

Santa Margarita Water District



MEMORANDUM

To: Holders of Design
Criteria and Standard Drawings for Water
and Sewer Facilities

Date: January 19, 2016

From: Don Bunts, Chief Engineer

A handwritten signature in blue ink, appearing to be 'DB', located to the right of the 'From:' field.

Subject: Engineering Procedure Memos – Supplement to Design Criteria & Standard Drawings for
Water and Sewer Facilities

The attached Engineering Procedure Memos shall be adhered to along with the District's Design Criteria and Standard Drawings for all work performed within the District. These Engineering Procedure Memos supplement, supersede and/or revise the most recent Board approved version of the District's Design Criteria & Standard Drawings for Water and Sewer Facilities. Any questions should be directed to the Engineering Department.

Santa Margarita Water District



POST OFFICE BOX 2279, MISSION VIEJO, CALIFORNIA 92690-0279
26111 ANTONIO PARKWAY, SUITE A, LAS FLORES, CALIFORNIA
CUSTOMER SERVICE (949) 459-6420 ADMINISTRATION (949) 459-6600 OPERATIONS (949) 459-6430

MEMORANDUM

TO: Distribution List and Holders of Design Criteria and Standard Drawings for Water and Sewer Facilities

DATE: May 29, 2003

FROM: Dan Ferons, Chief Engineer /DMF

Also see page 3 of this memo for correction to Standard Drawings W1, W1A, W2, W3, RW1, & RW2

SUBJECT: Engineering Procedure Memo No. 54, Corrosion Protection of Buried Copper and D.I.P. and Sewer Manhole Inserts

The following changes are effective immediately for improvements within the District:

1. The District's Standard Drawings are to be revised as follows with provisions to provide polyethylene encasement of ductile iron pipe for protection against corrosive soils:

W-13 – Installation of D.I.P. Water Mains – Add Note "D.I.P. shall be double polyethylene encased per AWWA Standard C-105."

W-7 – Fire Hydrants – Add Note "Hydrant bury shall be double polyethylene encased per AWWA Standard C-105."

2. The following note shall be added to all improvement plans which call out for D.I.P. fitting and bends.

Applies to all construction

All ductile iron fittings and bends shall be double polyethylene encased per AWWA Standard C-105.

3. A certified soils report shall be submitted with improvement plans for first plan check which determines the level of pH and ammonia within the soil and the corrosive potential (resistivity) of the soil. If the soil is determined to be potentially corrosive due to low resistivities and ammonia, the following note shall apply and be shown on the improvement plans:

W1, W1A, W2 and W3 (various size water services) – Add Note "Copper shall be double polyethylene encased in sleeves, 8-mil. minimum thickness, and all openings in the sleeves shall be taped shut with Polyken #900 Tape Wrap or approved equal. Tape shall be applied in strict conformance with

~~manufacturer's recommendations. A 5 lb. Zinc Anode shall be installed with the copper tubing as shown on the attached detail and connected to the copper tubing below the angle meter stop."~~

~~It has been determined that the Ladera Phase V and Covenant Hills developments have highly corrosive soils; therefore, all copper water services will be required to comply with Note 3 above.~~

- ~~4. Due to rainwater infiltration into manholes within areas of the District under development, increasing the potential for wastewater spills, the following standard sewer note shall be added to all sewer improvement plans:~~

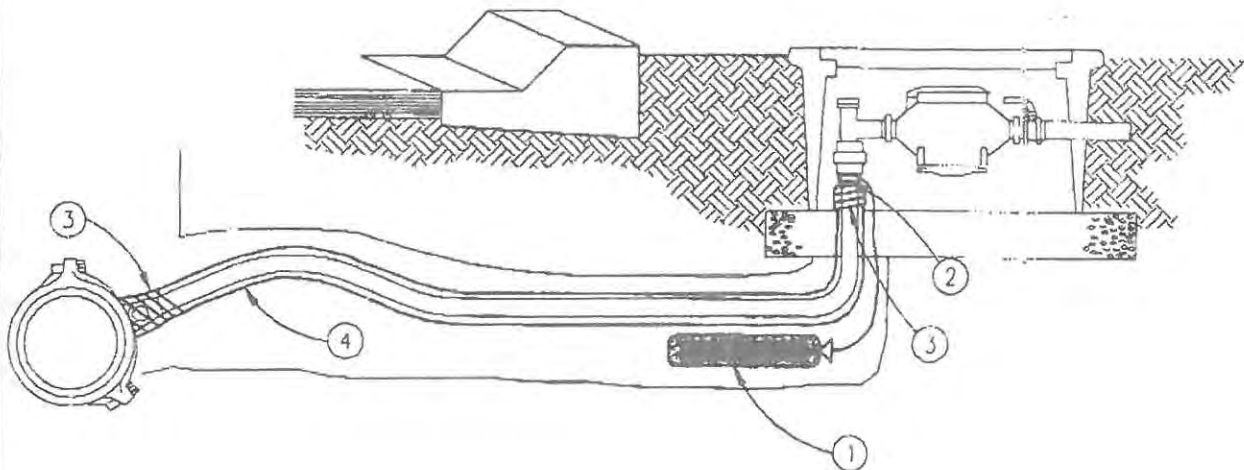
~~Standard Sewer Note No. (18). "Prior to any sewer being placed into service, a high density polyethylene manhole cover insert, manufactured by Flow In Flow, or approved equal, shall be installed on the manhole rim under the manhole cover in conformance with manufacturer's recommendations. The insert shall remain in place until the street is cap paved, at which time the insert is to be removed from the system."~~

- ~~5. In addition, the following note shall be added to Standard Drawing S1:~~

~~"Install polyethylene manhole cover insert, as manufactured by Flow In Flow, or approved equal, in accordance with District's Design Criteria."~~

DISTRIBUTION:

Bart Lantz
Hector Garcia
Jaime Aguilar
Clay Hutter
Tom Daxon
John Freese
Dixie Gillivan
Dia Badir
Raul Sanchez
Dave Seymour
Steve Francis
Rich Kisse
Gerre Bedell



- ① INSTALL SACRIFICIAL ANODE CONSISTING OF 15 LB. HIGH PURITY ZINC BAR BAGGED IN A BACKFILL OF CALCIUM, BENTONITE AND GYPSUM, WITH NO.12 SOLID COPPER LEAD WIRE. BURY ANODE IN SERVICE LINE TRENCH. SATURATE ANODE WITH EATER PRIOR TO BACKFILLING TRENCH.
- ② BRASS GROUNDING CLAMP WITH WIRE NUT.
- ③ POLYKEN #900 TAPE WRAP.
- ④ TWO LAYERS OF POLYETHYLENE SLEEVE, 8-MIL MIN. THICKNESS.

Correction to Standard Drawings W1, W1A, W2, W3, RW1, & RW2

**WATER SERVICES
CATHODIC PROTECTION**
N.T.S.

RBF CONSULTING PLANNING ■ DESIGN ■ CONSTRUCTION

27555 YNEZ ROAD, SUITE 400
TEMESCUA, CALIFORNIA 92591-4679
908.676.8042 • FAX 908.676.7240 • www.RBF.com

C:\WORK\15100372\CAD\DWG\151725100.DWG JDC 5/22/03 6:45 am

Santa Margarita Water District



MEMORANDUM

To: Distribution List and Holders of Design Criteria and Standard Drawings for Water and Sewer Facilities

Date: November 30, 2012

From: Don Bunts, Chief Engineer *DB*

Subject: Engineering Procedure Memo 55, Approved Water Meter Box and Cover

Effective immediately, the District's Standard Drawings are to be revised with the following approved materials for water meter box and cover.

<u>Standard Drawing</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Part Number</u>	<u>Drawing Number</u>
W-1, W-1A	Meter Box and Cover	J & R Concrete Products	P-W4 1/2-20K-Series Polymer Concrete Meter Box (Complete)	6056
W-2, W-3	Meter Box and Cover	J & R Concrete Products	P-W6B-20K-Series Polymer Concrete Meter Box (Complete)	6055
RW-1	Meter Box and Cover	J & R Concrete Products	P-W4 1/2-20K-Series Polymer Concrete Meter Box (Complete) (Purple) Recycled Water	6062
RW-2, RW-2A	Meter Box and Cover	J & R Concrete Products	PW6B-20K-Series Polymer Concrete Meter Box (Complete) (Purple) Recycled Water	6061

Superceded by Memo #58

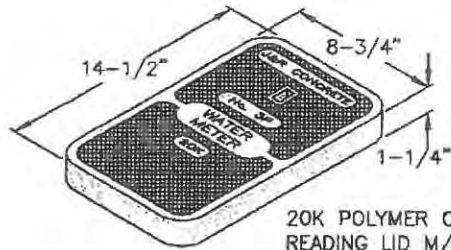
Superceded by Memo #58

Effective immediately, the following Revised Standard General Domestic Water Note No. 22 shall be added to all water and sewer improvement plans processed through the District:

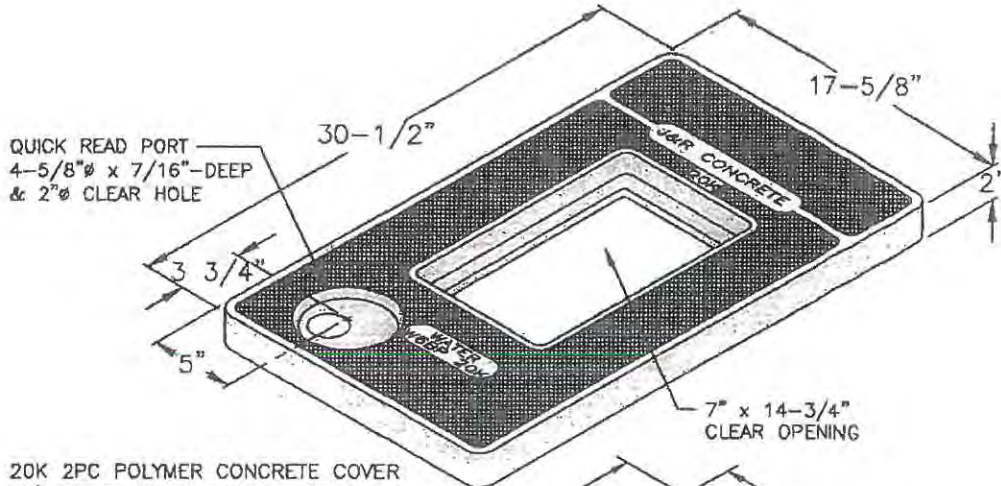
"Water meters shall be purchased from the District. Meter boxes, customer ball valves, gaskets, nuts and bolts and miscellaneous hardware must be purchased from a supplier with materials in accordance with the District's Standard Drawings. Meter box shall be concrete polymer and manufactured by J & R Concrete Products or approved equal."

Distribution

Dan Ferons	Clay Hutter	Rich Kissee	Beth Geldert
Jaime Aguilar	Tom Daxon	Gerre Bedell	Eddie Boulton
Jeff McDonnell	John Freese	Gary Russell	Steve Francis
Hector Garcia	Dia Badir	Bill Webster	

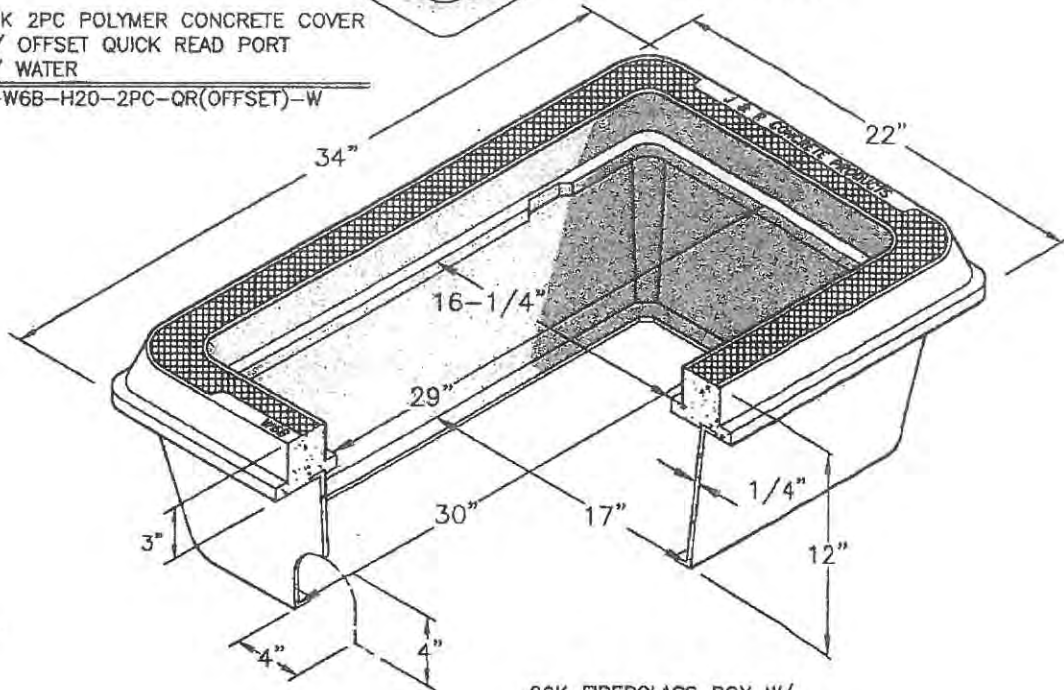


20K POLYMER CONCRETE
READING LID M/ WATER
P-W6B-H20-RL



QUICK READ PORT
4-5/8" x 7/16"-DEEP
& 2" CLEAR HOLE

20K 2PC POLYMER CONCRETE COVER
W/ OFFSET QUICK READ PORT
M/ WATER
P-W6B-H20-2PC-QR(OFFSET)-W



20K FIBERGLASS BOX W/
POLYMER CONCRETE RING
P-W6B-H20-BOX

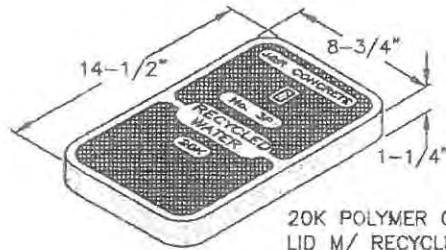
NOTE:
POLYMER CONCRETE BOXES & COVERS ARE INTENDED
FOR INCIDENTAL H2O TRAFFIC WHEEL LOADING!

DWG: 6055

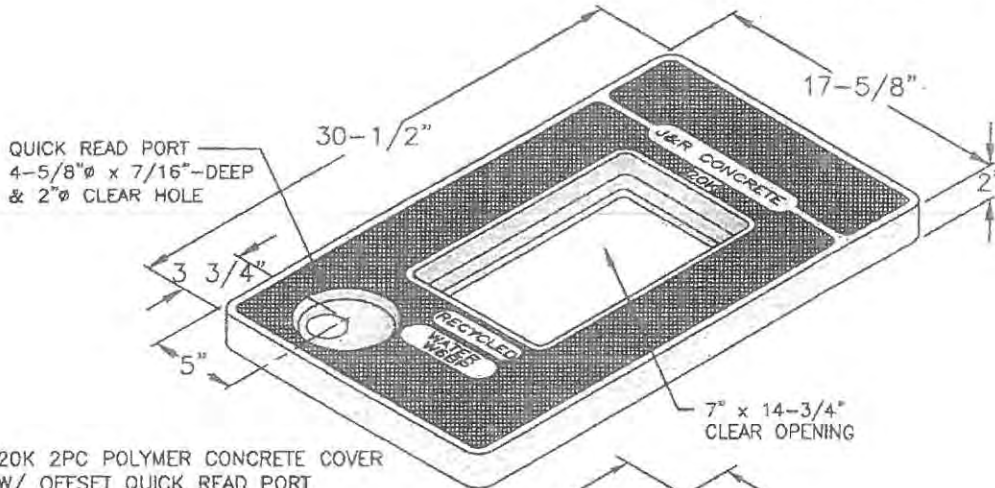
**P-W6B-20K-SERIES POLYMER
CONCRETE METER BOX**

J&R CONCRETE PRODUCTS

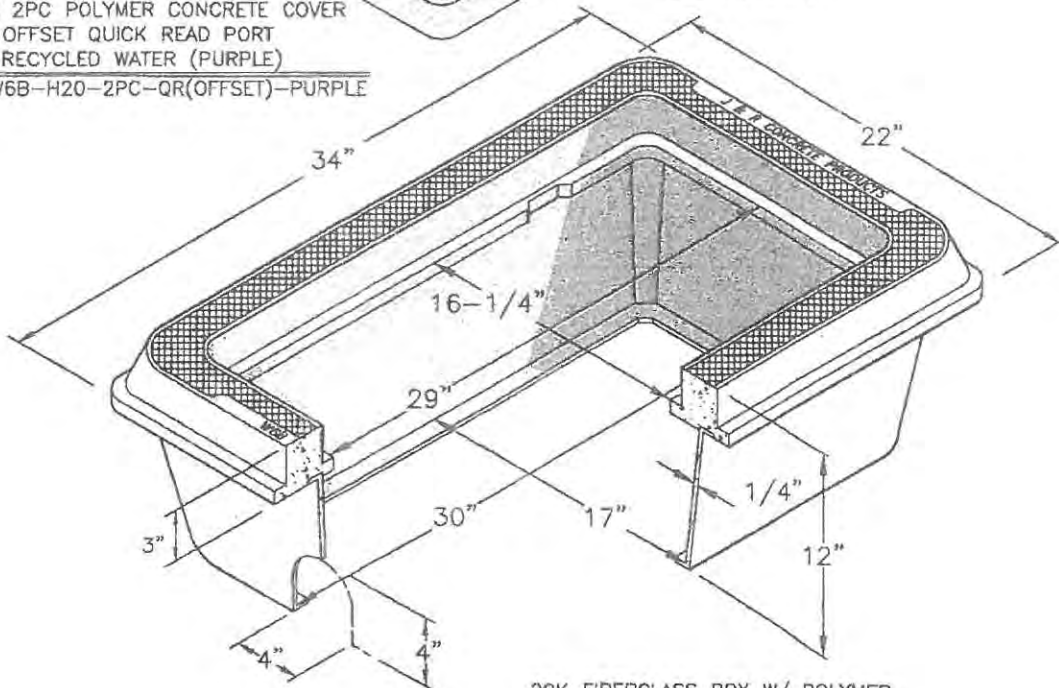
440 W. MARKHAM ST.
PERRIS, CA. 92571
PHONE:(951) 943-5855 FAX:(951) 940-9207



20K POLYMER CONCRETE READING LID M/ RECYCLED WATER (PURPLE)
P-W6B-H20-RL-RCW-PURPLE



20K 2PC POLYMER CONCRETE COVER W/ OFFSET QUICK READ PORT M/ RECYCLED WATER (PURPLE)
P-W6B-H20-2PC-QR(OFFSET)-PURPLE



20K FIBERGLASS BOX W/ POLYMER CONCRETE RING (PURPLE)
P-W6B-H20-BOX-PURPLE

NOTE:
POLYMER CONCRETE BOXES & COVERS ARE INTENDED FOR INCIDENTAL H2O TRAFFIC WHEEL LOADING!

DWG: 6061

P-W6B-20K-SERIES POLYMER CONCRETE METER BOX (PURPLE) RECYCLED WATER

J&R CONCRETE PRODUCTS

440 W. MARKHAM ST.
PERRIS, CA. 92571
PHONE:(951) 943-5855 FAX:(951) 940-9207

Santa Margarita Water District



MEMORANDUM

To: Distribution List and Holders of Design
Criteria and Standard Drawings for Water
and Sewer Facilities

Date: January 24, 2013

From: Don Bunts, Chief Engineer *DB*

Subject: Engineering Procedure Memo 56, Anodes on Appurtenances

Effective immediately, the following Standard General Domestic Water Note No. 23 shall be added to all water and sewer improvement plans processed through the District:

"All buried metal appurtenances, including fittings, adapters and hydrant burys, etc., shall have thirty pound sacrificial anodes with high purity zinc, bagged in 5% sodium sulfate, 75% gypsum and 20% bentonite backfill, with No. 6 HMWPE covered stranded copper lead wire. Sixty pound anodes are required for appurtenances on pipelines 12-inch and larger. Anode lead shall be attached with cadweld per District Standards. Saturate anode with water prior to placing backfill."

Distribution


Dan Ferons	Clay Hutter	Rich Kisse
Jaime Aguilar	Tom Daxon	Gerre Bedell
Jeff McDonnell	John Freese	Steve Francis
Hector Garcia	Dia Badir	Bill Webster

Santa Margarita Water District



MEMORANDUM

To: Distribution List and Holders of Design Criteria and Standard Drawings for Water and Sewer Facilities **Date:** June 5, 2015

From: Don Bunts, Chief Engineer 

Subject: Engineering Procedure Memo 57, Additional Customer Ball Valve Manufacturer

Effective immediately, the following information shall be added as an acceptable manufacturer under Item No. 6 within the Construction Items / Material list shown on District Standard Drawing Numbers W1A, W2, W3, RW1, RW2 and RW2A:

On Standard Drawing W1A (1-inch service) "Ford B13-444W-NLw/HB-34S"

On Standard Drawing W2 (1.5-inch service) "Ford BF13-666W-NLw/HB-67S"

On Standard Drawing W3 (2-inch service) "Ford BF13-777W- NLw/HB-67S"

On Standard Drawing RW1 (1-inch service) "Ford B13-444W-NLw/HB-34S"

On Standard Drawing RW2 (1.5-inch service) "Ford BFB-666W-NLw/HB-67S"

On Standard Drawing RW2A (2-inch service) "Ford BF13-777W- NLw/HB-67S "

Distribution

Gerre Bedell	Rich Kisse	Karla Houlihan	Pilar Yager
Jeff McDonnell	Jaime Aguilar	Bill Webster	Beth Geldert
Tom Daxon	John Freese	Dia Badir	Eddie Boulton
Brian Hobson	Doug Juvinal	Tricia Butler	


Santa Margarita Water District



MEMORANDUM

To: Distribution List and Holders of Design
Criteria and Standard Drawings for Water
and Sewer Facilities

Date: May 19, 2015

From: Don Bunts, Chief Engineer 

Subject: Engineering Procedure Memo 58, Approved Water Meter Box and Cover

Effective immediately, the District's Standard Drawings are to be revised with the following approved materials for water meter box and cover:

Standard Drawing	Description	Manufacturer	Part Number	Drawing Number
W-1, W-1A	Meter Box & Cover	J&R Concrete Products	P-W4 ½-20K-Series Polymer Concrete Meter Box (Complete)	6056-R1
RW-1	Meter Box & Cover	J&R Concrete Products	P-W4 ½-20K-Series Polymer Concrete Meter Box (Complete) (Purple) Recycled Water	6062-R1

