SECTION 5

WATER

5.1 GENERAL

Water system improvements proposed for inclusion into the City shall be designed in accordance with the criteria set forth herein, and pursuant to the current Water System Master Plan, unless otherwise approved in writing by the City Engineer. Maps and Plans for developments for which the City Engineer deems there to be insufficient water supply shall not be approved.

The design shall take into consideration physical conditions known to exist at the time and place of each installation and the probable operating requirements. Where such conditions render sections of these Specifications inapplicable, alternative methods of design may be substituted to the City, and upon written approval by the City Engineer thereof, may be incorporated in the plan.

Water mains and services shall be installed by a Developer or City Contractor holding the appropriate license for such work under the provisions of the State of California Business and Professions Code.

5.2 DESIGN

Permanent dead ends over 300 feet in length shall have circulating ties on twenty feet easements through side lot lines, unless modified at the option of the City.

Pipelines 8-inches and smaller shall be installed with a minimum of 36-inches of cover between the top of the pipe and the finished grade. Pipelines 12-inches or greater shall be installed with a minimum of 48-inches from the top to the finished grade.

For single family residential areas, all water mains shall be sized to provide 1000 gallons per minute fire flow from each of 2 adjacent fire hydrants flowing simultaneously with 20 pounds per square inch residual pressure. Size of water mains in high density residential, commercial, and industrial developments shall be designed by the design Engineer and approved by the City.

This fire flow can generally be obtained using the following design standards:

1/2 mile looped grid - 10 inch mains or larger

1/4 mile looped grid - 8 inch mains

Dead end mains with a fire hydrant - 8 inch mains

Distribution system, looped -8 inch mains

The distribution layout shall be a looped grid insofar as possible. Dead-ends shall have blowoff assemblies installed for flushing mains as shown on Drawing No W.2.

Water mains shall be 5' from centerline, as measured from centerline to the nearest side of the pipe. Water mains shall be on the opposite side of the centerline from the sewer line.

There shall be a minimum of three valves at tees and four valves at crosses. Valves on transmission mains should be spaced a maximum of 800 feet apart in residential areas and 500 feet in commercial areas.

Main Valves: Main valves shall be located so that any section of water system can be controlled by operating a maximum of 3 valves. In addition, valves shall be spaced so that a maximum of 1,000 feet of water main is controlled by the valves. When a butterfly valve is used, butterfly operator shall be toward nearest property line.

SYSTEM PRESSURE - Water distribution systems shall be designed so that normal operating pressure at service connections to the distribution system are no less than 40 pounds per square inch (psi) and no more than 90 psi under normal demand conditions. During periods of maximum day plus fire flow demand, the pressure shall not be less than 20 psi near the flowing hydrants that supply the fire flow demand.

RELIEF VALVES - Appropriately sized air vacuum release valves shall be located at all high points along the pipeline alignment and at all "dead ends" that occur at a high points. Air/Vacuum shall be located at points of excess negative pressure. And combination valves may be applied where appropriate. Refer to AWWA Manual M51 for further design guidelines.

Additionally, for all pipelines of 16-inch diameter and greater, an air vacuum valve shall be located on the downstream side of all mainline valves.

On arterial streets, air vacuum valves are to be placed prior to the curb radius with service in perpendicular with the mainline. All air vacuum valves shall be constructed per City Standards.

SYSTEM DEMAND CRITERIA - shall be in accordance with the water demand factors and peaking factors defined in the most recent City of Hughson Water Master Plan.

PIPE SIZING CRITERIA - The standard water pipeline sizes allowed in the City for new developments shall be 8-inch, 12-inch, 16-inch, 20-inch, 24-inch, 30-inch, 36-inch, and 42-inch in diameter.

Pipeline velocities shall not exceed 5 feet per second (fps) during peak hourly flow and not exceed 10 fps during maximum day plus fire flow.

In commercial and industrial areas, the standard minimum pipe size shall be 12-inches in diameter.

The City reserves the right to require 12-inch diameter minimum size pipelines in residential

areas, with no incremental diameter upsizing cost to the city, when necessary, as determined by the City.

The City may require pipe sizing in excess of the minimum size as determined by the design criteria herein when the facilities being constructed will serve, or may be extended to serve, additional lands.

POTABLE PIPELINE LOCATION - Installation of potable water lines adjacent to existing or proposed sewer lines, recycled water lines, and storm drains shall be in accordance with the Department of Health Services regulations, or City requirements, whichever is greater. The separation of water and sewer mains shall be in conformance with City Standard Drawing No. W-5. Generally, potable water pipelines shall be located above sewer lines and recycled water lines, preferably with a minimum clearance of 3 feet for perpendicular pipes, and parallel with a clearance of at least 10 feet (O.D. to O.D.) away from sewer lines.

When cover cannot be provided, concrete encasements or protective slab construction over the pipeline may be substituted. City staff shall be consulted, as special approval is required.

BACKFLOW PREVENTION - A backflow prevention device shall be required on domestic water service connections and irrigation water service conditions on all industrial or commercial buildings.

Backflow prevention devices shall be required on domestic water connections where water from other sources may become cross-connected to other water supplies or sources as determined by the City.

An approved backflow prevention device is required by Title 17, Drinking Water Supplies, of the California Administrative code, and shall be installed in conformance with City Standard Drawing No. W-7.

Water meters shall not be installed until after an approved backflow prevention device is installed.

WATER SAMPLING STATIONS - Where water sampling stations are required, as determined by the City, the stations shall be constructed in accordance with City Standard Drawing No. W-6 and No. W-6A.

Sampling stations shall be located at least 100 feet from a fire hydrant

Sampling stations shall not be placed past the last service connection on a dead end main.

For each water source, there shall be one sampling station located where raw (untreated) water from the source can be sampled.

WATER SYSTEM FACILITY DESIGN - The City will provide design oversight for new water system facilities design for facilities such as wells, treatment, storage tanks, or pressure reducing stations.

Site selection of all water system facilities shall be approved by the City and meet the requirements of the State Department of Health Services.

The layout of new well sites shall be in accordance with Standard City Drawing No. W-12 and AWWA Standard A100-06.

5.3 PIPE

Pipe used in construction of water distribution systems shall be either ductile iron pipe (DIP) or plastic pipe (PVC) and shall meet the standards of the American Water Works Association (AWWA), where applicable.

A. Ductile Iron Pipe (D.I.P.)

Ductile Iron Pipe shall have "Tyton Joints", "Ty-Seal Joints", or approved equal and shall conform to the current standard specifications of A.W.W.A Standard C-151/A21.59. Fittings shall conform to A.W.W.A. Standard 0110, joints shall conform to A.W.W.A. C111/A21.11 for rubber gasket joints.

A. Poly-Vinyl Chloride Pipe (PVC)

Poly-Vinyl Chloride Pipe shall conform to A.W.W.A. C900 Class 150 for up to 10 inches and C-905 for pipes 12 inches and larger for use in municipal water systems and fire protection lines. Rubber rings shall conform to manufacturers' recommendation.

Poly-Vinyl. Chloride Pipe shall be suitable for the purpose intended and shall be installed as per manufacturer's recommendations, and these Standards.

B. Water Lines

All mains shall include #12 copper tracer wire. The wire shall be connected to all valves and fittings.

5.4 FITTINGS

Bends, tees and other fittings shall be Cast Iron, Class 150 A.W.W.A. C-900 or C-905 for use with Poly-Vinyl Chloride. Cast Iron Pipe and Ductile Iron Pipe fittings shall be manufactured by Olympic Foundry, Phoenix Iron Works, or approved equal.

All fittings for use with PVC C900 pipe shall be cast-iron outside diameter push-on or mechanical joint fittings with exception of fittings with valves which shall be push-on or mechanical joint by flange. Ductile iron fittings shall be classified as "compact ductile iron fittings" and shall be produced in accordance with ANSI/AWWA A21.53/C153. Unless otherwise specified, the interior of ductile iron fittings shall be lined with uniform thickness of cement mortar "double thickness" then sealed with a bituminous coating in accordance with AWWA C104. the outside surfaces of the DIP fittings shall be coasted with a bituminous coating in accordance with ANSI A21.6 or A21.51.

All ductile iron fittings shall be polyethylene encased at the time of installation. Polyethylene encasement and installation shall be in accordance with AWWA C105.

Fittings shall be handled and jointed as specified for pipe installation herein. Reaction or thrust blocking shall be constructed at bends, tees, dead ends and where changes in pipe diameter occur, Blocking shall be made of Class B concrete, and shall be placed between undisturbed ground and the :fitting to be anchored. The area of hearing on the pipe and on the ground shall be that required by Standard Drawing No. W.4, The blocking shall be placed so that the joints of the pipe fittings will be accessible for repair.

5.5 VALVES AND VALVE BOXES

Valves shall be located on the discharge side of pipe connections; minimum 4 at crosses, 3 at tees, and always at the beginning of dead end mains. The City may require additional valves on critical sections or where the proposed valves requires closing more than 3 valves to isolate a section of pipeline.

Valves on transmission mains should be spaced a maximum of 800 feet apart in residential areas and 500 feet in commercial areas.

Isolation valves shall be flanged to the tee or cross within the street intersection. All isolation valves shall be direct buried (no vaults are required).

Valves and valve boxes shall be installed at the locations shown on the plans.

All valves shall be Dresser "450" Gate or Mueller A-2380 gate valve, or approved equal and shall be the rubber-seated, tight-closing type conforming to the current A.W.W.A. Specification C-504. Valves shall open left and be equipped with a 2-inch A.W.W.A. approved operating nut.

Valves boxes shall be Christy G5 with Christy Iron cover or approved equals. The following materials may be used for extensions: 8" Poly-Vinyl Chloride Pipe, (with a minimum 50 foot head); or approved equal. All valve boxes shall be installed to finished grade as per City Standard Drawing No. W-1.

5.6 WATER SERVICE MATERIALS

Each individual property shall have a separate water service complete from the water main to the property. The minimum size water service is 1-inch.

For properties other than single family residential, and for non-typical single family residential, the Design Engineer shall determine the water service size. For making such determination the Design Engineer shall take into account the anticipated water use, water pressure requirements, and property size. Concerns for fire water service shall also be considered.

Polyethylene Pipe may be used for all 1-inch through 2-inch water services.

Cast Iron, Ductile Iron or Galvanized Steel Pipe shall be used for all water services larger than 2 inches.

If abnormal or unusual conditions exist, the City may approve alternative pipe materials.

All water services, including meter boxes, shall be installed in accordance with City of Hughson's Standard Drawings No. W.8, W.9, W.10, or W.11.

