) inches in diameter.

Fire hydrant assemblies shall consist of a cast iron bury, a cast iron break-off spool and the hydrant. Break-off spools shall be not less than six (6) inches in length and not more than twelve (12) inches in length.

Fire hydrants shall be as noted unless otherwise called for on the plans or details:

"MUELLER" type: A-423 or an approved equal

Fire hydrants shall be painted as directed by the Engineer. Fire hydrants, bury and break-off spools shall be epoxy-lined and coated as herein specified for cast iron fittings.

All fire hydrant heads, buries and extension spools shall be bolted with stainless steel bolts and nuts satisfactory to the Engineer.

INSTALLATION OF SERVICE CONNECTIONS

Service connections shall be installed in accordance with the Water Company's Standard Details and the Uniform Plumbing Code. Water meter boxes or service connection boxes shall be installed by Contractor in accordance with the Standard Details or as directed by the Water Company in the field.

Service connections shall be adjusted to the proper relationship with curb, sidewalk, fence and property line. Angle meter stops shall be properly located as directed by the Water Company and as shown on the Standard Details.

If the Water Company determines that service connections are improperly installed, these service connections shall be abandoned at the water main and new service connections installed. The drilling of PVC for service connections shall be by the use of shall cutters to prevent chips from entering the pipe.

The installation of union connectors on service connections shall not be permitted under concrete areas such as driveways, sidewalks, curbs and gutters.

INSTALLATION OF SADDLES (SERVICE CLAMPS)

A saddle shall be installed for each service lateral, minimum three-quarter (3/4) inch, as required by the Water Company Standard Details. Saddles shall be brass or bronze.

TESTING AND CHLORINATION OF APPURTENANCES

All appurtenances shall be pressure tested and chlorinated concurrently with the main to which they are attached.

THRUST BLOCKS, VALVE PADS AND REVERSE ANCHORS

Thrust blocks and/or reverse anchors shall be provided for all bends, tees, crosses, reducers, and where indicated on the plans or required by the Water Company. Concrete pads shall be installed under all valves as indicated on the Water Company's Standard Details. Thrust blocks and reverse anchors shall be constructed in accordance with the Water Company's Standard Details, and shall bear against undisturbed earth. If in the opinion of the Water Company the earth against which the anchor bears is unsuitable to supported the imposed load, Contractor shall provide such additional anchorages as may be required by the Water Company. Ground against which concrete is to be placed shall be moistened prior to placing so that the ground will not absorb excessive moisture from fresh mortar tight and of sufficient strength to maintain shape during the placing of the concrete. Placing methods shall be such that the concrete will be placed in its final position without segregation. All concrete shall be spaced, placed and rodded to ensure smooth surfaces along form lines and to eliminate rock pockets. Thrust and valve support blocks shall be placed in such a manner that pipe and fitting joints will be accessible for repair. No concrete used for thrust blocks and valve pads shall be in contact with joints or pipe.

CURB MARKINGS

The location of all valves, blow-offs, air valves, services, etc. shall be marked on the closest curb face, if any or in accordance with the Water Company.

CONNECTIONS TO EXISTING MAINS

The Water Company will make all wet-tap connections to existing mains and Contractor shall make the closures thereto unless otherwise indicated on the plans or approved by the Water Company.

No new mains shall be connected to the Water Company's mains until the bacteriological tests on the new mains have been approved by the Water Company.

COATINGS AND ELECTROLYSIS PROTECTION

Ductile iron valves and fittings, buries, spools, fire hydrants, flanged adapters and air relief valves and other ferrous materials to be installed underground on water mains shall be lined with a thirteen (13) mil minimum to twenty (20) mil maximum thickness of fusion epoxy coating prepared from a on hundred (100) percent dry epoxy resin applied by the fluidizing bed method. Lining materials shall not be applied to valve stems, valve discs or valve seats. Lining materials shall not build up in thickness to interfere with joint assembly or with operation of the valve or fitting being epoxy lined.

Supplier's certificates showing conformance to this specification shall be delivered to the Water Company with each shipment of materials delivered to the jobsite.

EPOXY COATING

Coatings in this classification shall be thermally cured epoxy. Epoxy coatings shall be applied in compliance with manufacturer's specifications and shall not be field applied unless approved by the Water Company for repair to damaged sections.

SURFACE PREPARATION

Surface preparation shall be an approved abrasive blast cleaning method and shall be finished to NACE-1 (National Association of Corrosion Engineers) standards. No coating shall be applied over a prepared surface on which oxides have formed as the result of delays in applying the coating to the prepared surface. Reblasting of such surfaces to original specifications shall be required if oxide formation is detected.

FUSION-BONDED EPOXY

All ductile iron and steel valves, burys, spool pieces, flanged adapters, reducers, tees, crosses and other buried ferrous metallic fittings shall require a fusion epoxy coating and lining prepared from a 100% dry epoxy resin applied by either the fluidizing bed method or electrostatically, in accordance with AWWA C213 for fittings and with AWWA C550 for valves. The minimum coating thickness shall be 8 mils and the maximum coating thickness shall be 24 mils.

For valves, lining material shall not be applied to valves stems, valve discs or parallel disc seats. Lining materials shall not be built up in thickness so as to interfere with joint assembly or

with operation of the valve being epoxy lined, and in any case, should not be greater than 12 mils.

EPOXY COATING TESTS

All applied epoxy coating systems shall be tested for thickness and flaws. These tests may be conducted by the Water Company at the point of application or at the jobsite. The decision of the Water Company regarding test results will be final.

Tests for flaws and holidays in the coating system shall be by an approved low voltage wet sponge device developing at least 67 volts D.C. potential. Any flaws detected by the wet sponge test shall be repaired to the specification requirement.

Tests to determine coating thickness shall be made by an acceptable magnetic measuring device approved by the Water Company.

PETROLATUM WAX TAPE SYSTEM

Petrolatum wax tape system shall be Trenton Primer and #1 Wax-tape as manufactured by Trenton Corp., Denso Paste and Densyl Tape by Denso North America, Inc., or approved equal.

Tape system primer shall be saturated petroleum hydrocarbon, non-drying, non-hardening. Mastic shall be saturated petroleum hydrocarbon, non-hardening, self-supporting compound. Tape shall be non-woven synthetic fabric, fully impregnated and coated with neutral petroleum-based compound. Overwrap shall be plasticized PVC tape with natural and synthetic rubber adhesive.

TESTING AND DISINFECTION

All water mains and appurtenances shall be tested for pressure and leakage and will be disinfected prior to acceptance by the Water Company.

Testing and disinfecting of water mains and appurtenances shall be in accordance with the applicable current AWWA Standards except as may be modified herein. The Contractor shall notify the Water Company not less than twenty-four (24) hours in advance of the actual time of testing and disinfecting so that the Water Company may observe the procedure.

CONNECTING TO EXISTING WATER COMPANY WATER LINES

No permanent connection between any water main that has not passed a bacteriological test (hereinafter referred to as an "unsterile main") will be made to any existing water main or to any water main that has previously passed a bacteriological test (hereinafter referred to as a "sterile main") except as may be approved by the Water Company.

Water required for initial filling, pressure testing, leakage testing and chlorination of an unsterile main may be obtained from a sterile main by use of a jumper connection approved by the Water Company. That construction of the jumper proposed for use shall conform to the Water Company's Standard Details unless otherwise approved by the Water Company prior to installation.

If the jumper connection is used for initial filling of an unsterile main, the jumper connection shall be vented to atmosphere or disconnected from the sterile main and remain vented or disconnected until after the pressure and leakage tests, the jumper connection may be used to facilitate the flushing and the introduction of chlorine into the unsterile main, after which the jumper pipe shall again be vented or disconnected.

Upon approval of the bacteriological test, a permanent connection or closure shall be made between the two mains. The pipe used to make the connection shall be cleaned and disinfected with a swab saturated with a five (5) percent hypochlorite solution or by other means approved by the Water Company.

HYDROSTATIC PRESSURE TEST

All newly laid or repaired water mains shall be hydrostatic pressure tested in accordance with the requirements herein. The hydrostatic pressure test will <u>not</u> be performed until the following conditions have been met.

UNIMPROVED AREAS

In unimproved areas; that is, in areas where no pavement surfacing of any nature is to be construed, the hydrostatic pressure test shall be made only after the backfill has been placed and satisfactorily compacted and the general areas have been rough graded to approximately finished grade; all angle meter stops, fire hydrants and other appurtenances have been adjusted and set to final grade and location in accordance with the Water Company Standard Details; and until not less than seventy-two (72) hours have elapsed since the last concrete thrust block, reverse anchor or valve pad has been cast.

IMPROVED AREAS

In improved areas; that is, in areas where a pavement surfacing is to be constructed, the hydrostatic pressure test shall be made only after all other utilities, such as storm sewers, sanitary sewers, Pacific Gas and Electric, , AT&T, Cable TV, etc. have been installed; the curbs and gutters have been installed and the subgrade material portion of the pavement area has been constructed to proper grade, satisfactorily compacted and approved by the City; all angle meter stops, fire hydrants and other appurtenances have been adjusted and set to final grade and location in accordance with the Water Company's Standard Details or directions; and until not less than seventy-two (72) hours have elapsed since the last concrete thrust block, reverse anchor or valve pad has been cast.

The hydrostatic pressure test shall not be less than one (1) hour duration. Contractor may at his convenience conduct a preliminary pressure test at any time prior to the Water Company pressure test. The results of the preliminary test will not be considered by the Water Company.

All air shall be vented from all high spots in the water main before making any pressure tests.

The hydrostatic pressure test shall be one and one-half (1-1/2) times the operating pressure at the average elevation of the water main under test. However, notwithstanding the above, no water main will be tested at less than one-hundred-fifty (150) pounds per square inch pressure.

The specified hydrostatic pressure test shall be measured at the point determined by the water Company. The pressure shall be applied by means of a pump connected to the main in a manner satisfactory to the Water Company. The pump, pipe connection, bulkheads, pressure gauge and all other equipment, materials and labor required for performing the hydrostatic pressure test shall be furnished by Contractor at no expense to the Water Company.

LEAKAGE TEST

A leakage test shall be made on all newly laid or repaired water mains in accordance with the following requirements.

A hydrostatic pressure of one and one-half (1-1/2) times the operating pressure at the elevation of the water main, but not less than one-hundred-fifty (150) pounds per square inch, shall be applied to the water main for the leakage test and shall be maintained as constant as possible for not less than one (1) hour.

The leakage test may be held concurrently with the hydrostatic pressure test. However, the total elapsed time of the two tests shall not be less than two (2) hours.

ALLOWABLE LEAKAGE - POLYVINYL CHLORIDE PIPE

The measured leakage for class 200 polyvinyl chloride pipe shall not exceed 0.5 gallons (6" PVC) and 0.7 gallons (8" PVC) per one thousand (1000) feet of water main.

The pump, pipe connection, measuring devices, gauges and all other equipment, materials and labor required for performing the leakage test shall be furnished by the Contractor at no cost to the Water Company. The Water Company may, however, use Water Company gauges and measuring devices in place of Contractor's equipment. In case of a difference in the measured leakage rate between the measuring devices, the Water Company's measured leakage will govern in all cases.

DISINFECTION

All newly laid water mains and appurtenances shall be disinfected in accordance with the current edition of AWWA C651 except as modified herein.

Disinfection shall be done after the pressure and leakage tests have been performed and accepted.

Prior to disinfection, the water main and appurtenances shall be thoroughly flushed with water from the nearest source by means of a jumper pipe or truck.

Chlorine used for disinfection may be either liquid chlorine or hypochlorites. Tablets shall not be used unless approved by the Water Company. If liquid chlorine is used, the method of application and precautions outlined in Subsection 2.1 of AWWA C651 shall be followed, except as may be modified by the Water Company. Chlorine shall be applied by the continuous feed method as outlined in Subsection 5.2 of AWWA C651 except as may be modified by the Water Company.

Chlorine shall be applied at the beginning of the water main to be disinfected through the tee on the unsterile side of the double check valves on the upper pipe assembly. The chlorine concentration shall not be less than fifty milligrams per liter (50 mg/l) parts per million (ppm).

Water used to convey the chlorine solution throughout the water main shall be obtained from the existing distribution system through a jumper pipe, truck or any other approved source of supply. The rate of flow shall be so controlled that water will flow slowly into the unsterile main during the application of chlorine. Valves shall be manipulated so that the chlorine solution in the main being chlorinated will not flow back into the main supplying the water.

The end of the main being chlorinated shall be kept open and running during the application of chlorine and until the desired chlorine concentration is reached (not less than 50 ppm), after which each angle meter stop, fire hydrant, air valve line or any other connection to the water main shall be individually opened and flushed with the chlorine solution. After the water main and all connections thereto have been loaded with chlorine to the proper concentration of not less than 50 ppm, the water source, chlorine feeder and all other openings to the water main will be closed.

The chlorine solution shall remain in the water main for not less than twenty-four (24) hours, after which the treated water through the length of the unsterile main must contain not less than 10 mg/l (ppm) of chlorine.

Upon approval of the chlorine residual by the Water Company, the chlorine solution shall be flushed from the water main through each service, fire hydrant and blow-off. Flushing shall continue until the chlorine residual is not more than five-tenths (0.5) mg/l as determined by the Water Company.

In no case shall a chlorine solution of over 0.5 mg/l be held in the main or appurtenances for more than five (5) days from the initial injection to the final flushing.

Flushing water shall be dechlorinated and disposed of in accordance with local regulations.

BACTERIOLOGICAL TEST

Following the flushing of the chlorine solution from the water main, but not sooner than twelve (12) hours thereafter, the Water Company will secure samples of the water from the water main for laboratory bacteriological examination.

Taps installed in the water main shall be used for securing samples. Taps may consist of angle meter stops, piping to air

valves or risers to blow-offs. If in the opinion of the Water Company a sufficient number of the above types of taps are not available, additional temporary taps consisting of three-quarter (3/4) inch corporation stops shall be installed in the water main at locations chosen by the Water Company.

A sampling gooseneck-type pipe assembly shall be connected to each tap. The sampling pipe may be copper or galvanized steel not greater than one (1) inch diameter and will extend at least twelve (12) inches above ground and be free of dirt, mud or other contamination. The top of the sampling pipe shall be turned so as to project toward the street or other drainage facility.

Prior to connecting the sampling pipe to the tap, the sampling pipe shall be flushed clean and disinfected with a chlorine solution containing not less than five (5) percent hypochlorite solution. Flushing of the chlorine solution from the sampling pipe will be done just prior to the collection of the sample.

Two (2) samples, twenty-four (24) hours apart shall be taken from each sampling point by the Water Company. The sampling pipe may remain in place until after the second sample has been obtained or may be removed between samplings. If the sampling pipe is left in place, the end of the pipe should be covered to prevent the entrance of dust or other contaminants.

The Water Company will notify Contractor of the results of the coliform bacteriological tests. Should either the first or second day's bacteriological tests prove positive; that is, failure to pass the bacteriological test, indicating that the main is still contaminated, flushing, chlorination and bacteriological sampling shall be repeated as often as necessary until satisfactory results are obtained. If isolated sample points indicate positive results, flushing and resampling of those points may be approved by the Water Company.

After the disinfection produces satisfactory results, all temporary taps shall be securely closed and all sampling pipes removed and closure may be performed to existing Water Company's system. In no case shall the water main be placed in service or water used therefrom until the disinfection produces satisfactory results.

If a newly laid main or portion thereof requires repair or replacement after chlorination due to accidental breakage, etc., extreme caution shall be taken not to contaminate the interior of the undamaged water main with mud, direct, trench water, etc. If in the opinion of the Water Company the breakage may have caused the water main to become contaminated, the water main or damaged portion thereof shall be rechlorinated and retested as outlined above.

CLOSURE AFTER DISINFECTION

The Contractor shall notify the Water Company not less than twenty-four (24) hours prior to making the closure so that valves may be closed and advance notice of the shutdown may be given to all customers affected. Contractor shall stipulate the expected duration of the shutdown. In general, shutdowns shall be kept as short as possible and shall be made at times when there will be the least inconvenience to the customers. If, due to the nature of the demand on the system, a shutdown of the system is not possible during normal working hours, the Water Company will specify the date and time when a shutdown can be made and Contractor shall adjust his schedule accordingly.

The Water Company will close all valves in making a shutdown, and open all valves in restoring pressure to an existing main and initiating pressure in the new installation.

Prior to the closure, the Contractor shall excavate a sump sufficiently deep to receive the residual water in mains that cannot be dewatered by any other method without flowing back into the water mains. Water will then be pumped out of the sump hole, away from the excavation for the closure, and shall be properly disposed of.

Water level within the sump shall not be allowed to backflow into the water mains after it comes into contact with the trench. Should this contaminated water backflow into the main, the full disinfection and testing procedure shall be repeated.

CONTRACTOR'S RESPONSIBILITY FOR TESTING AND DISINFECTION

Notwithstanding anything contained herein, it shall be the sole responsibility of the Contractor to construct a water main capable of passing the pressure and leakage tests and to effect a disinfection of the water main. The fact that the Water Company provides inspection during the construction and testing of the water facilities and performs laboratory testing to determine the sterility of the water mains shall not abrogate the Contractor's responsibility in this regard.

It shall also be the responsibility of the Contractor to prevent the consumption of water for any and all uses from unsterile mains whether by their workmen, subcontractors or any other person who may come into contact with the water from the unsterile main.