Distribution

Dan Ferons

Rich Kisse

Gerre Bedell

Jaime Aguilar

Tom Daxon

Doug Juvinal

Jeff McDonnell

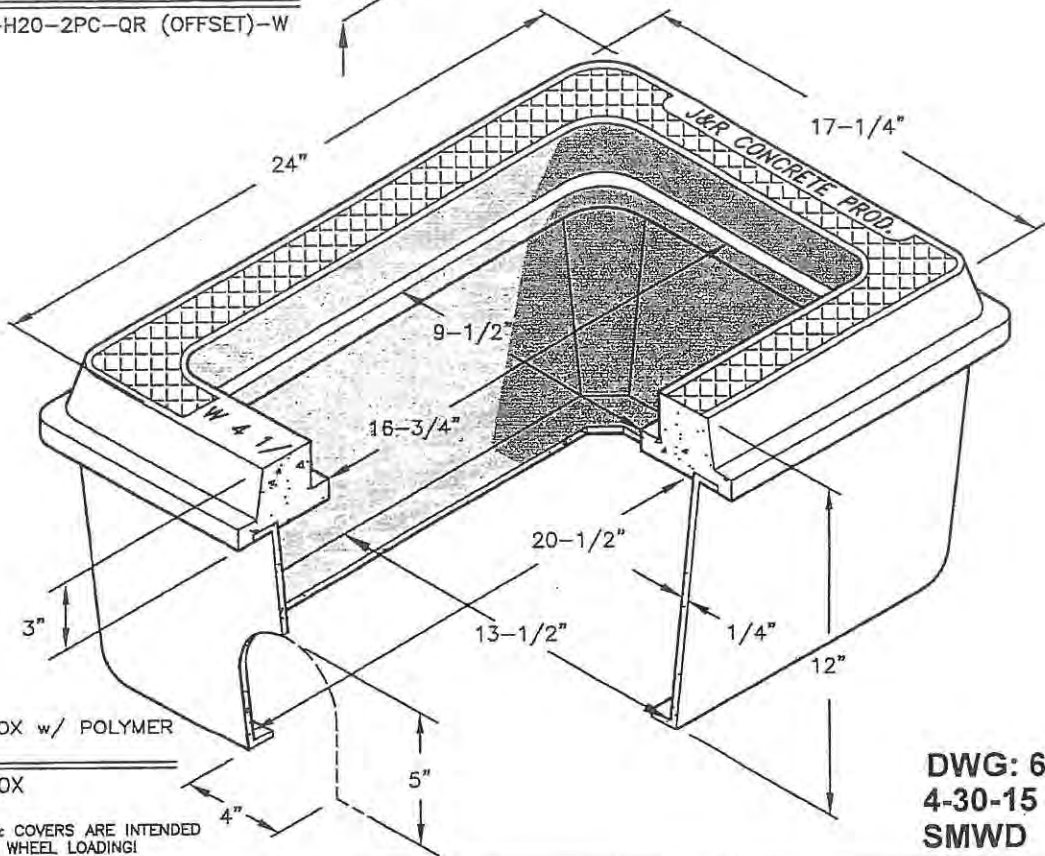
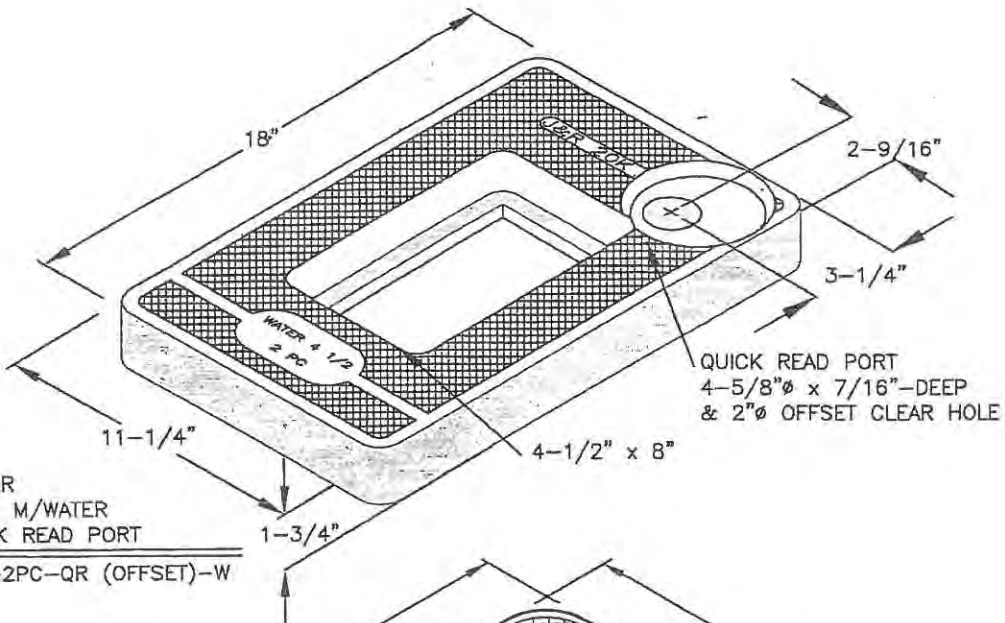
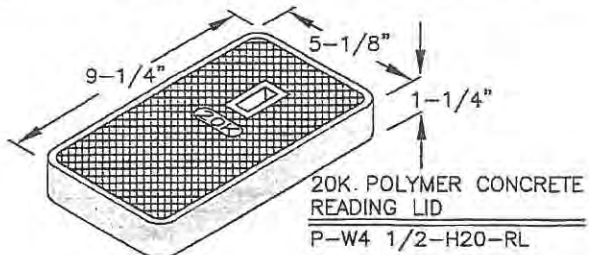
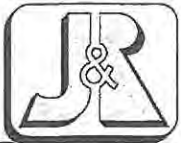
John Freese

Bill Webster

Karla Houlihan

Dia Badir

Tricia Butler



NOTE:
POLYMER CONCRETE BOXES & COVERS ARE INTENDED
FOR INCIDENTAL H2O TRAFFIC WHEEL LOADING!

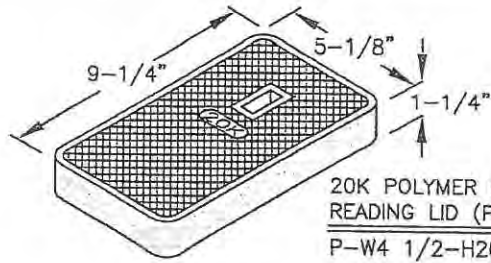
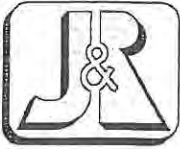
DWG: 6056-R1
4-30-15
SMWD

**P-W4 1/2-20K-SERIES POLYMER
CONCRETE METER BOX**

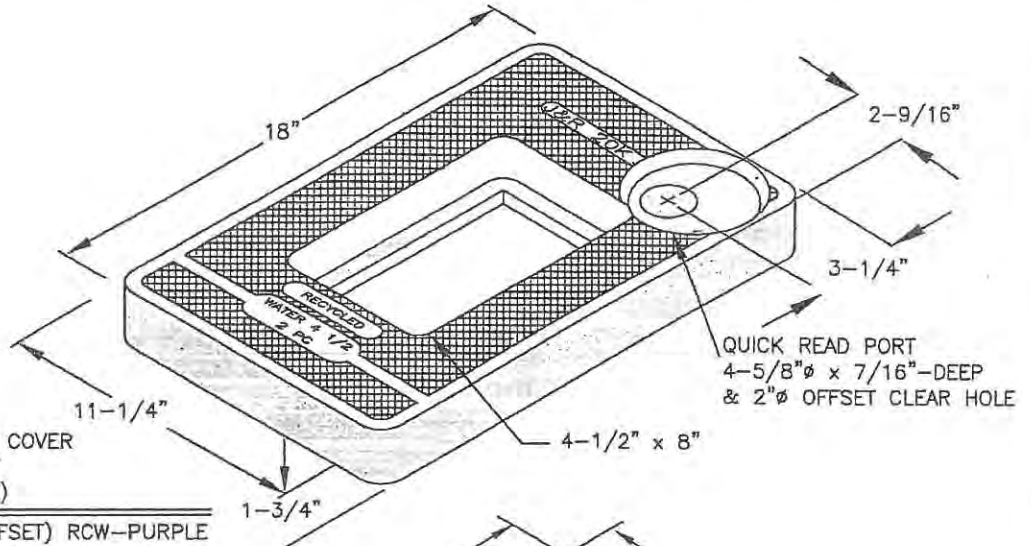
J&R CONCRETE PRODUCTS

440 W. MARKHAM ST.
PERRIS, CA. 92571
PHONE:(951) 943-5855 FAX:(951) 940-9207

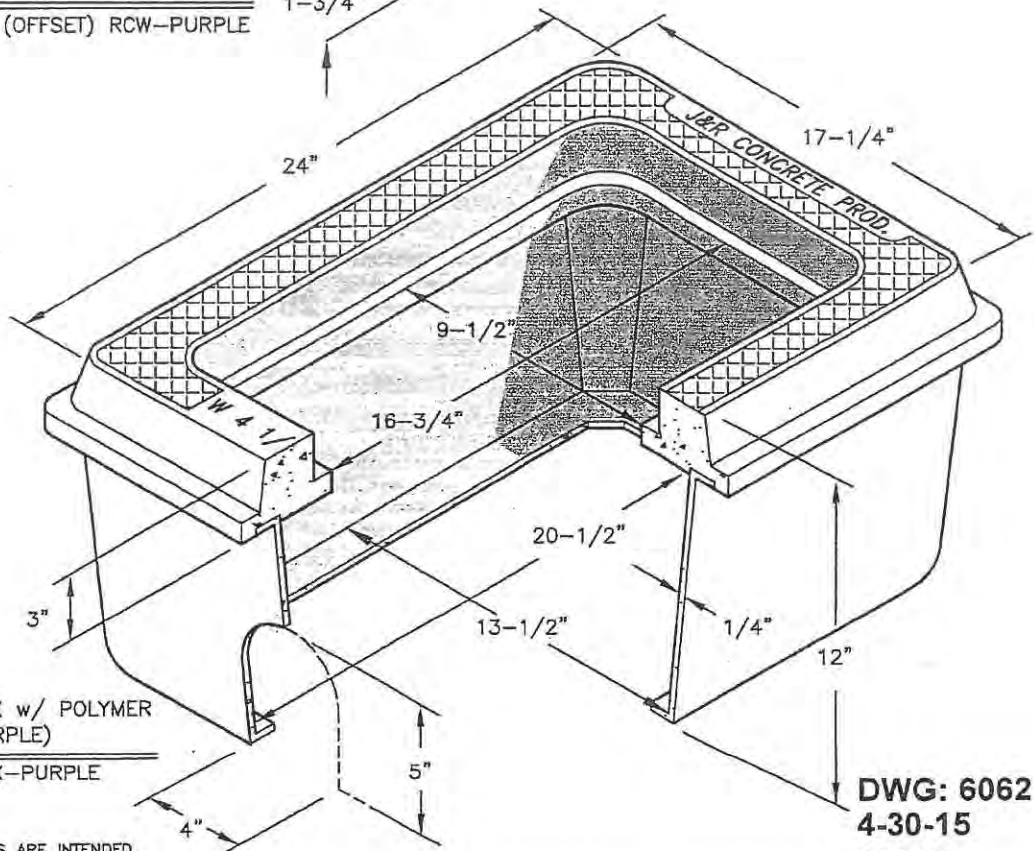




20K POLYMER CONCRETE
READING LID (PURPLE)
P-W4 1/2-H2O-RL-PURPLE



20K 2PC POLYMER CONCRETE COVER
W/ OFFSET QUICK READ PORT
M/ RECYCLED WATER (PURPLE)
P-W4 1/2-H2O-2PC-QR (OFFSET) RCW-PURPLE



20K FIBERGLASS BOX w/ POLYMER
CONCRETE RING (PURPLE)
P-W4 1/2-H2O-BOX-PURPLE

DWG: 6062-R1
4-30-15
SMWD

NOTE:
POLYMER CONCRETE BOXES & COVERS ARE INTENDED
FOR INCIDENTAL H2O TRAFFIC WHEEL LOADING!

**P-W4 1/2-20K-SERIES POLYMER
CONCRETE METER BOX (PURPLE)
RECYCLED WATER**

J&R CONCRETE PRODUCTS

440 W. MARKHAM ST.
PERRIS, CA. 92571
PHONE:(951) 943-5855 FAX:(951) 940-9207



Santa Margarita Water District



MEMORANDUM

To: Distribution List and Holders of Design Criteria and Standard Drawings for Water and Sewer Facilities

Date: ~~September 25, 2015~~
November 23, 2015

From: Don Bunts, Chief Engineer

Subject: Engineering Procedure Memo 59, Approved Air/Vacs and Enclosures - CORRECTION

Effective immediately, the District's Standard Drawings are to be revised with the following approved materials for air/vacs and enclosures:

AIR/VACS:

Standard Drawing	Description	Manufacturer	Working Pressure	Part Number
W-18	1" & 2" Combination Air Release and Vacuum Valve Assembly	A.R.I. USA Inc.	3 -250 psi 3 - 580 psi	D-040 D-065
W-19	4" Combination Air Release and Vacuum Valve Assembly	A.R.I. USA Inc.	3 -285 psi 3 - 580 psi	D-060 D-065
RW-6	1" & 2" Recycled Combination Air Release and Vacuum Valve Assembly	A.R.I. USA Inc.	3 -150 psi 3 - 250 psi	D-021 D-020
RW-6	4" Combination Air Release and Vacuum Valve Assembly	A.R.I. USA Inc.	3 -250 psi 3 - 360 psi	D-023 K-022

ENCLOSURES:

All air/vacs (Standard Drawings W-18, W-19, and RW-6) are to be covered with low density polyethylene, granite finish, round enclosures manufactured by Armorcast Products. 1" and 2" air/vacs are to be enclosed with Armorcast Part Number P6002002 (20" diameter x 36" high with 14 - 1/2" vent holes). 4" air/vacs are to be enclosed with Armorcast Part Number P6002001 (36" 24" diameter x 36" high with 18 - 1/2" vent holes).

Distribution

Dan Ferons	Rich Kisse	Gerre Bedell	Chad Cain
Jaime Aguilar	Tom Daxon	Doug Juvinal	Brian Hobson
Jeff McDonnell	John Freese	Bill Webster	Tony Gaetano
Karla Houlihan	Dia Badir	Tricia Butler	

D-040 250 psi

~~**D-040-C** 250 psi~~



Combination Air Valve

Description

The D-040 series Combination Air Valve has the features of both an air release valve and an air & vacuum valve.

The air release component is designed to automatically release small pockets of air to the atmosphere as they accumulate along a pipeline or piping system when it is full and operating under pressure.

The air & vacuum component is designed to automatically discharge or admit large volumes of air during the filling or draining of a pipeline or piping system. This valve will open to relieve negative pressures whenever water column separation occurs.

Applications

- Pump stations: after the pump and after the check valve.
- Downstream (after) and upstream (before) of shut-off valves.
- After deep-well pumps.
- On long constant-sloped pipeline segments.
- At peaks along the pipeline and at peaks relative to hydraulic gradient.
- At end lines.
- Before water meters.
- On strainers and filters.

D-040-C - additional applications

- Water pipelines vulnerable to vandalism and/or water theft.
- Water systems found in remote areas.

Operation

The air & vacuum component, with the large orifice, discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during its drainage and at water column separation.

High velocity air will not blow the float shut. Water will lift the float, which seals the valve.

At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will enter the system.

The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

The air release component releases entrapped air in pressurized systems.

Without air valves, pockets of accumulated air may cause the following hydraulic disturbances:

- Restriction of effective flow due to a reduction of the flow area. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.
- Acceleration of cavitation damages.
- Increase in pressure transients and surges.
- Internal corrosion of pipes, fittings and accessories.
- Dangerous high-energy bursts of compressed air.
- Inaccuracies in flow metering.

As the system fills and is pressurized, the combination air valve functions in the following stages:

1. Air in the pipeline is discharged by the air valve.
2. Liquid enters the air valve, lifting the float which pushes the sealing mechanism to its sealing position.
3. Entrapped air, which accumulates at peaks and along the system, rises to the top of the air valve, which in turn displaces the liquid in the air valve body.
4. The float drops down, unsealing the rolling seal. The air release orifice opens and the accumulated air is released.
5. Liquid enters the air release valve, the float rises pushing the rolling seal to its sealing position.

When internal pressure falls below atmospheric pressure (negative pressure):

1. The float will drop down, immediately opening the air & vacuum and air release orifices.
2. Air will enter into the system

Main Features

- Working pressure range: 3 - 250 psi.
- Testing pressure: 360 psi.
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.
- Reliable operation reduces water hammer incidents.
- Dynamic design allows for high capacity air discharge while preventing premature closure.
- Lightweight, small dimensions, simple and reliable structure.
- The discharge outlet enables the connection of a vent/drain pipe.
- The large size of the automatic air release orifice relative to the valve body:

- Discharges air at high flow rates.
- Lessens the danger of its obstruction by debris.
- Enables the usage of the rolling seal mechanism, making it less sensitive to pressure differential than a direct float seal.
- The body is made of high-strength composite materials and all operating parts are made of specially selected, corrosion-resistant materials.
- Due to its light weight, the valve may be installed on plastic piping systems, as well as other lightweight piping systems.
- D-040-C the body is protected in a metal shell for anti-vandalism/ theft applications.

Valve Selection

- Size range: 1/2", 3/4", 1", 2" threaded male connections, NPT
- Special Order: Optional BSPT connection
- Addition of ball valve tap; NPT male connection.

Options

- The D-040 air valve is available in the following options:
- D-040 1/2", 3/4", 1" & 2" - reinforced nylon body and base.
- D-040 C 3/4", 1" - ductile iron shell and stainless steel base
2" - ductile iron shell and base .
- D-040P SSB 3/4", 1" & 2" - reinforced nylon body and stainless steel base.
- D-040 SS 3/4", 1" & 2" - stainless steel body and stainless steel base.
- D-040 LP 3/4", 1" & 2" - designed for very low pressure systems with a working pressure of 0.725 - 87 psi.
- D-040 L 1/2", 3/4", 1", 2" - designed for systems with small suspended solids requiring a low sealing pressure, reinforced nylon/ PVDF body and base. The working pressure 0.725 - 150 psi

Note

For best suitability, it is recommended to send the fluid chemical properties along with the valve request.
Upon ordering, please specify: model, size, working pressure, thread and flange standard and type of liquid.

ACCESSORIES

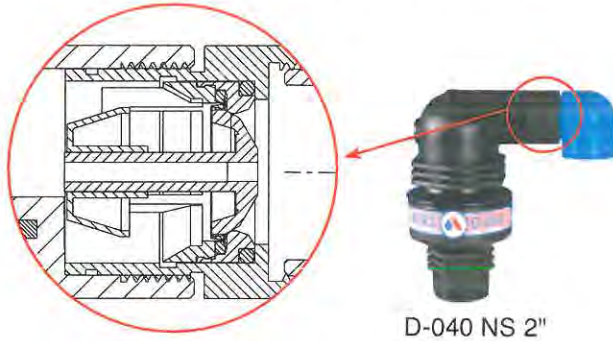
One-way models

D-040 series air valve is available as:

D-040-V -With a one-way, out-only attachment, allows air discharge only, prevents air intake (all models).

D-040-I -With a vacuum breaker, in-only attachment, allows air intake only, not allowing air discharge (D-040 2" only).

D-040-NS -With a non-slam, discharge-throttling attachment, allows full air intake, throttles air discharge (D-040 2" only).



Screen

Prevents penetration of debris and insects and can be assembled on the valve before or after the Discharge Outlet.

Each strainer has 2 threaded connections 1.5" NPSM/ 2" NPSM.



Air Valve Enclosure

A.R.I. air valve enclosure is used to protect air valve, for above surface air valve installations.

The special enclosure protects and hide the air valves from vandalism and damages.



D-060-C HF NS SB 285 psi

~~D-062 HF NS SB 360 psi~~



Underground Air Valve System for Potable Water

Description

The D-060-C HF NS SB is a complete product package that combines the reliable and efficient properties of the A.R.I. D-060-C HF NS Combination Air Valve with the added feature of a sub-surface valve that can be buried below ground. A specially designed gear box operated horizontal sliding disc valve - situated at the base of the D-060-C HF NS SB assembly - allows for the air valve disconnection and maintenance from ground level.

This gear box operated shut-off valve is equipped with a safety mechanism enabling disconnection and removal of the D-060-C HF NS air valve from its subsurface housing, even when the system is under pressure. Since service and maintenance operations of the unit are performed entirely from the surface, there is no need for safety considerations associated with confined space entry.

The D-060-C HF NS series Combination Non Slam Air Valve is a surge-dampening, slam-preventing, 3-stage combination air valve. The air valve provides high capacity vacuum protection and, at the same time, efficient surge suppression.

The air release component is designed to automatically release small pockets of air to the atmosphere as they accumulate along a pipeline or piping system when it is full and operating under pressure.

The air & vacuum component is designed to automatically discharge or admit large volumes of air during the filling or draining of a pipeline or piping system. This valve will open to relieve negative pressures whenever water column separation occurs.

The non slam component is designed to throttle air discharge through the smaller orifice of the non-slam disc to prevent surge.

Applications

- Municipal and industrial water conveyance systems.

Operation

The D-060-C HF NS series Combination Non Slam Air Valve is a surge-dampening, slam-preventing, 3-stage combination air valve. The air valve provides high capacity vacuum protection and, at the same time, efficient surge suppression.

1. At sudden drainage and/or water column separation (sudden pump trips or valve closure, for instance), the air & vacuum orifice admits air at high flow rates, thus preventing vacuum.
2. As the water column and/or pressure wave returns, large volumes of air are discharged at high velocities, raising the non-slam disc, partially closing the air & vacuum orifice and allowing air to exhaust slowly through the smaller orifice of the non-slam disc.
3. This slowly exhausting air pocket dampens the slam of the

returning water column, thus suppressing the pressure surge. As the water flow arrives at a much slower rate, dampened by the slower air discharge, it buoys up the main float, gently closing the air & vacuum component of the air valve.

4. The S-050-C air release component continues releasing air while the pipeline and the air valve are pressurized.

Without air valves, pockets of accumulated air may cause the following hydraulic disturbances:

- Restriction of effective flow due to a reduction of the flow area. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.
- Acceleration of cavitation damages.
- Increase in pressure transients and surges.
- Internal corrosion of pipes, fittings and accessories.
- Dangerous high-energy bursts of compressed air.
- Inaccuracies in flow metering

Main Features

D-060-C HF NS SB Underground Air Valve System for Potable Water:

- The D-060-C HF NS SB incorporates an integral, flat, gear box operated horizontal sliding disc valve with a 2", 3" full bore passage.
- The shut-off valve is operated from the surface.
- The quick connector between the adaptor and the shut-off valve facilitates detachment during handling.
- The integrated assembly handle eases the process of lifting the air valve assembly out from the valve box.
- Pipe connections: 3" threaded NPT or flanged, in accordance with all standards.
- Safety elements: Disengaging the air valve is safeguarded: unless the shut-off valve is in the "closed" position and the internal pressure is released, it is not possible to extract the air valve.
- All parts are corrosion resistant: Metal parts made of Stainless Steel, Ductile Iron or Steel, Composite material parts made of Nylon.
- Drainage system: a special one-way valve that drains the water from the valve box and does not admit water.

D-060-C HF NS Combination Air Valve:

- Working pressure range: D-060-C HF NS SB: 3 - 285 psi.
D-062 HF NS SB: 3 - 360 psi
- Testing pressure for the air valve is 1.5 times its working pressure.
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.

- All main flow cross-sections are equal or greater than the nominal port area.
- Aerodynamic design enables high flow rates of air both at intake and at discharge.
- Reliable operation reduces water hammer incidents.
- Dynamic design allows for high capacity air discharge while preventing premature closure.
- Special orifice seat design: Stainless Steel SAE 316 and E.P.D.M. rubber, assures long-term maintenance-free operation.
- Screen protected outlet.
- The upper screen is protected with a protective cover.
- FBE coating, both interior & exterior, in accordance with the standard DIN 30677-2.

Air Release Component

- Body made of high strength materials.
- All operating parts are made of specially selected corrosion-resistant polymer materials.
- Large size air release orifice:
 1. Dramatically reduces the possibility of obstruction by debris.
 2. Discharges high air flow rates.
 3. One size orifice for a wide pressure range (up to 360 psi), achieved by the rolling seal mechanism.