Service and meters shall be sized in accordance with the provisions of Section 1009 of the uniform Plumbing Code, using minimum pressure expected in the system.

Minimum meter size shall be 5/8" x 3/4".

All water service connections shall be metered with Badger Radio Read Meters with Pit Orion Recordall Transmitter Register or Approved Equals.

In addition, to a domestic water service meter, all commercial/industrial/municipal projects shall be required to provide a separate landscape irrigation meter.

5.7 MATERIALS TO BE FURNISHED AND INSTALLED BY DEVELOPER

The Developer or City Contractor shall furnish all labor, material, equipment and appliances required to complete the water mains and services specified.

5.8 STAKING OF WATER MAINS AND SERVICES

The water lines and services shall be staked by the Developer's Engineer on the project and installed by the Developer. Staking will be provided by the City on projects installed by City.

5.9 EXCAVATION

The Contractor shall perform all excavations necessary or required to construct all pipelines and structures. Excavation shall include the removal and disposal of all materials of whatever nature encountered. Trenches shall be excavated in open cut, following neat parallel lines equidistant from the centerline; such line shall be staked as set-forth in Section 5.8. No tunneling or jacking will be permitted without written permission from the Engineer. Trenches will be sufficient width to provide clearance for bracing, support and working space.

Care shall be taken to preserve all surface and subsurface facilities in the work area.

The trench shall be excavated to a minimum of 2 inches below the grade of the bottom of the pipe and 2 inches below couplings and bells. If any of the trench bottom is in material too hard to permit proper bedding of the pipe, excavation must be carried to a depth at least 4 inches below the grade of the bottom of the pipe, and this over-excavation shall then be brought to grade with approved material compacted in place. Should the trench bottom at any location be of material which will not afford a sufficient sound foundation,

it shall be excavated to a depth not greater than 2 feet below grade as directed by the Engineer and refilled to grade with approved materials compacted in place.

Excess and/or rejected material shall be disposed of by the Developer or City Contractor at their expense.

5.10 SHORING, BRACING AND SHEETING

The Contractor shall furnish, install and maintain such shoring, bracing and sheeting as required.

After the pipeline has been installed and sufficiently backfilled to protect the pipe, all shoring, bracing and sheeting shall be removed. All voids left by the removal of such bracing shall be carefully filled with suitable material compacted in place.

5.11 DISPOSAL OF SEEPAGE, STORM WATER, OR SURFACE WATER

The Contractor shall remove any seepage; storm water, or surface water that may be found or may accumulate in the excavation during the progress of the work. He shall furnish all pumps and other equipment necessary and shall keep all the excavation entirely free from water at all times during the construction of the work. When pipe-laying is in progress, the open ends of the pipe, shall be closed by approved means to prevent entrance of water or dirt into the line. Whenever water is excluded from the pipe, adequate backfill shall be deposited on the pipe to prevent floating. Any pipe which has floated shall be removed from the trench and re-laid as directed by the City.

5.12 PREPARATION OF TRENCH AND LAYING OF PIPE

All pipe for water mains and laterals shall be placed to line and grade as shown on the approved plans and at such depths as to provide 36 inches minimum cover from the top of the pipe to ultimate finish street grade. The Contractor shall be responsible for verifying ultimate finish grade.

When water lines are being installed in new subdivisions, mainline pipe and fire hydrant runs shall be installed prior to the installation of curb, gutter and sidewalk. The services shall be installed after the curb, gutter, and sidewalks. All pipe shall be installed as per manufacturer's recommendations and these Improvement Standards.

5.13 HANDLING OF PIPE ACCESSORIES

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and efficient execution of the work. All pipe, fittings, valves, hydrants, and accessories shall be lowered into the trench in such a manner as to prevent damage to pipe fittings. Under no circumstance shall pipe or accessories be

dropped or dumped into the trench. All foreign matter or dirt shall be removed from the interior of pipe before lowering into position in the trench. Pipe shall be kept clean by means approved the Engineer during and after laying. All pipe and accessories shall be inspected for defects prior to lowering into trench. Any defective, damaged or unsound pipe or accessory shall be repaired or replaced at the Contractor's expense.

5.14 SERVICE INSTALLATION

The services shall be installed as per Standard Drawing No. W.8 through W.11. Curb to be marked by stamping or chiseling a "W" on the curb face.

The curb stop, stainless steel insert, meter, meter adapter service plug for SP3 unit, meter box with a brick at each corner, and lid to be placed at correct depth and distance from sidewalk.

Plastic service pipe shall not be heat-flared. Because of the variation in the outside diameter of the pipe, a saddle tap in lieu of the Quiktap is required.

Special care shall be exercised to insure proper compaction is made under curb stop so it is vertical and the meter is level. Compaction shall be made under and around the meter box so it remains level and at the finish grade of the sidewalk.

Water services shall not be connected to 20-inch diameter or larger mains, unless specifically permitted by the City.

5.15 FIRE HYDRANTS

Fire hydrants shall be installed at the locations shown on the plans in conformance with City Standard Drawing No. W.3.

Hydrants shall be Clow 900 Series Wet Barrel Hydrant or approved equal, and shall conform to A.W.W.A. Standard C-503 for wet barrel hydrants. Hydrant color shall be safety yellow #1245 Ellis Paint Company Hy-Lux 1200 Waterborne Industrial Enamel.

Fire hydrants shall be installed with a minimum separation of 5 feet from any driveway, street light, power pole, sign, fence, walls, etc. and a minimum of 15 feet from any dry utility pole, vault or transformer.

Fire hydrants shall be installed 12-inches behind the sidewalk when sidewalk is adjacent to curb and 20-inches behind curb face when sidewalk is not adjacent to curb. All fire hydrants piping shall be the same size as the main and installed with a break-off check valve. No obstructions shall be permitted within 36 inches of the center of a hydrant, to ensure adequate access and operation.

All water lines service any hydrant that is located outside of the Right-of-Way, or on private property shall be metered.

Fire hydrant location shall be at ends of curb returns or at lot lines.

Fire hydrant spacing shall be, at minimum, 400 feet in residential, areas and 300 feet in commercial areas, or at intersections whichever is closer; in no case should the average coverage of each hydrant be more than 120,000 square feet. Insofar as possible, fire hydrants shall be located at street intersections rather than in the middle of blocks. Final fire hydrant locations are subject to the approval of the Fire Chief.

A blue reflectorized marker shall be permanently placed on the paving surface along street centerlines offset to the fire hydrant side opposite fire hydrant locations.

The plans shall show the centerline station for each hydrant along with the adjacent top of curb elevation.

5.16 TEMPORARY AND PERMANENT BLOW-OFFS

Appropriately sized blow-offs shall be located at all low points along the pipeline alignment and at all "dead end" locations. Additionally, for all pipelines 16-inch in diameter and greater, a blow-off shall be located on the upstream side of all mainline valves. All blow-offs shall be constructed to City standards.

Blow-offs should be located as near to storm drain catch basins whenever possible. On arterial streets, blow-offs are to be placed prior to the curb radius with the service line perpendicular with the mainline.

The size of blow-offs shall be based on the mainline pipe diameter as follows:
- 8-inch to 16-inch diameter mains: 4-inch diameter blow-offs
- 20-inch to 24-inch diameter mains: 6-inch diameter blow-offs
- Greater than 24-inch diameter mains: 8-inch diameter blow-offs

A 4-inch diameter blow-off shall be installed at the end of each segment of pipeline that is installed for future use. If the section of pipeline installed is creating a high point, an air vacuum valve will also be required.

Temporary and permanent blow-offs shall be installed at the locations on the plans in conformance with City Standard Drawing No. W.2. The final length of pipe, prior to the blow-off, shall be 18 to 39 inches.

All salvaged temporary blow-offs shall become the property of the Contractor and shall be removed from the job site before completion.

5.17 CONNECTIONS WITH EXISTING WATERLINES

The Developer or City Contractor shall make all excavation for connection to existing waterlines. Connections shall be made to existing water lines in the presence of the City.

The Developer or City Contractor shall furnish, install and maintain such shoring, bracing and sheeting necessary for connections as set forth in Section 5-10.

Existing valves shall not be operated unless qualified City personnel are present. Arrangements for operating existing valves shall be made with the City Director of Public Works at least 48 hours of consecutive city business days prior to scheduled operations.

Connections shall be made at such times as designated by the Engineer and in such a manner as to insure the least inconvenience to water users. No connection shall be made until the new work has been tested and disinfected as specified hereinafter. The Developer or City Contractor shall be responsible for safeguarding the existing system from all damage and possible contamination and be liable for impacts/cost associated with measures to immediately restore services.

The contractor shall furnish the pipe and materials necessary to make the tie-in to the existing system.

5.18 INSPECTION

A. INSPECTION

All water lines shall be inspected for proper installation by the City, prior to backfilling of trenches.

B. HYDROSTATIC TEST

After installing pipe and prior to complete backfilling of trenches the entire length 26 of each line shall be subjected to a hydrostatic pressure of not less that 200 psi for a period of not less than 1 hour. The pressure shall not be allowed to drop below 190 PSI. Curb stops, idler fittings and Sri units shall also be included in the hydrostatic test. At the end of the 1 hour pressure test the water pressure shall be bled clown to 150 PSI and a 1 hour leakage test performed, the contractor shall have all necessary equipment on hand to pressurize the piping and to measure the losses as the pump is operating. No pipe installation will be accepted if leakage for the section tested exceeds a rate in gallons per hour per 1,000 feet of pipe multiplied by ¼ of the pipe diameter in inches.

The Developer or City Contractor shall perform the test prior to connecting to the existing system. The Developer or City Contractor shall furnish and install temporary caps, plugs far SP3 units, thrust blocks, and other necessary materials needed to hold pressures on sections of line being tested.

Water for testing may be taken from the nearest blow-off, fire hydrant or other approved source. All pipe, fittings, valves, couplings and other materials needed to fill the test lines with water shall he supplied and installed by the Developer or City Contractor. Care shall be taken not to contaminate the existing system.

The pump, gage, pipe connection and all necessary apparatus and equipment needed for the test shall be supplied by Contractor.

The Contractor shall permanently stop all leaks. Repair clamps shall not be used, a full length section of pipe shall be installed to repair leaks. All defects occurring shall be tested again to determine final acceptability of the installation.

C. DISINFECTING WATER MAINS

Water mains shall be disinfected in conformance with the procedure specified in the current Standard Specifications for A.W.W.A. C651-99.