The Contractor shall indemnify and hold the Water Company harmless from any suits, claims or actions brought by any person or persons for or on account of any sickness or death sustained or arising out of the consumption of water from an unsterile main.

EARTHWORK

Earthwork includes all plant, labor, equipment, appliances and materials as required or necessary to excavate, trench, fill, backfill and grade for the construction of structures, sewers and graded areas.

CONTROL OF WATER

The Contractor shall furnish, install and operate all necessary machinery, appliances and equipment to keep excavations reasonably free from water during the construction and shall dispose of the water in accordance with local regulations so as not to cause injury to public or private property, or to cause a nuisance or a menace to the public. Contractor shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies and shall have available at all times competent mechanics for the operation of all pumping equipment.

The control of groundwater shall be such that softening of the bottom of the excavation, or the formation of "quick" conditions or "boils" shall be minimized. Dewatering systems shall be set up to operate so as to prevent the removal of any natural soils.

During excavation, installation of water mains, placing of trench backfill and the placing and curing of concrete, the excavation shall be kept reasonably free of water. When specified, the static water level shall be drawn down below the bottom of the excavation so as to maintain the undisturbed state of the natural soil and to allow the placement of backfill to the required density. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soil, prevent disturbances of compacted backfill and prevent flotation or movement of structures and water mains.

EXCAVATED MATERIAL

Arrangements for disposing of excess excavated material unsuitable for backfill shall be made by the Contractor at his own expense. Excavated material suitable for backfill shall be stored temporarily in such a manner as will facilitate work under the contract.

SHORING, SHEETING AND BRACING

Where sheet piling, shoring, sheeting, bracing or other supports are necessary they shall be furnished, placed, maintained and removed by the contractor. At all times, the rules of the California Department of Industrial Relations, Division of Industrial Accidents, with respect to excavation and construction shall be strictly observed. Sheet piling and other supports shall be withdrawn in such a manner as to prevent subsequent settlement of the pipe, or additional backfill on water lines which might cause overloading.

In accordance with the requirements of Section 6705 of the Labor Code of the State of California, the Contractor shall submit a detailed drawing to the Water Company before excavation, showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench or trenches five (5) feet or more in depth.

The minimum required protection will be that described in the Construction Safety Orders of the Division of Industrial Safety. If the Contractor presents a drawing which varies from the shoring system standards established by the Construction Safety Orders, the drawing shall be prepared and signed by a registered Civil Engineer, licensed by the State of California.

The Engineer will accept the drawing submitted by the Contractor and return it within five (5) working days with comments indicating whether or not they conform to the requirements of the specifications. However, the Contractor shall be responsible for the adequacy of the design. Said review will be to assure the Water Company of general compliance with the Labor Code and Safety Orders and shall not be construed as a detailed analysis for adequacy of the support system, nor shall any provisions of the above requirements be construed as relieving the Contractor of his overall responsibility and liability for the work.

The Contractor shall not start excavation until after the trench support drawing has been returned by the Engineer.

In addition, the Contractor shall obtain, pay for and comply with all provisions of any permit required by Section 6500 of the California Occupational Safety and Health Act.

The design, planning, installation and removal of all shoring, sheeting and bracing shall be accomplished in such a manner as to maintain the undisturbed state of the soil adjacent to the trench and below the excavation bottom.

REMOVAL OF OBSTRUCTIONS

The Contractor shall remove, or cause to be removed, all trees, including stumps, fences and all structures where the proper construction and completion of the work require their removal. The Contractor shall also remove all rock, stones, debris and obstructions of whatsoever kind or character, whether natural or artificial, encountered in the construction of the work.

Material that is removed as hereinabove specified is not to be incorporated in the improvements being constructed, and shall be disposed of according to applicable laws, by the Contractor at his expense.

STRUCTURES

The site shall be cleared of all natural obstructions, pavement, utilities and other items which will interfere with construction. Unless otherwise specified, any method of excavation may be employed which, in the opinion of the Contractor, is considered best.

Ground shall not be dug by machinery nearer than twelve (12) inches from any finished structure without the express approval of the Water Company. The last three (3) inches shall be removed without disturbing the structure. Should the excavation be carried below the required lines and grades because of the Contractor's operations, the Contractor shall refill such excavated space to the proper elevation in accordance with the procedure specified for backfill, or if under footings, the space shall be filled with concrete as directed by the Water Company.

Where, in the opinion of the Water Company, the undisturbed condition of the natural soil is not adequate to support the structure, the Water Company shall direct the Contractor to over excavate to adequate supporting soil and refill the over excavated space as directed by the Water Company. Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms, installation of services and for inspection, except where concrete is authorized to be deposited directly against excavated surfaces or against existing concrete surfaces.

BACKFILLING FOR STRUCTURES

After completion of foundation footings and walls, and of other construction below the elevation of the final grade, all forms shall be removed and the excavation shall be cleaned of all debris.

Substructure surfaces shall be waterproofed if required and as specified. Sheet piling shall not be removed until backfilling operations are completed.

Backfill shall be composed of clean native material or imported material acceptable to the Water Company. Backfill shall be placed in layers not exceeding eight (8) inches in loose depth and compacted by tamping or rolling. Jetting is not permitted.

Regardless of the method of compaction, the final density shall not be less than ninety-five (95) percent of maximum density at optimum moisture as determined by AASTHO T180 or by California Test 216. The final relative density shall be ninety-five (95) percent for the top twelve (12) inches of the backfill in paved and/or traffic areas.

Structural Backfill shall be Class 2 aggregate base, ¾" maximum size gradation conforming to Section 25 of the Standard Specifications.

EXCAVATION AND BACKFILL FOR WATER LINES

Unless otherwise indicated on the plans or in the special conditions, excavation for water lines shall be by open cut. For water mains to be constructed in filled areas, the entire area fill shall be placed and compacted to at least five (5) feet above the proposed main invert before the water main trench is excavated.

Trenches shall be excavated at least four (4) inches below the barrel of the pipe and the bottom refilled with select imported material of the type specified herein (Bedding Material).

The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe, exclusive of bells and collar, plus twenty-four (24) inches. A minimum of six (6) inches shall be maintained between pipe and trench wall. Whenever the maximum allowable trench width is exceeded for any reason, the Contractor shall embed or cradle the pipe in a manner satisfactory to the Water Company.

Excavations five (5) feet and deeper shall be supported as set forth in the rules, orders and regulations of the California Department of Industrial Relations, Department of Industrial Accidents. Sheet piling and other shoring shall be withdrawn so as to prevent subsequent settlement of the pipe. No sheeting will be withdrawn from below the top of the pipe after completion of backfill to that level.

Where water is encountered in pipe trenches, the Contractor shall furnish and install and operate such pumps or other devices as may be necessary for removing the water during construction

of the pipelines. Trenches shall be kept free from water while the pipe or other structures are installed, while concrete is setting and until backfill has progressed to a sufficient height to anchor the work against possible flotation or leakage. Water shall be disposed of in accordance with local regulations and in such a manner as not to cause injury to public or private property, or be a menace to the public health.

Whenever the bottom of the trench is rock, soft, yielding, or in the opinion of the Water Company, otherwise unsuitable as a foundation for pipe, the unsuitable material shall be removed to a depth such that when replaced with crushed rock it will provide a stable and satisfactory foundation. Special compaction of the imported material may be required.

Trenching adjacent to, or near, structures shall be made using construction methods that will not result in damage to the structure. Excess excavated material not required for backfilling and material unsuitable for backfill shall be disposed of by the Contractor at his own expense.

TRENCH BEDDING MATERIAL

After the pipe has been properly laid and inspected, select backfill material shall be placed under and around the pipe and shall be thoroughly consolidated to a final density of at least ninety-five (95) percent of maximum density as determined by AASHTO T180 or by California Test 216. Consolidation shall be obtained by mechanical means. The select material shall be free from organic matter, and of such size and gradation that the desired compaction can be readily attained. The size of gradation shall fall within the following limits.

Bedding Material: - Caltrans Class 1A Permeable

SIEVE SIZE	PERCENTAGE PASSING SIEVE
1 inch	100
3/4 inch	90-100
3/8 inch	20-55
No. 4	0-10
No. 8	0-5

TRENCH BACKFILL MATERIAL

Above the level of bedding material, the trench shall be filled with structural backfill material as designated on the Plans and Specifications. Backfill shall be placed in layers not exceeding

eight (8) inches in loose depth and compacted by mechanical means to a density of not less than ninety-five (95) percent maximum density at optimum moisture as determined by California Test 216 or 231 (Nuclear Gauge). In areas to be paved, the upper twelve (12) inches of the structural backfill should be compacted to ninety-five (95) percent relative compaction. Lower potions of the structural backfill material shall be compacted to a minimum of ninety-five (95) percent relative compaction. The size of gradation shall fall within the following limits

Structural Backfill shall be Class 2 aggregate base, ¾" maximum size gradation conforming to Section 25 of the Standard Specifications. The finishing of the roadway (aggregate base and asphalt concrete) shall match the existing finishing and be constructed to the requirements of the City of East Palo Alto.

SITE DRAINAGE

The Contractor shall control grading in the vicinity of any structure or trench such that the surface of the ground will be properly sloped to prevent water from running into the excavated areas. Excavation shall be performed in such a manner that the area of the site and the area immediately surrounding the site for a distance of twenty-five (25) feet, including slopes and ditches, will continually and effectively drain away from excavated areas.

Pumps and discharge lines of sufficient capacity to prevent the accumulation of groundwater and rainwater during excavation shall be at the site and in proper operating condition at all times.

Except as authorized by the Water Company in writing, excavations shall be subject to the approval of the Water Company.

Water discharged from any excavation shall be disposed of in accordance with local regulations and in a manner to protect the work and adjacent property from damage. Except when authorized by the Water Company, no water shall be drained into work already built or under construction.

The Contractor shall be responsible for and shall repair at his expense any damage to foundations, structures or any other part of the work caused by floods, water or failure of any part of the diversion or protective work.

CLEAN-UP

After completing all piping earthwork, the Contractor shall leave the site in a neat and clean condition, doing such grading as is required by the drawings, or if not called for, to restore the site to its original shape and configuration. Any existing feature, improvement, structures and other facility damaged or affected by the work shall be replaced, repaired or restored to its original condition or better.

CONCRETE WORK

Concrete work includes the construction of all thrust blocks, footings, slabs, walls, supports and other concrete items, complete with steel reinforcement.

CEMENT

Cement shall conform to ASTM C150 Type II. Only one brand of cement shall be used for exposed architectural concrete throughout any one structure or composite element. Insofar as possible, all cement used in the work shall be taken from stock bins at the place of manufacture.

Cement brought to the site of the work shall at all times be suitably stored and protected from exposure to the atmosphere. In the event the cement shows signs of deterioration, it shall be removed from the worksite unless additional tests show that it conforms to the requirements stated above.

AGGREGATE

Fine and coarse aggregate for concrete shall conform to ASTM C33 or to Caltrans Standard Specifications Section 90-2.02, "Aggregates" with the appropriate test methods designated therein. In reinforced concrete, maximum size of aggregate shall be one and one-half (1-1/2) inches, except in slabs and walls eight (8) inches or less, where three-quarter (3/4) inch maximum aggregate shall be used.

WATER

Water shall be potable water, clean and free from injurious amounts of oil, acid, alkali and organic materials.

REINFORCING STEEL

Reinforcing steel shall conform to ASTM A615 Grade 60. Deformation shall conform to ASTM A615. Wire reinforcement shall conform to ASTM A185, with mesh and wire sizes as indicated on the plans.

QUALITY

Concrete shall be composed of cement, natural or crushed aggregate and water proportioned and mixed as hereinafter specified. Pozzolan and water reducing air entraining agent shall be used when specified by the Water Company. The exact proportions of cement and aggregate shall be such as to produce a workable, strong, dense, impermeable concrete having appropriate consistency and strength.

CONSISTENCY

The quantity of water required for the proper consistency of the concrete shall be determined by the slump test, in accordance with ASTM C143. Slump allowances shall be as follows.

Vertical Wall Sections, Columns: Maximum slump four (4) inches, plus or minus one (1) inch tolerance.

Floor Slabs, Beams and Footings: Maximum slump three (3) inches, plus or minus one-half (1/2) inch tolerance.

STRENGTH

Compressive strength shall be determined at the end of twenty-eight (28) days on standard 6 x 12 inch test cylinders in accordance with ASTM C39. The minimum compressive strength shall be three thousand (3,000) pounds per square inch.

TESTS

Tests shall be made by the Water Company of the materials and of the resulting concrete at such intervals as deemed necessary by the Water Company. The concrete mix shall be changed whenever, in the opinion of the Water Company, such change is necessary or desirable to secure the required workability, density, impermeability and strength.

BATCHING

Concrete batching equipment shall be provided to determine and to control accurately the relative amounts of cement, water, sand and coarse aggregate entering into the concrete. Sand, cement and coarse aggregate shall be measured by direct weighing.

Water shall be measured by direct weighing or by volumetric measurement. Equipment and its operation shall be subject at all times to the approval of the Water Company.

MIXING

When authorized by the Water Company, concrete may be mixed in a batch mixer of approved type which will ensure a uniform distribution of the materials throughout the mass, so that the mixture is uniform in color and homogeneous. The mixer shall be equipped with a suitable charging hopper, a water storage and water measuring device, controlled from a case which can be kept locked and so constructed that the water can be discharged only while the mixer is being charged. The entire contents of the mixing drum shall be discharged before recharging. The mixer shall be cleaned at frequent intervals while in use. The volume of mixed material per batch shall not exceed the rated capacity of the mixer.

TRANSIT MIXED CONCRETE

Transit mixed concrete shall be used, provided that all the above requirements as to batching, mixing and placing are complied with, and provided further that the concrete shall be placed within two (2) hours after water is first added to the batch. Transit mixed concrete shall comply with all provisions of ASTM C94.

DEPOSITING CONCRETE

Concrete shall not be placed until all forms and reinforcement have been approved by the Water Company.

CURING

Unformed concrete surfaces shall be covered with wet burlap mats as soon as the concrete has set sufficiently and shall thereafter be kept wet under burlap until backfilled. Formed surfaces, both interior and exterior, shall be similarly water-cured under burlap mats or by water sprays beginning as soon as the forms are stripped. At the option of the Contractor, concrete surfaces may be cured by the curing compound method as defined below. Where wooden forms are used, they shall be wetted immediately before concreting and shall be kept moist until removed, or may be treated with an approved form sealer before pouring.

Concrete curing compounds, if their use is permitted by the Water Company, shall be of a nature and composition not deleterious to concrete, and thinned to a working consistency, either with a volatile solvent or by emulsification with water. The curing compound shall be of a standard and uniform quality ready for use as shipped by the manufacturer. At the time of use, the curing compound shall be in thoroughly stirred condition. Curing compound shall not be diluted by the addition of solvent or thinners or be altered in any manner without the specific approval of and in a manner prescribed by the manufacturer.

The curing compound shall, when treated in accordance with ASTM C156, be effective in limiting the water loss in the concrete test specimens to three and one-half (3-1/2) percent when applied at the coverage rate recommended by the manufacturer.

Curing compound shall form a continuous, unbroken membrane which will adhere to moist concrete and which will not peel from the surface or show signs of such deterioration within thirty (30) days after application under actual weather and working conditions.

This compound shall be sufficiently transparent and free from color so that there will be no permanent change in the color of the concrete. The compound shall contain, however, a temporary hue of sufficient color to make the membrane clearly visible for a period of at least four (4) hours after application.

PROTECTION AND REPAIR OF CONSTRUCTION

All surfaces shall be protected against injury. During the first seventy-two (72) hours after placing the concrete, wheeling, working or walking on the concrete shall not be permitted. All slabs subject to wear shall be covered with a layer of sand or other suitable material as soon as the concrete has set. "Sisalkraft" paper or other similar tough waterproof paper may also be used, provided all joints between adjacent strips of paper are sealed. This does not alter the requirements for proper curing.

No concrete shall be placed during rain. All concrete placed within twelve (12) hours preceding a rainstorm shall be protected with waterproof canvas or other suitable covering.

All concrete construction shall be protected from excessive loadings. Installation of mechanical and electrical equipment shall be accomplished by employing shoring, bearing plates, frames, cranes and temporary beams.

Immediately after the removal of forms, all concrete shall be inspected and all joints, rough sections or rock pockets containing loose materials shall be repaired by cutting back to solid concrete and making an opening of such size and shape as will form a one (1) inch key for cement mortar fill. All form tie holes and small imperfections shall be kept wet for two (2) hours and then coated with neat cement paste. The fill for small imperfections and form tie holes shall consist of cement mortar composed of one (1) part cement well mixed with one and one-half (1-1/2) parts of fine aggregate by volume and just enough water so that the mortar will stick together on being molded into a ball by slight pressure of the hands. This mortar shall be thoroughly compacted into place. Where the area and volume of defective concrete is large, it shall be repaired by reforming the surface and filling the opening with concrete. For such major repairs, the filling shall be reinforced and doweled securely to old concrete and shall be neatly finished to match the surface, color and texture of the adjacent concrete. All patches shall be kept damp for seven (7) days.