Advantages and Benefits

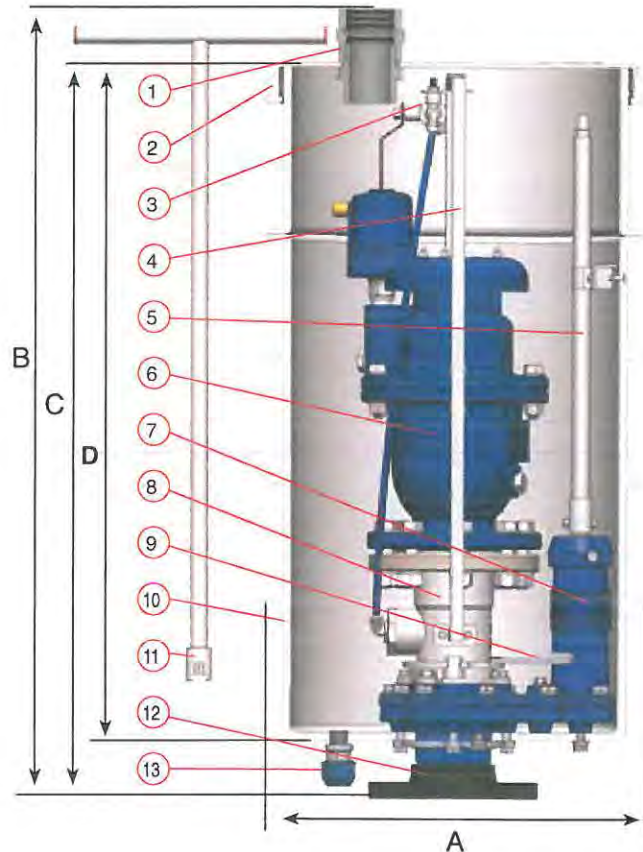
- Relatively lightweight and convenient to install.
- Sub-surface installation.
- Low installation costs:
 - No need for expensive, large excavation.
 - No need for expensive, human-accessible manholes.
- Low Maintenance costs:
 - No need for specialized tools or safety equipment.
 - One person for operation and maintenance.
 - Clean and environmentally friendly.
- Safe in operation:
 - Greatly reduces danger of contact with local fauna – snakes and scorpions, etc!
 - Entirely operated and maintained from ground level.
- Reliable and efficient operation:
 - Dynamic design allows high velocity air discharge while preventing premature closure.
 - Unique Rolling Seal mechanism.
 - Since the valve is a sub-surface (underground), it is more resistant to frost conditions.

Valve Selection

- Two different installation lengths:
 1. 31.7 inch tube; complete system length: 36.8 inch.
 2. 39.6 inch tube; complete system length: 44.6 inch.

Note

For best suitability, it is recommended to send the fluid chemical properties along with the valve request. Upon ordering, please specify: model, size, working pressure, threads standard and type of liquid.



UNDERGROUND AIR VALVE SYSTEM PARTS LIST AND SPECIFICATION

No	Part	Material
1.	Vent Outlet	Polyethylene
2.	Valve Box Cover	Polyethylene
3.	Pressure Relief Valve	Stainless Steel SAE 316
4.	Lifting Handle	Stainless Steel SAE 304
5.	Operating Rod	Stainless Steel SAE 304
6.	D-060-C HF NS Air Valve	see below
7.	Sliding Disc Valve w/ Gear Box	DI+STST+E.P.D.M. STST+STST+E.P.D.M.
8.	Adaptor - Quick Connector	Stainless Steel SAE 316
9.	Safety Handle	Stainless Steel SAE 316
10.	Valve Box	Polyethylene
11.	"T" Key	Stainless Steel SAE 304
12.	Flange 3" 4"	Reinforced Nylon / Stainless Steel SAE 316
13.	Drainage One Way Valve Connection	Polypropylene + Acetal

D-065 HF 580 psi

Combination Air Valve for High Flow



Description

The D-065-C HF series Combination Air Valve has the features of both an air release valve and an air & vacuum valve. The air release component is designed to automatically release small pockets of air to the atmosphere as they accumulate along a pipeline or piping system when it is full and operating under pressure. The air & vacuum component is designed to automatically discharge or admit large volumes of air during the filling or draining of a pipeline or piping system. This valve will open to relieve negative pressures whenever water column separation occurs.

Applications

- Municipal and industrial water conveyance systems.
- Water pipelines vulnerable to vandalism and/or water theft.
- Water systems found in remote areas.
- Water systems with pressure demands up to 580 psi.

Operation

The air & vacuum component, with the large orifice, discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during its drainage and at water column separation.

High velocity air will not blow the float shut. Water will lift the float which seals the valve.

At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will enter the system.

The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

The air release component releases entrapped air in pressurized systems.

Without air valves, pockets of accumulated air may cause the following hydraulic disturbances:

- Restriction of effective flow due to a reduction of the flow area. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.
- Acceleration of cavitation damages.
- Increase in pressure transients and surges.
- Internal corrosion of pipes, fittings and accessories.
- Dangerous high-energy bursts of compressed air.
- Inaccuracies in flow metering.

As the system starts to fill, the combination air valve functions according to the following stages:

1. Air in the pipeline is discharged by the valve.
2. Liquid enters the air & vacuum component, lifting the float to its sealing position.
3. Liquid enters the air release component of the valve, lifting the float and pushing the rolling seal to its sealing position.
4. Entrapped air, accumulating at peaks and along the system, rises to the top of the air release valve, displacing the liquid in the valve's body.
5. The float drops, unsealing the rolling seal. The air release orifice opens and the accumulated air is released.
6. Liquid replaces the air released from the valve, buoying up the float and pushing the rolling seal back to its sealing position.

When internal pressure falls below atmospheric pressure (negative pressure):

1. The floats will drop down, immediately opening the air & vacuum and air release orifices.
2. Air will enter the system.

Main Features

- Working pressure range: 3 - 580 psi.
- Testing pressure :
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.
- All main flow cross-sections are equal or greater than the nominal port area.
- Aerodynamic design enables high flow rates of air both at intake and at discharge.
- Reliable operation reduces water hammer incidents.
- Dynamic design allows for high capacity air discharge while preventing premature closure.
- Special orifice seat design: Stainless Steel and E.P.D.M. rubber, assures long-term maintenance-free operation.
- Screen protected outlet.
- The upper screen is protected with a protective cover.

Air Release Component

- Body made of high strength materials.
- All operating parts are made of specially selected corrosion-resistant polymer materials.
- Large size air release orifice:
 - Dramatically reduces the possibility of obstruction by debris
 - Releases air at high flow rates.

- One size orifice for a wide pressure range (up to 580 psi), achieved by the rolling seal mechanism.

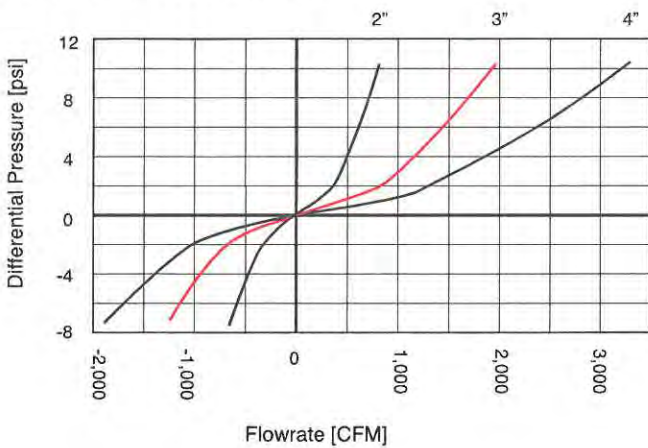
Valve Selection

- Size Range: 2" - 8"
- These valves are manufactured with flanged ends to meet ASA 300, ASA 600 standard or any requested standard.
- Valve coating: Fusion bonded epoxy coating in accordance with the standard DIN 30677-2.
- Other coatings are available upon request.
- The air release component and the air & vacuum component are available as separate units.

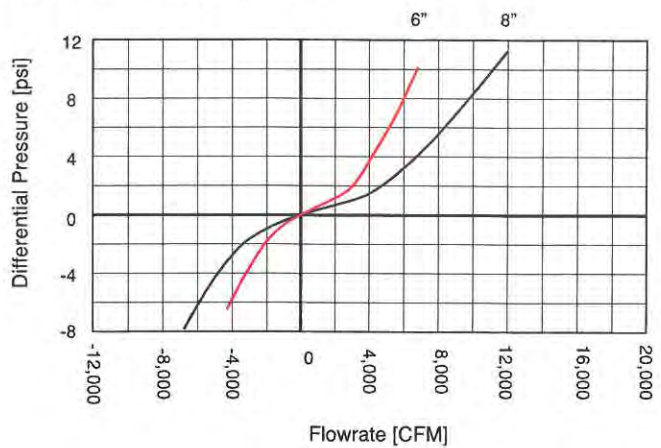
Note

For best suitability, it is recommended to send the fluid chemical properties along with the valve request.
Upon ordering, please specify: model, size, working pressure, thread and flange standard and type of liquid.

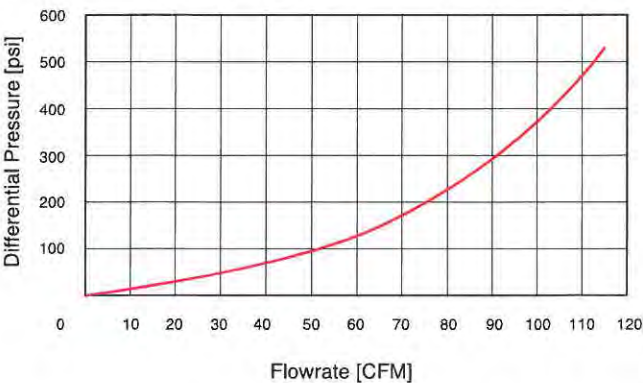
AIR & VACUUM FLOWRATE



AIR & VACUUM FLOWRATE



AIR RELEASE FLOWRATE



D-021 150 PSI



Combination Air Valve Reclaimed and Non-Potable Water

Description

The D-021 Combination Air Valve combines an air & vacuum component and an air release component in a single body. The valve is specifically designed to operate with liquids carrying low concentrations of solid particles such as reclaimed and non-potable water. The combination air valve discharges air (gas) during the filling or charging of the system, admits air into the system during drainage and at water column separation and releases accumulated air (gas) from the system while it is operating under pressure. The valve's unique design enables the separation of the liquid from the sealing mechanism and assures optimum working conditions

Applications

Water with low concentrations of suspended solids:

- Reclaimed water
- Raw water
- Effluent water
- Coolant water

Operation

The air & vacuum component discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during drainage and at water column separation.

High velocity air will not blow the float shut. Water will lift the float which activates the sealing of the valve.

At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will enter the system.

The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

The air release component releases entrapped air in pressurized systems.

Without air valves, pockets of accumulated air may cause the following hydraulic disturbances:

- Restriction of effective flow due to a reduction of the flow area. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.

- Acceleration of cavitation damages.
- Increase in pressure transients and surges.
- Internal corrosion of pipes, fittings and accessories.
- Dangerous high-energy bursts of compressed air.
- Inaccuracies in flow metering.

As the system fills and is pressurized, the combination air valve functions according to the following stages:

1. Air (gas) is discharged by the valve
2. When the liquid level reaches the valve's lower portion, the lower float is lifted, pushing the sealing mechanism to its sealing position.
3. The entrapped air is confined in a pocket between the liquid and the sealing mechanism. The air pressure is equal to the system pressure.
4. Increases in system pressure compress the trapped air in the upper section of the conical chamber. The conical shape assures the height of the air gap. This enables separation of the liquid from the sealing mechanism.
5. Entrapped air (gas), accumulating at peaks and along the system, rises to the top of the valve and displaces the liquid in the valve's body.
6. When the liquid level lowers to a point where the float is no longer buoyant, the float drops, unsealing the rolling seal. The air release orifice opens and allows part of the air that accumulated in the upper portion of the valve to be released to the atmosphere.
7. Liquid enters the valve. The float rises, pushing the rolling seal to its sealing position. The remaining air gap prevents the wastewater from fouling the mechanism.

When internal pressure falls below atmospheric pressure (negative pressure):

1. The floats will drop down, immediately opening the air & vacuum and air release orifices.
2. Air will enter into the system.

Main Features

Main Features

- Working pressure range: 3 - 150 psi
- Testing pressure: 250 psi
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.

The unique design of the valve prevents contact between the reclaimed water and the sealing mechanism by creating an air gap at the top of the valve. These features are achieved by:

- The conical body shape: designed to maintain the maximum distance between the liquid and the sealing mechanism and still obtain minimum body length.
- Independent spring-guided linkage between the lower float/rod assembly and the upper float sealing mechanism: allows free movement of the float and rod. Vibrations and movement of the lower float due to turbulence will not unseal the upper float sealing mechanism
- The Rolling Seal Mechanism: less sensitive to pressure differentials than a direct float seal. It accomplishes this by having a comparably large orifice for a wide pressure range (up to 150 psi).
- Funnel-shaped lower body: designed to ensure that residue reclaimed water solid matter will fall back into the system and be carried away by the main pipe.
- Body made of composite materials, resistant to corrosion.
- Internal metal parts are made of corrosion-resistant stainless steel. Floats are made of composite materials.
- Flexible rolling seal provides smooth positive opening, closing, and leak-free sealing over a wide range of pressure differentials.
- Drainage tap with ball valve is provided.
- 3/8" threaded discharge outlet enables connection of a vent pipe.
- Dynamic design allows for high capacity air discharge while preventing premature closure.
- The ball valve can be opened to release trapped pressure and drain

the valve body prior to maintenance and for back-flushing during maintenance.

Valve Selection

- Size Range: 1" & 2" with a NPT male threaded connection or with flanged ends to meet any requested standard.
- Additional one-way out check valve attachment allows air discharge, not allowing air intake.

Note

- The D-021 air valve is intended for use with reclaimed and raw water. For use with aggressive liquids and liquids containing high concentrations of solid particles, please consult with our application engineers or with the marketing dept.
- For best suitability, it is recommended to send the fluid chemical properties along with the valve request.
- Upon ordering, please specify: model, size, working pressure, thread and flange standard and type of liquid.

D-020 250 psi



Combination Air Valve for Wastewater

Description

The D-020 Combination Air Valve combines an air & vacuum component and an air release component in a single body. The valve is specifically designed to operate with liquids carrying solid particles such as wastewater and effluents. The combination air valve discharges air (gases) during the filling or charging of the system, admits air into the system during drainage and at water column separation and releases accumulated air (gases) from the system while it is operating under pressure. The valve's unique design enables the separation of the liquid from the sealing mechanism and assures optimum working conditions.

Applications

- Pump stations for sewage, wastewater & water treatment plants.
- Wastewater and effluent water transmission lines.

Operation

The air & vacuum component discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during drainage and at water column separation.

High velocity air will not blow the float shut. Water will lift the float which activates the sealing of the valve.

At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will enter the system.

The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

The air release component releases entrapped air in pressurized systems.

Without air valves, pockets of accumulated air may cause the following hydraulic disturbances:

- Restriction of effective flow due to a reduction of the flow area. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.
- Acceleration of cavitation damages.
- Increase in pressure transients and surges.
- Internal corrosion of pipes, fittings and accessories.
- Dangerous high-energy bursts of compressed air.
- Inaccuracies in flow metering.

As the system fills and is pressurized, the combination wastewater air valve functions in the following stages:

1. Air (gas) is discharged by the valve.
2. When the liquid level reaches the valve's lower portion, the lower float is lifted, pushing the sealing mechanism to its sealing position.
3. The entrapped air is confined in a pocket between the liquid and the sealing mechanism. The air pressure is equal to the system pressure.
4. Increases in system pressure compress the trapped air in the upper section of the conical chamber. The conical shape assures the height of the air gap. This enables separation of the liquid from the sealing mechanism.
5. Entrapped air (gas), accumulating at peaks and along the system, rises to the top of the valve and displaces the liquid in the valve's body.
6. When the liquid level lowers to a point where the float is no longer buoyant, the float drops, unsealing the rolling seal. The air release orifice opens and allows part of the air that accumulated in the upper portion of the valve to be released to the atmosphere.
7. Liquid enters the valve. The float rises, pushing the rolling seal to its sealing position. The remaining air gap prevents the wastewater from fouling the mechanism.

When internal pressure falls below atmospheric pressure (negative pressure):

1. The floats will drop down, immediately opening the air & vacuum and air release orifices.
2. Air will enter into the system.

Main Features

- Working pressure range: 0,7 - 250 psi.
- Testing pressure: 360 psi.
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.
- The unique design of the valve prevents contact between the wastewater and the sealing mechanism by creating an air gap at the top of the valve. These features are achieved by:
 - **The conical body shape:** designed to maintain the maximum distance between the liquid and the sealing mechanism and still obtain minimum body length.
 - **Independent spring-guided linkage between the lower float/rod assembly and the upper float sealing mechanism:** allows free movement of the lower float and rod. Vibrations and movement of the lower float due to turbulence will not unseal the upper float sealing mechanism.
 - **The Rolling Seal Mechanism:** less sensitive to pressure fluctuations.

than a direct float seal. It accomplishes this by having a comparably large orifice for a wide pressure range (up to 250 psi).

- **Funnel-shaped lower body:** designed to ensure that residue wastewater matter will fall back into the system and be carried away by the main pipe.

- All inner metal parts made of stainless steel.
- 1½" threaded discharge outlet enables for the connection of a vent hose/pipe.
- Dynamic design allows for high capacity air discharge while preventing premature closure.
- The ball valve can be opened to release trapped pressure and drain the valve body prior to maintenance and for back-flushing during maintenance.

Valve Selection

- Size range 2" – 8".
- These valves are manufactured with flanged ends to meet any requested standard
- The 2" and 3" valve is also available with a threaded NPT connection.
- Standard welded/cast steel body, also available in stainless steel.
- Valve body coating: fusion bonded epoxy coating in accordance with the standard DIN 30677-2.
- Other coatings are available upon request.
- **D-020 LP** for Low Pressure, Working pressure range: 0.725- 87 psi.
- **D-020 SB** Underground Air Valve System.
- Additional accessories:
 - With a One-way, Out-only attachment, allows for air discharge only, prevents air intake.
 - With a Vacuum Breaker, In-only attachment, allows for air intake only, prevents air discharge.
 - With a Non-Slam discharge-throttling attachment, allows for free air intake, throttles air discharge.



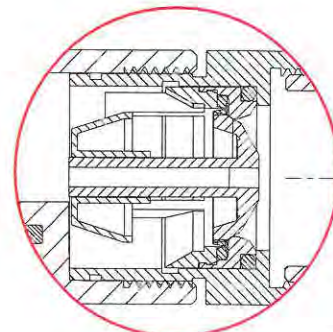
D-020 SB

Note

- The D-020 air valve is intended for use with raw wastewater. For use with aggressive liquids, please consult with our application engineers or with the marketing dept.
- For best suitability, it is recommended to send the fluid chemical properties along with the valve request.
- Upon ordering, please specify: model, size, working pressure, thread and flange standard and type of liquid.

D-020 Non-Slam Single Orifice Add-on Component Data Table

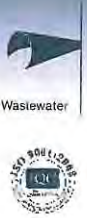
Inlet Size	Discharge Orifice	Total NS Area	NS Orifice	Switching Point	Flow at 5.8 psi
2" - 8"	1.5 Inch	0.03 Sq.In.	0.2 Inch	Spring loaded Normally closed	10.3 CFM



D-020-NS

D-023 250 psi

Combination Air Valve for Wastewater **PATENTED**



Description

The D-023 Combination Air Valve combines an air & vacuum component and an air release component in a single body. The valve is specifically designed to operate with liquids carrying solid particles such as wastewater and effluents. The combination air valve discharges air (gas) during the filling or charging of the system, admits air into the system during drainage and at water column separation and releases accumulated air (gas) from the system while it is operating under pressure. The valve's unique design enables the separation of the liquid from the sealing mechanism and assures optimum working conditions.

Applications

- Pump stations for sewage, waste water & water treatment plants.
- Wastewater and effluent water transmission lines.

Operation

The air & vacuum component discharges air at high flow rates during the filling of the system and admits air into the system at high flow rates during drainage and at water column separation.

High velocity air will not blow the float shut. Water will lift the float which activates the sealing of the valve.

At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will enter the system.

The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

The air release component releases entrapped air in pressurized systems.

Without air valves, pockets of accumulated air may cause the following hydraulic disturbances:

- Restriction of effective flow due to a reduction of the flow area. In extreme cases this will cause complete flow stoppage.
- Obstruction of efficient hydraulic transmission due to air flow disturbances.
- Acceleration of cavitation damages.
- Increase in pressure transients and surges.
- Internal corrosion of pipes, fittings and accessories.
- Dangerous high-energy bursts of compressed air.
- Inaccuracies in flow metering.

As the system fills and is pressurized, the combination wastewater air valve functions in the following stages:

1. Air (gas) is discharged by the valve.
2. When the liquid level reaches the valve's lower portion, the float is lifted, pushing the sealing mechanism to its sealing position.
3. The entrapped air is confined in a pocket between the liquid and the sealing mechanism. The air pressure is equal to the system pressure.
4. Increases in system pressure compress the trapped air in the upper section of the conical chamber. The conical shape assures the height of the air gap. This enables separation of the liquid from the sealing mechanism.
5. Entrapped air (gas), accumulating at peaks and along the system, rises to the top of the valve and displaces the liquid in the valve's body.
6. When the liquid level lowers to a point where the float is no longer buoyant, the float drops, unsealing the air release seal. The air release orifice opens and allows part of the air that accumulated in the upper portion of the valve to be released to the atmosphere.
7. Liquid enters the valve. The float rises, pushing the air release seal to its sealing position. The remaining air gap prevents the wastewater from fouling the mechanism.

When internal pressure falls below atmospheric pressure (negative pressure):

1. The float will drop down, immediately opening the air & vacuum and air release orifices.
2. Air will enter into the system.

Main Features

- Working pressure range: 3 - 250 psi.
- Testing pressure: 360 psi.
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.
- The unique design of the valve prevents contact between the wastewater and the sealing mechanism by creating an air gap at the top of the valve. These features are achieved by:

1. **The conical body shape and the external lever:** designed to maintain the maximum distance between the liquid and the sealing mechanism and still obtain minimum body length.
2. **Spring-guided linkage between the float/rod assembly and the sealing mechanism:** allows free movement of the float and rod. Vibrations and movement of the float due to turbulence will not unseal the sealing mechanism.
3. **Funnel-shaped lower body:** designed to ensure that residue wastewater matter will fall back into the system and not block the main pipe.

- All inner metal parts made of stainless steel.
- Unique design of external lever prevents contact between the wastewater and the sealing mechanism, prevents clogging by floating solids and ensures drip-tight sealing.
- The D-023's orifice plug-disc linkage assembly is external, keeping the levers and pins outside the air valve body and its corrosive atmosphere.
- Discharge outlet enables for the connection of a vent pipe.
- The ball valve can be opened to release trapped pressure and drain the valve body prior to maintenance and for back-flushing during maintenance.

Valve Selection

- Size range availability: 3" - 8".
- Valves manufactured with flange ends to meet any requested standard.
- The 3" valve is also available with a threaded NPT connection.
- Standard stainless steel body, also available in welded/cast steel.
- Standard stainless steel two- directional venting outlet cover for D-023 stainless steel body.
- Standard ductile iron one -directional venting outlet cover for D-023 welded/cast steel body.
- Valve body made of ductile iron, fusion bonded epoxy coated in accordance with standard DIN 30677-2
- Additional coatings available upon request.
- **D-023 SB** Underground Air Valve System.
- Optional Accessories:
 - With a One-way, Out-only attachment, allows for air discharge only, prevents air intake.
 - With a Vacuum Breaker, In-only attachment, allows for air intake only, prevents air discharge.
 - With a Non-Slam discharge-throttling attachment, allows for free air intake, throttles air discharge - Model **D-023 NS**.
 - With a **Spray Guard**

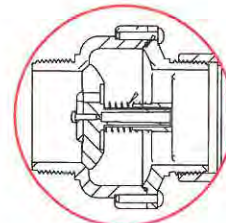
The Spray Guard® minimizes liquid spray discharge from the air valve outlet, mainly during rapid pipeline filling conditions. Operation: Fluid reaches the air valve at high speeds while the valve body is still empty. The Spray Guard® breaks the front of the fluid wave progressing along the walls of the air valve body and directs it downwards, thus preventing the fluid from reaching the orifice and discharge outlet.

Note

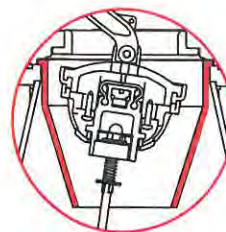
- The D-023 air valve is intended for use with raw wastewater. For use with aggressive liquids, please consult with our application engineers or with the marketing dept.
- For best suitability, it is recommended to send the fluid chemical properties along with the valve request.
- Upon ordering, please specify: model, size, working pressure, thread and flange standard and type of liquid.