5.19 BACKFILLING OF TRENCHES

After the pipe has been properly laid and inspected, backfill material shall be placed around the pipe at a depth of 12 inches above the top of the pipe and shall be thoroughly compacted to final density of at least 90 percent. This shall be done in such a manner as to not injure or disturb the pipe. All excavation within the existing street roadbed shall be backfilled and compacted until the relative compaction is not less 95 percent. Backfill material shall be placed in layers not to exceed 8 inches in depth and moistened as necessary before compaction. Each layer shall be thoroughly tamped, rolled or otherwise compacted and brought to grade. Backfill in trenches between the back of the curb and property lines shall be thoroughly consolidated to a final density of at least 90 percent of maximum density. Compaction of backfill material by ponding or jetting will not be permitted. Field density may be determined by any method accepted by the City Engineer.

5.20 RESTORING SURFACE

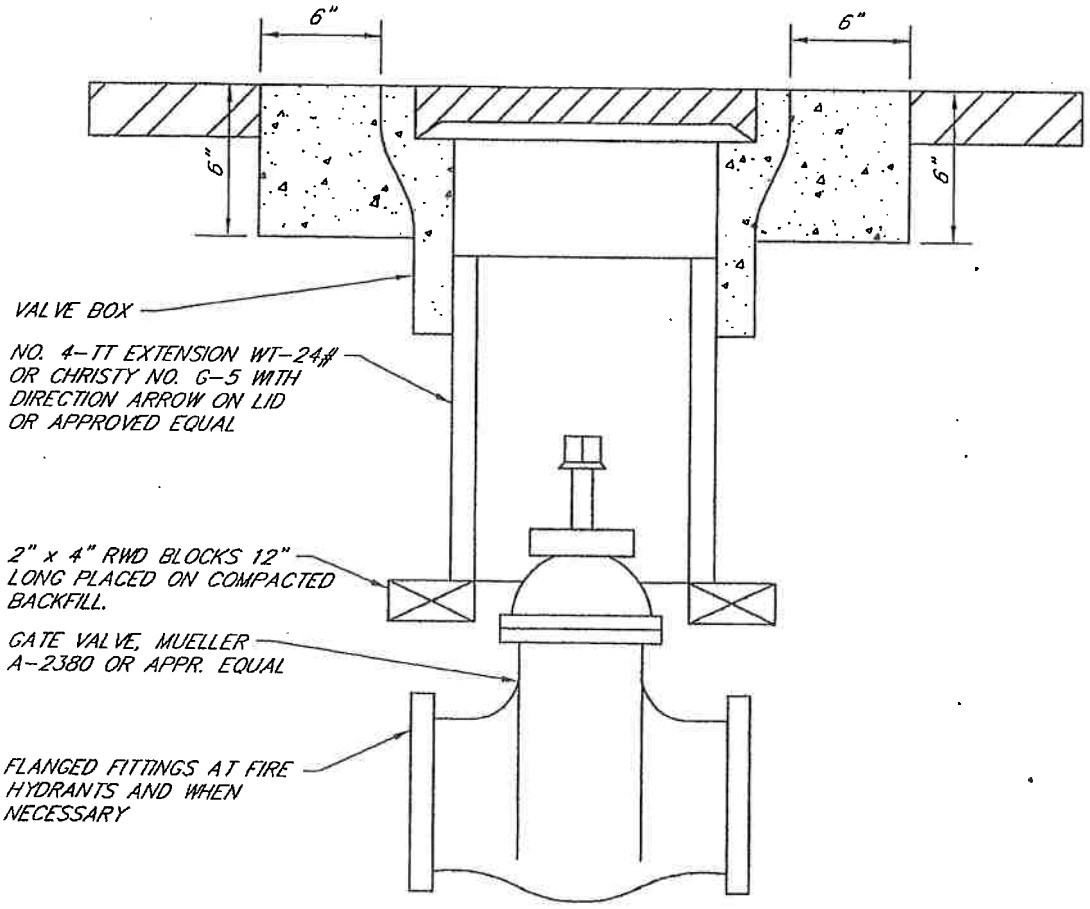
The surface off all trenches shall be filled and compacted so that the surface will conform to the condition of the surrounding ground. The repaving requirements of the plans shall be met regardless of type of existing surfacing.

Existing pavement shall be cut in neat parallel lines as shown on City Standard Drawing No. SS.7.

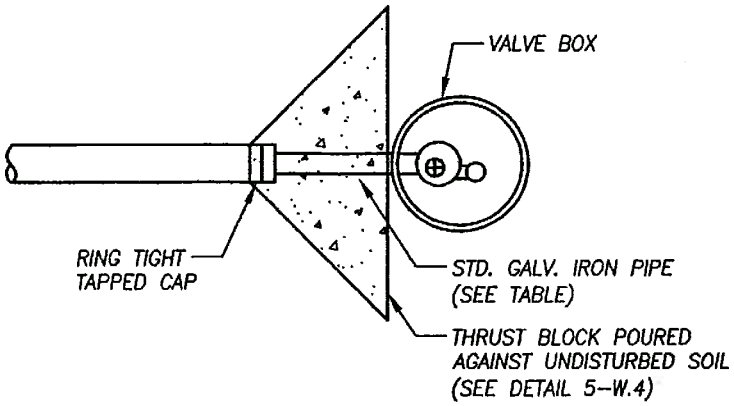
Aggregate base shall be Class II compacted to 95% relative compaction. Aggregate base shall have ¾-inch maximum combined grading.

Asphalt concrete shall be Type B, AR 4000 with ½-inch maximum aggregate, medium grading.

A paint binder of asphaltic emulsion shall be applied to all surfaces in conformance with Section 39-4 of the State Improvement Standards.

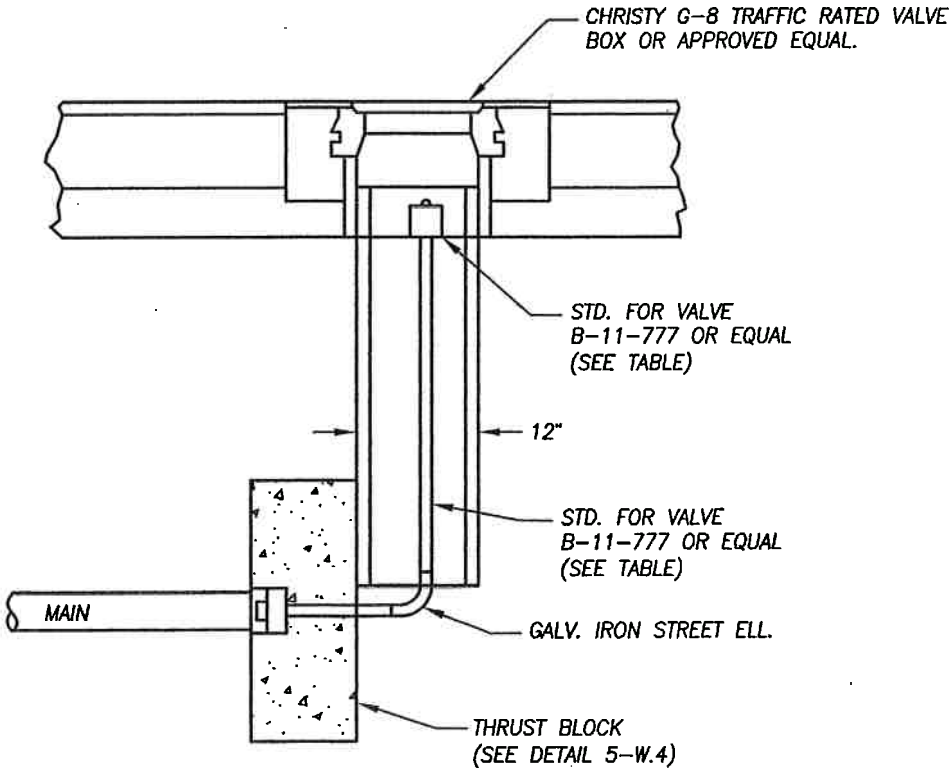


CITY OF Hughson	WATERLINE GATE VALVE ASSEMBLY	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: DATE APPROVED: 5/11/04	CITY OF HUGHSON	STANDARD DETAIL 5-W.1



BLOW–OFF SIZE TABLE

PIPE DIAMETER @ MAIN	BLOW–OFF & VALVE DIAMETER
8–12 INCHES	2 INCHES
12–16 INCHES	4 INCHES
20–24 INCHES	6 INCHES
GREATER THAN 24 INCHES	8 INCHES