Where the work requires concrete of existing structures to be removed, the existing concrete and steel shall be cut accurately to the lines required under the supervision of the Water Company. The cutting shall be accomplished in a manner that preserves, free from cracks or other injuries, those parts of the existing structure that are to remain. Where the cut surface is to be left exposed, it shall be cleaned, sprayed with water, faced with one to one and one-half (1:1-1/2) mortar and finished to match adjacent surfaces.

FINISH OR FORMED SURFACES

All finished or formed surfaces shall conform accurately to the shape, alignment, grades and sections required. The finished surface shall be free from fins, bulges, ridges, offsets, honeycombing or roughness of any kind, and shall present a finished, smooth, continuous hard surface. All sharp angles shall be rounded or beveled where required. Any formed surface to be painted shall be free of any material that will be detrimental to the paint.

ASPHALT PAVING

Asphalt paving includes the furnishing and installation of all materials, equipment and labor necessary for the replacement and restoration of all streets, roads, highways, sidewalks, curbs, gutters, driveways and similar surfaces.

GENERAL

Any concrete or bituminous paved surface which is broken, removed or damaged by the Contractor's operations shall be restored at least to the condition existing prior to beginning work. Notwithstanding the provisions of this section, all work will be subject to the requirements of the local agency having jurisdiction over the affected area. The Contractor shall familiarize himself with the requirements of said agencies and shall comply in all respects with these requirements. Wherever there is a conflict between the requirements of the agency having jurisdiction and the requirements of this section, the more restrictive of the two shall be the requirement with which the Contractor shall comply.

MATERIALS

1. Concrete

   Concrete shall be as hereinbefore specified.

2. Aggregate Base Course

   Aggregate base course shall conform to the requirements of Caltrans Standard Specifications, Section 26 and shall be Class 2, three quarter (3/4) inch maximum size.

3. Prime Coat

   Prime coat shall conform to the requirements of Caltrans Specifications, Section 39. Liquid asphalt grade for prime coat shall be as specified in the Special Conditions.

4. Asphalt Concrete Surfacing

   Asphalt concrete surface shall conform to the requirements of Caltrans Specifications, Section 39, and shall be Type B, one-half (1/2) inch maximum size. Paving asphalt shall conform to the provisions in Section 92 and shall be of the penetration range specified in the Special Conditions.

PREPARATION OF SUBGRADE

After backfill has been properly placed in the trench and other affected areas, in accordance with these Standard Specifications, the surface shall be rolled or tamped until the subbase is firm and unyielding. Mud or other soft or spongy material shall be removed and the space filled with gravel and rolled or tamped in layers not exceeding four (4) inches in thickness. The edges of all existing surfaces shall be saw cut and square prior to placement of the base course and final surface.

CONCRETE SURFACES

Reconstruction of concrete curbs, gutters, driveways and sidewalks shall be of the same kind of material and in not less than the same dimensions as the existing work. In the case of concrete slabs, the minimum thickness shall be six (6) inches in traffic areas and four (4) inches otherwise. Repairs shall be made by removing and replacing the entire portion between joints or scores and not merely by refinishing the damaged part. All work shall match the appearance of the existing improvements as nearly as practicable.

ASPHALTIC SURFACES

After the base course has been compacted, plant mix surfacing shall be applied to a minimum depth of three inches, but in no case less than the thickness of the existing pavement. Before placing the plant mix surfacing, a prime coat of asphaltic emulsion shall be applied over the area to be resurfaced. Proportioning, mixing, spreading and compaction of asphalt concrete shall conform to applicable portions of Caltrans Standard Specification, Section 39, except that a self-propelled mechanical spreading and finishing machine need not be used.

SURFACE TREATMENTS

If special surface treatment such as seal coat, armor coat or fog seal is required by the jurisdictional authority, it shall be done to the requirements of the authority.

RESTORATION OF SURFACE MARKERS

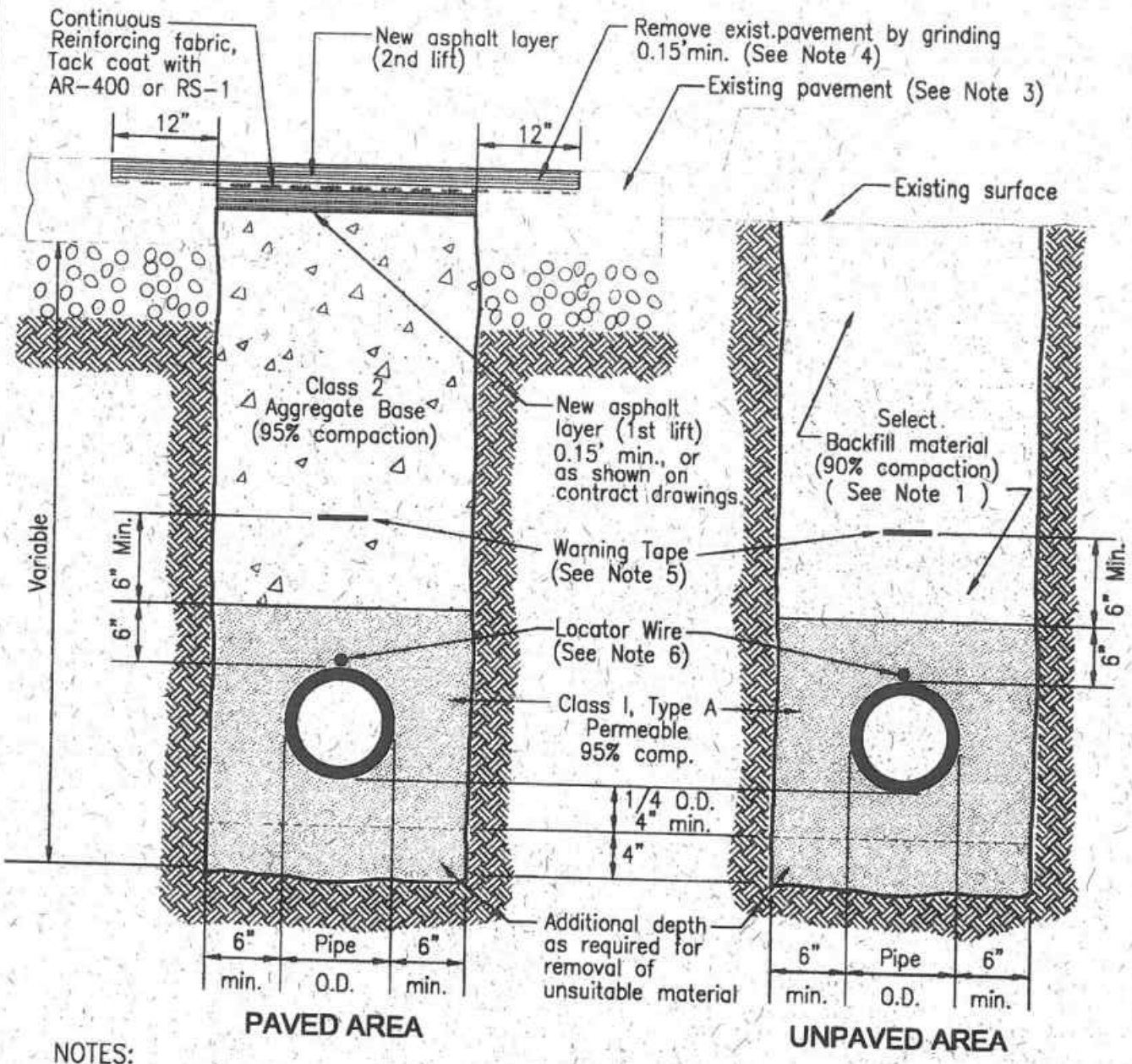
Traffic markers or other surface markings painted on the roadway surface which have been damaged or destroyed shall be replaced in strict accordance with the requirements of the jurisdictional authority.

Index to Standard Details

Detail #	Title
1.	W - 1 Utility Trench Detail
2.	W - 2 Air Release Valve
3.	W - 3A 1"or 2" Plastic Service Connection
4.	W - 3B Residential Service Connection with Fire Sprinkler
5.	W - 4 2" Blow Off
6.	W - 5 2"Polyethylene Loop (Connecting New Water Main to Existing)
7.	W - 6 Fire Hydrant
8.	W - 7 Thrust Blocks
9.	W - 8 Excavation for Tapping Sleeves & Valves
10.	W - 9 Locator Wire
11.	W - 10 Valve Stem Extension
12.	W - 11 Valve Box and Riser
13.	W - 12A Fire Service System Layout Plan
14.	W - 12B Fire Department Connection Post Indicator Valve
15.	W - 13 Double Check Detector (Above Grade)
16.	W - 14A Backflow Prevention Device 2 - inch Diameter and Smaller
17.	W - 14B Backflow Prevention Device 2-1/2 - inch Diameter and Larger
18.	W - 14C Backflow Preventer Enclosure Cage Assembly
19.	W - 15A Cut and Plug Inactive Line
20.	W - 15B Capping Active Line (For Existing Plain End Pipe)
21.	W - 16 Joint Restraint with Petrolatum Tape System
22.	W - 17 Thrust Restraint Length Table
23.	W - 18 Hydrant Guard

PALO ALTO PARK MUTUAL WATER COMPANY

DRAWINGS

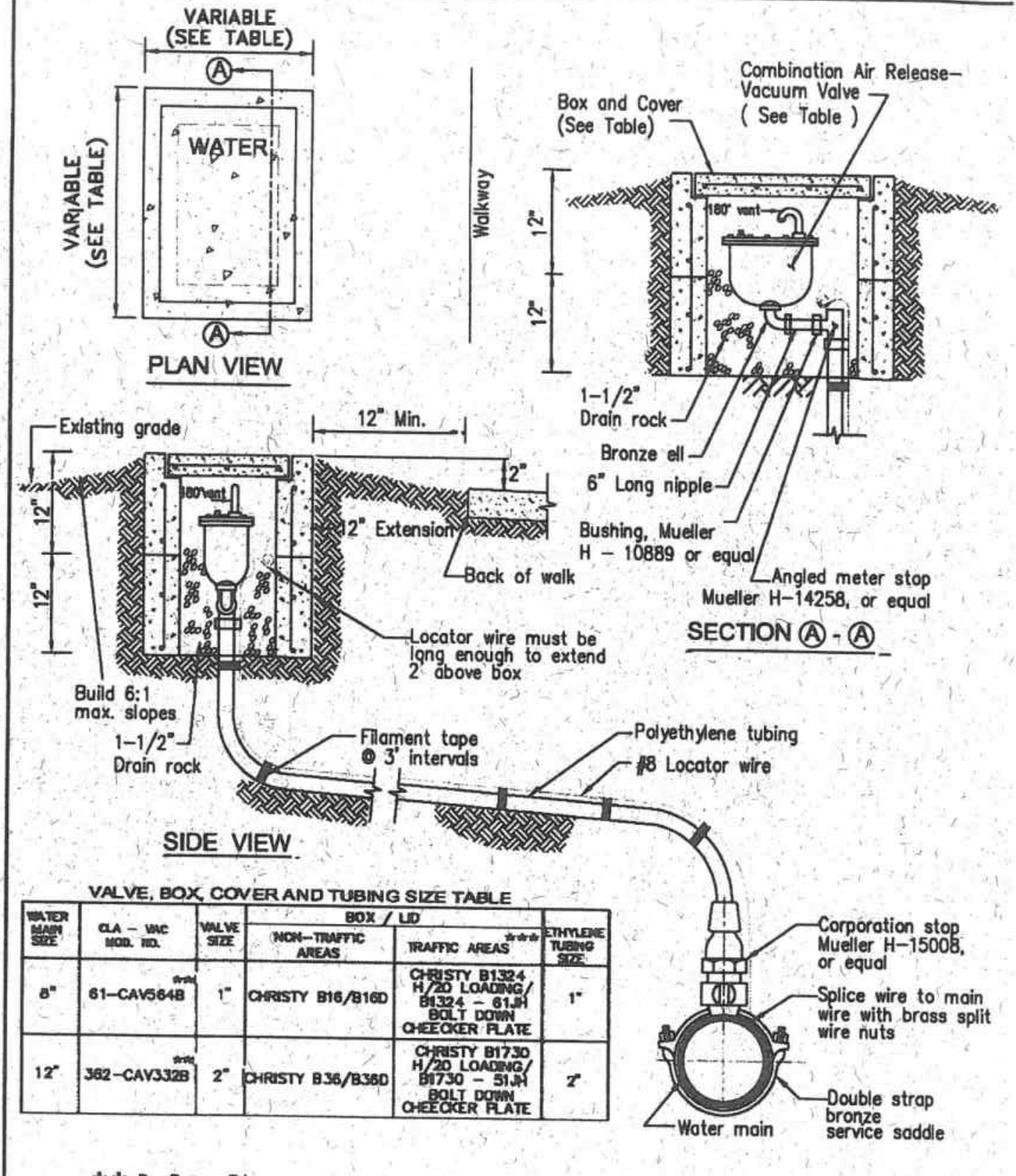


NOTES:

1. Select backfill material – material from excavation, free from stones or lumps exceeding 3" in greatest dimension, vegetable matter, or unsatisfactory material. (See Specifications)
2. For new streets use design structural section as shown on plans.
3. If the edge of the trench falls within 3' of the gutter, or edge of pavement, the entire pavement shall be removed.
4. If existing pavement is less than 3" thick, pavement edge shall be sawcut to full depth in lieu of grinding.
5. Place Warning Tape 14" above pipe.
6. Place locator wire at top of pipe.

NOT TO SCALE

STANDARD DETAIL	Palo Alto Park Mutual Water Company STANDARD SPECIFICATIONS & DRAWINGS	
DATE: 09/24/2015	UTILITY TRENCH DETAIL	W - 1 SHT 1 OF 1



VALVE, BOX, COVER AND TUBING SIZE TABLE

WATER MAIN SIZE	CLA – VAL MOD. NO.	VALVE SIZE	BOX / LID		POLYETHYLENE TUBING SIZE
			NON–TRAFFIC AREAS	TRAFFIC AREAS ***	
8"	61–CAV564B **	1"	CHRISTY B16/B16D	CHRISTY B1324 H/20 LOADING/ B1324 – 61JH BOLT DOWN CHECKER PLATE	1"
12"	362–CAV332B **	2"	CHRISTY B36/B36D	CHRISTY B1730 H/20 LOADING/ B1730 – 51JH BOLT DOWN CHECKER PLATE	2"

** B = Bronze Trim

*** Install 6" P.C.C. slab underneath for support.

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	AIR RELEASE VALVE	W - 2 SHT 1 OF 1