D-023 SB



NS element



Spray Guard® element

K-020 250 PSI

K-022 360 PSI



Air & Vacuum Valve

Description

The K-020 & K-022 Air & Vacuum Valves are specifically designed to operate with liquids carrying solid particles such as wastewater and effluents. These air & vacuum valves discharge air (gases) during the filling or charging of the system and admit air into the system during drainage. The valve's unique design enables the separation of the liquid from the sealing mechanism and assures optimum working conditions.

Applications

- Pump stations for sewage, wastewater & water treatment plants.
- Wastewater and effluent water transmission lines.

Operation

The K-020 & K-022 air & vacuum valves discharge air at high flow rates during the filling of the system and admit air into the system at high flow rates during its drainage and at water column separation. High velocity air will not blow the float shut. Water will lift the float which activates the sealing of the valve.

At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will enter the system. The smooth discharge of air reduces pressure surges and other destructive phenomena.

The intake of air in response to negative pressure protects the system from destructive vacuum conditions and prevents damage caused by water column separation. Air entry is essential to efficiently drain the system.

As the system starts to fill, the valve functions according to the following stages:

1. Air/gas is discharged by the valve
2. When the liquid level reaches the valve's lower portion, the float is lifted, pushing the sealing mechanism to its sealing position.

When internal pressure falls below atmospheric pressure (negative pressure):

1. The floats will immediately drop down, opening the air & vacuum orifice.
2. Air will enter into the system.

Main Features

- Working pressure range: K-020: 3 - 250 psi.
K-022: 3 - 360 psi
- Testing Pressure: 1.5 times the working pressure of the air valve.
- Maximum working temperature: 140° F.
- Maximum intermittent temperature: 194° F.
- The valve's unique design prevents contact between the wastewater and the sealing mechanism by creating an air gap at the top of the valve. Those features are achieved by:
 - The conical body shape: designed to maintain the maximum distance between the liquid and the sealing mechanism and still obtain minimum body length.
 - Funnel-shaped lower body: designed to ensure that residue wastewater matter will fall back into the system and be carried away by the main pipe.
- Flushing is possible while the valve is under pressure by opening the ball valve in the valve's lower body.

Valve Selection

- Size range: 3" - 4".
- These valves are manufactured with flanged ends to meet any requested standard.
- Standard stainless steel body, also available in welded/cast steel.
- Air valve coating: fusion bonded epoxy according to standard DIN 30677-2.
- Other coatings are available upon request.
- Optional Accessories
 - With a One-Way, Out-only attachment, allows for air discharge only, prevents air intake.
 - With a Vacuum Breaker, In-only attachment, allows for air intake only, prevents air discharge.
 - With a Non-Slam discharge-throttling attachment, allows for free air intake, throttles air discharge.

Note

- The K-020 air valve is intended for use with raw wastewater. For use with aggressive liquids, please consult with our application engineers or with the marketing dept.
- For best suitability, it is recommended to send the fluid chemical properties along with the valve request.
- Upon ordering, please specify: model, size, working pressure, thread and flange standard and type of liquid.

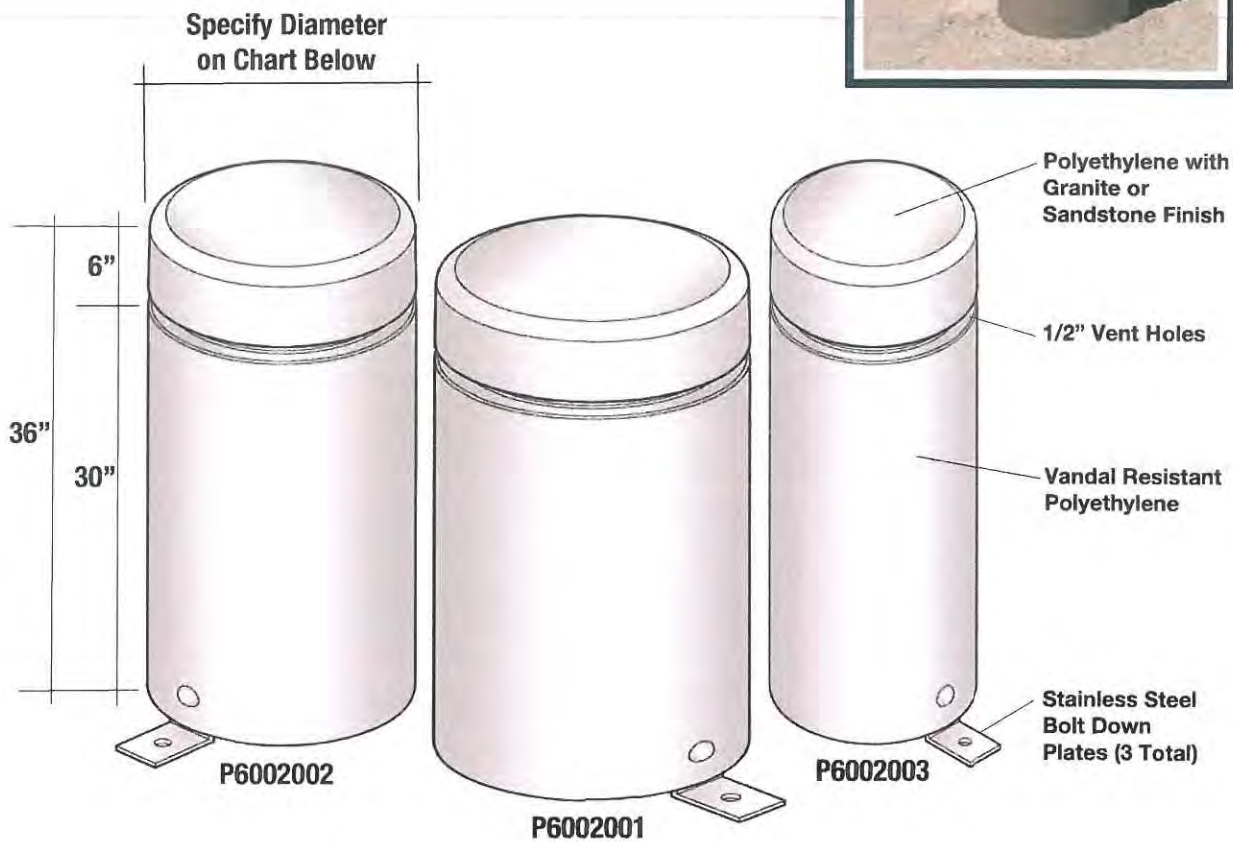
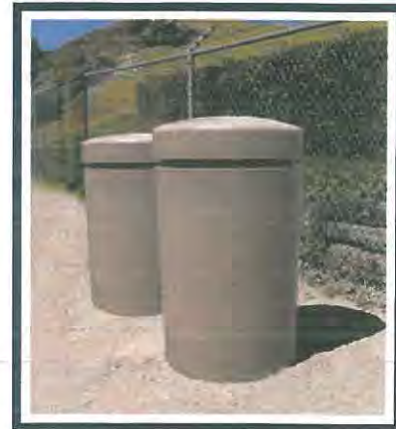
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ARMORCAST PRODUCTS COMPANY **POLYMER CONCRETE**

FEATURES

Armorcast Products Air Vacuum Valve Enclosures are manufactured from low density polyethylene material with UV inhibitors for commercial or residential settings. They are maintenance free, graffiti resistant, sturdy, lightweight, high impact resistant and have outstanding weatherability. Easy to install and access. Aesthetically pleasing finishes include Sandstone, Granite, Light and Dark Green, additional colors are available.



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Round Enclosure	20" DIA. x 36" with 14- 1/2" Vent Holes	P6002002	25 lbs.	6
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*4" A/V's
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SANTA MARGARITA WATER DISTRICT

DESIGN CRITERIA AND STANDARD DRAWINGS FOR WATER AND SEWER FACILITIES

SANTA MARGARITA WATER DISTRICT
26111 Antonio Parkway
Rancho Santa Margarita, California 92688
(949) 459-6655

March 2009
Revised May 17, 2012

Copy No. _____

RESOLUTION #09-03-02

A RESOLUTION OF THE BOARD OF DIRECTORS OF SANTA MARGARITA WATER DISTRICT ADOPTING REVISED, PROCEDURES AND DESIGN CRITERIA, STANDARD SPECIFICATIONS, SUPPLEMENTS AND STANDARD SPECIAL PROVISIONS AND STANDARD DRAWINGS FOR USE IN THE DESIGN AND CONSTRUCTION OF WATER AND SEWER FACILITIES WITHIN THE SANTA MARGARITA WATER DISTRICT

WHEREAS, by Resolution No. 82-10-1, the Board of Directors of Santa Margarita Water District adopted "Standard Specifications for Public Works Construction," 1982 Edition, and "Standard Special Provisions and Standard Drawings for Water and Sewer Construction," dated 1982; and "Procedures and Design Criteria for Water and Sewer Facilities," dated 1982,

WHEREAS, by Resolution No. 92-10-4, the Board of Directors of Santa Margarita Water District adopted revised "Standard Special Provisions and Standard Drawings for Water and Sewer Construction," dated 1992, and whereas, by Resolution No. 90-11-1, the Board of Directors of Santa Margarita Water District adopted Revised "Procedures and Design Criteria for Water and Sewer Facilities,"

WHEREAS, by Resolution No. 96-09-07, the Board of Directors of Santa Margarita Water District adopted "Design Criteria and Standard Drawings for Water and Sewer Facilities within the Santa Margarita Water District," dated April 1996,

WHEREAS, by Resolution No. 01-10-10, the Board of Directors of Santa Margarita Water District adopted "Design Criteria and Standard Drawings for Water and Sewer Facilities within the Santa Margarita Water District," dated October 2001,

WHEREAS, the Chief Engineer has submitted revised "Standard Specifications for Public Works Construction" ("Green Book") as written and promulgated by the Southern California Chapters of the American Public Works Association and the Associated General Contractors of American, latest edition; and

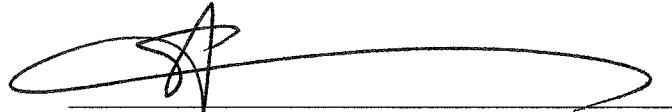
WHEREAS, future Supplements and new editions to the Standard Specifications for Public Works Construction will be published periodically; and

WHEREAS, the Chief Engineer has also submitted revised "Standard Special Provisions and Standard Drawings for Water and Sewer Construction;" and revised "Procedures and Design Criteria for Water and Sewer Facilities" dated March 2009, for use in conjunction with the Standard Specifications for Public Works Construction; and

WHEREAS, it would be in the best interests of the Santa Margarita Water District to have said revised "Standard Special Provisions and Standard Drawings" and revised "Procedures and Design Criteria for Water and Sewer Facilities" approved and adopted by the Board of Directors;

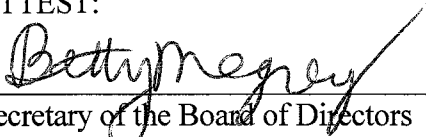
NOW, THEREFORE, BE IT RESOLVED, DELIVERED AND ORDERED that said latest edition of the Standard Specifications, and any Supplements thereto, and revised "Standard Special Provisions and Standard Drawings" and revised "Procedures and Design Criteria for Water and Sewer Facilities" are adopted. Furthermore, said revised Standards shall apply to all design and construction of water and sewer facilities effective the date of their adoption.

ADOPTED, SIGNED AND APPROVED this 13th, March, 2009



President of the Board of Directors
of Santa Margarita Water District

ATTEST:



Secretary of the Board of Directors
of Santa Margarita Water District

SANTA MARGARITA WATER DISTRICT

DESIGN CRITERIA AND STANDARD DRAWINGS

FOR WATER AND SEWER FACILITIES

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PREFACE

The Santa Margarita Water District was established on December 23, 1964, under the provisions of the California Water District Law (Section 34000 et seq. of the California Water Code). The District presently supplies water and sewer service in accordance with the needs of specific portions of the District, based on such factors as land use, topography, ownership lines, and other characteristics of water supply and wastewater treatment needs. These factors provide the basis for the delineation and adoption of Plans of Works, the authorization and sale of bonds, and the determination and levying of taxes and assessments by the District to cover the cost of services provided.

Although the District has adopted specific and sometimes unique plans for the facilities required to provide service, it is the District's desire to standardize wherever possible the design and construction of the facilities to be operated and maintained by the District in a uniform manner District-wide. Therefore, this manual has been prepared to formulate the general procedures and requirements to serve these purposes. These "Design Criteria and Standard Drawings for Water and Sewer Facilities" are to be used in conjunction with the "Standard Specifications for Public Works Construction," latest edition, "Greenbook"), and the District's "Rules and Regulations for Water and Sewer Service" and "Rules and Regulations for Nondomestic Water Service" as the basic documents which identify and provide the formal guidelines and requirements for obtaining domestic water, sewer, and recycled water service from the District and for the design and construction of District facilities.

The formatting and section numbering in this manual is substantially different than previous editions. The table of contents has been reorganized to include all the sections and the page numbering is consistent throughout the document. Due to the format updating, changes from previous versions are not highlighted in the document.

DEFINITIONS

Whenever the following terms, or pronouns used in their place, occur in these or in any documents that these Design Criteria and Standard Drawings govern, the intent and meaning shall be interpreted as follows:

Acceptance - the formal action by the Board accepting the dedication of completed facilities.

Air Gap Separation - a physical break where a pipe or hose is connected to or discharges into a vessel or conduit, provided that the break is at least double the diameter of the pipe, measured vertically above the rim of the receiving vessel or conduit and in no case less than one inch.

Applicant - an owner, his developer, builder, engineer, or other authorized representative who applies as the owner's official agent to the District for domestic water, sewer, and, if applicable, recycled and nondomestic water service.

ASTM - The American Society for Testing and Materials. All references to the specifications of the ASTM are understood to refer to the current specifications as revised or amended at the date of construction.

Attorney - the District's General Counsel.

AWWA - The American Water Works Association. All references to the specifications of the AWWA are understood to refer to the current specifications as revised or amended at the date of construction.

Board - the Board of Directors of the Santa Margarita Water District.

Contractor - the person, firm or corporation entering into contract with the owner or developer for the performance of work required under said contract and the District's ordinances, rules, regulations and specifications.

City – cities whose jurisdictional boundaries overlap the District's boundaries.

County - the County of Orange, State of California.

District - the Santa Margarita Water District, its authorized employees and agents.

Domestic Water (Potable Water) - that water which is pure and wholesome, does not endanger the lives or health of human beings, and conforms to the latest edition of the National Primary Drinking Water Standards, the California Safe Drinking Water Regulations or other applicable standards.

Engineer - the Chief Engineer of the Santa Margarita Water District or his authorized agent.

General Manager - an individual designated by the Santa Margarita Water District as the chief executive officer and agent for the District.

Individual Sewage Disposal System - a single system of sewage treatment tanks and disposal facilities serving only a single lot.

Inspector - any person authorized by the District to perform inspection of either onsite or offsite facilities prior to construction, during construction, after construction and during operation.

Nondomestic Water - water served from the District's offsite nondomestic water facilities, including but not limited to, a combination of treated wastewater, recycled water, intercepted surface and subsurface stream flow, supplemented by other waters, including domestic (potable) water.

Offsite Facilities - designates or relates to domestic water, recycled water and nondomestic water facilities up to and including the water meters, and sewer facilities within a public street, right-of-way, District property or easement. All offsite domestic water, sewer recycled and nondomestic water facilities will be owned, operated and maintained by the District upon acceptance by the District of the dedicated facilities.

Onsite Facilities - designates or relates to sewer facilities located wholly within the Owner's property, and domestic water, recycled water and nondomestic water facilities downstream of the water meters. All onsite domestic water, sewer, recycled and nondomestic water facilities will be owned, operated, and maintained by the Owner, unless otherwise specified.

Owner - any holder of legal title, contract purchaser, or lessee of property for which service is requested from the District.

Plans - the plans, working drawings, detail drawings, profiles, typical cross sections, general cross sections, and supplemental drawings, or reproductions thereof, approved by the Engineer, which show locations, character, dimensions, or details of the work.

Record Drawings – plans that show the facilities including changes made during the construction and all revisions to the original plans.

Recycled Water – water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

Regulations - the District's "Rules and Regulations for Water and Sewer Service," and "Rules and Regulations for Nondomestic Water Service."

Service - the furnishing of domestic water, recycled water and nondomestic water to an Owner through a metered connection to the onsite facilities, and the reception, transfer, treatment and disposal of sewage from an Owner's property through a connection to the offsite facilities, or the disposal of sewage from an approved Individual Sewage Disposal System.

Sewage Flows - estimated quantities of wastewater generated which shall be determined in conformance with the District's Plans of Works or as otherwise specified by the Engineer.

Sewer - a pipe or conduit used to convey liquid waste.

Standard Special Provisions and Standard Drawings - the District's "Standard Special Provisions and Standard Drawings for Water and Sewer Construction" latest edition, which are to be used in conjunction with the District's "Standard Specifications."

Standard Specifications - the "Standard Specifications for Public Works Construction" (Green Book), latest edition, which are the District's reference specifications to be used in conjunction with the "Standard Special Provisions and Standard Drawings."

State - the State of California.

Terms - the terms "acceptable", "accepted", "adequate", "approved", "directed", "necessary", "or equal", "proper", "required" and "specified" mean acceptable, accepted, adequate, approved, directed, necessary, or equal, proper, required, or specified by or in the opinion of the District.

Water Demands - estimated quantities of water consumption, which shall be determined in conformance with the District's Plans of Works, the requirements of the Orange County Fire Authority, or as specified by the Engineer.

Waterworks Standards - regulations adopted by the State of California Department of Public Health which are the minimum standards for the design and construction of changes in the distribution system of an existing public water system.

Work - the improvements proposed to be constructed or done pursuant to a legal agreement and consistent with these Design Criteria and Standard Drawings, including the furnishing of all labor and materials.

PART A

PROCEDURES AND GENERAL REQUIREMENTS

FOR CONSTRUCTION OF

WATER AND SEWER FACILITIES

Section A-1

REQUIREMENTS FOR PROCURING WATER AND SEWER SERVICE FROM DISTRICT

This section describes the required procedure for an Applicant to obtain service from the District for the proposed service area and approval for construction of any domestic water, sewer, recycled and/or nondomestic water facilities to be dedicated to the District for operation and maintenance.

Unless otherwise approved by the Board, Service by the District shall be in accordance with the District's "Rules and Regulations for Water and Sewer Service," and "Rules and Regulations for Nondomestic Water Service." The design and construction of all water and sewer facilities to be operated and maintained by the District shall conform to the requirements of the "Design Criteria and Standard Drawings for Water and Sewer Facilities," the District's "Standard Specifications" and the California Waterworks Standards, the requirements of the Orange County Fire Authority, and the guidelines and requirements of the State and County Health Departments.

A-1.1 AVAILABILITY OF SERVICE

The Applicant shall check with the District to determine the current District boundaries, limits of its system, and the availability of service. Because of the District's water recycling program, the District will not provide sewer services to an area unless it is also the water purveyor for that area.

A-1.2 PRELIMINARY FEASIBILITY INVESTIGATION

In some areas, a feasibility investigation and report may be necessary to establish whether and how the District can most efficiently serve the proposed area. An agreement shall be executed and money deposited if deemed necessary by the District whereby the Applicant shall advance the estimated cost to the District for making the feasibility study.

A-1.3 IF SERVICE AREA IS OUTSIDE DISTRICT'S EXISTING IMPROVEMENT DISTRICTS

If all or any part of the area proposed to be served by the District is located outside of the District's existing improvement districts, the Applicant shall officially request, by

letter to the General Manager, annexation to the District's nearest existing water and sewer improvement districts or formation of a new improvement district. A minimum of 180 days should be allowed for action by the Board on the annexation request. A complete legal description of the property to be annexed, three copies of a map showing the property area, and the appropriate fees shall accompany the annexation request letter.

A-1.4 CONTROL OF DESIGN AND PLAN REVIEW

The Applicant shall submit a master development plan and improvement plans of the proposed domestic water, sewer, recycled water, and nondomestic water facilities to the Engineer for review and approval, as specified in Section A-3.1 "Water and Sewer Designs for Tract Development." The improvement plans for all offsite facilities shall be prepared by a Registered Civil Engineer in the State of California, and shall conform to the requirements contained in Part B "Design Criteria for Domestic Water, Sewer, Recycled Water and Nondomestic Water Facilities" of this manual.

A-1.5 IF SERVICE AREA IS WITHIN DISTRICT'S EXISTING IMPROVEMENT DISTRICTS

If all of the area or tract proposed to be served by the District is located wholly within the District's existing water and sewer improvement districts, the Applicant shall submit to the District a letter requesting Service. Upon approval by the District of the request for Service, the District will provide an "Application to and Agreement with the Santa Margarita Water District for Domestic Water, Sewer, Recycled Water and Nondomestic Water Service," a form for which is set forth in Appendix 1.

A-1.6 APPLICATION AGREEMENT AND DEPOSIT OF FEES

The Applicant shall then execute the application agreement and return it to the District, and shall, at the same time, deposit on account with the District the required sum of money necessary to meet all fees and other charges, as specified in Section A-2, "Plan Review, and Inspection Fees," or as otherwise agreed upon by District and Applicant, before the District will approve the improvement plans. All rates and fees regarding service and their respective administrative provisions shall be fixed and established by the Board. Project Bond Data forms are available at the District. These forms are to be used to establish the estimated unit construction cost of Developer installed facilities to be dedicated to the District. The most current Project Bond Data forms, rate and fee schedule are incorporated into these Procedures.

A-1.7 GRANTING OF EASEMENTS TO THE DISTRICT

Prior to the Engineer signing the improvement plans for the domestic water, sewer, recycled water and nondomestic water facilities required to serve the area for which Applicant has requested service from the District, the Applicant shall have prepared, processed, granted, recorded and conveyed to the District all easements which are not to be dedicated on a tract or parcel map and which are required by the District for operating, maintaining, modifying or replacing the facilities. All easements shall be of a

form, content, and purpose satisfactory to the District, and shall be recorded with the Office of the Recorder, County of Orange, California. All easements shall conform to the requirements contained in Section A-3.2, "Providing Required Easements."

A-1.8 RESPONSIBILITY FOR CONSTRUCTION OF FACILITIES

Except for the District's plan of works facilities, construction of all domestic water, sewer recycled water, and nondomestic water facilities within the area proposed to be served, and any other required facilities outside the area proposed to be served will be the obligation of the Applicant at its expense. Funds for construction of District plan of works facilities for which District funds are not available but which are required to serve the proposed area shall be advanced by the Applicant under an agreement between the District and the Applicant. The Applicant shall cause all installation work to meet the District's "Standard Specifications" and "Standard Special Provisions and Standard Drawings for Water and Sewer Construction"; and upon Acceptance of the facilities, the Applicant shall convey the facilities to the District per Section A-1.9.

A-1.9 DEDICATION OF FACILITIES TO DISTRICT

Upon completion and final inspection of all work, the Applicant shall file a request, at least 30 days prior to a regular Board meeting, for dedication to and formal Acceptance of the facilities by the District. The Applicant shall also furnish the District a report of actual costs (Appendices 5, 6 and 7) of said facilities, a proper bill of sale (Appendices 2, 3 and 4), and record drawings of the facilities (see Subsection A-3.12). Upon said Acceptance, the District will give approval for the release of bonds posted to the District or to the City or County for the construction of domestic water, sewer and nondomestic water facilities.

A-1.10 GUARANTEES

As set forth in the Application Agreement in Appendix 1, the Applicant shall be responsible for any and all repairs and replacements to District facilities for a period of one year from the date of Acceptance without expense whatsoever to the District, ordinary wear and tear and unusual abuse or neglect excepted. In the event of failure to comply with the aforementioned conditions, the District is authorized to proceed to have the defects repaired and made good at the expense of the Applicant, who shall pay the cost and charges, including attorney fees and other incidental costs involved thereof, immediately upon demand. In addition, the specific provisions regarding guarantees, as contained in the District's "Standard Specifications" are hereby incorporated into these Procedures and Requirements.