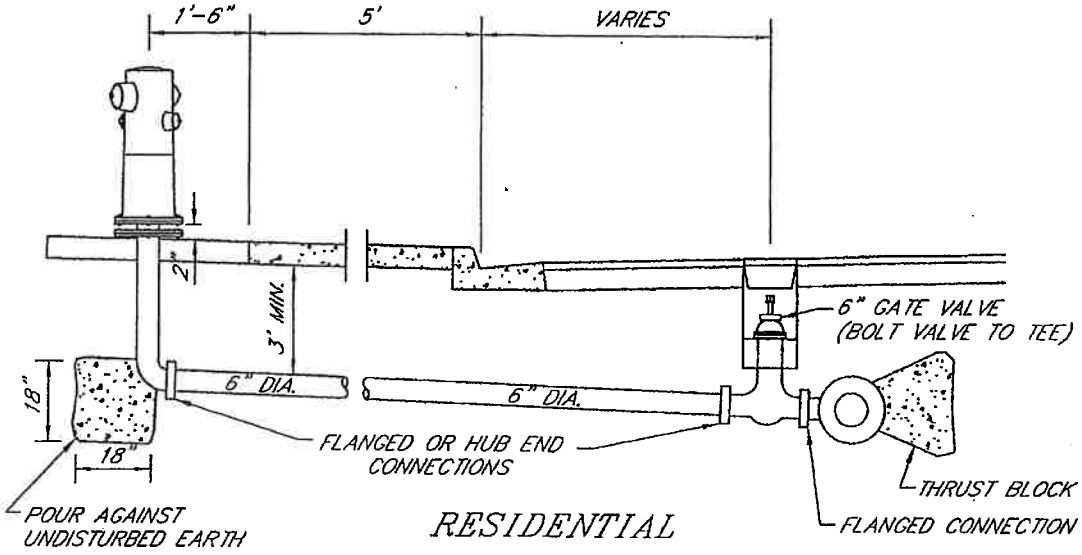
WATERLINE BLOWOFF ASSEMBLY

DRAWN BY: C.V.
CHECKED BY: P.K.
SCALE: NONE
DATE: 7/07

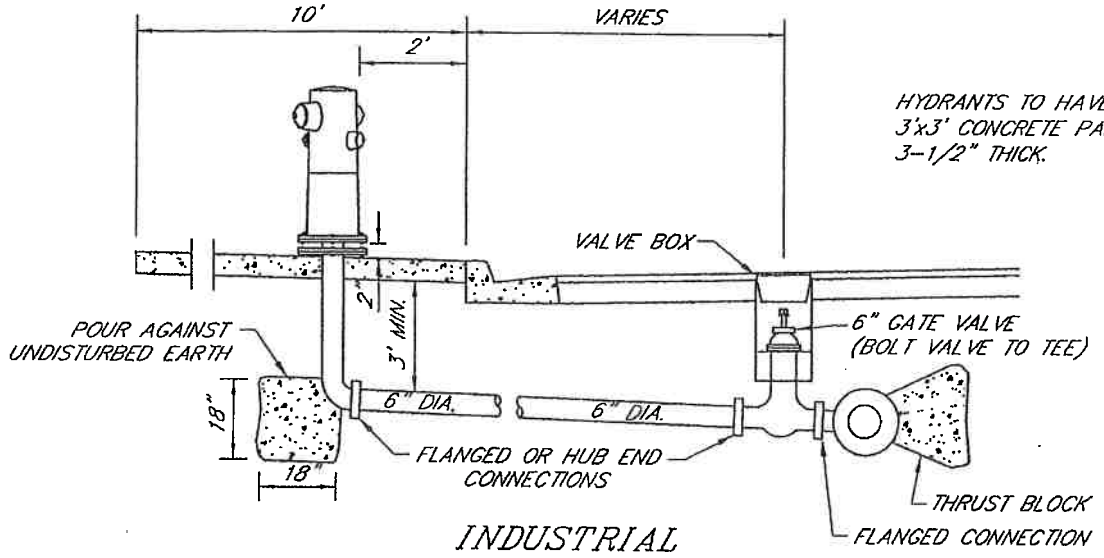
APPROVED BY: _____
DATE APPROVED: 8/13/07

CITY OF HUGHSON

STANDARD DETAIL
5–W.2



RESIDENTIAL

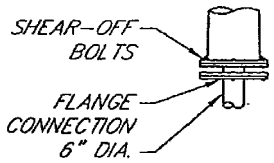


INDUSTRIAL

NOTES:

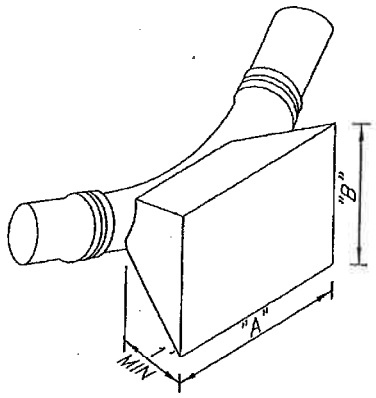
FIRE HYDRANTS SHALL BE RICH "RANGER SERIES" #945, #950, #960 OR APROVED EQUAL

FOR GATE VALVE & VALVE BOX SEE DETAIL SHEET 5-W.1

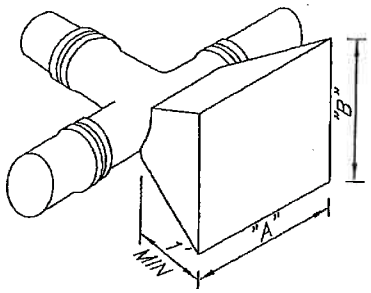


F.H. BASE DETAIL

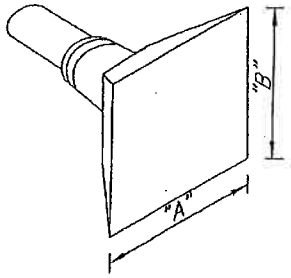
City of Hughson	FIRE HYDRANT ASSEMBLY	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: [signature] DATE APPROVED: 5/1/04	CITY OF HUGHSON	STANDARD DETAIL 5-W.3



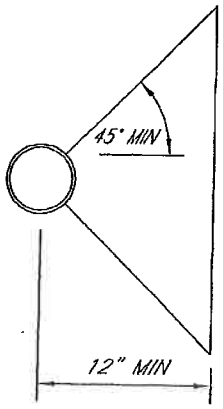
TYPICAL THRUST BLOCK
(CAST IRON BEND)



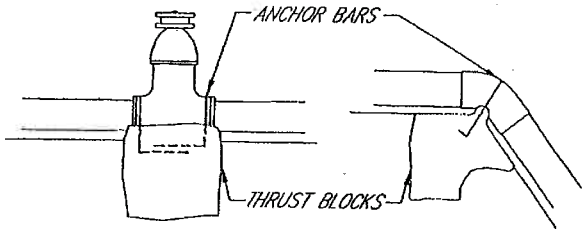
TYPICAL THRUST BLOCK
(TEE OUTLET)



TYPICAL THRUST BLOCK
(DEAD END)



TYPICAL SECTION THRU
THRUST BLOCK



WHEN REQUIRED BY
THE CITY ENGINEER

NOTE: ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED SOIL.

THRUST BLOCK AREA REQUIRED		
FITTINGS	ALLOWABLE SOIL BEARING VALUE	
	1,000 LBS. PER SQ. FT.	
6" LINE	"A"	"B"
22 ½°	1"-6"	1'-6"
45°	2"-0"	2'-0"
90°	3'-0"	2-6"
TEE OUTLET	3'-0"	2'-0"
DEAD END	3'-0"	2'-0"
8" LINE		
22 ½°	2'-0"	2'-0"
45°	3'-0"	2'-6"
90°	4'-0"	3'-6"
TEE OUTLET	3'-6"	3'-0"
DEAD END	3'-6"	3'-0"
10" LINE		
22 ½°	3'-0"	2'-0"
45°	4'-0"	3'-0"
90°	5'-6"	4'-0"
TEE OUTLET	4'-0"	4'-0"
DEAD END	4'-0"	4'-0"
12" LINE		
22 ½°	3'-0"	3'-0"
45°	4'-6"	4'-0"
90°	8'-0"	4'-0"
TEE OUTLET	5'-6"	4'-0"

CITY OF Hughson

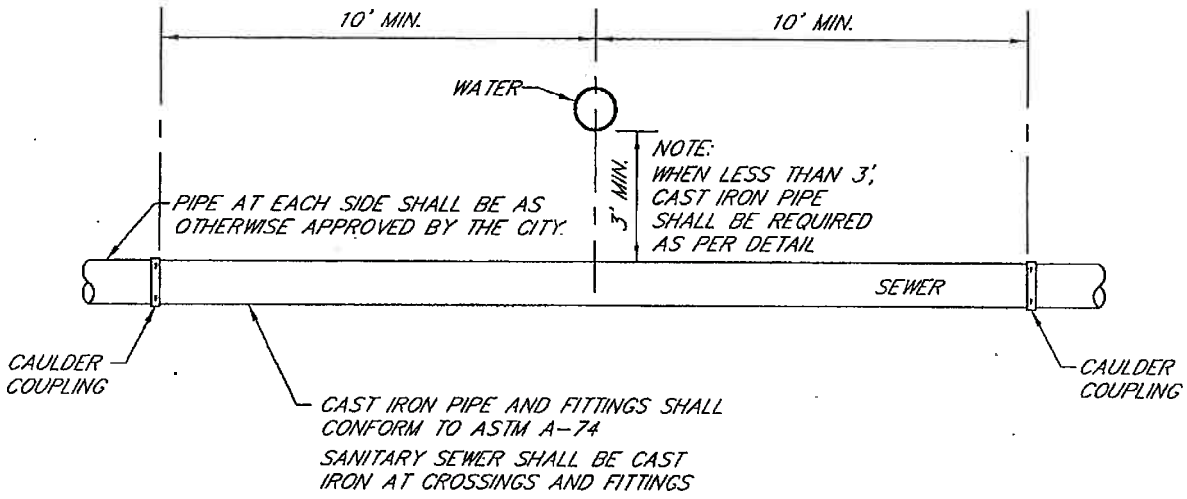
THRUST BLOCK DETAILS

DRAWN BY: A.D.R.
CHECKED BY: R.H.H.
SCALE: NONE
DATE: 1/04

APPROVED BY: _____
DATE APPROVED: 8/15/07

CITY OF HUGHSON

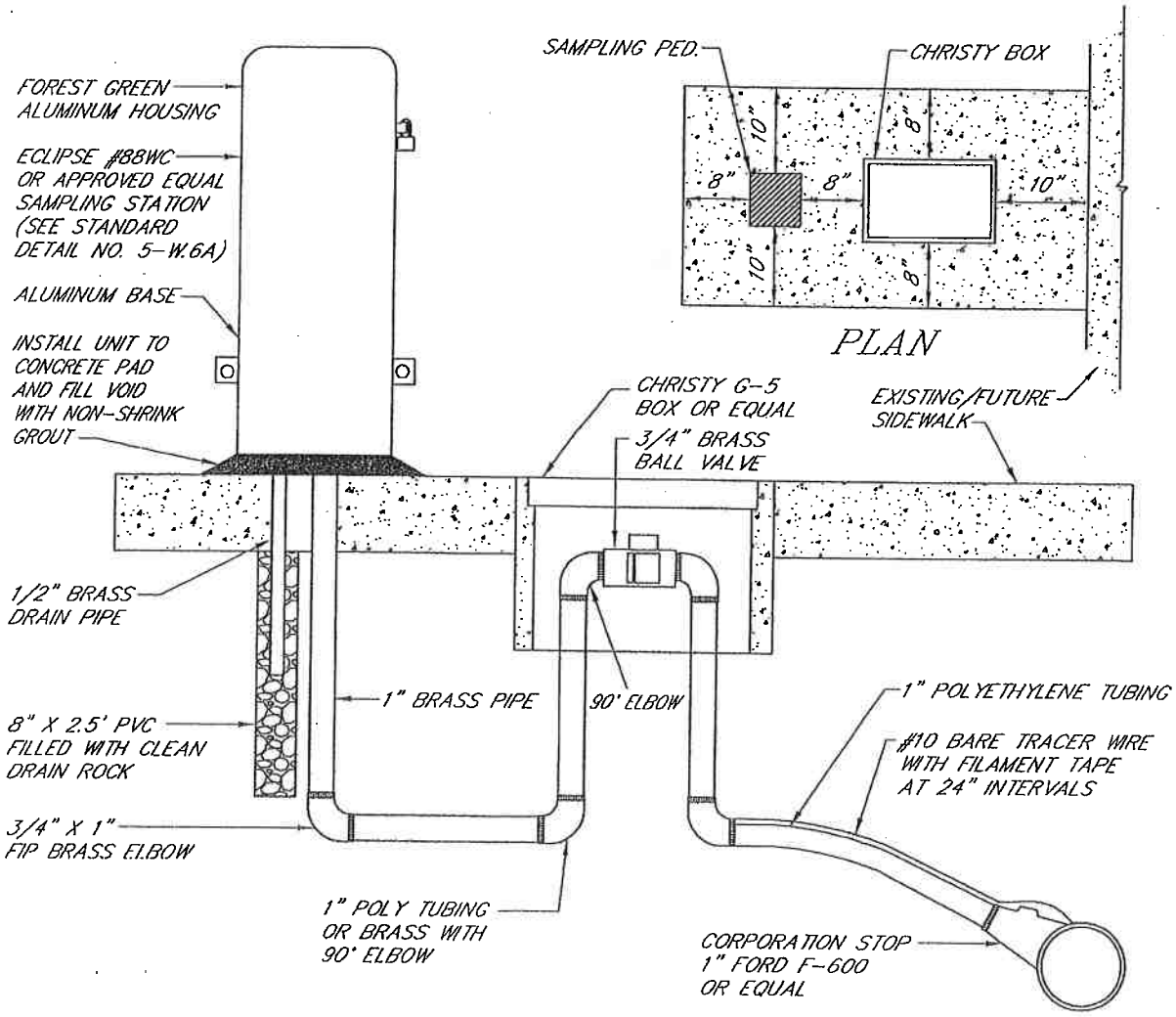
STANDARD DETAIL
5-W.4



NOTES:

1. WATER MAINS AND SEWERS SHOULD BE SEPARATED AS FAR AS IS REASONABLE IN BOTH THE HORIZONTAL AND VERTICAL DIRECTIONS WITH SEWERS ALWAYS LOWER THAN WATER MAINS.
2. THE HORIZONTAL DISTANCE BETWEEN PRESSURE WATER MAINS AND SEWER SHALL BE AT LEAST 10 FEET.
3. ALL CONSTRUCTION SHALL MEET REQUIREMENTS SET FORTH BY THE STATE OF CALIFORNIA, DEPARTMENT OF HEALTH SERVICES.

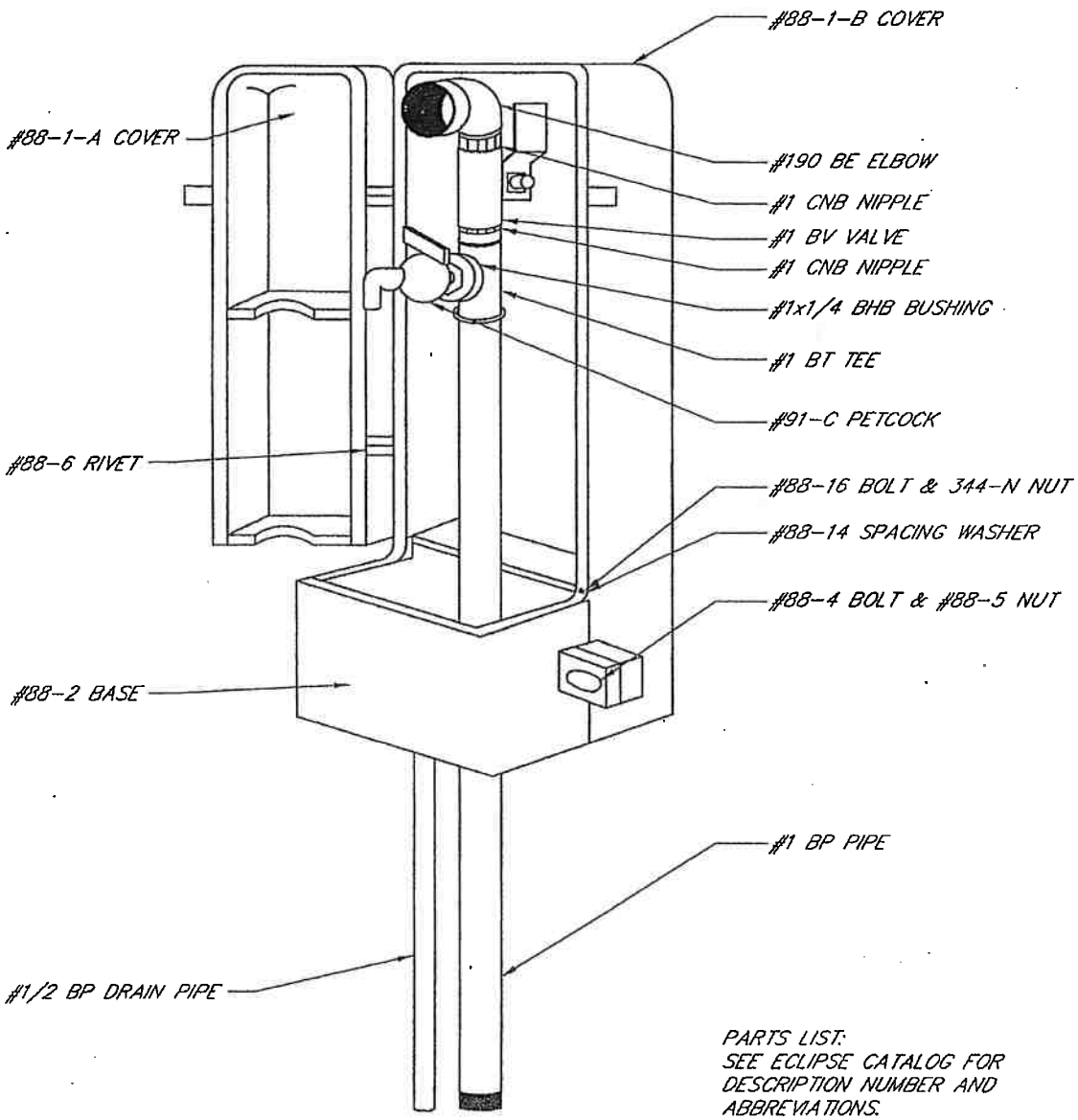
CITY OF Hughson	SEPARATION BETWEEN SEWER AND WATER MAINS	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: _____ DATE APPROVED: 8/13/87	CITY OF HUGHSON	STANDARD DETAIL 5-W.5



NOTES:

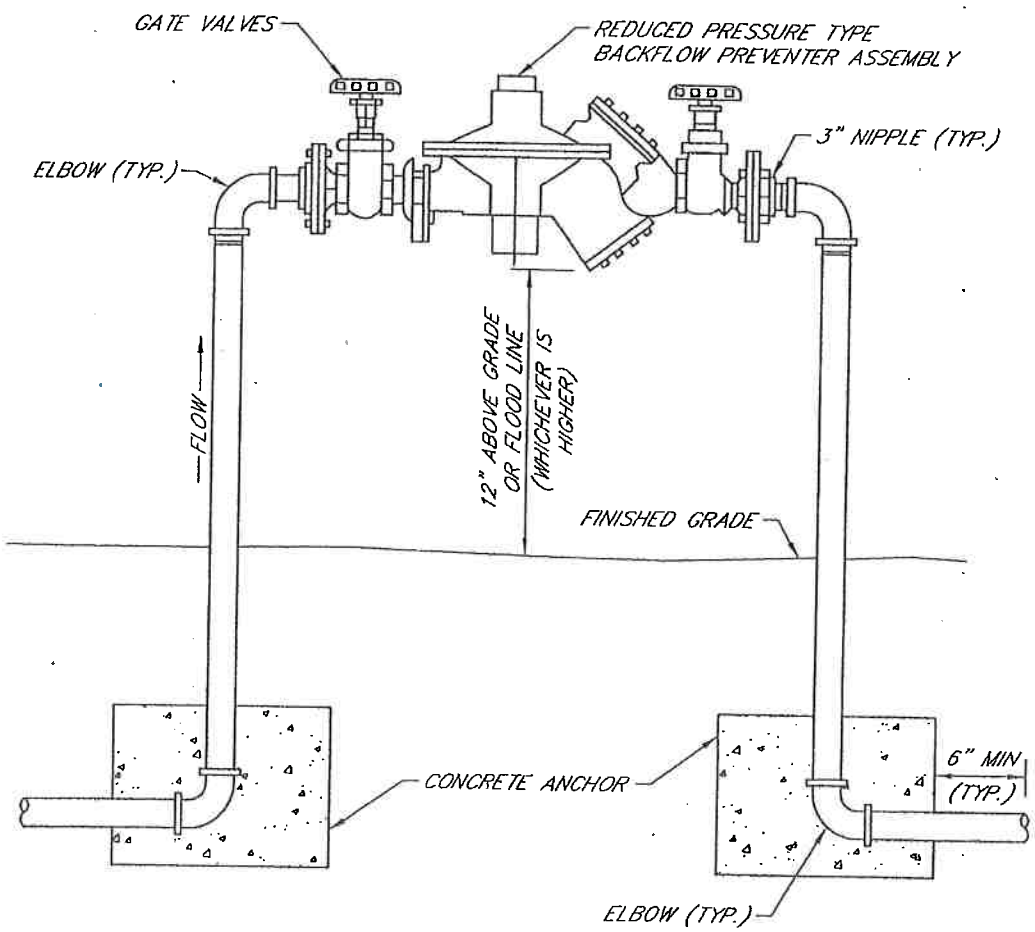
1. SAMPLING STATIONS SHALL BE 3' BURY, WITH A 1" MIP INLET, AND A 1" FIP DISCHARGE. A 1/4" BENT-NOSE SAMPLING BIBB SHALL BE LOCATED BEFORE THE DISCHARGE.
2. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE, ALUMINUM-CAST HOUSING.
3. WHEN OPENED, THE STATION SHALL REQUIRE NO KEY FOR OPERATION, AND THE WATER WILL FLOW IN AN ALL BRASS WATERWAY.
4. ALL WORKING PARTS WILL BE OF BRASS AND SERVICEABLE FROM ABOVE GROUND WITH NO DIGGING. A 1/2" BRASS DRAIN TUBE SHALL BE PROVIDED WITHIN THE LOCKING COVER.
5. A 1" BALL VALVE SHALL CONTROL THE WATER FLOW, AND BE LOCATED AFTER THE SAMPLING BIBB, AS MANUFACTURED BY KUPFERLE FOUNDRY, ST. LOUIS, MO. 63102 OR APPROVED EQUAL. SEE 5-W.6A.