PALO ALTO PARK MUTUAL WATER COMPANY

STANDARD DETAIL

STANDARD SPECIFICATION AND DRAWINGS

DATE: 09/24/2015

1" OR 2" PLASTIC SERVICE CONNECTION

W - 3A

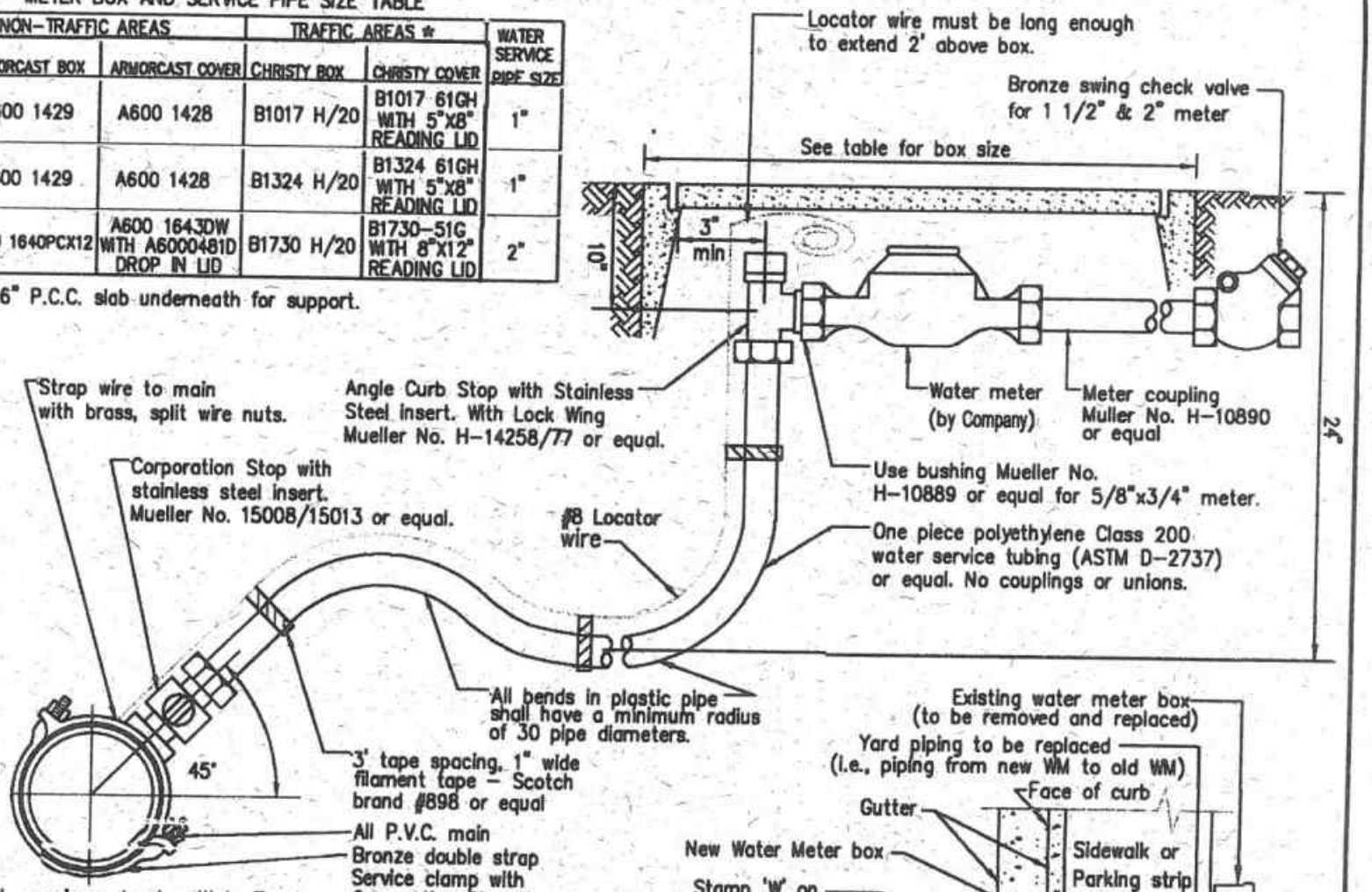
SHT 1 OF 2

NOT TO SCALE

METER BOX AND SERVICE PIPE SIZE TABLE

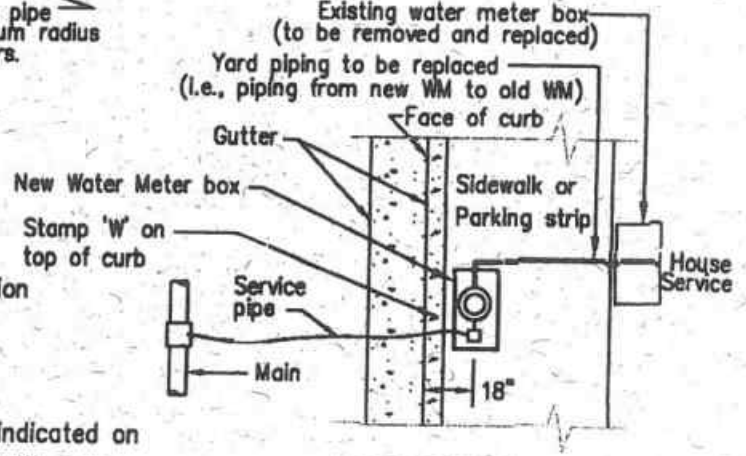
METER SIZE	NON-TRAFFIC AREAS		TRAFFIC AREAS *		WATER SERVICE PIPE SIZE
	ARMORCAST BOX	ARMORCAST COVER	CHRISTY BOX	CHRISTY COVER	
5/8", 3/4"	A600 1429	A600 1428	B1017 H/20	B1017 61GH WITH 5"X8" READING LID	1"
1"	A600 1429	A600 1428	B1324 H/20	B1324 61GH WITH 5"X8" READING LID	1"
1 1/2" & 2"	A600 1640PCX12	A600 1643DW WITH A6000481D DROP IN LID	B1730 H/20	B1730-51G WITH 8"X12" READING LID	2"

* Install 6" P.C.C. slab underneath for support.



NOTES:

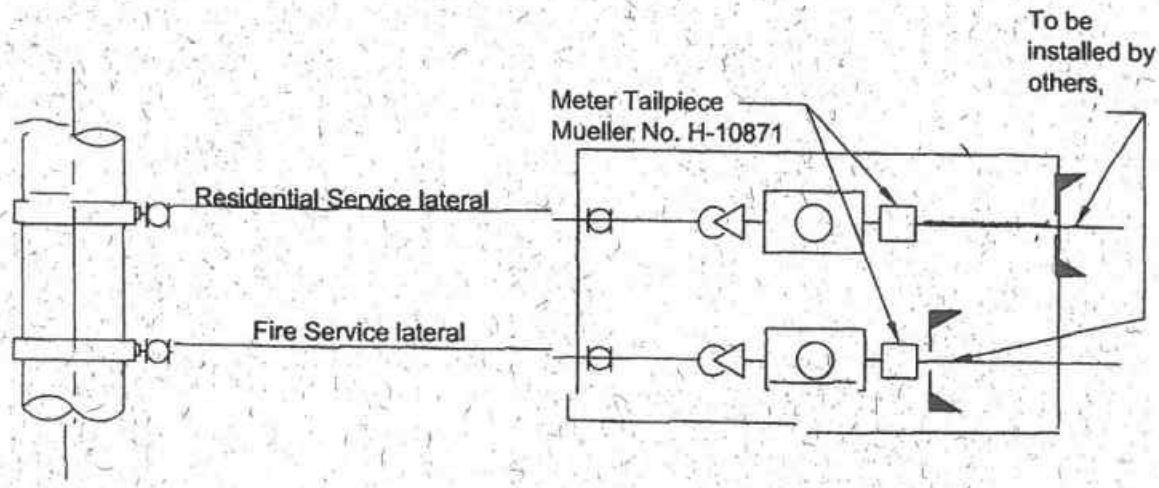
1. All services to be Wet Tap.
2. Use a # 8 Locator wire-stranded Blue, single length of wire with insulation intact. Coat cut end of wire with scotchcote electrical coating or equal.
3. Mark a "W" on curb at all water services.
4. Center Meter Box over Meter to grade.
5. Remove and replace existing water meter box to new location as indicated on the location plan this sheet. Replace service pipe and yard piping with new PE pipe with minimum pipe diameter as shown on table above.



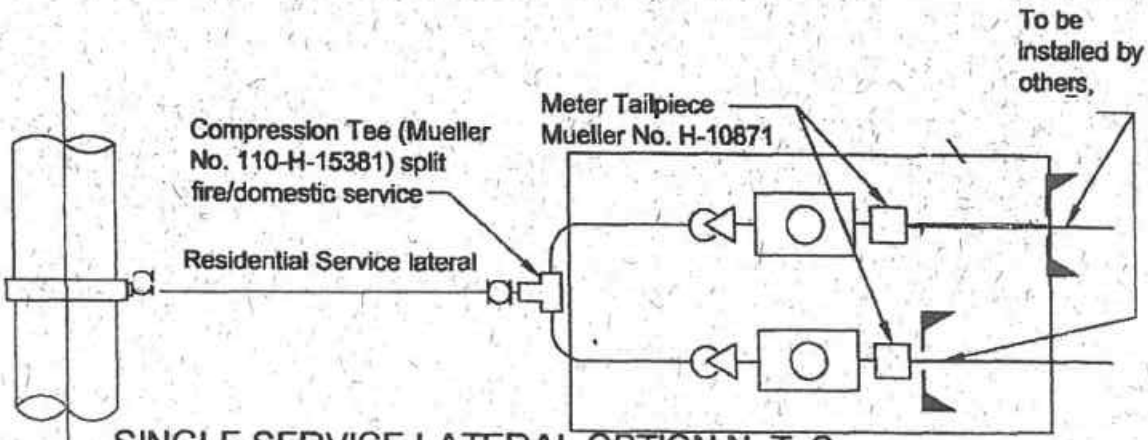
LOCATION PLAN

Notes:

1. Stagger angles of taps per Company approval. 18" minimum between taps & 24" minimum distance away from bell pipe or collar.
2. Torque requirements per manufacturer's specifications.
3. Saddles shall be properly sized for kind and size of pipe according to the manufacturer's instructions.
4. Tap sizes over 2" requires a hot tap with a tapping sleeve. Tap to be performed by a Palo Alto Park Mutual Water Company approved company.
5. Center meter box over meter(s) to grade.
6. Meter (s) box to be Christy FL 30 Fi berlyte (FL30B0x20) or approved traffic rated equivalent.
7. For meter (s) installation see Details.
8. Size for a fire service Lateral to be determined by the Fire District. Size of residential service lateral to be determined by Palo Alto Park Mutual Water company.

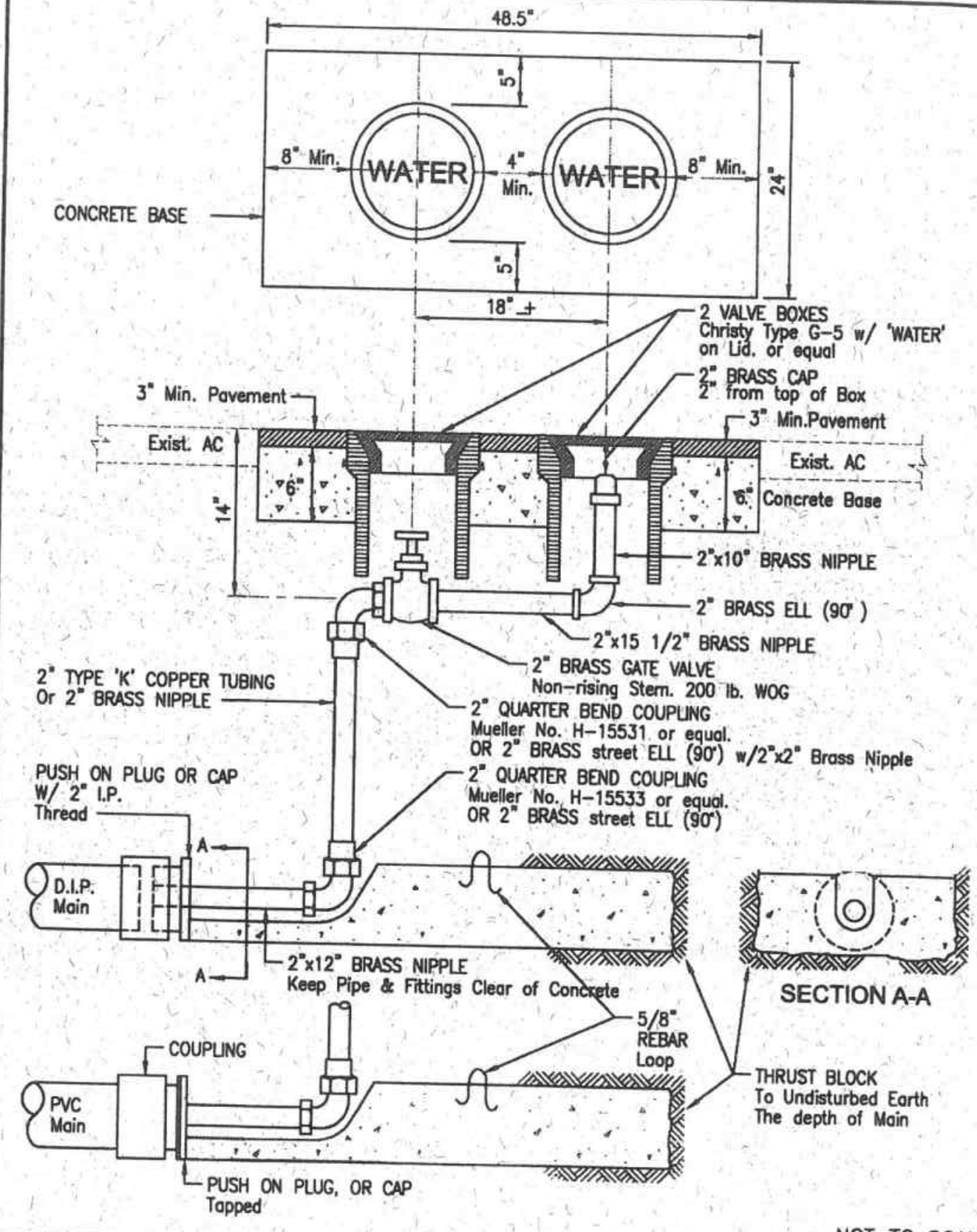


DUAL SERVICE LATERAL OPTION N. T. S.



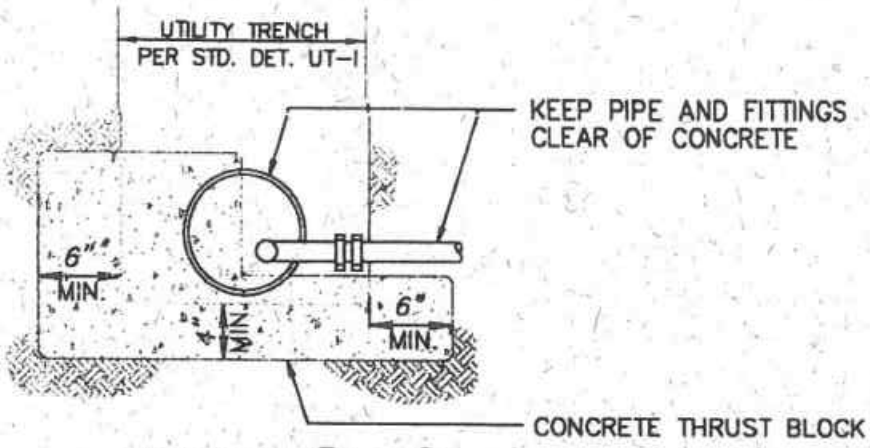
SINGLE SERVICE LATERAL OPTION N. T. S.

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	RESIDENTIAL SERVICE CONNECTION WITH FIRE SPRINKLER	W-3B SHT 1 OF 1

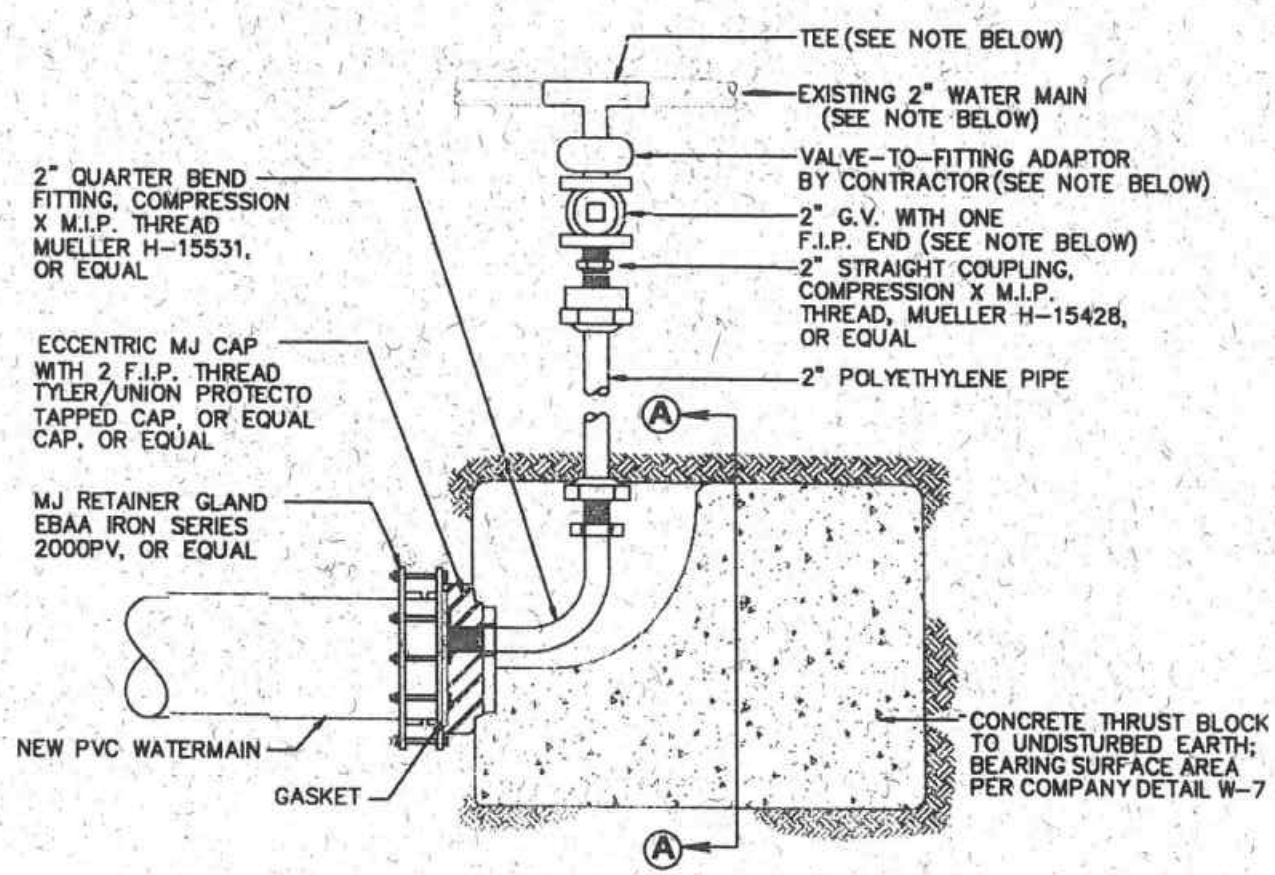


NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**2" BLOW OFF**	W - 4 SHT 1 OF 1



SECTION Ⓐ - Ⓐ



PLAN

NOTES:

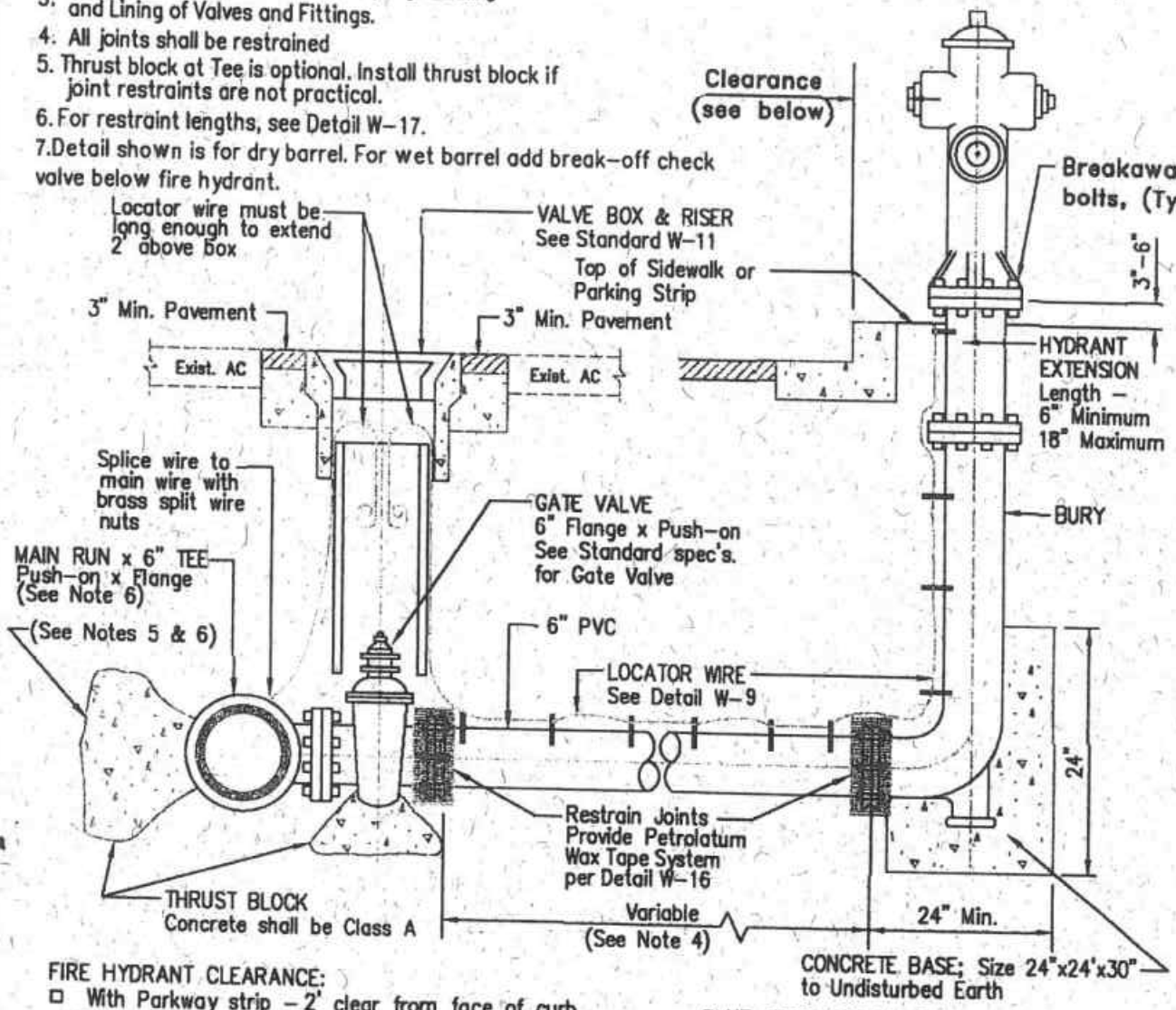
1. IF EXISTING MAIN IS GREATER THAN 2", USE TAPPING SLEEVE WITH VALVE AND NECESSARY ADAPTOR TO CONNECT.
2. INSTALL VALVE BOX AND RISER PER STD. DETAIL W-11.

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**2" POLYETHYLENE LOOP** (CONNECTING NEW WATER MAIN TO EXISTING)	W - 5 SHT 1 OF 1

NOTES:

1. All Flange Bolts & Nuts shall be kept clear of Concrete.
2. All Nuts, Bolts and washers shall be Stainless Steel.
3. See Standard specification for Epoxy Coating and Lining of Valves and Fittings.
4. All joints shall be restrained
5. Thrust block at Tee is optional. Install thrust block if joint restraints are not practical.
6. For restraint lengths, see Detail W-17.
7. Detail shown is for dry barrel. For wet barrel add break-off check valve below fire hydrant.

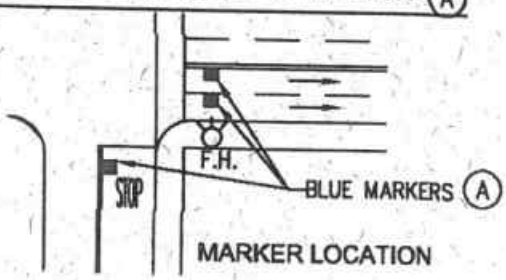


FIRE HYDRANT CLEARANCE:

- With Parkway strip – 2' clear from face of curb to fire hydrant.
- With Monolithic Curb, Gutter & sidewalk – 18" clear from back of sidewalk to fire hydrant.

BLUE REFLECTIVE MARKER:

Blue markers shall be placed on the left hand side of all travel lanes adjacent to the fire hydrant up to the center of the street. (A)

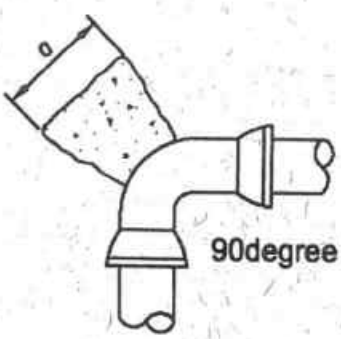


FIRE HYDRANT TABLE

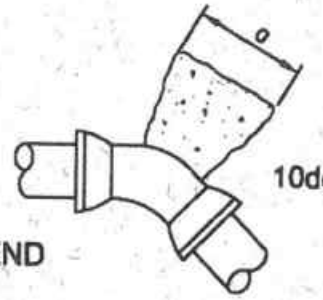
FIRE HYDRANT TYPE	MODEL	OUTLET SIZES
TYPE A – DRY BARREL AWWA C502	MUELLER A-423	2-2 1/2" & 1-4 1/2"
TYPE B – WET BARREL AWWA C503	CLOW 92 LOW SILHOUETTE	2-2 1/2" & 1-4 1/2"
TYPE C – WET BARREL AWWA C503	CLOW 76	2-2 1/2" & 1-4 1/2"
TYPE D – WET BARREL AWWA C503	CLOW 865	2-4 1/2" & 1-2 1/2"

NOT TO SCALE

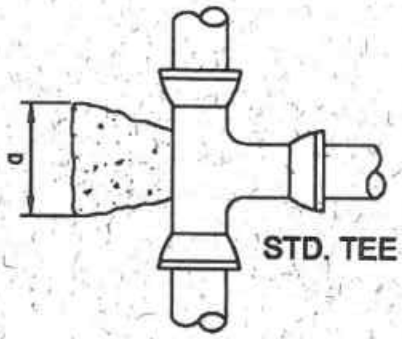
STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE:09/24/2015	**FIRE HYDRANT**	W - 6 SHT 1 OF 1



90degree BEND

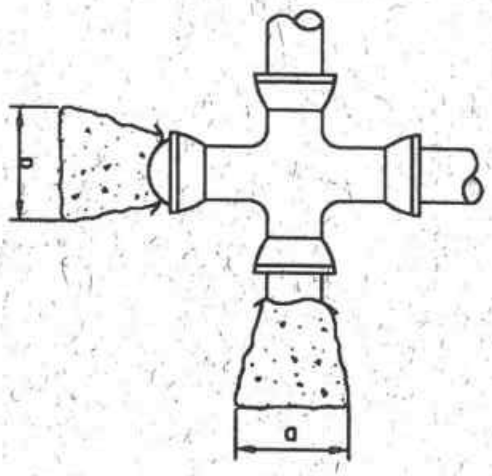


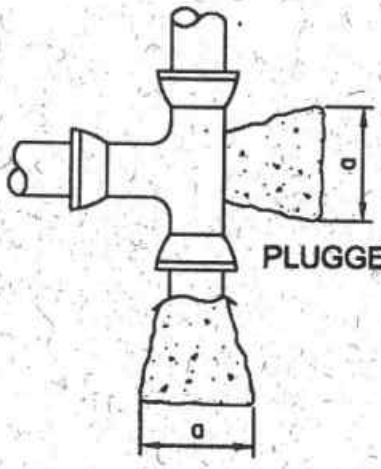
10degree TO 45degree BENDS



STD. TEE

PLUGGED CROSS





PLUGGED RUN

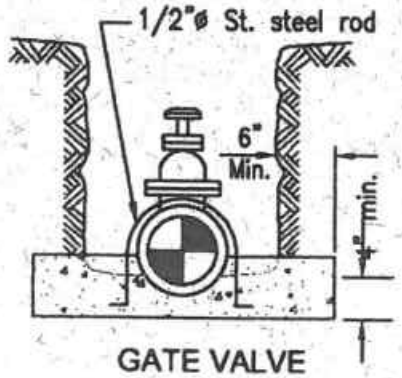
NOTE:

1. All Thrust Blocks shall bear against undisturbed Earth.

AREA (a) IN SQ. FT.

TYPE OF FITTING	SIZE OF PIPE							
	4"	6"	8"	10"	12"	14"	16"	18"
90° ELL	2	5	8	13	18	25	32	41
45° ELL	1	3	5	7	10	14	18	22
22 1/2° ELL	1	2	3	4	5	7	9	12
11 1/4° ELL	1	1	2	2	3	4	5	6
PLUG/TEE	1.5	4	6	9	13	18	23	29

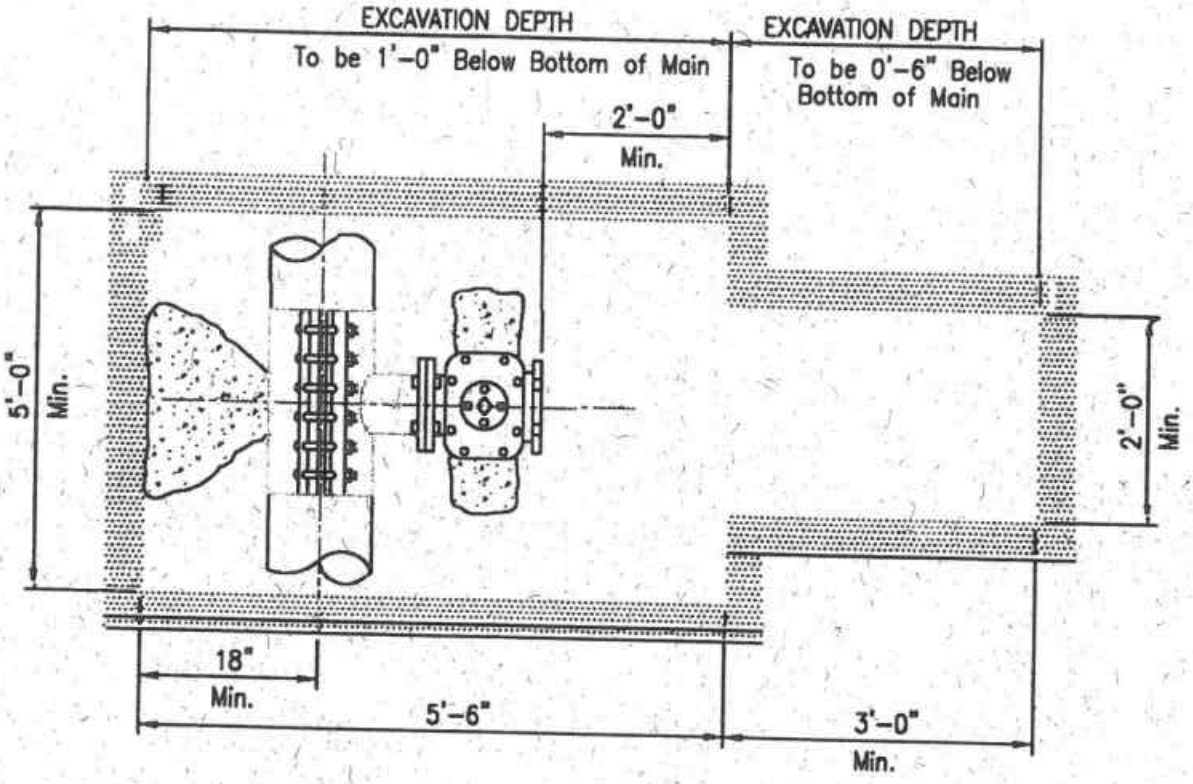
Based on Soil bearing value of 2000 lbs. per sq. ft. and water pressure of 225 psi form as required to keep concrete off of mechanical joint or flange bolts.



GATE VALVE

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATONS AND DRAWINGS	
DATE: 09/24/2015	**THRUST BLOCKS**	W - 7 SHT 1 OF 1

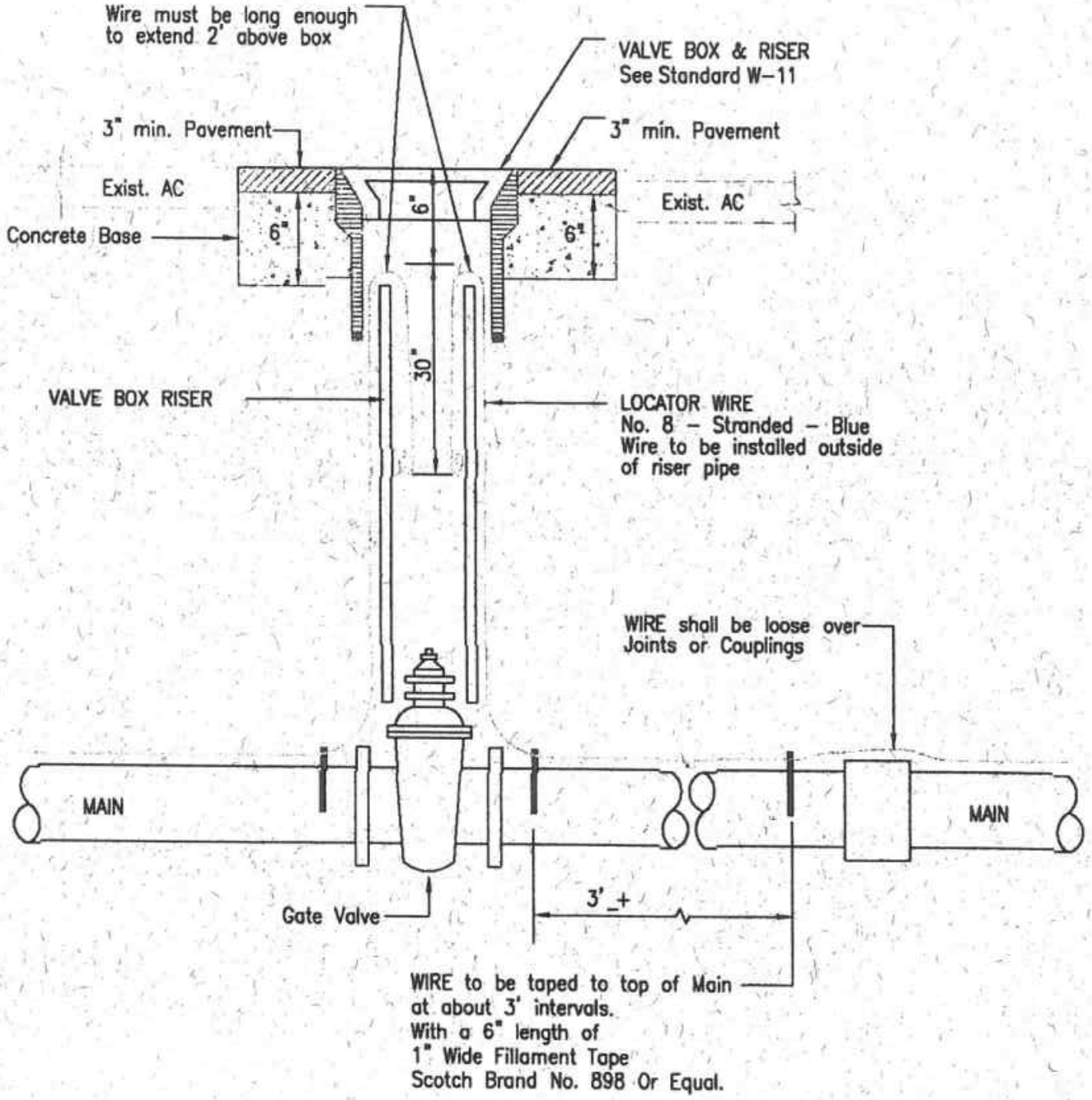


NOTES:

1. No tap to be made within 30" of a joint or fitting on C.I.P. or D.I.P.
2. Tap on AC and P.V.C. pipe shall be made 3' minimum from any coupling or fitting.
3. Contractor to install thrust block behind and under tapping sleeve
4. The Contractor supplies the material and The Company makes the wet tap.
5. Tapping Sleeves shall be all 316L Stainless Steel by Smith Blair Model 663-316LSS or approved equal; and Tapping Valves shall be Mueller flange x mechanical joint or approved equal.
6. When cathodic protection is required, do not connect bond cables to a stainless steel tapping sleeve.