Section A-2

PLAN REVIEW, INSPECTION, AND CONNECTION FEES

All financial arrangements are to be completed by the Applicant with the District before improvement plans will be signed by the Engineer and before the start of any construction. All payments shall be made in favor of Santa Margarita Water District, and submitted to the District's Accounting Department for processing. The amounts of the required fees and other charges will be determined based on the then governing schedule of rates and charges adopted by the Board.

A-2.1 PLAN REVIEW FEE DEPOSIT

At the time that the tentative master development plans (see Subsection A-3.1.1) for the proposed water, sewer, recycled water, and nondomestic water facilities are submitted to the Engineer for review, the Applicant shall make the plan review fee deposit. The required fee deposit will be based on a specified dollar amount for each lot to be served, or in the event that the water and sewer facilities are either to be located outside the area proposed to be served or for areas not being subdivided, the plan review fee deposit will be based on a specified percentage of the estimated construction cost of the facilities. Upon receipt of the plan review fee deposit by the District, the Engineer will proceed with the master development plan review.

A-2.2 FINAL PLAN REVIEW AND INSPECTION FEE

Prior to approval of the improvement plans by the District, the applicant shall deposit with the District the final plan review and inspection fee, which will be based on a percentage of the water and sewer bond amounts as established by the District. The District will establish a minimum fixed lump-sum fee to cover the costs of plan review, inspection, and administration for projects valued at less than the amount specified by the Board in the current fee schedule available from the District. The Engineer will advise the Applicant of the amount of the fee after completion of the initial plan review.

In both the percentage and lump-sum fee basis, the Applicant will be given credit for the plan review fee deposit as outlined in Subsection A-2.1 above.

A-2.3 OTHER FEES AND CHARGES

In addition to the plan review and inspection fees described above, the Applicant shall deposit with the District all other required fees and charges, as outlined below:

- a. Water meter charges.
- b. Construction water charges.
- c. Any other applicable fees or charges established by the Board.

Section A-3

DISTRICT DESIGN AND INSPECTION CONTROL PROCEDURES

A-3.1 WATER AND SEWER DESIGNS FOR TRACT DEVELOPMENT

A-3.1.1 Master Development Plan - Prior to the District issuing a preliminary will-serve letter for a proposed development, the Applicant (which for the purposes of this section is normally construed to be the Developer's engineer) shall submit two sets of the tentative master development plan showing the plan of the proposed domestic water, sewer, recycled water and nondomestic water systems for approval by the Engineer. Substantiating engineering calculations, as specified in Part B, Design Criteria, shall accompany the submittal of the master development plan when requested by the Engineer. The payment of the plan review fee deposit as described in Section A-2.1 shall also accompany the master plan submittal by the Applicant. The information required to be included on the master development plan and the criteria upon which the Engineer will review and approve this plan are outlined below.

A-3.1.2 Domestic Water System Master Plan - The master development plan shall show the sizes and relative locations of all water lines, valves, fire hydrants, reservoirs, pump stations and pressure reducing stations; and the location and width of all required District easements for the domestic water facilities. The Engineer will review the domestic water system design for the planned development taking into consideration the following:

- a. Existing transmission main locations, sizes, pressures, and available capacities.
- b. Orange County Fire Authority fire flow requirements.
- c. District's domestic water system Plans of Works.
- d. District's design criteria (see Section B-2).

The final sizing and required looping of the water system will be shown and approved by the Engineer. The Applicant shall submit written tentative approval from the Orange County Fire Authority for hydrant location and spacing.

A-3.1.3 Sewer System Master Plan - The master development plan shall show the sizes, directions of flow, and relative locations of all sanitary sewer mains, manholes, lift stations, and, if applicable, treatment and disposal facilities; and the location and width of all required District easements for the sewer facilities. The Engineer will review the sewer system design for the planned development taking into consideration the following:

- a. Existing trunk sewer locations, sizes, and available capacities.
- b. Slopes, sizes, and design capacities of sewer collection mains in relation to the projected population for the lots to be served.

- c. District's sewer system Plans of Works.
- d. District's design criteria (see Section B-3).

A-3.1.4 Recycled Water and Nondomestic Water System Master Plans - Prior to the preliminary design of any recycled water and/or nondomestic water system facilities, the Applicant shall have obtained approval from the District for the use of recycled water and/or nondomestic water and installation of recycled and nondomestic water system facilities within the proposed development, in accordance with the requirements of the District's "Rules and Regulations for Nondomestic Water Service." The master development plan of the proposed recycled water and/or nondomestic water system shall show the sizes and relative locations of all water lines, valves, reservoirs, pump stations and pressure reducing stations; and the location and width of all required District easements for the recycled water and nondomestic water facilities.

The Recycled Water and Nondomestic Master Plan shall also show the areas proposed to be irrigated with recycled and nondomestic water; the location of all irrigation water meters, and the maximum flow rates, acreages to be irrigated, design pressure required to operate the irrigation system, and District main pressure for each recycled and nondomestic water meter service.

The Engineer will review the recycled water and nondomestic water system design for the planned development taking into consideration the following:

- a. Existing transmission main locations, sizes, pressures, and available capacities.
- b. District's recycled and nondomestic water system Plans of Works.
- c. District's "Rules and Regulations for Nondomestic Water Service."
- d. District's design criteria (see Section B-4).

A-3.1.5 Approval of Master Plan - The Engineer will return one "red lined" copy of the reviewed master plan of the proposed domestic water, sewer, and recycled nondomestic water facilities to the Applicant showing any corrections and/or comments. This master development plan as corrected shall then be submitted to the District for approval. Once it has been approved, the applicant shall submit two copies for the District's use. The master development plan is for preliminary layout only. Final design will be approved based on improvement plans.

A-3.1.6 Improvement Plans for Individual Tracts - The Applicant shall submit to the Engineer two sets of individual tract applicable domestic water, sanitary sewer, recycled water and nondomestic water systems improvement plans, along with a grading plan and a final tract or parcel map which shows the gross acreage involved in the proposed development, separate easement legal description and exhibit if required, and a title report dated not more than two months prior to submittal together with the required plan review fee. Substantiating engineering calculations, as specified in Part B Design Criteria, shall accompany the submittal of the domestic water, sewer, and recycled

nondomestic water systems improvement plans when required by the Engineer. The improvement plans will be reviewed by the Engineer for conformance with the approved master development plan and the District's design criteria. Tract maps and parcel maps will be reviewed to ascertain that they correctly dedicate the required District easements. The Engineer will return one "red lined" set of the reviewed improvement plans to the Applicant showing any corrections and/or comments. The Applicant shall make the corrections noted, shall respond to the Engineer's comments in a manner appropriate to the comment, and shall provide the Engineer with copies of the required easements to the District if recorded by separate instrument.

Upon completion of these requirements to the satisfaction of the Engineer, the Applicant can bring the original drawings to the District for the Engineer's signature required by the District and City and/or County, providing all fees and all easements have been received by the District, in accordance with the provisions of Sections A-1 and A-2. The title to the property over which easements have been granted to the District shall be to the satisfaction of the District.

A-3.2 PROVIDING REQUIRED EASEMENTS

If an easement is required for construction and/or maintenance of domestic water, sanitary sewer, or recycled and nondomestic water facilities, the minimum width shall be 20 feet for a single pipeline, 30 feet for two pipelines and 40 feet for three pipelines unless otherwise specified or approved by the Engineer. In areas where facilities are to be located in private streets, the District shall be provided an easement for its facilities as well as for ingress and egress purposes over the entire right-of-way width of the street. In addition, where fire hydrants and/or meter services are to be located outside the public or private street right-of-way, the District shall be provided an easement parallel to the street right-of-way and extending a minimum of 3 feet beyond the hydrants or meters, unless otherwise specified or approved by the Engineer.

Each easement shall be located on one lot unless otherwise specified or approved by the Engineer. All easements shall incorporate adequate provisions and means for ingress and egress to the facilities by the District at all times.

The following procedure shall be followed when processing easements with the District which are not to be conveyed on a tract or parcel map:

- a. Applicant shall submit two copies of the easement description and exhibit (8-1/2" x 11" or 8-1/2" x 14" finished size) to the Engineer for review. If acceptable, the Applicant shall furnish original copies of the description and exhibit along with a title report currently dated for the benefit of the District reflecting all deeds of trust and encumbrances. If not acceptable, the Engineer will return the description and exhibit with the required corrections noted. The Applicant shall make the required corrections noted. The applicant shall make the required corrections and resubmit the revised original easement legal description and exhibit to the Engineer.

All blanks in the documents, such as project identification, title report number, map and book numbers and pages, dates, etc., must be filled in. The easement exhibit must contain a vicinity map showing the location of the easement in relation to major streets and highways, as well as a drawing depicting the easement boundaries with bearings, distances, points of beginning, north arrow, scale, and any other information required by the Engineer.

- b. The District will prepare the required documents, determine required subordinations and prepare agreements for same, and distribute the documents for the required signatures. After approval by the District, the documents will be forwarded to the County for recordation. Any fees charged by the County or title company involving the recordation of the easements shall be paid for by the Applicant.

Upon recordation, copies of each easement document shall be retained by the District for its use, and one copy shall be forwarded to the party executing the easement.

A-3.3 FURNISHING PLANS

A-3.3.1 Signed Utility Plans. Four sets of completely signed and approved domestic water, sewer, recycled water and nondomestic water systems improvement plans shall be furnished to the Engineer at least two working days before the required preconstruction conference prior to commencing work.

A-3.3.2 Time Period Signed Plans Valid. Plans approved by the District will be valid for only one year from the date of District approval. If construction has not started within one year from date of approval, the District will then require the plans to be reviewed and reserves the right to require additional plan review fees.

A-3.3.3 Digital Submissions Requirements for District Mapping. At the time that plans are submitted for final approval by the District, the Engineer shall submit the digital graphics file in an AutoCAD drawing file format (DWG). The drawing file name must reflect the title of the project being submitted for approval. (For Example: TR 13858, 12" Water Sienna Parkway and O'Neill Dr. or Ladera Office Park). The DWG file should be submitted on a Compact Disk (CD). Substantial changes to plans submitted to the District for approval by the Engineer may require a resubmittal of DWG file prior to the approval of plans.

The DWG file will be verified by District staff for data accuracy and compliance with the required layering convention prior to improvement plan approval by the Chief Engineer. Visit the District Web site at "<http://www.smwd.com/>" to download the most current **DIGITAL SUBMITTAL REQUIREMENTS** and **SMWD LAYER SETUP FILES**. Click on "General Information." Once there, scroll to bottom. Click on "SMWD Layer Setup Files."

A-3.3.4 Residential Layer Setup

RESIDENTIAL PROJECTS

Instructions for using SMWDRESIDENTIAL menu

1. Create SMWD directory.
2. Unzip SMWDRESIDENTIAL_setup.exe file into SMWD directory.
3. Open AutoCAD.
4. Open drawing file that is to be sent to SMWD for approval.
5. Insert SMWDRESIDENTIAL_setup.dwg into file. (file has nothing to see, except all SMWD layers).
6. Transfer each layer into appropriate SMWD layer convention.
7. Discard inappropriate layers.
8. If desired, load attached SMWDHP4V.pc3 file for plotting preliminary drawings.
9. Refer to Excel file named “Residential Layer Names” (enclosed) for layer naming convention and pertinent notes.
10. Refer to drawing named SMWD residential dwg. as sample drawings for desired submits.
11. Use SMWD furnished blocks. Explode when necessary so that blocks will be on their appropriate layers.
12. Submit drawings to SMWD according to Design Criteria And Standard Drawings for Water And Sewer Facilities.

A-3.3.5 Commercial Layer Setup

COMMERCIAL PROJECTS

Instructions for using SMWDCOMMERCIAL menu

1. Create SMWD directory.
2. Unzip SMWDCOMMERCIAL_setup.exe file into SMWD directory.
3. Open AutoCAD.
4. Open drawing file that is to be sent to SMWD for approval.
5. Insert SMWDCOMMERCIAL_setup.dwg into file. (file has nothing to see, except all SMWD layers).
6. Transfer each layer into appropriate SMWD layer convention.
7. Discard inappropriate layers.
8. If desired, load attached SMWDHP4V.pc3 file for plotting preliminary drawings.
9. Refer to Excel file named “Commercial Layer Names” (enclosed) for layer naming convention and pertinent notes.
10. Refer to drawing named SMWD_commercial.dwg as sample drawings for desired submittals.
11. Use SMWD furnished blocks. Explode when necessary so that blocks will be on their appropriate layers.
12. Submit drawings to SMWD according to Design Criteria And Standard Drawings for Water And Sewer Facilities.

A-3.3.6 Residential Data Layering

The following data layering will be required for the DWG file submitted to the District: “Log on to the <http://www.smwd.com/> for the most CURRENT REQUIREMENTS.”

RESIDENTIAL DATA LAYERING

<u>LAYER NAMES</u>	<u>COLOR BY LAYER</u>	<u>LINETYPE</u>	<u>DESCRIPTION</u>
CURB	4	CONTINUOUS	
DW_AV	2	CONTINUOUS	Air Vac
DW_BO	2	CONTINUOUS	Blow Off
DW_CASING	7	CONTINUOUS	Steel Casing
DW_ENCASEMENT	7	CONTINUOUS	Concrete Encasement
DW_ETS/LINE	2	CONTINUOUS	Electrolysis Test Station
DW_FH	2	CONTINUOUS	Fire Hydrant
DW_FH_LATERAL	2	CONTINUOUS	
DW_FH_VALVE	1	CONTINUOUS	
DW_LATERAL	7	CONTINUOUS	
DW_LINE	180	CONTINUOUS	Main Line
DW_METER	4	CONTINUOUS	
DW_RED	7	CONTINUOUS	Reducer
DW_SERVICE	4	CONTINUOUS	Service Line
DW_VALVE	1	CONTINUOUS	
EASEMENT	3	HIDDEN	
LOT_NO	3	CONTINUOUS	Lot Number
LOTLINE	3	CONTINUOUS	
ND_AV	2	CONTINUOUS	Air Vac
ND_BO	2	CONTINUOUS	Blow Off
ND_CASING	3	CONTINUOUS	Steel Casing
ND_ENCASEMENT	7	CONTINUOUS	Concrete Encasement
ND_ETS	2	CONTINUOUS	Electrolysis Test Station
ND_LINE	10	CONTINUOUS	Main Line
ND_METER	2	CONTINUOUS	
ND_SERVICE	2	CONTINUOUS	
ND_VALVE	2	CONTINUOUS	
SEWER_CASING	3	CONTINUOUS	Steel Casing
SEWER_ENCASEMENT	7	CONTINUOUS	Concrete Encasement
SEWER_FLOW_ARROW	7	CONTINUOUS	Flow Direction
SEWER_FORCEMAIN	14	CONTINUOUS	
SEWER_LATERAL	4	CONTINUOUS	
SEWER_LINE	12	CONTINUOUS	Main Line
SEWER_MH	7	CONTINUOUS	Manhole
SEWER_BO	2	CONTINUOUS	Blow Off
SEWER_ETS	2	CONTINUOUS	Electrolysis Test Station
ST_CL	2	CENTER2	Centerline
ST_NAMES	255	CONTINUOUS	
ST_ROW	4	CONTINUOUS	Right of Way
TRACT_BNDRY	6	PHANTOM2	Tract Boundary
TRACT_NO	6	CONTINUOUS	Tract Number

A-3.3.7 Commercial Data Layering

The following data layering will be required for the DWG file submitted to the District: “Log on to the <http://www.smwd.com/> for the most CURRENT REQUIREMENTS.

COMMERCIAL DATA LAYERING

<u>LAYER NAMES</u>	<u>COLOR BY LAYER</u>	<u>LINETYPE</u>	<u>DESCRIPTION</u>
BLDG_FOOT_PRINT	7	CONTINUOUS	
BLDG_NUMBER	7	CONTINUOUS	
BLDG_ADDRESS	7	CONTINUOUS	
BLDG_SUITE_NUMBER	7	CONTINUOUS	
CURB	4	CONTINUOUS	
DW_BACKFLOW	2	CONTINUOUS	Domestic Backflow (Public)
DW_BLDG_FIRE_LINE	2	CONTINUOUS	Bldg. Fire Line (Private)
DW_CASING	7	CONTINUOUS	Steel Casing
DW_DETECTOR_CHECK	7	CONTINUOUS	Detector Check (Public)
DW_FH	2	CONTINUOUS	Fire Hydrant (Private)
DW_FH_LATERAL	2	CONTINUOUS	(Private)
DW_FH_VALVE	1	CONTINUOUS	(Private)
DW_FH_SERVICE_LINE	2	CONTINUOUS	Fire Line (Private)
DW_IRRG_BACKFLOW	3	CONTINUOUS	Dom. Irrig. Backflow (Public)
DW_IRRIG_METER	7	CONTINUOUS	Dom. Irrig. Meter (Public)
DW_IRRIG_SERVICE	3	CONTINUOUS	Dom. Irrig. Service (Public)
DW_LATERAL	7	CONTINUOUS	(Public)
DW_LINE	180	CONTINUOUS	Main Line (Public)
DW_METER	4	CONTINUOUS	(Public)
DW_RED	7	CONTINUOUS	Reducer
DW_SERVICE	4	CONTINUOUS	(Public)
DW_VALVE	1	CONTINUOUS	(Public)
DW_WM	7	CONTINUOUS	Water Meter (Public)
EASEMENT	3	HIDDEN	
GREASE TRAP	7	CONTINUOUS	(Private)
LOT_NUMBER	3	CONTINUOUS	
LOTLINE	3	CONTINUOUS	
ND_CASING	3	CONTINUOUS	Steel Casing
ND_IRRIG_SERVICE	3	CONTINUOUS	Nondom. Irrig. Service (Public)

ND_LINE	10	CONTINUOUS	
ND_METER	2	CONTINUOUS	
ND_VALVE	2	CONTINUOUS	
SEWER_CASING	3	CONTINUOUS	Steel Casing
SEWER_FLOW_ARROW	7	CONTINUOUS	Flow Direction
SEWER_FORCEMAIN	14	CONTINUOUS	
SEWER_LATERAL	4	CONTINUOUS	(Public)
SEWER_LINE_PUBLIC	12	CONTINUOUS	
SEWER_LINE_PRIVATE	7	HIDDEN	On Site Line (Private)
SEWER_MH_PRIVATE	7	CONTINUOUS	Private Manhole
SEWER_MH_PUBLIC	7	CONTINUOUS	Public Manhole
SEWER_MM	7	CONTINUOUS	Monitoring Manhole
SEWER_CO	7	CONTINUOUS	Clean Out (Private)
SEWER_PUMP	7	CONTINUOUS	Lift Station (Private)
ST_NAMES	255	CONTINUOUS	
ST_ROW	4	CONTINUOUS	Right of Way
TRACT_BNDRY	6	PHANTOM2	Tract Boundary
TRACT_NO	6	CONTINUOUS	Tract Number

A-3.3.8 Checking of Digital Data for Residential Projects

1. Correct Layering.
2. Verification that digital and hard copy plans are consistent.
3. Verification of a continuous pipeline shown in one drawing File.
4. Verification that digital files DO NOT contain unresolved line types, font files, and cross references.
5. Verification that digital files DO NOT contain future or existing layers.
6. Verification that digital files DO NOT contain future or existing layers. Verification that Engineers symbols have been replaced with SMWD furnished blocks, inserted into their correct location and edited when necessary. For example, all valve blocks must be placed in their correct location and rotated so that crossing lines in the valve symbol are at a 45 deg angle to the distribution line. These valves must not overlap each other or interfere with other objects in the same area. All water distribution lines must be trimmed to outside of valve symbol for clarity. All fire hydrant, air vac,

blow-off assemblies, water services and ETS symbols must be placed on property side of right of way line.

A-3.3.9 Checking of Digital Data for Commercial Projects

1. Correct Layering.
2. Verification that digital and hard copy plans are consistent.
3. Verification of a continuous pipeline shown in one drawing File.
4. Verification that digital files DO NOT contain unresolved line types, font files, and cross references.
5. Verification that digital files DO NOT contain future or existing layers.
6. Verification that Engineers symbols have been replaced with SMWD furnished blocks, inserted into their correct location and edited when necessary.

A-3.3.10 Accuracy and Coordinate System

The data accuracy of the DWG file will be consistent with the improvement plans submitted for approval and shall be based on the most current California Coordinate System in accordance with the County of Orange requirements.

A-3.4 NOTICE TO START CONSTRUCTION

Notice shall be given to the Engineer or District's Inspector at least two working days before the start of construction.

A-3.4.1 Curbs Installed Before Starting Facilities Construction. It is a requirement of the District that the curbs be installed or that the facilities be staked for line and grade in tracts prior to starting the installation of water, sewer and nondomestic facilities.

A-3.5 PRECONSTRUCTION CONFERENCE

A preconstruction conference shall be held at least 24 hours before starting construction, at which will be present the Contractor's working foremen and /or job superintendent, the Applicant's tract superintendent, and the District's Engineer and/or Inspector. The purpose of this meeting will be to resolve any questions on District specification requirements, to obtain the Contractor's construction schedule, and to disclose and discuss any known circumstances that might affect job installation.

A-3.6 INSPECTION OF WORK

All work shall be subject to inspection by the District and shall be left open and uncovered until approved by appropriate District Inspector.

The Contractor shall not proceed with any subsequent phase of work until the previous phase has been inspected and approved by the District. Inspection and approval by the District shall be obtained during and/or at the completion of the following portions of work, as determined by the District:

A-3.6.1 Water System Inspections

- a. Trench excavation and pipe bedding installation.
- b. Placing pipe, fittings and structures.
- c. Placing of all concrete anchors and thrust blocks.
- d. Placing and compacting the pipe zone backfill.
- e. Backfilling balance of trench to grade. (Compaction test to be performed by City and/or County road departments in public rights-of-way and by private soils consultant retained by the Applicant and approved by the District in private streets and easements. Copies of test results shall be given to the District by the Applicant for approval before final acceptance of the work).
- f. Pressure testing of all mains and services.
- g. Disinfecting and flushing of pipelines.
- h. Repaving trench cuts.
- i. Raising valve box covers to finish grade.
- j. Installation of service lines, meter boxes and water meters.

A-3.6.2 Sewer System Inspections

- a. Trench excavation and pipe bedding installation.
- b. Placing of pipe, fittings and structures.
- c. Placing and compacting of the pipe zone backfill.
- d. Backfill of the balance of the trench to grade (Compaction tests to be taken by the City and/or County road departments in public rights-of-way and by private soils consultant retained by the Applicant and approved by the District in private streets and easements. Copies of test results shall be given to the District by the Applicant for approval before final acceptance of the work).
- e. Testing of all sewers and laterals after backfill compaction.
- f. Manholes and main line cleanouts are raised to finish grade and the system balled and flushed, and a mandrel test performed for PVC sewers.

- g. Video inspection of mainline and laterals provided to SMWD prior to occupancy.

A-3.6.3 Recycled Water and Nondomestic Water Inspections

- a. Trench excavation and pipe bedding installation.
- b. Placing color-coded pipe, fittings and structures.
- c. Placing of all concrete anchors and thrust blocks.
- d. Placing and compacting the pipe zone backfill.
- e. Backfilling balance of trench to grade. (Compaction test to be performed by City and/or County road departments in public rights-of-way and private soils consultant retained by the Applicant and approved by the District in private streets and easements. Copies of test results shall be given to the District by the Applicant for approval before final acceptance of the work).
- f. Pressure testing of all mains and services.
- g. Flushing of pipelines.
- h. Repaving trench cuts.
- i. Raising valve box covers to finish grade.
- j. Installation of service lines, meter boxes and water meters.