CITY OF Hughson	BACTERIALOGICAL SAMPLING STATION	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: _____ DATE APPROVED: 8/13/01	CITY OF HUGHSON	STANDARD DETAIL 5-W.6



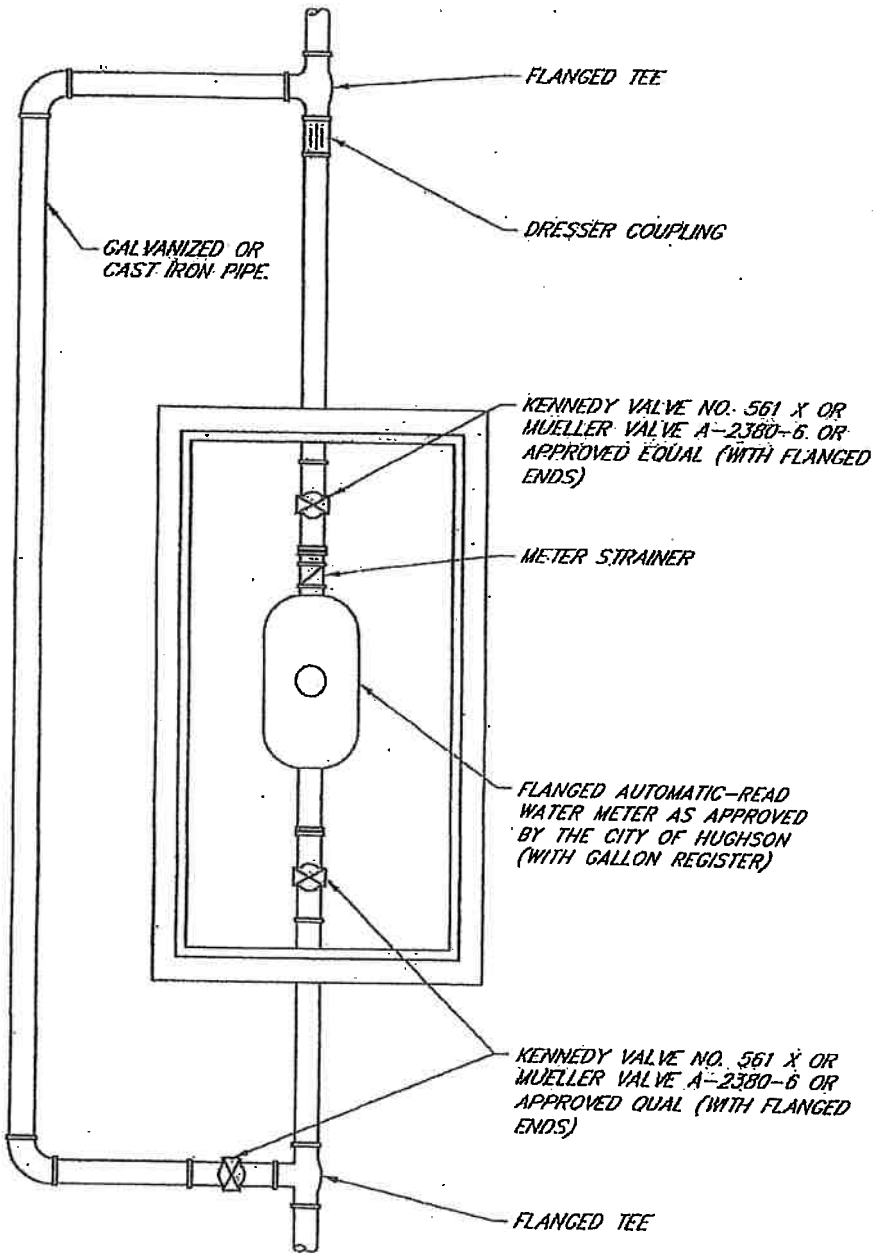
PARTS LIST:
SEE ECLIPSE CATALOG FOR DESCRIPTION NUMBER AND ABBREVIATIONS.

CITY OF Hughson	BACTERIALOGICAL SAMPLING STATION	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: [signature] DATE APPROVED: 5/4/04	CITY OF HUGHSON	STANDARD DETAIL 5-W.6A

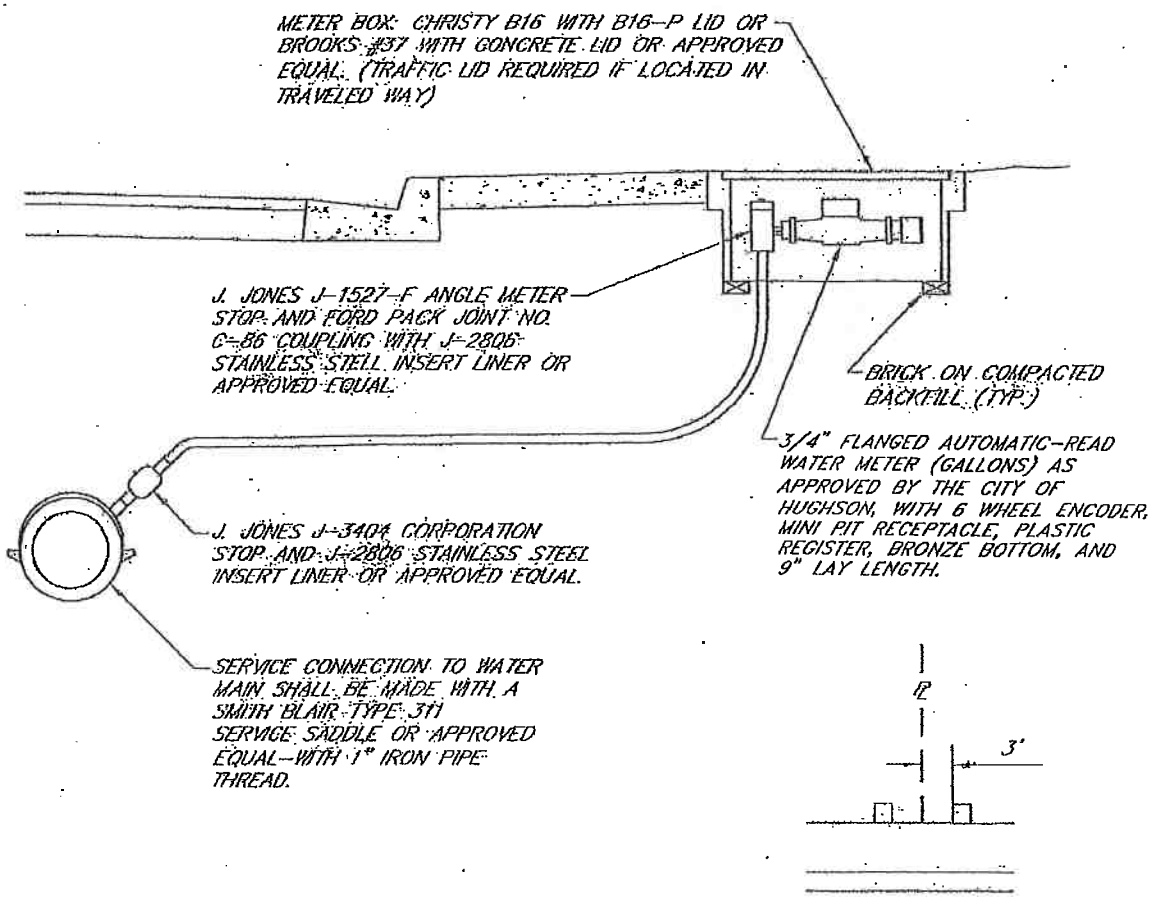


1. ALL PIPE FITTINGS SHALL BE SCHEDULE 40, GALVANIZED STEEL UNLESS OTHERWISE SPECIFIED.
2. CONCRETE SHALL BE 420-C-2000.
3. THE BACKFLOW PREVENTER DEVICES AND INSTALLATIONS SHALL BE APPROVED BY A.W.W.A. AND THE CITY.
4. VALVE ASSEMBLIES MAY HAVE SCREWED OR FLANGED FITTINGS.
5. COAT ALL EXPOSED THREADS WITH AN APPROVED RUST INHIBITING SEALANT.
6. APPROVED PLASTIC TAPE 1/2" WIDE SHALL BE USED ON ALL THREADED CONNECTIONS.
7. DISSIMILAR METALS SHALL BE SEPARATED BY AN APPROVED DI-ELECTRIC COUPLING.
8. PLASTIC PIPE SHALL NOT BE USED ABOVE FINISHED GRADE.

CITY OF Hughson	BACKFLOW PREVENTER DEVICE	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: [signature] DATE APPROVED: 5/1/04	CITY OF HUGHSON	STANDARD DETAIL 5-W.7



Hughson	WATER SERVICE LARGER THAN 2" DIAMETER	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: _____ DATE APPROVED: 03/27/2006	CITY OF HUGHSON	STANDARD DETAIL 5-W.8



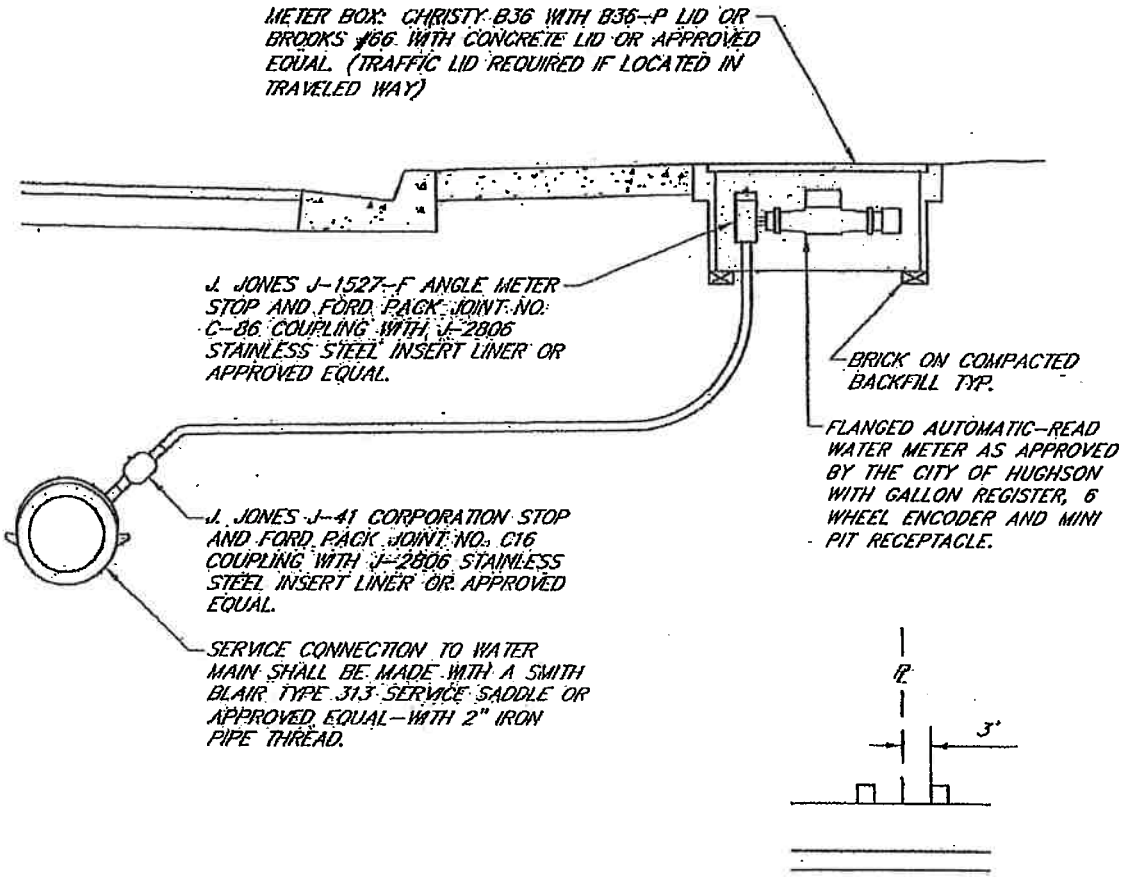
METER BOX LOCATION

NOTES:

SERVICE LATERAL SHALL BE POLYETHYLENE PLASTIC PIPE (PE3406, SDR7, PR160, P.O.E.) IN IRON PIPE SIZES AND SHALL BE SUITABLE FOR TRANSPORTING POTABLE WATER. POLYETHYLENE PIPE SHALL COMPLY WITH A.S.T.M. STANDARD D2239-73.