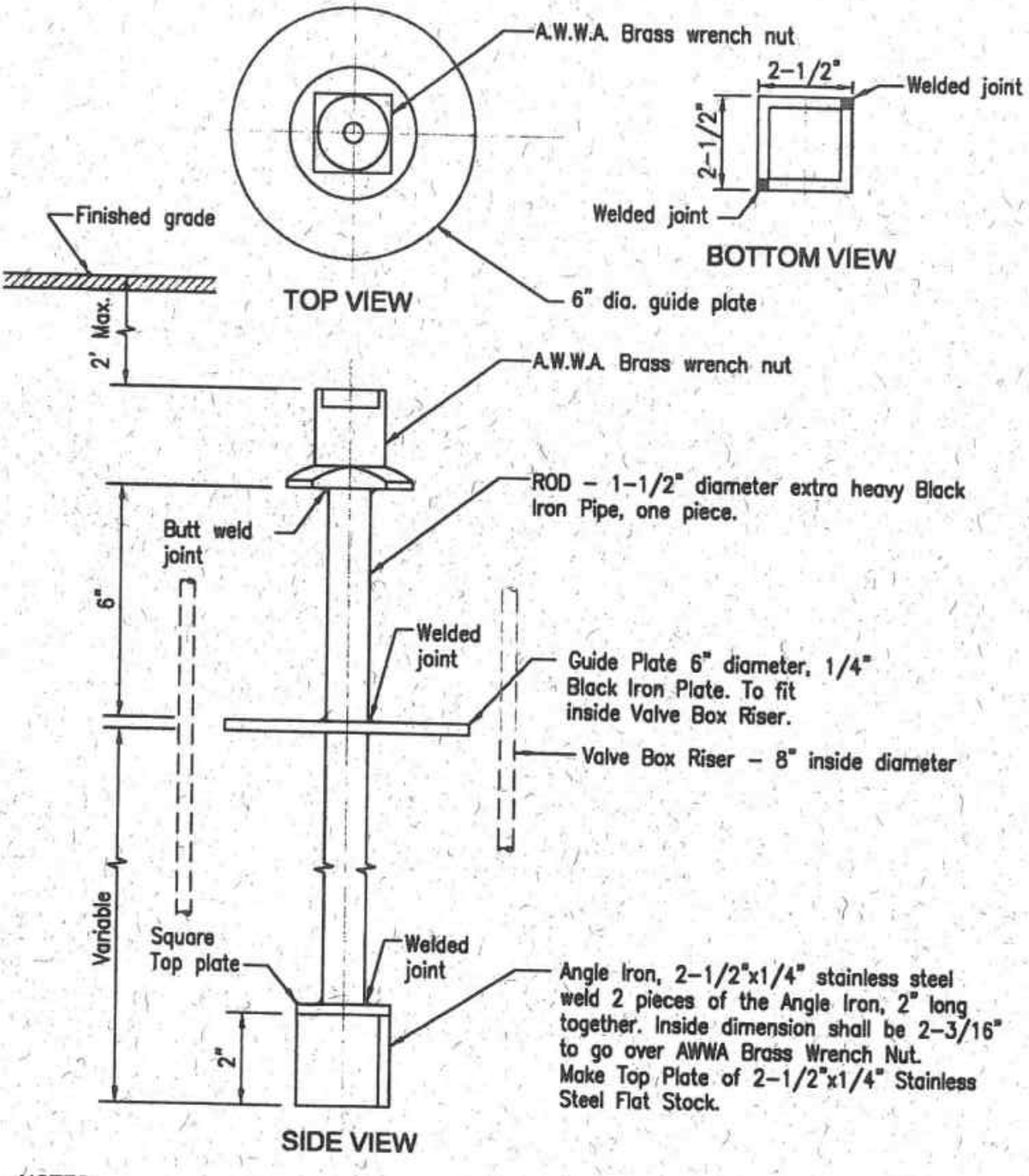
NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**EXCAVATION FOR TAPPING SLEEVES & VALVES**	W-8 SHT 1 OF 1



NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**LOCATOR WIRE**	W-9 SHT 1 OF 1

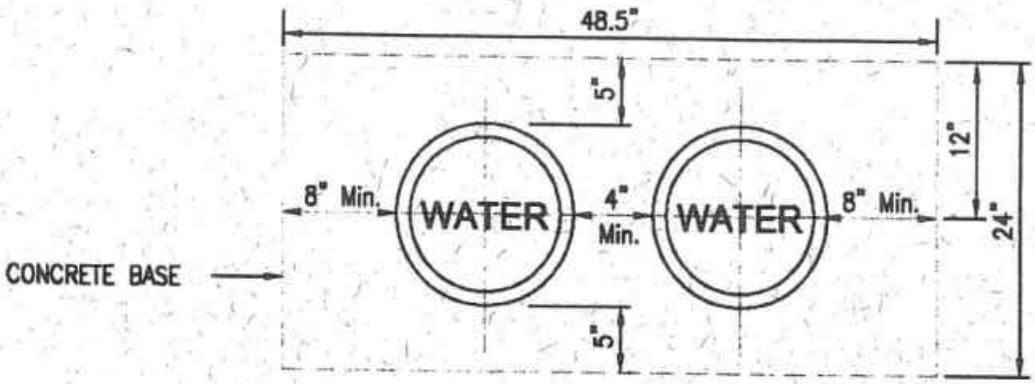


NOTES:

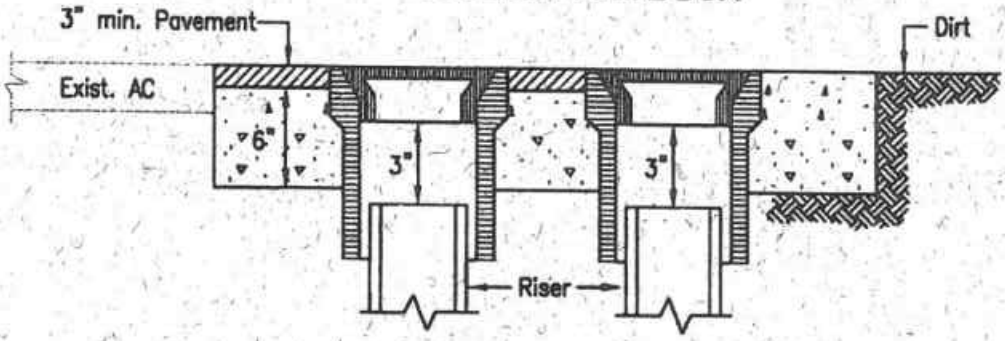
1. Extensions are required for valves extending for more than 4 feet below the surface.
2. The Valve Stem shall be Fusion Epoxy Coated per Standard Specifications.

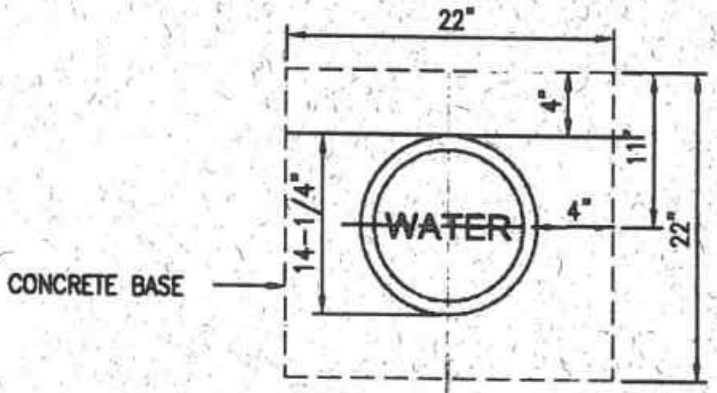
NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**VALVE STEM EXTENSION**	W - 10 SHT 1 OF 1

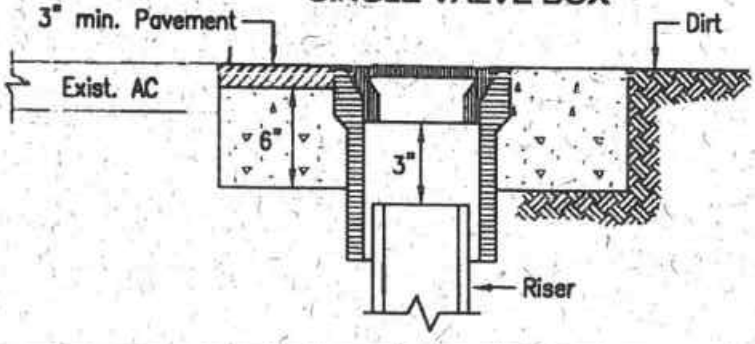


DOUBLE VALVE BOX





SINGLE VALVE BOX



NOTE:

VALVE BOX – Christy Type G5 Box or equal

COVER – Each Cover shall have cast into it the letters "WATER"

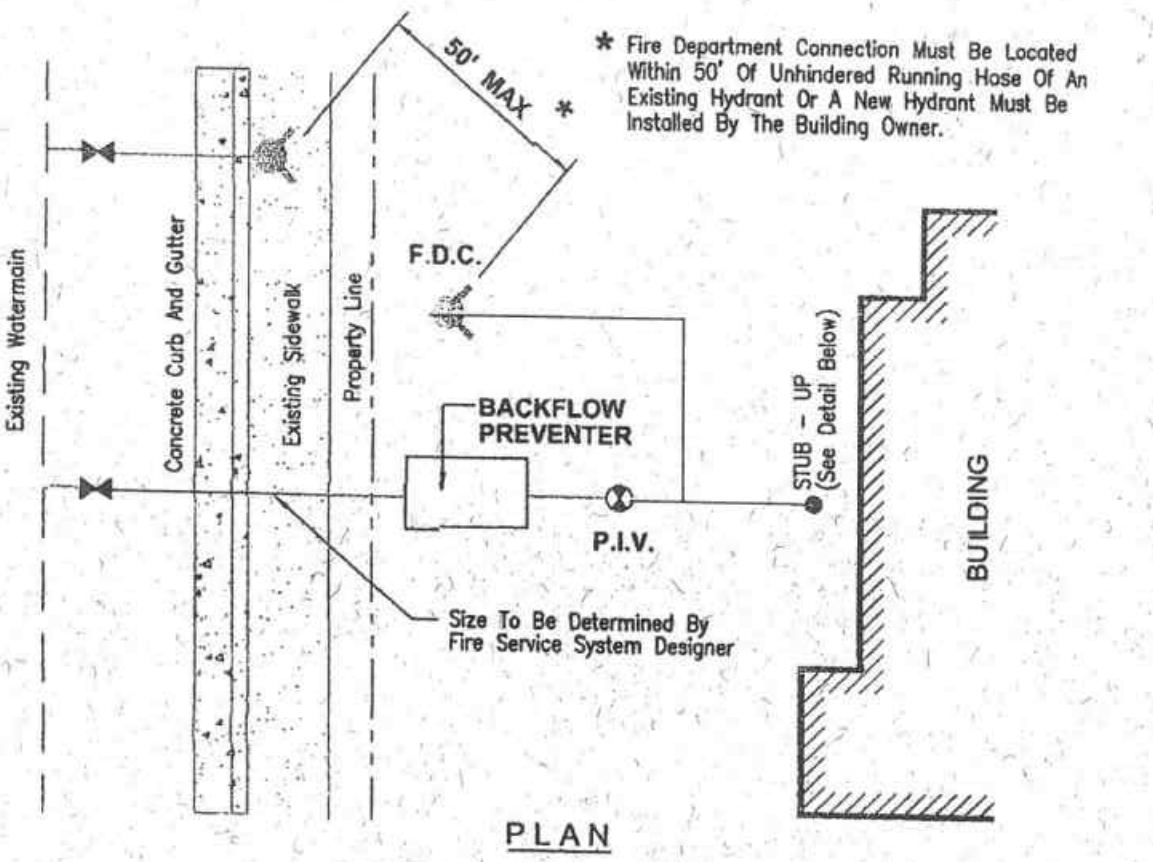
RISER – Shall be of one piece 8" PVC Pipe

CONCRETE – Class A

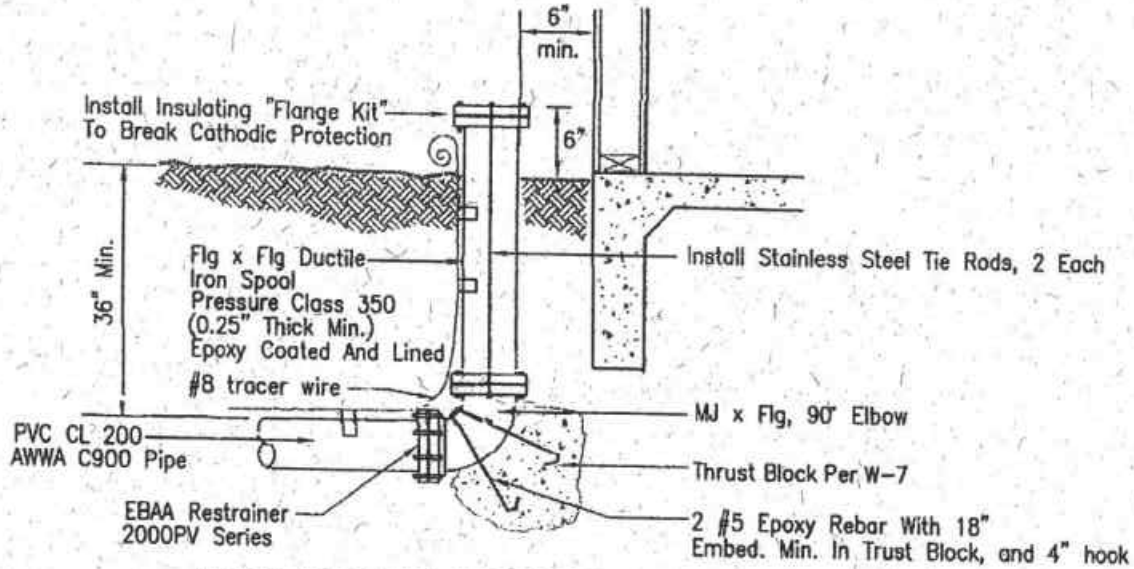
VALVE BOX IN DIRT – Set Valve Box, install concrete base even with surface

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**VALVE BOX AND RISER**	W - 11 SHT 1 OF 1



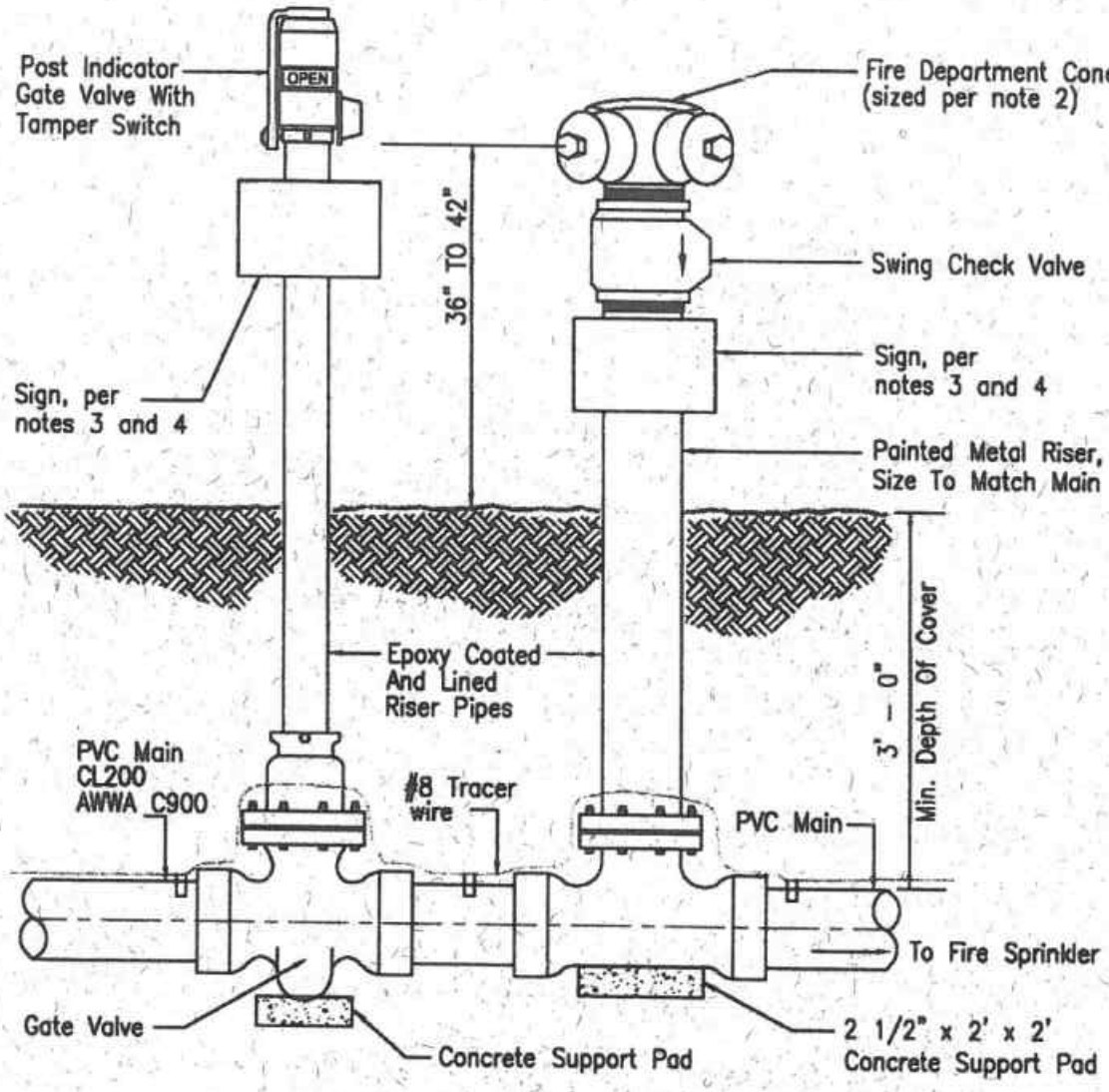
PLAN



FIRE SPRINKLER RISER STUB - UP

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**FIRE SERVICE SYSTEM LAYOUT PLAN**	W - 12A SHT 1 OF 1