A-3.6.4 Costs of Overtime Inspection and Other Services

- a. Inspection of the work as well as other required services will be provided by the Santa Margarita Water District between the hours of 7:00 a.m. and 3:30 p.m. on Monday through Friday only. Any inspections or other services by the District requested by or made necessary as a result of the actions of the Contractor or Developer beyond the hours stated above, shall be paid for by the Contractor or Developer at the prevailing rate of 1-1/2 times the regular hourly rate.
- b. Inspections or other services by the District requested by or made necessary as a result of the actions of the Contractor or Developer on Saturdays, Sundays or Holidays, must be scheduled and approved by the Santa Margarita Water District and paid for by the Contractor or Developer in advance, at the prevailing rate for overtime and/or holiday work.

A-3.7 DISTRICT AUTHORITY

The District shall at all times have access to the work during construction and shall be provided reasonable assistance for ascertaining full knowledge respecting the progress, workmanship, and character of materials used and employed in the work. No pipe, fittings, thrust block or other materials shall be installed or backfilled until inspected and approved by the District. The Contractor shall give due notice to the District Inspector in advance of backfilling as well as all other inspection phases so that proper inspection may be provided.

Inspection of the work shall not relieve the Contractor of any obligations to complete the work as prescribed by the District's standards. Defective work shall be made good before any testing or final inspection will be permitted. Any defective work or unsuitable materials may be rejected notwithstanding the fact that such defective work and unsuitable materials had been previously overlooked by the District.

The District shall have the authority to suspend the work wholly or in part for such time as it may deem necessary due to the failure of the Contractor to carry out orders given by the District Inspector or to perform any provisions of the plans and specifications. The Contractor shall immediately comply with the written order of the District to suspend the work wholly or in part. The work shall be resumed when methods or defective work are corrected as ordered and approved in writing by the District.

A-3.8 PUTTING PORTIONS OF WATER OR SEWER FACILITIES IN SERVICE EARLY

The Engineer may approve putting newly installed water or sewer mains into service after compaction has been approved by the governing agency; after the water mains have been pressure tested, chlorinated, flushed, and have passed the bacteriological test; and after sewers have been balled, video inspected, and have passed the required air tests. This partial acceptance shall be granted only upon written request from the Applicant and subsequent approval by the Engineer. Nothing in this section shall be construed as relieving the Applicant of full responsibility for completing the work in its entirety, for making good any defective work and materials, for protecting the work from damage, and for being responsible for damage and for work as set forth in the agreement and other contractual documents; nor shall such action by the District be deemed completion and acceptance, and such action shall not relieve the Applicant of the provisions of Subsection A-10, "Guarantees."

A-3.9 FINAL DOMESTIC WATER, RECYCLED WATER, AND NONDOMESTIC WATER FACILITIES INSPECTION

Before final acceptance, the District Inspector, other District personnel as required and the Contractor's superintendent or foreman, will make a final inspection of all work to check particularly on the following items:

- a. That all phases of the job are completed in accordance with plans and specifications.

- b. That all valve boxes are raised to finish grade and that all pavement patching is completed.
- c. That all valves are referenced out and the District Inspector has been given all reference measurements.
- d. That all right-angle meter stops and meters are properly positioned and that all meter boxes are positioned and raised to proper grade.
- e. That fire hydrants are raised to proper grade, in a vertical position, painted, and that the concrete pad is placed properly.
- f. That backfill has passed all compaction requirements
- g. That all system valves are turned and left open (except those specifically required to be normally closed), and that the turns required for complete open/close cycle are recorded on the record drawings.
- h. That all domestic waterlines have been chlorinated and disinfected.
- i. That all line pressure testing and flushing has been completed.
- j. That the job site is clean and that all of the Contractor's equipment and materials are removed.
- k. That required service lateral locations have been marked on curb.
- l. That record drawings have been provided to the District.

A-3.10 FINAL SEWER SYSTEM INSPECTION

Before final acceptance, the District Inspector will require the Contractor to flush, ball and mandrel all PVC sewer mains, and to flush and ball all VCP sewer mains again, even though the sewers have been balled previously, and video inspected.

The District Inspector, other District personnel as required, and the Contractor's superintendent or foreman, will make a final inspection of all work to check particularly on the following items:

- a. That all bulkheads and plugs have been removed and that all debris has been cleaned from all sewer mains.
- b. That the concrete base and channels in manholes are smooth.
- c. That manhole interiors are clean of all debris and excess concrete mortar.
- d. That all manhole concrete grade rings are adequately grouted and properly set.

- e. That manhole covers has been properly set to correct grade and all surrounding pavement has been repaired.
- f. That proper field tests have been made on all sewer main sections and manholes, particularly where sections of manholes had to be repaired.
- g. That backfill has passed all compaction requirements.
- h. That lateral locations have been marked on curb.
- i. That record drawings have been provided to the District.

A-3.11 INTERPRETATION OF SPECIFICATIONS AND DETAIL DRAWINGS

The figured dimensions shown on the drawings shall govern, but work not dimensioned shall be as directed. Work not particularly shown or specified shall be the same as similar parts that are shown or specified or as directed. Full size or large scale details shall take precedence over smaller scale drawings as to shape and details of construction. Specifications shall govern as to material. Scale drawings, full-size details, and specifications are intended to be fully cooperative and to agree; but should any discrepancy or apparent difference occur between plans and specifications, or should errors occur in projects being constructed by others affecting the work of the Contractor, and the Contractor proceeds with the work affected without instruction from the District, the Contractor shall be fully responsible for any resultant damage or defect.

A-3.12 ACCEPTANCE OF FACILITIES AND RELEASE OF BONDS

After completion of the construction of all domestic water, sewer, recycled water and nondomestic water facilities, and upon the satisfaction of all final inspection requirements, the District Inspector will notify the developer's engineer to prepare record drawings accurately reflecting the facilities and showing all revisions in the work which constituted departures from the original improvement plans approved by the District.

The developer's engineer will submit to the District Inspector one copy of the draft record drawings with a final delta on the cover sheet indicating "As-Built" or "Record Drawing." The draft record drawings will be reviewed by the appropriate District Inspector. If corrections are needed, the plans will be returned to the developer's engineer for updating. Once the corrections are made, the Developer's Engineer will be required to submit one complete set of the record drawings on .004 matte contact or photo Mylar.

A-3.13 DISTRICT POLICY ON REGENERATIVE WATER SOFTENERS

The District has built and maintains modern water reclamation plants to conserve as much water as possible. Wastewater from the sewer system is treated to the standards established by the State Health Department for irrigation water. Salts and minerals that are harmful to vegetation and agricultural crops should be kept out of the wastewater and the District sewer system because minerals are not removed from the wastewater in the water reclamation process. Therefore the adopted Rules and Regulations of the District strongly discourage the use of any home regenerative or automatic water softener that can discharge saltwater or brine into the District sewer collection system. Water softeners that are recharged at central plants may be used. Services renting precharged water softeners and exchanging them periodically are readily available. Commercial installations of regenerative water softeners will be specifically permitted by the District only after approval of holding facilities that allow brine to be pumped and transported outside the District area of sewage collection.

A-3.14 USE OF DISTRICT SEWER FACILITIES

The District has regulations on the types of wastes allowed to be discharged into its sewers in order to protect the facilities of the District and their operations and to meet its discharge requirements. The District's Rules and Regulations set forth these requirements. These provisions establish conditions under which certain users are required to obtain permits for use of District sewer facilities. Applicants whose sewage discharges qualify them for a permit shall not be allowed to connect to a District lateral sewer or sewer main until a written notification is provided by the District allowing the hookup. All users must comply with the discharge prohibitions established in the District's Rules and Regulations and applicable permits.

A-3.15 DISTRICT'S REGULATION REGARDING CROSS CONNECTIONS

All domestic (potable) water services shall be subject to the provisions of the District's Rules and Regulations on water backflow prevention. The following summarizes these provisions:

Cross connections of any type that permit a backflow condition from any source or system other than that of the District's potable water system is prohibited. A connection constituting a potential or actual backflow hazard is not permissible unless a backflow prevention device or air gap, which is approved by the California State Department of Health and local Health Agency and complies with Title 17 of the California State Administrative Code, is installed. Such an installation shall at all times be subject to inspection and regulation by the District for the purpose of avoiding possibility of backflow.

The District has a cross-connection control inspector who is available for consulting on any questions regarding cross-connections.

The District will not provide any water service to any premises unless the public water supply is protected as required by State and District regulations.

Only those backflow prevention assemblies approved by the California State Department of Health shall be acceptable for use in the District.

The customer shall regularly test (at least once a year) and service such assemblies to maintain them in satisfactory operating condition and shall overhaul or replace such assemblies if they are found defective.

Records of such annual tests, repairs and overhauling shall be kept by the customer and copies forwarded to the District.

Service of water to any premises may be discontinued by the District after notice if a backflow prevention device required by the District Rules and Regulations is not installed, tested and maintained, or if any defect is found in an installed backflow prevention device, or if it is found that a backflow prevention device has been removed or bypasses, or if unprotected cross-connections exist on the premises and service will not be restored until such conditions or defects are corrected.

The District's Rules and Regulations further define how waterlines must be marked where multiple water systems are in use and outline the duties and responsibilities of a customer's water supervisor.

A copy of the District's Ordinance instituting a Cross-Connection Control Program is included in Appendix 8.

Additional reference for guidelines as to when, why and what types of backflow and cross-connection control assemblies are approved may be found in:

- a. Regulations Relating to Cross Connections, California Administrative Code - Title 17 - Public Health.
- b. Manual for Cross Connection Control by USC Foundation for Cross Connection Control and Hydraulic Research.
- c. Manual of Recommended Practice for Backflow Protection and Cross Connection Control for Public Water Supplies (amended and prepared by the Cross Connection Control Committee of the American Water Works Association).

A-3.16 RAISING OF VALVE BOXES AND MANHOLE RIMS

Where facilities are constructed by the District prior to paving by the Applicant in conjunction with scheduling of proposed developments, it shall be the responsibility of the Applicant to raise to grade all valves and manholes that are within paved portions of the development after each lift of pavement. It shall also be the Applicant's responsibility to maintain access to all valves at all times.

A-3.17 ENCROACHMENT PERMITS

An Encroachment Permit or a set of District approved plans is required for all work on the District's system, or within fee property or an easement held by the District, except

for District employees and contractors employed by the District for emergency repairs. If a permit or approved plans have not been issued by the District, the work will be stopped until such approvals have been issued.

For routine construction, such as the installation of a water service or connection of a sewer lateral, it is unnecessary to provide engineering drawings. For routine construction, an application for an Encroachment Permit accompanied with a sketch, prepared by the applicant showing the proposed work is normally reviewed for issuance of an Encroachment Permit by the District. Also, in some special cases as determined by the District, an Encroachment Permit will be issued when there are engineering drawings.

Section A-4

DISTRICT PROCEDURES AND REQUIREMENTS FOR CONSTRUCTION AND/OR CONVERSION OF ONSITE RECYCLED WATER AND NONDOMESTIC WATER SYSTEMS

The use, procedures, regulations, requirements, design, construction and operation of onsite facilities for recycled water and nondomestic water service shall be in accordance with the District's "Rules and Regulations for Nondomestic Water Service," which is hereby incorporated into these Procedures and Design Criteria, and the requirements for Recycled Water and Nondomestic Water System Master Plans as specified in Subsection A-3.1.4 of these Procedures and Design Criteria.

PART B
DESIGN CRITERIA
FOR
DOMESTIC WATER, SEWER
RECYCLED WATER AND
NONDOMESTIC WATER FACILITIES

Section B-1

GENERAL DESIGN CRITERIA

B-1.1 IMPROVEMENT PLANS

Improvement plans shall be prepared and submitted to the Engineer for approval and signature for all domestic water, sewer, recycled water and nondomestic water facilities to be constructed by the District or by the Applicant and dedicated to the District for operation and maintenance. All improvements shall be designed and constructed in accordance with these "Design Criteria and Standard Drawings for Water and Sewer Facilities" and the District's Standard Specifications ("Standard Specifications for Public Works Construction," latest edition). For tract developments, the water and sewer facilities may be shown on the improvement plans which are to be approved by the City or County.

The general requirements for the preparation of the improvement plans are outlined below.

B-1.1.1 Drawings

- a. Drawings shall be on standard (24" x 36") sheets with sheet number, title, revisions and signature blocks.
- b. Improvement plans shall be prepared in ink on Mylar.
- c. Title sheets shall have an index or key map clearly indicating the sheet numbers issued.
- d. The following shall be clearly shown on the drawings, preferably on the Title Sheet:
 - (1) Project benchmark(s) and basis of bearings.

- (2) Detailed quantity estimates and standard notes, categorized by domestic water, sewer recycled water and nondomestic water facilities.
- e. Improvement plans shall have a separate small scale Index map showing the overall layout of domestic water, sewer and nondomestic water facilities. The map shall include all pipelines, valves, fire hydrants, manholes and manhole numbers.
- f. The following scales shall be used on all drawings, unless otherwise approved or specified by the Engineer:
 - (1) Plan and Profile Sheets:

Horizontal:	1" = 40'
Vertical:	1" = 4' (1" = 8', or as appropriate for steep grades)
 - (2) Details: As appropriate to clearly indicate the work.
- g. Profiles shall be shown on the top of the sheets.
- h. All facilities to be operated and maintained by the District shall be located within public rights-of-way or recorded easements which shall be clearly shown on the improvement plans (see Part I, Subsection C-2 for easement requirements).
- i. The drawings shall show on plan and profile the position of all other known or proposed underground facilities.
- j. Waterline and sewerline curve data bearings and distances are to be included on plans.
- k. Record drawings shall be prepared upon completing the construction of the improvements.

B-1.1.2 Signatures

- a. Unless otherwise specified or approved by the Engineer, each sheet of plans submitted for the Engineer's approval shall be signed and sealed by the civil engineer responsible for that design, except that a sheet of complex grading, structural, mechanical or electrical plans shall be signed by the professional engineer responsible for that design. The registration seal shall clearly indicate the expiration date.
- b. Civil and other professional engineers signing plans to be submitted for the Engineer's approval shall be registered with the State of California.
- c. Plan revisions subsequent to the Engineer's approval shall be clouded and highlighted and resigned per the requirements of subsection B-1.1.2 "a" and "b" above prior to submittal for the Engineer's approval.

B-1.1.3 Submittals

- a. Domestic water, sewer, recycled water, nondomestic water and structural design calculations shall accompany plans submitted for checking, when requested by the Engineer.
- b. Plans submitted for approval shall be accompanied by a letter of transmittal addressed to the Engineer.
- c. Plans shall be checked for consistency, accuracy, drafting and conformance with the District's Design Criteria and Standard Drawings prior to submission for the Engineer's approval.
- d. Check prints shall accompany revised plans which are resubmitted for approval. Resubmitted plans shall be accompanied by a letter of transmittal addressed to the Engineer.

B-1.2 SEPARATION BETWEEN WATERLINES AND SEWERLINES

B-1.2.1 Horizontal Separation. Orange County Health Department regulations require a 10-foot-minimum separation between domestic water, sewer, recycled and nondomestic water mains. However, in special situations where there is no alternative but to install the mains with less than the required separation, special construction will be required as shown on the Standard Drawings. In no case shall recycled or nondomestic water mains be located within a street at a distance of 6 feet from the curb face, which is the standard location for domestic water mains.

B-1.2.2 Vertical Separation. Normally, domestic water, sewer, recycled and nondomestic water mains shall be located vertically from the street surface in order of the higher quality, i.e., domestic water shall be above recycled or nondomestic water and nondomestic water shall be above sewer.

Whenever a recycled or nondomestic water main or sewer main crosses a domestic water main, special construction will be required as shown on the Standard Drawings.

If a sewer, recycled or nondomestic water main is above a domestic water main or if a sewer main is above a recycled nondomestic water main, the special construction shall extend a sufficient distance on both sides of the crossing to provide a minimum of 10 feet of horizontal clearance. If a sewer or a recycled or nondomestic water main is located below a domestic water main and there is less than the required 1-foot vertical clearance between the mains, special construction will be required as shown on the Standard Drawings. These construction requirements shall not apply to those house laterals that cross less than 3 feet below a pressure domestic water or recycled or nondomestic water main.

Section B-2

DESIGN CRITERIA FOR DOMESTIC WATER FACILITIES

B-2.1 GENERAL WATER SYSTEM CRITERIA

- B-2.1.1 Standard Requirements. The design and construction of all domestic water system facilities to be operated and maintained by the District shall be in accordance with these Design Criteria and Standard Drawings, the American Waterworks Association, as well as the guidelines and requirements of the Orange County Fire Authority, and the California Department of Forestry.
- B-2.1.2 Calculations Required. Substantiating engineering calculations or hydraulic modeling demands, pressures, and structural designs shall accompany plan submittals to the Engineer when requested.
- B-2.1.3 Looped Systems. Each project or development shall have at least two connections to waterlines in different streets to form a looped water system. If connection to different streets is impractical or impossible in the opinion of the Engineer, connections to a waterline in the same street will be permitted, provided that adequate valving for isolation of the segments of waterlines is incorporated. Non-looped systems will be permitted only with the express permission of the District.
- B-2.1.4 Design System Demands. In general, the design of the domestic water system facilities shall be based on the water demands, pressure zones and system elements as outlined in the District's applicable domestic water system Plan of Works. Demand factors for specific types of localized development not addressed in the plans of work (e.g., industrial, heavy commercial, high and heavy density residential areas, etc.) shall be based on normally accepted standards of the water industry, subject to the approval of the Engineer.

Average day, maximum day, and peak hour water demands shall be established by the Engineer prior to the start of design per requirements of Section A-3. Fire flow demands shall be established by the Orange County Fire Authority. The Applicant shall obtain the fire flow requirements from the Orange County Fire Authority and shall submit them in writing to the Engineer. The Applicant shall submit for the Engineer's review a hydraulic analysis that shows that the proposed water system is adequate to meet the required fire flows when requested by the Engineer.

- B-2.1.5 Design System Pressures. The following criteria shall be met for all domestic water systems unless otherwise approved or specified by the Engineer:
- a. The minimum residual pressure at any point in the system shall be 20 psi at maximum day plus design fire flow demands; however, the minimum residual pressure near the location of a fire flow shall conform to the requirements of the Orange County Fire Authority.

- b. The minimum residual pressure at any point in the system shall be 40 psi at peak hour demand conditions.
- c. The minimum static pressure at any service location (meter) shall be 50 psi unless waived by the Engineer.
- d. Pressure regulators are required to be installed on the customer's side of the meter if the static pressure exceeds 80 psi at the meter.
- e. Each dwelling unit must be supplied with its own water service and meter unless otherwise approved in advance by the Engineer.

B-2.1.6 Improvement Plans. Improvement plans for domestic water system facilities shall be prepared in accordance with the requirements of Section B-1 and shall include the following:

- a. Profiles of water mains 12 inches in diameter and larger and any size water main within an easement.
- b. Detailed quantity estimates indicating linear footage of pipe by size, class and type; number of valves by size, class and type; number of fire hydrants; number of water services by size; number of blowoffs and air and vacuum valve assemblies; linear footage of concrete encasements (if applicable); and any other appurtenances which should be identified for quantity purposes.
- c. Standard domestic water system notes, including but not limited to the following:
 1. The water system as shown on these plans shall be constructed by the Developer in accordance with the Santa Margarita Water District Design Criteria and Standard Drawings for Water and Sewer Facilities and the Standard Specifications ("Standard Specifications for Public Works Construction" (Green Book), as last revised). The Contractor shall have a copy of each of these standards, as well as a copy of the project plans and specifications, on the job at all times.
 2. The Developer shall furnish the District with recorded easements for all portions of the water system outside the public right-of-way.
 3. The District shall be furnished with four copies of approved construction plans prior to the start of construction.
 4. The District Inspector shall be notified at least two working days prior to the start of construction and any subsequent required inspection. Phone (949) 459-6505 to arrange for inspection.
 5. A preconstruction conference with representatives from all affected agencies and the Contractor shall be held on the job site at least 24 hours prior to the start of construction.

6. The Contractor shall obtain all City and/or County permits prior to the start of construction.
7. Water mains shall be staked for line and grade or shall be installed subsequent to the installation of the curbs but prior to paving of the streets. The minimum cover over domestic water mains shall be 36 inches below pavement finished grade.
8. No valve shall be located within a gutter or other concrete drainage device.
9. All fire hydrants shall be installed per the District's Standard Drawings.
10. All exposed buried metal appurtenances in contact with the soil or water, including pipe, flanges, nuts, bolts, valves, couplings, etc., shall be given two (2) coats of Bitumastic No. 50 protective coating, or equal.
11. All buried bolts, anchor bolts and nuts shall be Type 316 stainless steel and shall be coated with Bitumastic No. 50 or approved equal.
12. All ductile iron fittings and bends shall be double polyethylene encased per AWWA Standard C-105.
13. Shut down of existing waterlines to facilitate connection to existing facilities shall be coordinated with the District Inspector. No connections to the District's existing water system shall be made until the new facilities have been successfully tested and disinfected. All connections to the District's water system shall be made in the presence of the District Inspector.
14. Water house connection laterals shall be installed behind the curb prior to paving of the street. The services shall be extended to their final location by the Developer at a time prior to pressure testing of the water system.
15. All water services shall be installed with a 5-foot horizontal separation from any sewer lateral and in accordance with the District's revised standard drawings.
16. All water services supplied with pressure higher than 80 psig shall be provided with approved pressure regulators set at 80 psig or as required by the uniformed plumbing code.
17. Meter boxes shall be installed directly behind the curb whether sidewalk is directly behind the curb or not. Meter boxes installed behind rolled curb or within driveways shall have traffic lids.
18. No facility is to be backfilled until inspected by the District.
19. The Developer shall raise all valve boxes to the finished pavement grade upon completion of the pavement. If the surface course of pavement is not

completed within a reasonable amount of time after the base course of pavement is completed, the Developer shall raise the valve boxes to the finished grade of the base course so that the District may operate the valves. The Developer shall then raise all valve boxes to final finished grade of the pavement upon completion of the surface course of pavement. The required raising of valve boxes to the finished grade of the base course of pavement will be determined and specified by the Engineer.

20. Backflow preventers approved by the California State Department of Health are the only backflow prevention assemblies acceptable for use in the District. The District's cross connection inspector shall be notified prior to installation of backflow device at (949) 459-6513.
21. Irrigation systems must comply with the District's Rules and Regulations for Nondomestic Water Service.
22. Water meters shall be purchased from the District. Meter boxes, customer ball valves, gaskets, nuts and bolts and miscellaneous hardware must be purchased from a supplier with materials in accordance with the District's standard drawings.

B-2.2 WATER MAINS

- B-2.2.1 Sizes of Mains. The normal minimum size transmission main shall be 12 inches in diameter. The normal minimum size distribution main shall be 8 inches in diameter. No 10-inch or 14-inch diameter mains will be allowed without specific approval of the Engineer. Unless otherwise specified herein or approved by the Engineer, all water mains shall be looped.

Transmission mains shall normally be sized based on a headloss of 3 feet or less per 1000 linear feet of pipe, and in no case shall the design headloss exceed 5 feet per 1000 linear feet of pipe unless specifically approved by the Engineer. For distribution mains, the maximum allowable design velocity shall be 8 feet per second.

On dead-end streets, the minimum size main shall be 8 inches to at least the last fire hydrant. On dead-end streets serving the equivalent of 25 or less normal-size residential lots, or no more than two fire hydrants; looping of the water main will not be required. However, the water main shall be extended beyond the last fire hydrant with a minimum 4-inch diameter line, which shall terminate with a dead-end service connection conforming to the District's Standard Drawings.

When the water main is looped to an adjacent street, the water main shall be a minimum of 8 inches in diameter, extending through an easement within a casing as shown on standard drawings, and valved at each end of the easement within the street pavement.