WHEN METER IDLER IS INSTALLED PRIOR TO METER, IT SHALL BE FORD NO. 3 OR APPROVED EQUAL 3/4" METER SIZE BY 19" LONG.

Hughson	1 INCH WATER SERVICE	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: [signature] DATE APPROVED: 03/27/2006	CITY OF HUGHSON	STANDARD DETAIL 5-W.9



METER BOX LOCATION

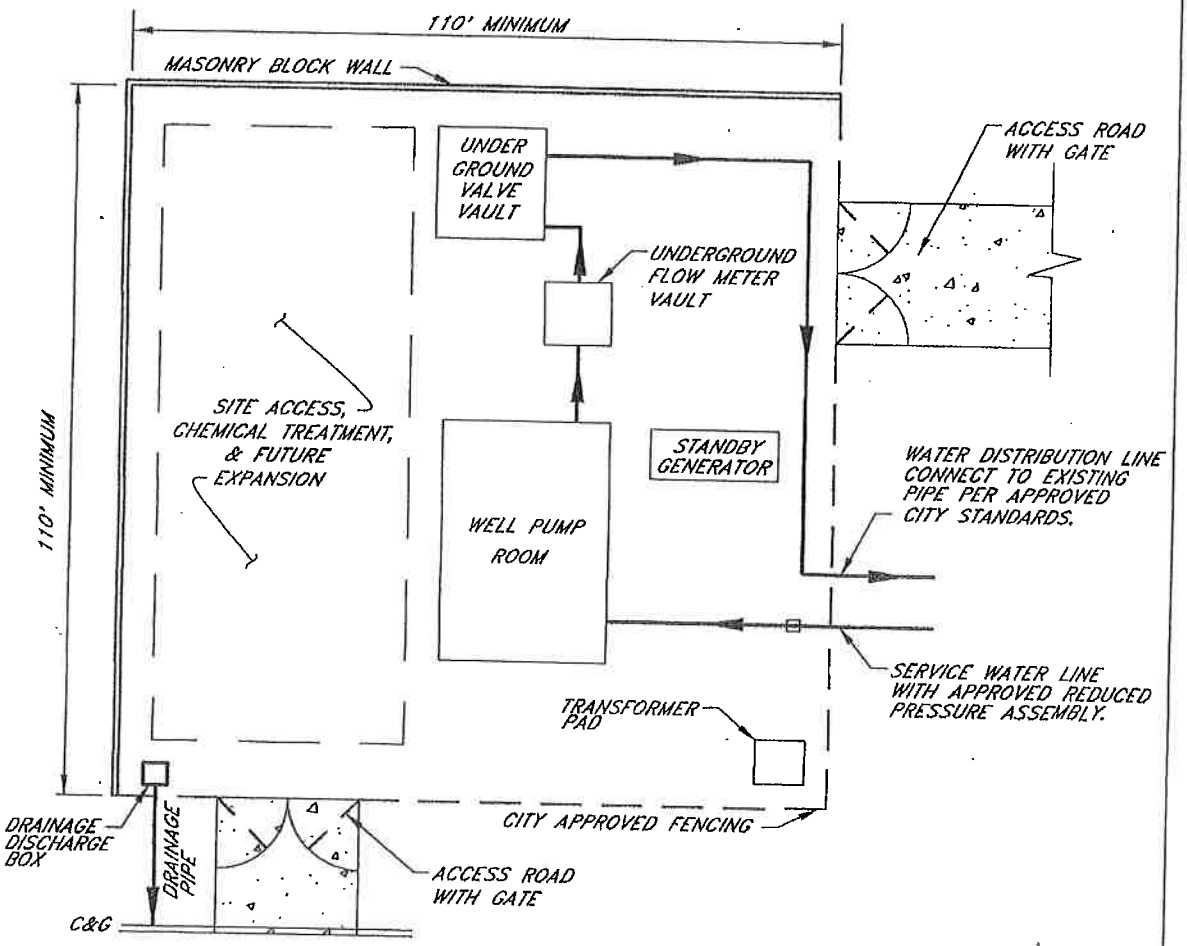
NOTES:

SERVICE LATERAL SHALL BE POLYETHYLENE PLASTIC PIPE (PE3406, SDR7, PR160, P.S.I.) IN IRON PIPE SIZES AND SHALL BE SUITABLE FOR TRANSPORTING POTABLE WATER. POLYETHYLENE PIPE SHALL COMPLY WITH A.S.T.M. STANDARD D2239-73.

WHEN METER IDLER IS INSTALLED PRIOR TO METER, IT SHALL BE FORD NO. 7 OR EQUAL 2" METER SIZE BY 17" LONG.

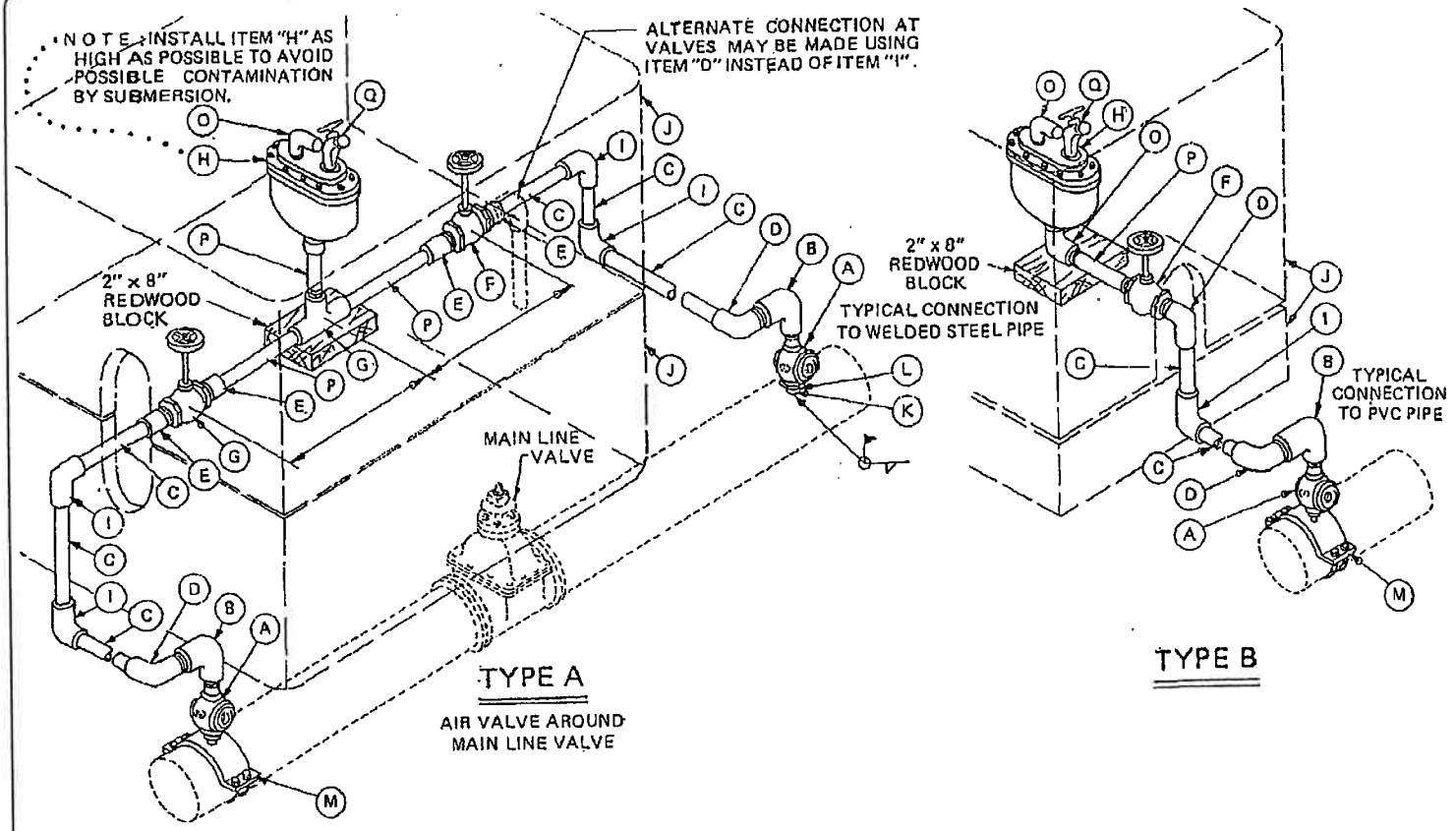
LATERALS SHALL BE TUNNELED UNDER CURB AND GUTTER.