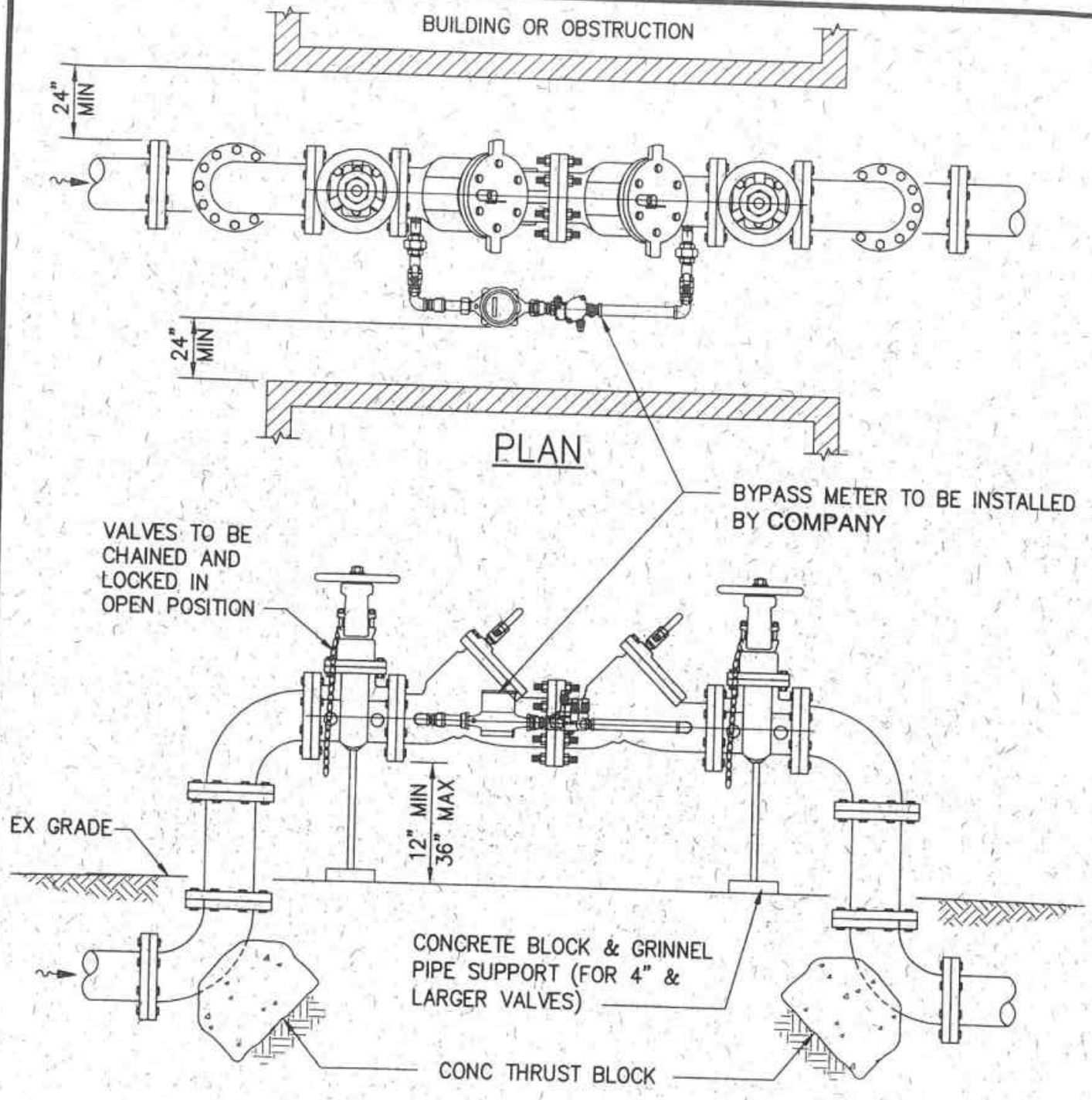


NOTES:

1. Landscape plantings, when fully grown, shall not obscure valve or fire department connection (three feet minimum clearance required on all sides).
2. For fire department connections supplying combination sprinkler system – one 2 1/2 inch inlet is required for each 250 GPM of the system demand or fraction thereof.
3. All post indicating valves and fire department connections shall be identified as to its function and what they serve. The sign shall be aluminum with a minimum thickness of 0.080 inch. The message shall be a minimum of one–inch high black lettering on a white reflective background. All background sheeting and letters used shall be high intensity manufactured by 3M company. The sign shall be mounted by at least two flared leg brackets attached to the riser by stainless steel straps.
4. For systems requiring a fire pump, the inlets of the fire department connections shall have permanent signs stating the pumping pressures needed to overcome the internal water system. Signs shall be constructed and mounted similar to identification signs.
5. All underground bolts, nuts and washers shall be 316 stainless steel.

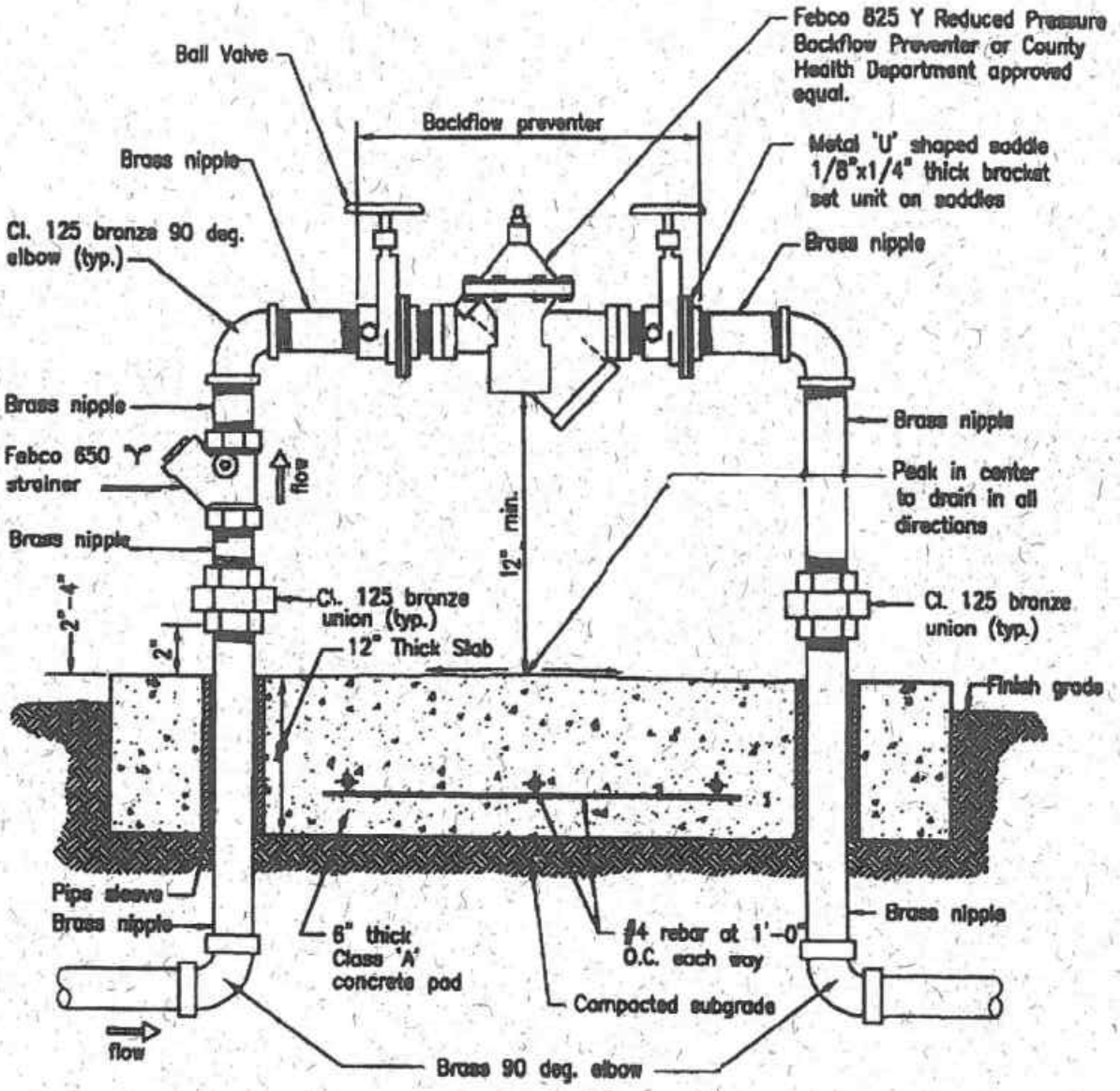
NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWING	
DATE: 09/24/2015	**FIRE DEPARTMENT CONNECTION POST INDICATOR VALVE**	W - 12B SHT 1 OF 1



NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE:09/24/2015	DOUBLE CHECK DETECTOR (ABOVE GRADE)	W-13 SHT 1 OF 1



NOTE: 1. Backflow Prevention Device shall be provided with a steel enclosure

by LeMeur Welding and Manufacturing-Model # BF-99 (dark green). Dimensions of concrete pad, bockflow prwenter assembly and LeMeur enclosure shall be coordinated to provide suitable arrangement.

2. For use on irrigation lines and on services where a private well is in use.

NOT TO SCALE

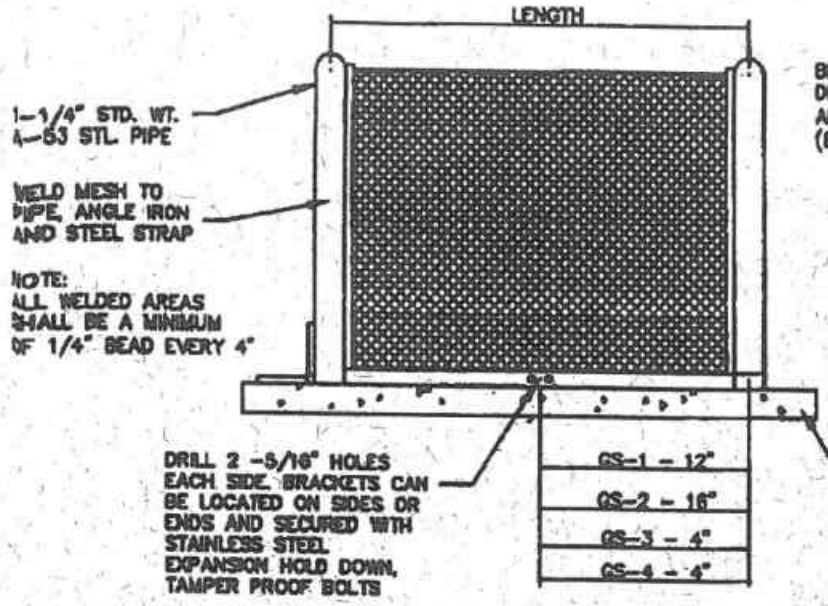
STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**BACKFLOW PREVENTION DEVICE** **2-inch Diameter and Smaller**	W-14A SHT 1 OF 1

NOTES:

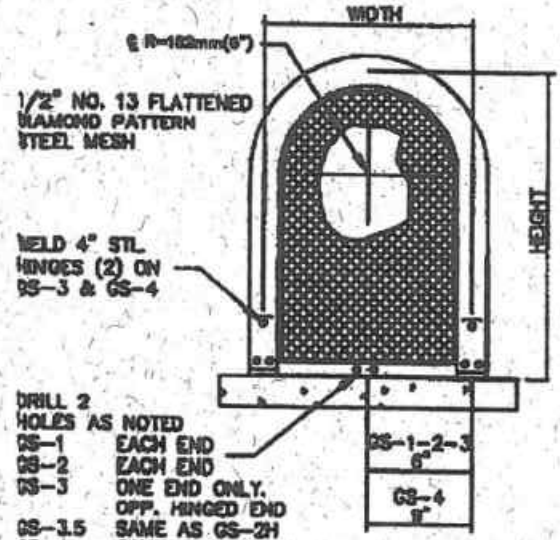
1. BACKFLOW PREVENTION ASSEMBLY SHALL BE FEBCO B25YO OR APPROVED EQUAL CONTACT THE SAN MATEO COUNTY CROSS-CONNECTION CONTROL PROGRAM AT HTTP://SMCHEALTH.ORG/CROSSCONNECTION.
2. TEST COCKS AND RISING STEM (OS & Y) VALVES MUST BE SUPPLIED AND INSTALLED AS SHOWN.
3. BACKFLOW ASSEMBLY SHALL BE INSTALLED AS CLOSE AS PRACTICAL TO METER.
4. ALL PIPING AND APPURTENANCES SHALL BE AWWA RATED 200 PSI.
5. ALL ASSEMBLIES SHALL BE TESTED UPON INSTALLATION AND ANNUALLY THEREAFTER BY A CERTIFIED BACKFLOW TESTER TAGS INDICATING 10 DAYS OF THE TEST FOR FURTHER INFORMATION , CONTACT SAN MATEO COUNTY CROSS-CONNECTION CONTROL PROGRAM AT (650)372-6204 OR HTTP://SMCHEALTH.ORG/CROSSCONNECTION.
6. ASSEMBLY SHALL BE LOCATED A MINIMUM OF 24-INCHES FROM ANY PERMANENT STRUCTURE AND SHALL BE ACCESSIBLE FOR TESTING AND MAINTENANCE.
7. MECHANICAL OR FLANGED JOINT, COUPLING AND CONNECTIONS REQUIRED. (NO PUSH ONJOINTS ALLOWED).
8. DUE TO CORROSIVE SOIL ON THE BAY SIDE OF HWY 101, UNDERGROUND PIPE SHALL BE C900, PVC RATED 200 PSI OR GREATER. FITTINGS SHALL BE MORTAR LINED, EPOXY COATED DUCTILE IRON. ABOVE GROUND PIPING SHALL BE COPPER OR DUCTILE IRON PIPE.

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE:09/24/2015	2-1/2" DIAMETER AND LARGER BACKFLOW PREVENTION ASSEMBLY	W-14B



BPDI BACKFLOW PREVENTION DEVICE ENCLOSURES OR APPROVED EQUAL (WWW.BPDI.COM) (800) 266-5411



NOTE:
AFTER ALL WELDING, ENTIRE UNIT SHALL BE PROCESSED WITH IRON PHOSPHATE PRETREATMENT. ELECTROSTATIC APPLICATION OF POWDER SHALL BE FUSION BONDED - PRS-8-4004-C (BEIGE) OR PRS-8-4003-C (LEAF GREEN) COLOR AS DIRECTED PER PLANS OR APPROVED EQUAL.

ALL UNITS ALSO AVAILABLE IN 304 S.S. GS-3.5 AVAILABLE IN 304 S.S. ONLY.

ALL BOLTS FOR HINGES AND HASPS SHALL BE ZINC PLATED, TAMPER PROOF, EXCEPTION - USE SS HARDWARE FOR SS UNITS.

STD. SIZES	CENTERLINE DIMENSIONS		WEIGHT (lbs) GS	WEIGHT (lbs) CGS
GS-0.5	12"W x 18"H x 12"L	LIFT OFF UNIT	35	30
GS-1	12"W x 24"H x 24"L	LIFT OFF UNIT	40	34
GS-2	12"W x 24"H x 32"L	LIFT OFF UNIT	45	40
GS-3	12"W x 24"H x 42"L	HINGED UNIT	51	46
CGS-3.5	12"W x 39"H x 42"L	HINGED UNIT	N/A	85
GS-4	16"W x 30"H x 48"L	HINGED UNIT	67	60

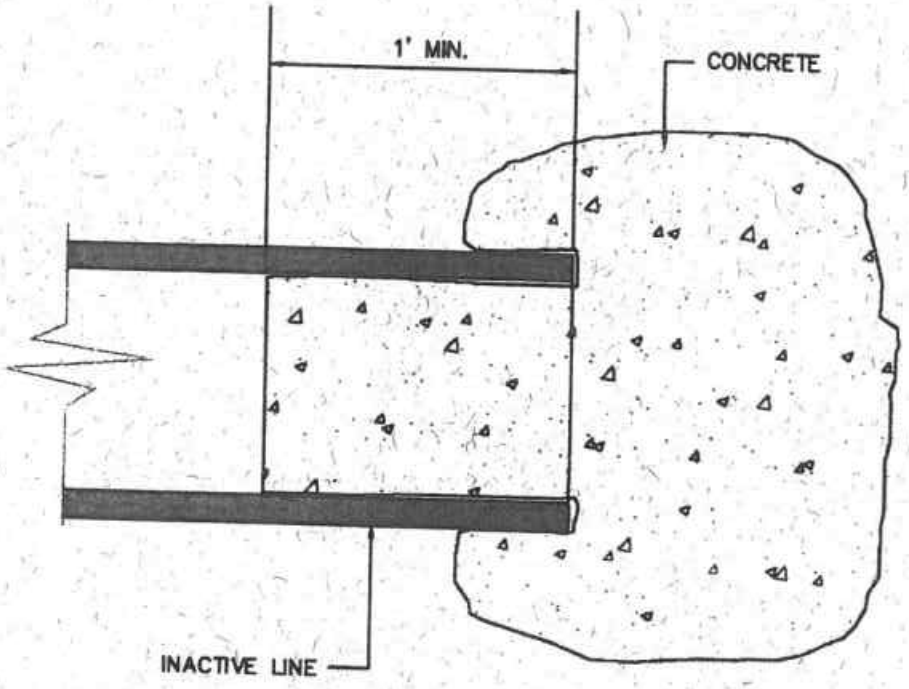
NOTE:
GS = POWDER COATED STEEL GUARD SHACK
CGS = STAINLESS STEEL COAST GUARD SHACK W/ SAND BLASTED SATIN FINISH

NOTES:

1. MAINTAIN 50mm(2") MINIMUM CLEARANCE AT TOP AND 305mm(12") ON ALL SIDES BETWEEN ENCLOSURE AND ANY PIPE AND FITTINGS.
2. 150mm(6") PCC SLAB SHALL EXTEND 152mm(6") BEYOND ENCLOSURE. ALL SIDES SLOPE TO PERIMETER. SEE DETAIL G-3.
3. 150mm(6") AB AT 95% RELATIVE COMPACTION.
4. FINISHED GRADE SHALL BE 25mm(1") ABOVE GRADE IN UNPAVED AREAS.