- B-2.2.2 Type and Class of Pipe. All transmission mains shall be of the type and class as specified by the Engineer. Unless otherwise approved by the Engineer, all 4", 6" and 8" domestic water distribution mains shall be polyvinyl chloride pipe (PVC), Class 200 minimum conforming to AWWA C-900 with ductile-iron, push-on type fittings, Class 200 minimum, except for water mains located within an easement through a lot which shall be ductile iron pipe, Class 50 minimum unless otherwise approved by the Engineer. Ductile iron pipe shall have mechanically restrained joints when located outside of road right-of-way. All joints, including valves, shall be cathodically bonded per District standards and have sacrificial anodes. All ductile iron pipe, fittings and bends shall be double polyethylene encased per AWWA Standard C-105
- B-2.2.3 Minimum Depth to Top of Water Main. The top of domestic water mains shall be a minimum of 1.5 pipe diameters or 36 inches, whichever is greater, below the street pavement finished grade unless otherwise specified or approved by the Engineer because of unusual field conditions.
- B-2.2.4 Standard Location. Domestic water mains shall be located within the street pavement area at a distance of 6 feet from the curb face. Special approval by the Engineer is required for any water main which is not located within a street or at a distance of 6 feet from the curb face.

B-2.3 WATER VALVES

- B-2.3.1 Type of Valves. All main line water valves less than 12" diameter shall be resilient wedge gate valves, unless otherwise specified or approved by the Engineer. All mainline water valves 12" diameter and larger shall be butterfly valves. Other valves shall be as specified in Part C & E Standard Special Provisions for Water and Sewer Construction.
- B-2.3.2 Location of Valves. There shall be at least two control valves at the 3-way intersection of any water mains; at least three control valves at the 4-way intersection of any water mains; and four control valves at any 4-way intersection of major distribution mains. All fire hydrant laterals shall have a control valve. The control valves at all intersections as described herein shall be flanged to the main line tee or cross unless otherwise approved by the Engineer. Valves shall be spaced so that no more than two fire hydrants would be taken out of service at any one time. Unless specifically approved by the Engineer, the maximum allowable spacing for intermediate valves on transmission mains is 1,200 feet. All intermediate main line valves should be located on the prolongation of a property line wherever possible.

Where water mains are located within an easement outside of paved streets, a valve shall be located at each end of the easement within the street section.

In no event shall any valve be installed within a gutter or other concrete drainage device.

Valve stem tops having over 48 inches of cover shall be provided with an approved extension.

The final determination of the locations of all valves shall be subject to the approval of the Engineer.

B-2.3.3 Blow-offs and Air and Vacuum Valves. Blowoffs shall be installed at the end of all mains where either the flow velocity or the slope of the main could cause sediment to settle at the end of the main. Blowoffs shall normally be installed at all low points in mains larger than 8" in diameter and at any other location specified by the Engineer to assure the capability of complete flushing of a main. Air and vacuum valves shall be installed at all high points on mains larger than 8 inches in diameter.

B-2.4 FIRE HYDRANTS

B-2.4.1 Types. All fire hydrant assemblies shall be wet barrel, of the types and configuration specified in the Part C and E Standard Special Provisions for Water and Sewer Construction and the Standard Drawings. Standard color for the hydrants in the District is Rustoleum 7645 Yellow, or approved equal.

B-2.4.2 Location. Locations of fire hydrants shall be in accordance with the District's Standard Drawings and to the satisfaction of the Orange County Fire Authority. Fire hydrants shall be accessible at all times, and shall conform to the following criteria:

- a. On distribution mains rather than transmission mains unless otherwise specified or approved by the Engineer.
- b. On the larger main at the intersection of two mains.
- c. On the side of the main nearer to the street right-of-way line.
- d. At the street intersection rather than in the cul-de-sac for cul-de-sacs less than 250 feet in length.
- e. On the beginning of the curb return (BCR) at intersections.
- f. On the prolongation of a lot line, but a minimum of 3 feet from the edge of any driveway, light standard, underground utility vaults or other similar obstructions.
- g. A minimum horizontal clearance of 30" from the face of curb or 18" from back of sidewalk, with the 4" pumper outlet perpendicular to the curb face.
- h. A minimum horizontal and vertical clearance of 18" around operating nuts and protective caps, with the hydrant flange mounted 3"-6" above finished grade.
- i. Any hydrant not located within a sidewalk shall be set in a 3' x 3' concrete pad.
- j. Design criteria for fire flows and durations are located in the Appendix.

B-2.4.3 Spacing. The required spacing of all fire hydrants shall be subject to the approval of the Orange County Fire Authority. The following guidelines for maximum spacing of hydrants are presented for normal installations:

- a. Residential areas - 300 feet, but not more than 120,000 square feet per hydrant.
- b. Commercial and industrial areas - 300 feet, but not more than 90,000 square feet per hydrant.

B-2.5 WATER SERVICES

Water services shall be installed in accordance with the Part C and E Standard Special Provisions for Water and Sewer Construction and the Standard Drawings, and the following requirements:

- a. The minimum service line size to the meter shall be 1" in diameter.
- b. Special designs are required to be submitted for approval of the Engineer for commercial, irrigation, or industrial services to which the District's Standard Special Provisions for Water and Sewer Construction and Standard Drawings are not applicable.
- c. No water meter shall be located in an area or location which is not easily accessible to the District at all times.
- d. For any lot which is also supplied with a recycled or nondomestic water service, an air gap device or an approved reduced pressure principle (RPP) backflow prevention device, if approved by the District and the State Health Department, shall be installed on the customer side of the domestic water meter as shown on the District's Standard Drawings and in accordance with State Health Department Regulations.
- e. Each dwelling unit must be supplied with its own water service meter, unless prior approval is obtained from the Engineer.

B-2.6 COMMERCIAL/INDUSTRIAL PRIVATE WATER SYSTEMS

B-2.6.1 Private Water Systems. All plans submitted for review and acceptance for commercial/industrial developments shall have private onsite water systems. The District may at the sole discretion of the Engineer require the onsite system to be "public" if it would be of a significant benefit to the District. Each site will be reviewed on an individual basis at the time plans are submitted. As a condition of service, the District will require the landowner to provide a letter acknowledging that the onsite facilities are private and will be properly maintained according to industry standards and further agree to hold the District harmless from any claims on the design, existence, maintenance and operation of the private onsite systems. The Customer will be billed for unauthorized use of water through detector checks in addition to a service charge for the detector check. Standards and standard drawings used for the private onsite system shall be in conformance with the requirements of the responsible regulatory agencies. If Santa Margarita Water District Standard Drawings are used, the valve can lids, sewer manholes, etc., shall not have "SMWD" cast into the cover.

- B-2.6.2 Commercial/Industrial Water System. All onsite domestic water systems for commercial/industrial developments shall be private and shall be owned, operated and maintained by the property owner. Each commercial unit shall have an individual water meter located directly behind the curb within a public street right-of-way as indicated on the District's Standard Drawings and backflow device approved by the District's Cross Connection Control Specialist prior to installation and located to the satisfaction of the District's Cross Connection Control Specialist. The backflow device and the remainder of the service from the meter shall be private. If the meter cannot be located within the public right-of-way, it shall be located in an easement dedicated to the District adjacent to the street right-of-way.
- B-2.6.3 Commercial/Industrial Irrigation. Separate irrigation water meters shall be provided for all landscaping for commercial/industrial developments. The irrigation meters on the domestic water system or the recycled or nondomestic water system shall be located directly behind the curb within the public street right-of-way as indicated on the District's standard drawing. All irrigation services on the domestic system shall have a backflow device approved by the District's Cross Connection Control Specialist prior to installation and located to the satisfaction of the District's Cross Connection Control Specialist on the customer's side of the meter. If the meter cannot be located within the public right-of-way, it shall be located in an easement to the District adjacent to the street right-of-way.
- B-2.6.4 Commercial/Industrial Fire Protection. All onsite fire hydrants and fire protection supply mains for commercial/industrial developments shall be private and shall be owned, operated and maintained by the property owner. Each private fire protection system shall be connected to the District's domestic water system through an approved detector check assembly approved by the District's Cross Connection Control Specialist prior to installation, located at the property line in an easement dedicated to the District as indicated on the District's standard drawings. The District shall be responsible for maintenance of the service up to the property line. The bypass meter on the detector check shall be owned and maintained by SMWD. The remainder of the system, including the detector check shall be private.

B-2.7 PUMP STATIONS AND PRESSURE REDUCING STATIONS

All pump stations and pressure reducing stations shall be special designs subject to the approval of the Engineer.

Section B-3

DESIGN CRITERIA FOR SANITARY SEWER FACILITIES

B-3.1 GENERAL SEWER SYSTEM CRITERIA

B-3.1.1 Standard Requirements. The design and construction of all sanitary sewer system facilities to be operated and maintained by the District shall be in accordance with these Design Criteria and Standard Drawings, as well as the water quality guidelines and requirements of the State of California and the County of Orange.

B-3.1.2 Calculations Required. Substantiating engineering calculations for size pipe and structural designs shall accompany plan submittals to the Engineer when requested.

B-3.1.3 Design Sewage Flows. In general, the design of sanitary sewer system facilities shall be based on the projected ultimate sewage flow rates and system elements as outlined in the District's applicable sewer system Plan of Works. Sewer generation rates for specific types of localized development not addressed in the plans of work (e.g., heavy commercial, high and heavy density residential areas, etc.) shall be based on normally accepted standards of the industry and shall be subject to the approval of the Engineer. All sewer mains shall be designed for peak sewage generation rates based on the ultimate development plan for the area proposed to be served and in accordance with the criteria specified below.

B-3.1.4 Improvement Plans. Improvement plans for sanitary sewer system facilities shall be prepared in accordance with the requirements of Section B-1 and shall include the following:

- a. Sewer centerline stationing shall be shown (example: [0+00.00]) independently of street stationing. Also, all manholes shall be numbered (example: MH No. 1).
- b. Profiles of all sewer mains, with invert elevations at the centerline of manholes. The profile shall also show invert elevations and directions in and out of manholes if there is a drop in elevation through a manhole or a change in flow line slope.
- c. Location and size of all sewer laterals ("house connection sewers").
- d. Detailed quantity estimates indicating linear footage of pipe by size, class and type; number of manholes; linear footage of concrete encasements (if applicable); and any other appurtenances which should be identified for quantity purposes.
- e. Standard sewer system notes, including but not limited to the following:
 1. The sewer system as shown on these plans shall be constructed by the Developer in accordance with the Santa Margarita Water District's Standard Specifications ("Standard Specifications for Public Works

Construction" (Green Book), as last revised), and "Design Criteria and Standard Drawings for Water and Sewer Facilities." The Contractor shall have a copy of each of these standards, as well as a copy of the project plans and specifications, on the job site at all times.

2. The Developer shall furnish the District with recorded easements for all portions of the sewer system outside the public right-of-way.
3. The District shall be furnished with four copies of the approved construction plans prior to the start of construction.
4. The District Inspector shall be notified at least two working days prior to the start of construction and any subsequent required inspection. Phone (949) 459-6505 to arrange for inspection.
5. A preconstruction conference with representatives from all affected agencies and the Contractor shall be held on the job site at least 24 hours prior to the start of construction.
6. The Contractor shall obtain all required City and/or County permits prior to the start of construction.
7. Stations shown as [0+00.00] are sewer stations and are independent of all other stations. Sewer lengths are calculated horizontal distances along the centerline of the sewer.
8. Sewer mains, manholes, and house connection laterals shall be installed prior to paving of the streets.
9. The Contractor shall verify the horizontal and vertical locations of all utility crossings and points of connection to the District's existing sewer system prior to construction of the sewers.
10. All sewer mains, manholes, and house connection laterals shall be staked by a licensed surveyor, and a complete set of cut sheets shall be supplied to the District Inspector.
11. A separate house connection lateral shall be constructed from the sewer main to the property line for each individually owned dwelling unit, unless otherwise approved by the Engineer. Construction and location of all house connection laterals shall be in accordance with the District's Standard Special Provisions and Standard Drawings.
12. No facility is to be backfilled until inspected by the District.
13. In order to prevent accidental use of the new sewer prior to completion and acceptance of the work, the outlet or inlet to existing tie-in manhole(s) shall be sealed with broken brick and mortar. Installation

of these plugs shall be approved by the Engineer. Plugs shall be removed only at the direction of District's Inspector.

14. The Developer shall raise all manhole frames and covers to the finished pavement grade upon completion of the pavement. If the surface course of pavement is not completed within a reasonable amount of time after the base course of pavement is completed, the Developer shall raise the manhole frames and covers to the finished grade of the base course so that the District will have access to the sewer system. The Developer shall then raise all manhole frames and covers to final finished grade of the pavement upon completion of the surface course of pavement. The required raising of manhole frames and covers to the finished grade of the base course of pavement will be determined and specified by the Engineer.
15. All manholes and/or cleanouts shall be adjusted to final grade and the private sewer lateral shall be cleaned to the satisfaction of the Santa Margarita Water District before it is connected to the District's system.
16. All sewer laterals from single family houses shall not be connected to the District's sewer system until the mainline has been air tested and mandrelled per District standards. The lateral shall be cleaned to the satisfaction of the Santa Margarita Water District before it is connected to the District's system.
17. In order to verify acceptable construction, all sewer lines to be owned, operated and maintained by the District, and all sewer laterals, shall be video inspected after cleaning and mandrelling. The Developer shall contract with an independent video inspection company to perform this inspection. Any sewer line or lateral found to be defective shall be repaired and reinspected, including video, prior to being placed in service.
18. Prior to any sewer being placed into service, a high density polyethylene manhole cover insert, manufactured by Flow in Flow, or approved equal, shall be installed on the manhole rim under the manhole cover in conformance with the manufacturer's recommendation. The insert shall remain in place until the street is cap paved, at which time the insert is to be removed from the system by the Developer.

B-3.2 SEWER MAINS

B-3.2.1 Minimum Size. The minimum size sewer main shall be 8 inches in diameter.

B-3.2.2 Minimum Slope Design. All sewers shall be so designed and constructed as to give mean velocities, when flowing half full, of not less than 2.0 feet per second, based on Manning's formula using an "n" value of 0.013 for VCP and 0.011 for PVC.

Sewer mains 12 inches in diameter and smaller shall be designed to flow no greater than half full at design peak flows.

Sewer mains larger than 12 inches in diameter shall be designed to flow no greater than three-quarters full at design peak flows.

The following are minimum slopes that should be provided; however, slopes greater than these are desirable and should be provided whenever possible:

Pipe Size (inches)	Minimum Slope (feet per 100 feet)
8	0.40
10	0.28
12	0.22
15	0.16
18	0.12
21	0.10
24	0.08

B-3.2.3 Types of Pipe. Except as otherwise specified in Section B-2 and as shown on the District's Standard Drawings for sanitary sewers in the vicinity of water mains, the acceptable types of sewer pipe and uses are as follows:

- a. All gravity sewers shall be extra strength VCP, PVC pipe conforming to the requirements of ASTM Specification D 3034 for SDR 35, or Uni-bell Uni-B-7 conforming to the requirements of ASTM Specification F679.
- b. Sewer force mains shall be Class 200 PVC pipe meeting AWWA C 900 standards, or polyurethane lined and coated ductile iron pipe, Class 50 minimum, with mechanically restrained joints and sacrificial anodes.
- c. All sewer service laterals shall be PVC pipe conforming to the requirements of ASTM Specification D 3034 for SDR 35.
- d. Same pipe material shall be used between manholes.

B-3.2.4 Depth to Top of Sewer Mains. The top of the sewer main shall be a minimum of 7 feet below the finished surface, unless otherwise approved by the Engineer. Sewer mains exceeding 16 feet in depth require special approval by the Engineer.

B-3.2.5 Standard Location and Alignment. In local residential and industrial streets, sewer mains shall be located 6 feet from the centerline of the street. In major, primary, and secondary highways, sewer mains shall be located in the center of the driving lane nearest to the center of the street. No sewer main is to be located within a median strip, a parking lane or parking stalls.

Special approval by the Engineer is required for any sewer main which is not located within a paved street. A steel casing may be required for sewers installed within an

easement or below any surface feature. All-weather access roads, a minimum of 12 feet wide, shall be provided for all manholes not located within a paved street.

Barring other limiting design and construction considerations, a maximum separation between sewer and water mains in new subdivisions shall be achieved by the following construction procedures:

- a. On curvilinear streets, the sewers shall parallel as nearly as possible the street centerline by means of horizontal curves.
- b. Sewer mains should normally be installed on the opposite side of the centerline from the water mains, unless otherwise specified or approved by the Engineer.

The minimum horizontal radius of curvature for the various sizes of each of the acceptable types of sewer pipe materials is as follows:

<u>VCP</u> Nominal Pipe Size (Inches)	Minimum Radius of Curvature (feet)		
	<u>(6 Ft. Lengths)</u>	<u>(5 Ft. Lengths)</u>	<u>(4 Ft. Lengths)</u>
8-12	175	150	125
15-24	230	190	150
27-36	340	235	230

<u>PVC</u> Nominal Pipe Size (Inches)	Minimum Radius of Curvature (feet)	
	<u>For Standard 20 Ft. Lengths</u>	
8	240	
10	350	
12	420	
15	490	

B-3.2.6 Siphons. Special approval of the District must be obtained prior to the design of any sewer siphon.

B-3.3 SEWER MANHOLES

B-3.3.1 Manhole Location and Spacing. Manholes shall be located and installed as follows:

- a. At all changes in size, slope, or alignment of sewer mains, including the beginning and end of horizontal and vertical curves as determined by Engineer.
- b. At the end of each sewer main.
- c. At the junction of sewer mains, as well as at the junction of a sewer main and a lateral of the same size as the sewer main.

- d. With vehicular access.
- e. At other locations specified by the District.

The maximum spacing of manholes shall be 400 feet for 8-inch through 15-inch diameter sewers, and 500 feet for sewers greater than 15 inches in diameter. All manholes shall be provided with all-weather vehicular access. A 0.1 foot elevation differential is required through manholes with a straight run and 0.2 foot differential for manholes with an angle.

B-3.3.2 Manhole Type and Sizes. Manholes shall be precast reinforced concrete with eccentric style cones and cast iron frames and covers, conforming to the District's Standard Drawings. The minimum diameter of manholes, frames and covers, shall be as follows:

<u>Manhole Depth (Rim to Invert)</u>	<u>Inside Diameter of Shaft</u>	<u>Diameter of Frame & Cover</u>
5 Ft. or Less (as approved by Engineer)	60"	30" Flat Top
> 5 Ft. through 12 Ft.	48" *	24"
>12 Ft. through 16 Ft.	60"	30"
> 16 Ft. (as approved by Engineer)	72"	36"
Monitoring manholes	48" or 60"	30"

* The maximum size sewer pipe that may be connected to a 48-inch manhole is 18 inches.

Allowable design head losses in manholes are as follows:

- a. Straight run through manholes shall be based on 0.10 foot loss.
- b. Angle turn in manhole shall be based on 0.5 velocity head loss or 0.20 foot, whichever is greater.

B-3.4 SEWER CLEANOUTS

Mainline sewer cleanouts may be required at the discretion of the Engineer as a means of providing wastewater relief from a possible sewage stoppage.

B-3.5 SEWER SERVICE LATERALS

House connection laterals shall be constructed to the property line with a standard Wye and cleanout at the end of the lateral at the property line as shown on the District's Standard Drawings. Cleanout and Wye are not required for single family, detached residential units. There shall be one lateral for each individually owned dwelling unit, unless otherwise approved by the Engineer. Laterals shall be located at the center of

each lot and shall be constructed perpendicular or radial to the property line. If the Developer desires to install a sewer lateral at a location other than in the center of a lot, the improvement plans shall indicate the centerline station of the lateral on the sewer or show a distance from a property corner. In no case shall a sewer lateral be located within 5 feet of a property line. Laterals shall have a minimum cover of 4 feet from the top of the curb to the top of the pipe at the property line. Laterals which are smaller in size than the sewer main to which they connect shall not be connected to the sewer main at a manhole. The minimum size of house connection laterals shall be as follows:

- a. Single family: 4 inches minimum
- b. All other: 6 inches minimum

B-3.6 COMMERCIAL/INDUSTRIAL PRIVATE SEWER SYSTEMS

B-3.6.1 Private Sewer Systems. All plans submitted for review and acceptance for commercial/industrial developments shall have private onsite sewer systems. The District may at the sole discretion of the Engineer require the onsite system to be "public" if it would be of a significant benefit to the District. Each site will be reviewed on an individual basis at the time plans are submitted. As a condition of service, the party responsible for payment of the sewer charges to enter into an agreement with the District acknowledging that the onsite facilities are private and will be properly maintained according to industry standards and further agree to hold the District harmless from any claims on the design, existence, maintenance and operation of the private onsite systems. Standards and standard drawings used for the private onsite system shall be in conformance with the requirements of the responsible regulatory agencies. If Santa Margarita Water District Standard Drawings are used, sewer manholes and cleanouts shall not have "SMWD" cast into the cover.

B-3.6.2 Onsite Sewer Collection. All onsite sewer collection systems for commercial/ industrial developments shall be private and shall be owned, operated and maintained by the property owner up to the District's sewer line in a public street. A cleanout or manhole shall be installed at the property line in accordance with District Standard Drawings. Each building onsite shall have an individual sewer lateral with a monitoring manhole with a straight channel through the base. Monitoring manholes shall be installed in accordance with District criteria. All laterals from a building shall be connected to the main lateral upstream of the monitoring manhole for that building. No lateral connections are to be made downstream of the monitoring manhole. The District's authority to enter on the property for industrial waste discharge is provided in the ordinance for this item and easements for separate ingress and egress will not be required.

B-3.7 SEWER LIFT STATIONS

The detailed design criteria for each sewer lift station will be established by the Engineer based on the specific conditions of each installation on a case-by-case basis.

B-3.8 SEWER FORCE MAINS

Force mains shall be designed according to the following criteria:

- a. The capacity of the force main shall be capable of transferring an amount equal to the design peak flow discharge from the lift station with the criteria below in Section B-3.8b.
- b. Velocities at design flow:
 - (1) Desirable velocity = 3.0 fps
 - (2) Minimum velocity = 2.0 fps
 - (3) Maximum velocity = 6.0 fps
 - (4) Peak Flow Velocity > 3.0 fps
- c. The minimum pipe size shall be 4 inches in diameter.
- d. The minimum cover over the pipe shall be 42 inches below the street pavement finished grade.
- e. Discharge from the force main shall be into a manhole with a smooth flow transition into a gravity sewer.

Section B-4

DESIGN CRITERIA FOR OFFSITE RECYCLED WATER AND NONDOMESTIC WATER FACILITIES

B-4.1 GENERAL RECYCLED AND NONDOMESTIC WATER SYSTEM CRITERIA

B-4.1.1 Standard Requirements. The design and construction of all recycled water and nondomestic water system facilities to be operated and maintained by the District shall be in accordance with these Design Criteria, the District's Standard Specifications, the District's "Standard Special Provisions and Standard Drawings," the District's "Regulations for Nondomestic Water Facilities," as well as the guidelines and requirements of the State and County Health Departments and the State Water Quality Control Board.

No fire hydrants or service connections other than irrigation services shall be connected to the recycled water and nondomestic water system.

B-4.1.2 Calculations Required. Substantiating engineering calculations for demands, pressures and structural designs shall accompany plan submittals to the Engineer when requested.

B-4.1.3 Design System Demands. In general, the design of the recycled water and nondomestic water system facilities shall be based on the water demands, pressure zones and system elements as outlined in the District's applicable recycled water and nondomestic water system Plan of Works. Unless otherwise approved by the Engineer, all recycled water and nondomestic irrigation systems shall be designed with an application rate not to exceed 25 gallons per minute per acre for turf areas and 20 gallons per minute per acre for slope areas. All recycled water and nondomestic irrigation systems shall also include weather based irrigation control systems to reduce outdoor water use by monitoring and using information about site conditions (such as the site's sun exposure, soil moisture, rain, wind, slope, soil, plant type, and more).

B-4.1.4 Design System Pressures. The offsite recycled water and nondomestic water system facilities shall be designed to operate at a minimum pressure of 55 psi at the meter.