City of Hughson	2 INCH WATER SERVICE	DRAWN BY: A.D.R. CHECKED BY: R.H.H. SCALE: NONE DATE: 1/04
APPROVED BY: [signature] DATE APPROVED: 03/27/2006	CITY OF HUGHSON	STANDARD DETAIL 5-W.11



1. ALTERNATIVE SITE LAYOUTS MAY BE APPROVED BY THE CITY ENGINEER FOR BOOM TRUCK ACCESS, CHEMICAL TREATMENT, AND FUTURE SITE EXPANSION.
2. PERIMETER FENCING SHALL BE MASONRY WALLS OR CITY APPROVED ORNAMENTAL FENCING SPECIFIED BY SITE CONDITIONS AND CITY ENGINEER APPROVAL.
3. BUILDING FEATURES AND ARCHITECTURE SHALL BE DETERMINED AND APPROVED BY THE CITY ENGINEER.
4. SITE SHALL BE SURFACE GRADED TO DRAIN AWAY FROM ALL CONCRETE PADS AND TO COLLECT ALL DRAINAGE ONSITE, CONVEYED THROUGH ONSITE DISCHARGE BOX, AND INTO APPROVED EXISTING DRAINAGE SYSTEM PER CITY STANDARDS.
5. ALL PAVEMENT SECTIONS SHALL HAVE AN ASPHALT STRUCTURAL SECTION AS DETERMINED BY A GEOTECHNICAL ENGINEER.
6. ALL OFFSITE REQUIREMENTS AND CONDITIONS MUST BE APPROVED BY APPROPRIATE REGULATORY AGENCIES.
7. WELL PUMP ROOM WILL INCLUDE, BUT NOT BE LIMITED TO, AN EYEWASH STATION, AN APPROVED ROOF HATCH FOR ACCESS REMOVAL OF WELL HEAD, A DECHLOR DRAIN BOX, A CHLORINATION STATION, AND ELECTRICAL CONTROL PANELS.
8. SITE SPECIFIC DESIGN SHOULD INCLUDE, BUT NOT BE LIMITED TO, INTERIOR AND EXTERIOR LIGHTING, SAMPLE TAPS, EQUIPMENT SIZING AND ORIENTATION, AND SIGNAGE.

	TYPICAL WELL SITE LAYOUT	DRAWN BY: JDR CHECKED BY: DMC SCALE: NONE DATE: 3/06
APPROVED BY: Dan Hall DATE APPROVED: 03/27/2006	CITY OF HUGHSON	STANDARD DETAIL 5-W.12



ITEM	MATERIAL	NO. REQ'D EA.	TYPE A			NO. REQ'D EA.	TYPE B		
			PVC MAINS	WELDED STEEL MAINS			PVC MAINS	WELDED STEEL MAINS	
			SIZE OF VALVE				SIZE OF VALVE		
			1"	1"	2"		1"	1"	2"
A	CHABOT COCK	2	1"	1"	2"	1	1"	1"	2"
B	ELL, 90°, BRASS	2	1"	1"	2"	1	1"	1"	2"
C	TUBING – RIGID COPPER	LGTH REQ'D	1"	1"	2"	LGTH REQ'D	1"	1"	2"
D	ELL, 90° COPPER TO IPT M	2	1"	1"	2"	2	1"	1"	2"
E	COUPLING, COP. TO IPT M	4	1"	1"	2"	–	–	–	–
F	GATE VALVE – NONRISING STEM – BRONZE SCREW	2	1"	1"	2"	1	1"	1"	2"
G	TEE, BRASS, COP. TO COP. TO 1 PT F	1	1"	1"	2"	–	–	–	–
H	VALVE – AIR AND VACUUM AND AIR RELEASE, EPOXY LINED	1	1"	1"	2"	1	1"	1"	2"
I	ELL, 90° COP. TO COP.	4	1"	1"	2"	1	1"	1"	2"
J	METER BOX (DOUBLE STACKED OR WITH A 8" HIGH REDWOOD BOX EXTENSION)	2	NO. 6	NO. 6	NO. 6	1	NO. 5	NO. 5	NO. 6
K	HALF NIPPLE, STEEL	1	–	1" x 2"	2" x 2"	1	–	1" x 2"	2" x 2"
L	SEE NOTE 10	2	–	1"	2"	1	–	1"	2"
M	SERVICE – CLAMP	2	2 STRAP x 2"	–	–	1	2 STRAP x 2"	–	–
O	PVC, SCREW, SCHED. 80 ELL	1	1"	1"	2"	3	1"	1"	2"
P	NIPPLE, SCHED. 80 PVC OR RIGID COPPER TUBING	2	LGTH REQ'D	LGTH REQ'D	LGTH REQ'D	1	LGTH REQ'D	LGTH REQ'D	LGTH REQ'D
Q	HOSE BIBB	1	1/2"	1/2"	1/2"	1	1/2"	1/2"	1/2"

NOTES:

1. USE 1" AIR VALVE ASSEMBLIES FOR 6" THROUGH 16" PIPE. USE 2" AIR VALVE ASSEMBLIES FOR 20" PIPE AND LARGER OR AS DESIGNATED BY THE ENGINEER.
2. MAINTAIN A GRADE UPWARD FROM CHABOT COCK TO AIR VALVE. (NO TRAPS)
3. THE COPPER TUBING SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT AMERICAN SOCIETY FOR TESTING MATERIALS STANDARD SPECIFICATIONS FOR COPPER WATER TUBE (SERIAL DESIGNATION 888) TYPE K, AND SHALL BE DRAWN AND HAVE A HARDNESS (ROCKWELL) WITHIN THE RANGE OF 87F TO 97F.
4. REFER TO DWG. 5-W.9 FOR DETAILS OF METER BOX INSTALLATION.
5. COAT ITEMS K, M AND H WITH MASTIC.
6. SUPPORT AIR VALVE BODY ON FIRMLY COMPACTED EARTH, AS SHOWN.
7. TAPE WRAP REDWOOD BLOCKING OR COVER WITH TWO LAYERS OF POLYWRAP.
8. REFER TO DWG. 5-W.14 FOR METAL ENCLOSURE.
9. USE "DELRIN" INSULATING COUPLING, OR INSULATING DIELECTRIC UNION.

CITY OF Hughson

1" & 2" AIR VALVE INSTALLATION
COMBINATION AIR, VACUUM, & AIR RELEASE VALVE

DRAWN BY: C.V.
CHECKED BY: P.K.
SCALE: NONE
DATE: 7/07

APPROVED BY: _____
DATE APPROVED: 8/13/07

CITY OF HUGHSON

STANDARD DETAIL
5–W.13

APPROVED BY: _____

DATE APPROVED: 8/13/07

CITY OF HUGHSON

AIR RELEASE VALVE ASSEMBLY
METAL ENCLOSURE

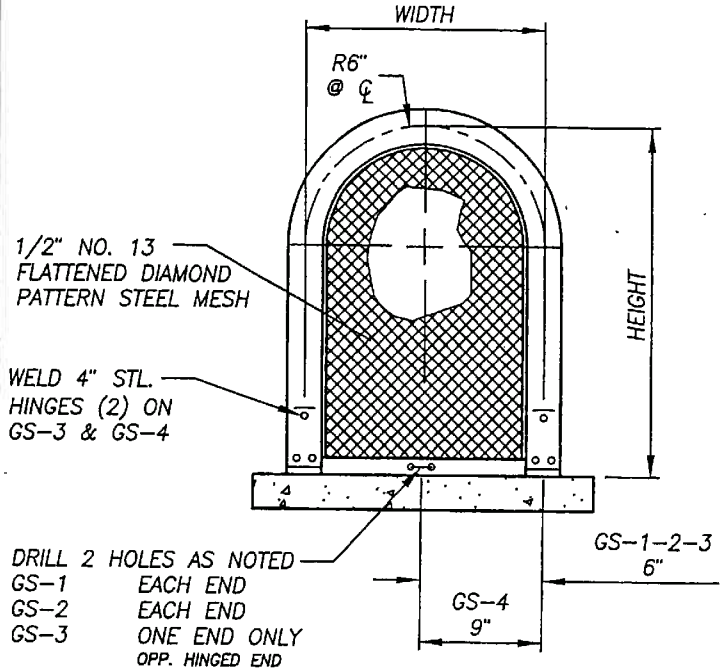
CITY OF HUGHSON

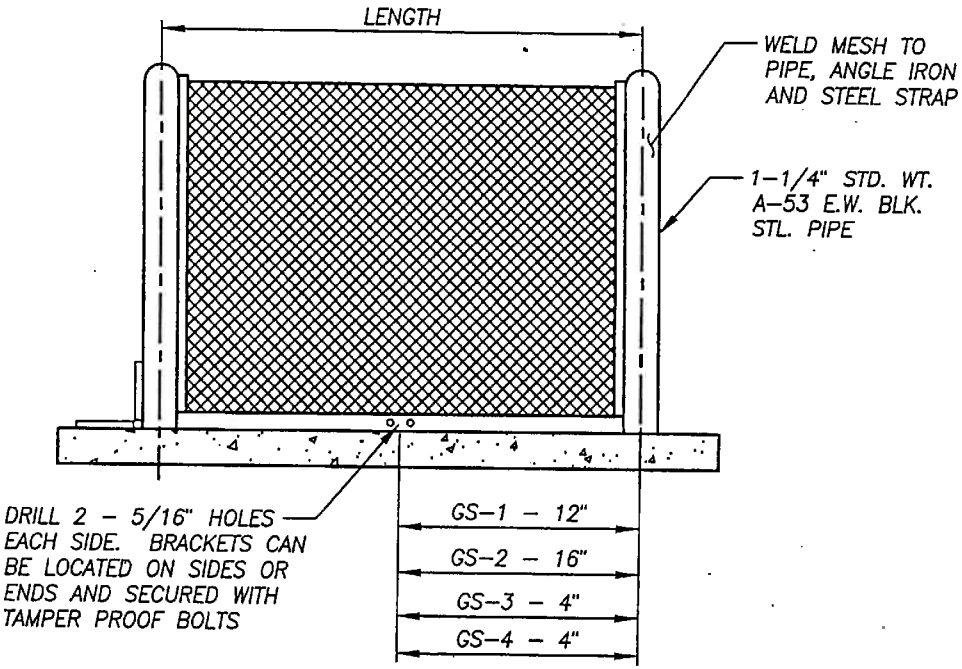
5-W.14

DRAWN BY: C.V.
CHECKED BY: P.K.
SCALE: NONE
DATE: 7/07
STANDARD DETAIL

GUARDSHACK–
STANDARD SIZED "POWDER COATED" METAL ENCLOSURE
MODELS GS–.5 TO GS–2 FOR 1/2"–2" BACKFLOW ASSEMBLIES
www.DPDI.com

SHALL BE DPDI OR APPROVED EQUAL





NOTE:
ALL WELDED AREAS SHALL BE A MINIMUM OF 1/4" BEAD EVERY 4"

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) OR APPROVED EQUAL.

ALL UNITS ALSO AVAILABLE IN 304 SS.
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. SIZE	CENTERLINE DIMENSIONS			WEIGHT	
				GS	CGS
GS–.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	35		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 30"H x 42"L	HINGED UNIT	N/A		55
GS–4	18"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 STAIN FINISH