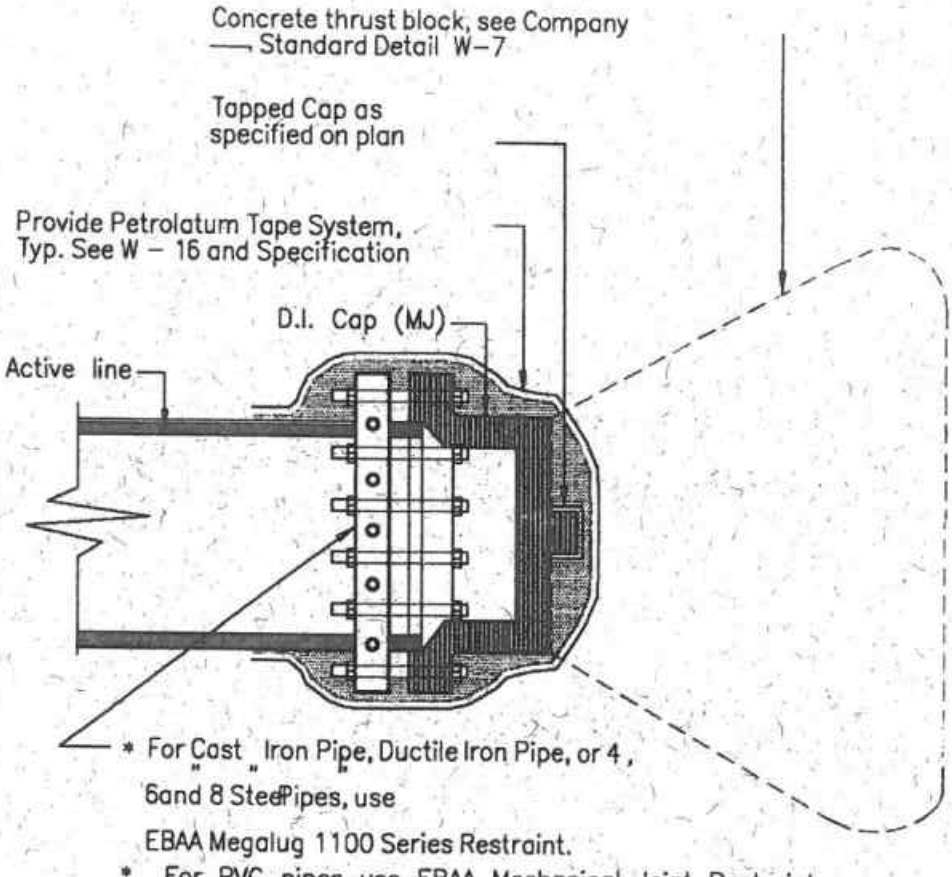
NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE:09/24/2015	BACKFLOW PREVENTER ENCLOSURE CAGE ASSEMBLY	W-14C



NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**CUT AND PLUG INACTIVE LINE**	W - 15A SHT 1 OF 1



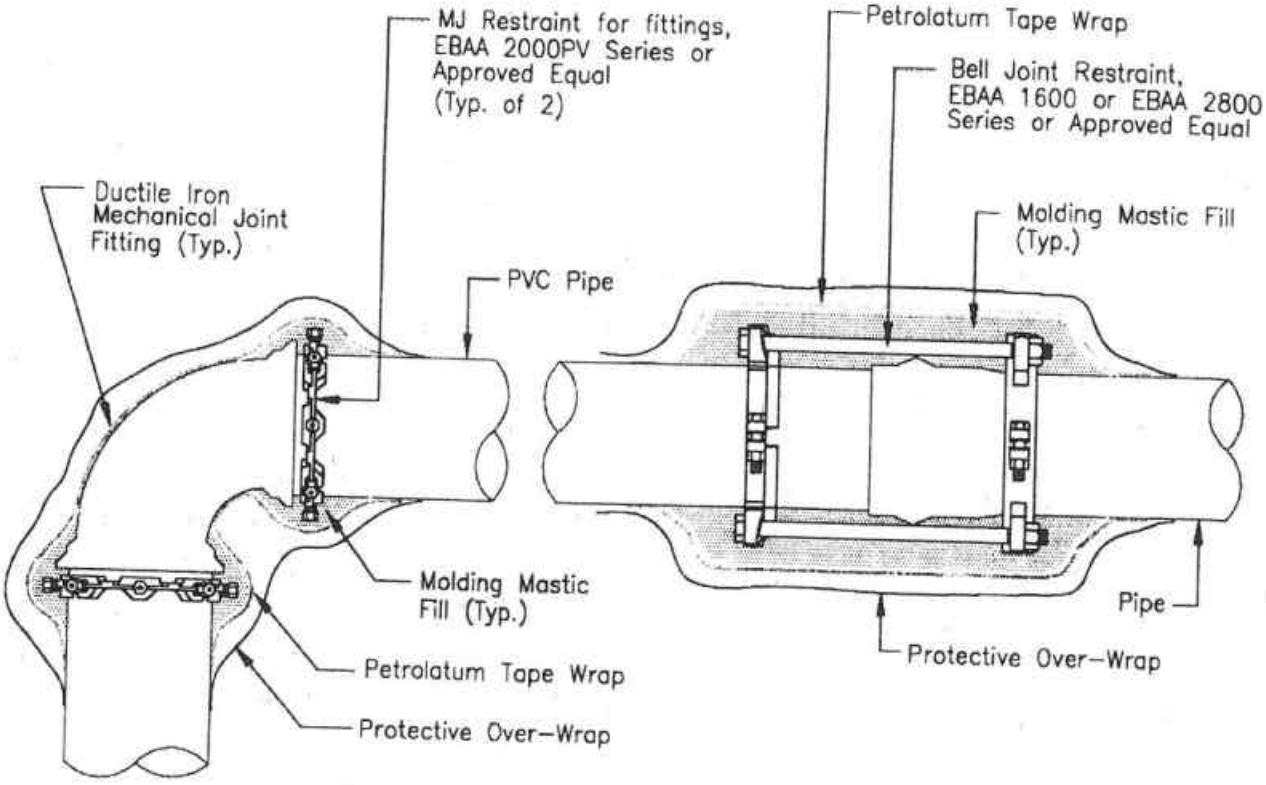
CAPPING (ACTIVE) LINE WITH PETROLATUM WRAP

NOTES:

1. In lieu of thrust block, joint restraints shall be installed per thrust restraint length requirement per Detail W–17
2. Refer to Standard Detail W — 16 and specification for Petrolatum tape System

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**CAPPING ACTIVE LINE** (FOR EXISTING PLAIN END PIPE)	W - 15B SHT 1 OF 1



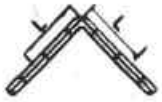
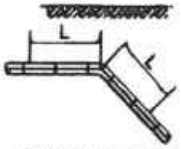
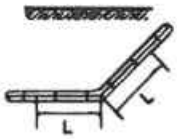
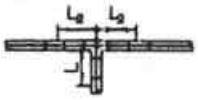
NOTES:

1. The petrolatum tape system is made by Trenton Corporation, Denso Paste and Densyl Tape made by Denso North America, or approved equal; over–wrap shall be plasticized PVC tape with rubber adhesive.
2. Provide a smooth profile on irregular shaped fittings such as flanged joints and joint restraints using molded mastic filler packed into irregularities to eliminate bridging and voids prior to wrapping.
3. Applicable to fittings in horizontal and vertical orientations.

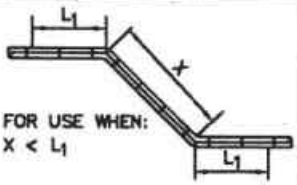
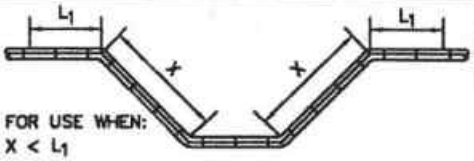
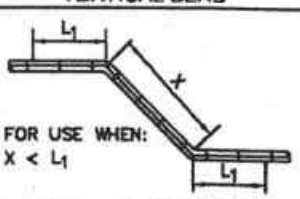
NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**JOINT RESTRAINT WITH PETROLATUM TAPE SYSTEM**	W - 16 SHT 1 OF 1

MINIMUM LENGTH (L) OF RESTRAINT, EACH SIDE OF STANDARD FITTING (IN FEET)

	SINGLE BENDS														
	HORIZONTAL BEND				VERTICAL BENDS								TEE		DEAD END
					 UPWARD THRUST				 DOWNWARD THRUST						
PIPE SIZE	90°	45°	22.5°	11.25°	90°	45°	22.5°	11.25°	90°	45°	22.5°	11.25°	L_2	L	L
8–INCH PIPE	25	10	5	3	N/A	41	20	10	N/A	8	4	2	22	1	68
12–INCH PIPE	35	15	7	4	N/A	58	28	14	N/A	12	6	3	22	1	97

MINIMUM LENGTH (L) OF RESTRAINT, EACH SIDE OF STANDARD FITTING (IN FEET)

	COMPOUND BENDS [5, 6]											
	HORIZONTAL BEND				VERTICAL BENDS				VERTICAL BEND			
	 FOR USE WHEN: $X < L_1$				 FOR USE WHEN: $X < L_1$				 FOR USE WHEN: $X < L_1$			
PIPE SIZE	90°	45°	22.5°	11.25°	90°	45°	22.5°	11.25°	90°	45°	22.5°	11.25°
8–INCH PIPE	50*	20	10	6	N/A	82	40	20	N/A	82	40	20
12–INCH PIPE	70*	30	14	8	N/A	116	56	28	N/A	116	56	28

GENERAL NOTES:

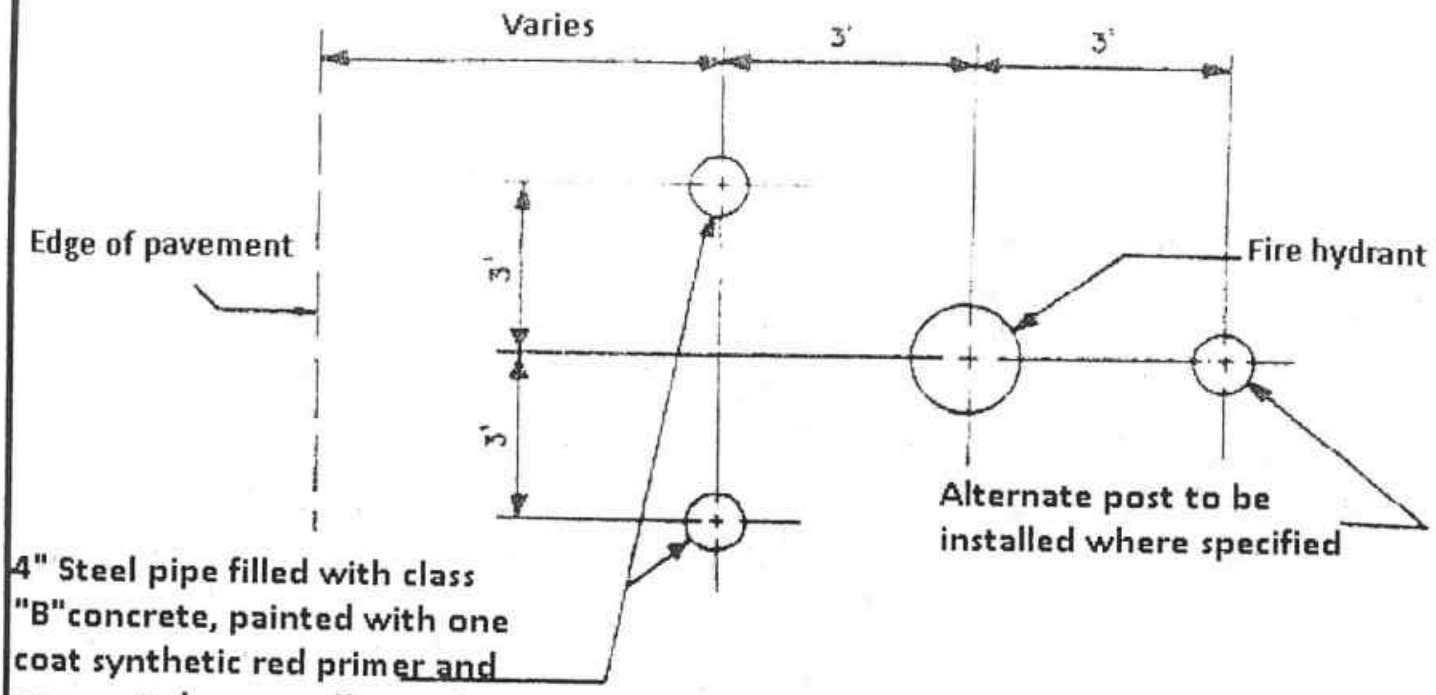
1. All new bends, valves, and other fittings shall be restrained for the minimum distances shown.
2. This Table is based on EBAA Restraining Devices.
3. All fittings shall be restrained using mechanical restraining devices unless otherwise noted.
4. Wrap restraining devices with Petrolatum Tape Wrap System per Specification W – 16.
5. Single bend restaint length shall be used when $X > L_1$.
6. Compound bend restraint length shall be used when $X < L_1$.
7. * – Provide thrust blocks in lieu of restraints or as indicated on the drawings.

DESIGN CRITERIA

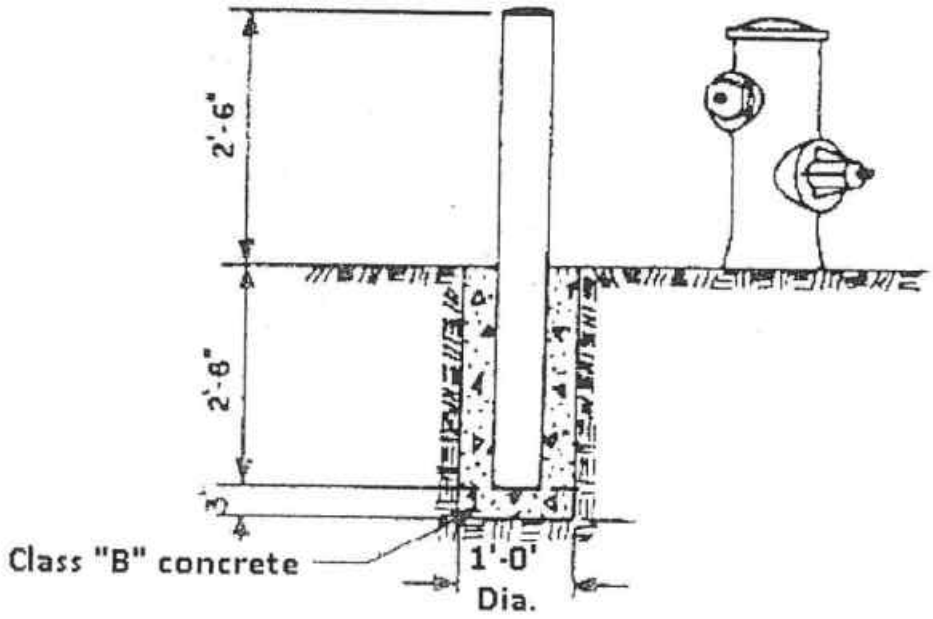
Pressue: 200 PSI
Soil: CL
Bedding: GRANULAR
Trench Type: TYPE V
Depth: 4 ft.
Vertical Offset Lower Bend Depth: 6 ft.
Safety Factor: 1.5:1

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE: 09/24/2015	**THRUST RESTRAINT LENGTH TABLE**	W - 17 SHT 1 OF 1



PLAN



ELEVATION

NOT TO SCALE

STANDARD DETAIL	PALO ALTO PARK MUTUAL WATER COMPANY STANDARD SPECIFICATIONS AND DRAWINGS	
DATE:09/24/2015	HYDRANT GUARD NTS	W-18