B-4.1.5 Improvement Plans. Improvement plans for offsite recycled water and nondomestic water system facilities shall be prepared in accordance with the requirements of Section B-1 and Section B-2.1.6, with the following additional standard notes for the recycled water and nondomestic water system included on the plans:

- (1) All recycled water and nondomestic water mains shall have a minimum cover of 42" below the street pavement finished grade, or be encased in concrete.
- (2) The recycled water and nondomestic water system shall be pressure tested in accordance with the District's Standards.
- (3) All recycled water and nondomestic water facilities included in this work shall be installed in accordance with the District's "Rules and Regulations for Nondomestic Water Service."

B-4.2 RECYCLED AND NONDOMESTIC WATER MAINS

B-4.2.1 Sizes of Mains. The normal minimum size transmission main shall be 8 inches in diameter. The normal minimum size distribution main shall be 6 inches in diameter. No 10-inch or 14-inch diameter mains will be allowed without specific approval of the Engineer. For distribution mains, the maximum allowable design velocity shall be 8 feet per second.

All water mains 12" in diameter and larger shall have a profile shown on the improvement plans.

B-4.2.2 Types and Class of Pipe. Unless otherwise specified or approved by the Engineer, all recycled water and nondomestic water mains shall be purple PVC pipe Class 200 meeting AWWA C 900 standards, except for mains located within an easement through a lot which shall be ductile iron pipe, Class 50 minimum. Ductile iron pipe shall have restrained joints (outside of road right-of-way), and sacrificial anodes. Ductile iron pipe shall be provided with identification tape in accordance with the District's standard drawings.

B-4.2.3 Minimum Depth to Top of Water Main. The top of recycled water and nondomestic water mains shall be a minimum of 42 inches below street pavement finished grade or the main shall be encased in concrete.

B-4.2.4 Standard Location. Recycled water and nondomestic water mains shall normally be located between domestic water mains and sewer mains and shall conform to the separation requirements of Subsection B-1.2.

B-4.3 VALVES

The type and location of nondomestic water system valves shall conform to the requirements of Subsection B-2.3, except that intermediate main line valves shall be located as specified by the Engineer.

B-4.4 SERVICES

Recycled Water and nondomestic water services shall conform to the requirements of Subsection B-2.5.

B-4.5 PUMP STATIONS AND PRESSURE REDUCING STATIONS

All pump stations and pressure reducing stations shall be special designs subject to the approval of the Engineer.

Section B-5

STANDARD PAINT COLORS FOR DISTRICT FACILITIES

<u>Application</u>	<u>Color</u>	<u>Number</u>	<u>Manufacturer</u>
Domestic Water Pump Station Pumps, Motors, Valves and Piping	Blue	7530	Sinclair
Collection System Lift Station and Water Reclamation Plant Piping, Pumps, Motors, Valves, District Sign Background	Light Desert Tan Enamel	2MB30P-1061	DuPont
Recycled/Nondomestic Pump Stations, Piping, Pumps, Motors, Valves	Purple	9600	Devoe
Hydrants	Yellow	7645	Rustoleum
Electrical Panels	Boulder Grey	7519	Sinclair

PART C STANDARD SPECIAL PROVISIONS FOR WATER AND SEWER CONSTRUCTION

Section C-1

INTRODUCTION

It is the District's desire to provide water and sewer service and to standardize wherever possible the design and construction of the facilities to be operated and maintained by the District in a uniform manner District-wide. Therefore, Part "C" has been prepared to incorporate the standard special provisions and standard drawings, to be used in conjunction with the "Standard Specifications for Public Works Construction," latest edition (SSPWC), which has been adopted by the District as its standard specifications for construction of all District water and sewer facilities.

These revised "Standard Special Provisions and Standard Drawings for Water and Sewer Construction" supersede the 2001 edition of this manual previously adopted for construction of District facilities. In conjunction with the District's adopted "Rules and Regulations for Water and Sewer Service," "Rules and Regulations for Nondomestic Water Service," as well as the "Design Criteria and Standard Drawings for Water and Sewer Facilities", these standards will serve as the basic documents which identify and provide the formal guidelines and requirements for obtaining water and sewer service from the District and for the design and construction of District facilities.

The standard special provisions and definitions included in this manual are presented in the same numerical sequence as that contained in the "Standard Specifications for Public Works Construction," latest edition. Each sentence, paragraph, or section of this manual is intended to delete, replace, amend, or supplement the corresponding section in the "SSPWC," as described in each special provision.

PART 1 - GENERAL PROVISIONS

1-2 DEFINITIONS

Add and/or amend all of the following: Whenever the following terms, or pronouns used in their place, occur in these specifications or in any other documents that these specifications govern, the intent and meaning shall be interpreted as follows:

Acceptance - the formal action by the Board accepting the dedication of completed facilities.

Applicant - an owner, his developer, builder, engineer, or other authorized representative who applies as the owner's official agent to the District for domestic water, sewer and, if applicable, nondomestic water service.

Board - the Board of Directors of the Santa Margarita Water District.

Contractor - the person, firm or corporation entering into contract with the owner or developer, or the District, for the performance of work required under said contract and the District's ordinances, rules, regulations and specifications.

County - the County of Orange, State of California.

Design Criteria and Standard Drawings for Water and Sewer Facilities - the District's "Design Criteria and Standard Drawings for Water and Sewer Facilities" latest edition, which is to be used in conjunction with the District's "Standard Specifications"

District - the Santa Margarita Water District, its authorized employees and agents; also known as Agency.

Domestic Water (Potable Water) - that water which is pure and wholesome, does not endanger the lives or health of human beings, and conforms to the latest edition of the United States Public Health Service Drinking Water Standards, the California Safe Drinking Water Act, or other applicable standards.

Inspector - any person authorized by the District to perform inspection of the water and sewer facilities prior to construction, during construction, after construction, and during operation.

Laboratory - the materials testing laboratory authorized by the District to test materials and work involved in the construction governed by these specifications.

Nondomestic Water - water served from the District's off-site nondomestic water facilities, including but not limited to, a combination of treated wastewater and intercepted surface and subsurface stream flow, supplemented by other waters, including domestic (potable) water.

Owner - any holder of legal title, contract purchaser, or lessee of property for which service is requested from the District.

Record Drawings - drawings which show the facilities, including all revisions to the original plans.

Recycled Water - water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

Standard Drawings - the details of standard structures, devices or instructions referred to on the plans or in specifications by title or number; also known as Standard Plans.

Standard Specifications - the "Standard Specifications for Public Works Construction" (SSPWC), "Greenbook" latest edition, published by Building News, Incorporated, 3055 Overland Avenue, Los Angeles, CA 90034 which is the District's Standard Specifications to be used in conjunction with the "Standard Special Provisions and Standard Drawings."

2-5 PLANS AND SPECIFICATIONS

2-5.3.2 Record Drawings

The Contractor shall have on file one set of Contract Drawings, hereinafter referred to as "RECORD DRAWINGS," upon which he shall record all variations between the work as constructed and as originally shown on the Contract Drawings or other Contract Documents. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate fully the work as actually constructed. Said record drawings shall be accessible at all times during the construction period and shall be delivered to the Engineer upon completion of the work.

3-3.2.3 Markup for Extra Work

(a) Work by Contractor. The following percentages shall be added to the Contractor's costs and shall constitute the markup for all overhead and profits:

- 1) Labor20
- 2) Materials.....15
- 3) Equipment Rental15
- 4) Other Items and Expenditures15

In addition to the sum of the costs and markups provided for in this subsection, the Contractor shall also be compensated for the actual increase in the Contractor's bond premium caused by the extra work.

6-8 COMPLETION, ACCEPTANCE AND WARRANTY

6-8.1 Warranty

The Applicant or Contractor shall warranty the work against leaks and breaks due to defective materials or workmanship furnished by the Contractor and against settlement of backfill and damage to resurfacing for a period of one year from the date of Acceptance by the Board. Damage or leaks due to acts of God or from sabotage and/or vandalism are specifically excepted from this warranty.

The date of Acceptance will be the date on which the entire tract or commercial or industrial complex is accepted by the Board, or in the case of a District contract, the date the contract is accepted by the Board. Partial releases are not considered to relieve the Applicant or the Contractor of responsibilities under this section.

When defective material or workmanship is discovered in the work requiring repairs to be made under this warranty, the Applicant or Contractor shall be notified by telephone, and he shall make all repairs at his own expense within three calendar days after receipt of such telephoned notice. This telephone notice will be followed up by written correspondence. Should the Applicant or Contractor fail to repair the damage within the three days, the District may make the necessary repairs and charge the Applicant or Contractor with the actual cost of the repairs. In emergencies demanding immediate attention, the District shall have the right to repair the defect or damage and charge the Applicant or Contractor with the actual cost of all labor and material required.

7-10 PUBLIC CONVENIENCE AND SAFETY

7-10.3 Street Closures, Detours and Barricades

Add the following: "The Contractor shall also provide traffic control in accordance with the "State of California Manual of Traffic Controls For Construction and Maintenance Work Zones," latest edition, including supplements to date published by Building News, Incorporated, 3055 Overland Avenue, Los Angeles, CA 90034. This handbook shall apply to all street closures, barricades, detours, lights, signs, temporary bridges or other required safety devices. Temporary bridges proposed for public use by the Contractor shall be approved in advance by the Engineer, and shall be clearly posted as to load limit as provided in "Work Area Traffic Control Handbook."

PART 2 - CONSTRUCTION MATERIALS

203-1 PAVING ASPHALT

Add the following: "Paving asphalt shall meet requirements set forth by the County of Orange or applicable city, latest revision."

207 PIPE

Unless specifically authorized by the Engineer, pipe manufactured from the following materials are not permitted for use: ABS (Acrylonitrile-Butadiene-Styrene); RPM (Reinforced Plastic Mortar); RTR (Reinforced Thermosetting Resin); ACP (Asbestos Cement Pipe); RCPP (Reinforced Concrete Pressure Pipe), CCP (Concrete Cylinder Pipe, CCFRPM (Centrifugally Cast Fiberglass Reinforced Plastic Mortar Pipe).

207-10 STEEL PIPE

207-10.2.2 Design Criteria

Revise second paragraph to read: "Steel cylinders shall have a wall thickness of not less than 10 gage (0.135 inch or 3.43 mm) for all pipe diameters." Interior pipe joint sealant shall be used on all CML&C steel pipe less than 24-inches in diameter; the sealant shall be Product No. GS-79 manufactured by General Sealants Corporation or approved equal.

207-10.2.8 Welding

Add to first paragraph: "Field hand welding shall be done by certified welders in accordance with the latest edition of AWWA C206 by welders qualified under the standard qualification procedure of the ASME Boiler and Pressure Vessel Code, Section IX, Welding Qualifications."

207-25 POLYVINYL CHLORIDE PLASTIC PRESSURE PIPE (PVC)

207-25.1 General

Polyvinyl chloride plastic pressure pipe shall be used for water mains 4, 6, 8 and 12-inches in diameter, unless specified otherwise. PVC pressure pipe shall be Class 200 meeting the requirements of AWWA C-900, for 12 inches and under, and shall have integral bell and spigot joints with elastomeric gaskets. PVC pressure pipe shall be Class 235 meeting the requirements of AWWA C-905 for pipes greater than 12 inches. The pipe shall be as manufactured by J-M Manufacturing Company or equal.

207-25.2 Material Requirements

Material used to produce the pipe shall be made from Class 12454-B rigid polyvinyl chloride compounds, or better, as specified in ASTM D 1784, with an established hydrostatic

design basis (HDB) equal to or greater than 4000 psi for water at 73.4°F (23°C). Elastomeric gaskets shall comply with the requirements specified in ASTM F477.

207-25.3 Conformance Requirements

All PVC pressure pipe shall be manufactured in strict accordance with the latest revisions of AWWA C900 and C905 and the applicable ASTM standards listed therein. The manufacturer shall furnish an affidavit that all delivered materials comply with the requirements of AWWA C900 and these specifications.

207-25.4 Fittings

All fittings for PVC pressure pipe shall be ductile or cast-iron and shall be in accordance with the latest revisions of AWWA C110, C153, C111, C104 and Section 207-9 of the Standard Specifications for Public Works Construction (SSPWC). All fittings shall be push-on type and be thrust-blocked and anchored in accordance with SMWD Standard Drawing W12 and W15.

207-25.5 Service Saddles

All service connections to PVC pressure pipe water main shall be constructed with bronze service saddles with IP threads for receiving a bronze corporation stop in accordance with SMWD Standard Drawings W1, W1A, W2, W3, ND1, RW2 and RW2A. Service saddles for PVC pressure pipe shall be manufactured to provide full support around the circumference of the pipe and have a minimum width of 2 inches along the axis of the pipe in order to provide full bearing and prevent distortion of the pipe when the saddle is made tight per manufacturers' requirements for torsion.

207-25.6 Installation

PVC pressure pipe shall be installed in accordance with AWWA C900 and C905 as last revised. Pipe bedding shall provide uniform longitudinal support under the pipe, in accordance with SMWD Standard Drawing No. W11. All pipe embedment material shall have a minimum sand equivalent (SE) of 30. Initial backfill material shall be worked under the sides of the pipe to provide satisfactory haunching and be hand tamped to 90% minimum relative compaction. Embedment material placed from the pipe springline to 12 inches above the pipe shall also have a minimum SE of 30 and may be compacted concurrently with the backfill. After placement and compaction of the backfill in the pipe zone, the balance of backfill materials may be machine placed. The material shall contain no large stones, rocks or foreign debris. Proper compaction procedures shall be exercised to provide required densities.

207-25.7 Hydrostatic Test for PVC Pressure Pipe

The PVC pressure pipe shall be tested at a hydrostatic pressure of 50 psi over maximum rated operating pressure of the pipe, for a duration of two (2) hours minimum for each test. Temporary or permanent thrust blocks shall be cast-in-place, as required, prior to tests, and the

Contractor shall provide all necessary braces, plugs, thrust blocks, caps, flanges, and other materials to permit proper conduct of the pressure testing. Concrete thrust blocks shall be cast not less than 5 days before the test.

207-25.7.1

No installation shall be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{ND\sqrt{P}}{7,400}$$

Where L = allowable leakage (gal/hr)
N = number of joints in the tested line
D = nominal diameter of pipe (in.)
P = average test pressure (psi)

The hydrostatic test shall be performed by an independent testing company approved by the District. The duration of the test shall be not less than 2 hours, and measurement shall be made by means of a calibrated suction tank showing the amount of water required by the test pump to maintain accurately the required test pressure. Test reports with original leakage readings shall be furnished by the Contractor to the Engineer.

207-25.7.2

Testing of pipe and piping appurtenances shall be conducted by installing test heads at the locations indicated by the Engineer and testing the pipe in separate reaches; provided that the Contractor will not be required to separately test pipe reaches of less than 1,000 feet in length. Furnishing, installation and removal of test heads shall be included in the price bid for the various kinds of pipe, and no additional payment will be made therefore.

207-26 HIGH DENSITY POLYETHYLENE PRESSURE PIPE (HDPE)

207-26.1 General

All HDPE (High Density Polyethylene) Pressure Pipe shall be manufactured in accordance with the latest revision of AWWA C-906. HDPE Pressure Pipe shall be a minimum of Class 200 or DR 9.0.

207-27 PIPE APPURTENANCES

207-27.1 General

Unless otherwise specified, all pipe appurtenances shall comply with the specifications herein and the appropriate Standard Drawing for the Santa Margarita Water District.

207-27.2 Valves

The flanges of valves shall be flat faced with full faced gaskets unless otherwise specified. Flanges of valves for water-working pressures of 175 psi or less shall be faced and drilled to 125-lb American Standard dimensions. Flanges of valves for water-working pressures greater than 175 psi shall be faced and drilled to 250-lb American Standard dimensions.

Unless otherwise specified, each valve body shall be shop tested under a test pressure equal to twice its design water-working pressure.

Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of the "Specification for Composition Bronze or Ounce Metal Castings" (ASTM B62). All interior stainless steel components shall be at a minimum, Type 18-8 stainless steel.

Except where otherwise provided, ferrous surfaces, exclusive of stainless steel surfaces, in the water passages of all valves, 4 inch and larger, and all air release and vacuum valves, regardless of size, shall be factory epoxy-coated by the valve manufacturer in accordance with AWWA C550, latest edition. Epoxy coatings shall be holiday free and fully cured prior to delivery to the project site. The exterior of all valves for buried service shall be either epoxy-coated or painted with asphaltic varnish. The epoxy lining and coating of all valves will be inspected by the District prior to any valve being installed. The Contractor shall notify the District seven days prior to valve installation to arrange for inspection.

Where, in the Engineer's opinion, because of the nature of the item being coated, it would be impossible to use fusion bonded powder epoxy method without causing damage to the item, the use of a liquid epoxy factory applied by the manufacturer of the item being coated will be permitted. Said liquid epoxy shall be 3-M Company epoxy primer and "Scotchkote" 312 or 314, or approved equal. The use of liquid epoxy other than those specified, including the equipment manufacturer's proprietary coating system, must be reviewed and approved by the Engineer prior to use.

207-27.2.1 Butterfly Valves

General

Butterfly valves, actuators and the materials used in their manufacture shall comply with the most recent revision of AWWA C-504 standards, NSF 61 and as modified herein.

The design pressure for butterfly valves shall be AWWA C504-2000 Class 150B or Class 250B as called out in the plans. Unless otherwise noted, where static line pressure is above 150 psi, Class 250 valves shall be used and shall mate to the adjoining flanges.

The valve manufacture's name, year of manufacturer, valve size, model number, and rated design pressure shall be cast on the body of each valve or by a permanently attached

stainless steel tag per AWWA C504 requirements. The operating direction to open shall be left and to close shall be right or as indicated on the plans.

Construction

Butterfly valves shall be of the tight closing, rubber seat type suitable for either underground or aboveground installation. Valves shall have the rubber seat mounted in the body of the valve and shall shut-off bubble-tight at the maximum rated design pressure bi-directionally (Valves shall be designed for flow in either direction). Valves shall be suitable for very infrequent operation after extended periods of activity. All exterior fasteners shall be 316 stainless steel.

Valves shall be short body and shall be constructed of ductile iron ASTM A-536 65-45-12. Flanged end valves shall be faced and drilled per ANSI B16.1, Class 150, Class 250 or Class 250 with ANSI B16.1 125 # drilling as noted on the plans or called out specifically herein.

Rubber seats shall be Peroxide cure EPDM. Sulfur cured EPDM and Buna-N are not acceptable. As seat materials are black, a dated signature from an authorized factory agent stating peroxide cured EPDM was/will be supplied, shall accompany submittals. Rubber body seats shall be of one-piece construction molded, bonded or retained in the valve body. Valves that use fasteners and retaining hardware to retain the seats or valves that have seats located on the valve disc are not allowed.

Shafts and disc shaft fasteners for butterfly valves rated at 150 psi shall be constructed of ASTM type 304 or 316 stainless steel. Shafts and disc shaft fasteners for butterfly valves rated at 250 psi shall be constructed of 17-4 H1100 stainless steel. Valve packing shall be of the self-adjusting Chevron type. The valve shall be fitted with non-metallic sleeve type bearings that are corrosion resistant and self-lubricated.

Discs for butterfly valves shall be comply with AWWA C504 and shall be ductile iron A536, Grade 65-45-12 or 70-50-05 or cast iron ASTM A48, Class 40 or cast iron ASTM A126, Class B. Valve disc edge shall be 316 stainless steel. The valve disc shall be secured to the shaft by means of solid, smooth sided, stainless steel or Monel taper pins or dowel pins having a circular cross section. Each taper pin or dowel pin shall extend through the shaft and shall be mechanically secured in place. Torque plugs or tangential fasteners shall not be allowed.

Coatings

All interior ferrous surfaces exposed to fluid shall be factory coated with two or more coats Ameron Amerlok 400, Amercoat 370 or Tnemec 140F PotaPox epoxy coating to a minimum Holiday free internal dry film thickness of 16 mils. All exterior ferrous surfaces shall be factory coated with two or more coats, Amerlok 400, Amercoat 370 or Tnemec 140F PotaPox epoxy coating to a minimum dry film thickness of 16 mils. The manufacturer of the valve shall

repair Field damage to the epoxy coating if required. Certification that the epoxy was applied at the valve manufacturers' factory shall be forwarded to the engineer before the valves are installed.

Testing

All valves proposed shall be leak and hydro tested in both directions by the valve manufacturer at the factory. Testing shall be 150 psi for class 150 valves and 250 psi for class 250 valves. Certified test results for each valve shall be forwarded to the consultant or District to review. All butterfly valves and butterfly valve actuators shall have successfully passed proof of design testing per AWWA C504-2000. Certified test results shall be forwarded to the consultant engineer with valve submittals.

Manufacturers

The valve manufacturer shall have 10 years experience manufacturing butterfly valves. Approved valve manufacturers shall be Henry Pratt, Dezurik or Mueller.

207-27.2.2 Resilient Wedge Gate Valves

Resilient wedge valves shall conform to the latest edition of AWWA C509. Valves shall be of the class and end type shown on the plans, and may be used only for nominal pipe sizes less than 12 inches in diameter. Cast-iron wedge shall be fully encapsulated with resilient material to meet ASTM tests for rubber to metal bond ASTM D429. All body bolts shall be Type 316 stainless steel. Valves shall be provided with a 2-inch square operating nut and open by turning counterclockwise. Valves shall be manufactured by Stockham, M & H, Clow, AFC, Mueller or approved equal.

207-27.3 Mechanical Couplings

Mechanical couplings shall be furnished where shown and shall be equipped with Grade H rubber gaskets.

207-27.4 Sleeve-Type Couplings

Sleeve-type couplings shall be furnished where shown, and shall be Dresser Style 38 standard length or Style 40 long sleeve; or approved equal, as required. Couplings shall be of steel, without pipe stop, and shall be of sizes to fit the pipe and fittings shown. The middle ring shall not be less than ¼-inch in thickness, and shall be either 5 or 7 inches long for standard couplings. Buried sleeve-type couplings shall be epoxy-coated with 100 percent pure epoxy, fusion-bonded, and provided with Type 316 stainless steel bolts and nuts.

207-27.5 Gaskets

Except as otherwise provided, gaskets for flanged joints shall be 1/16 thick laminated, Cranite, or approved equal.

Wherever blind flanges are shown, the gaskets shall consist of 1/16-inch thick reinforced rubber which shall cover the entire inside surface of the blind flange and shall be cemented to the surface of the blind flange.

207-27.6 Insulating Couplings

Where shown, pipe or fittings made of non-ferrous metals shall be isolated from ferrous metals by Lochinvar "V"-line insulating couplings rated at 1,000 psi as distributed by Corrosion Control Products Company, or approved equal.

207-27.7 Copper Tubing and Solders

Copper tubing shall conform to the requirements of the "Specifications for Seamless Copper Water Tube" (ASTM B88), and shall be Type "K" soft as manufactured by Anaconda, Phelps-Dodge, or Revere. Solder used in joining copper pipe and fittings shall be a "Silver Solder" composed of not less than 15% Silver (Ag.), not less than 80% Copper (Cu.), and not more than 5% Phosphorus (P.). Solders containing filler elements, other than those specified, such as Lead (Pb.), Zinc (Zn.), Cadmium (Cad.), Nickel (Ni.) or Tin (Sn.), will not be permitted.

207-27.8 Thrust Blocks and Anchor Blocks

Concrete thrust and anchor blocks shall be installed at the location and in accordance with the positions and dimensions as shown on the Standard Drawings. The District may direct any change in direction, location of dimension for field conditions or soil conditions which may arise.

207-27.9 Coating

All exposed buried ferrous metal appurtenances in contact with soil or groundwater, including pipe, flanges, nuts, bolts and valves, etc., shall be coated with Bitumastic 50 protective coating or approved equal.

207-27.10 Tracer Wire for Non-Metallic Pipelines

Copper tracer wire shall be installed with all non-metallic pipelines just below the horizontal centerline of the pipe, for the purpose of providing a continuous signal path for electronic pipe locators used to determine pipe alignment after installation. The copper wire shall be #12 Cu. with HMWPE insulation. The wire shall be electrically continuous throughout the entire piping system including adjacent fire hydrant assemblies. At hydrants, the wire shall be extended up the bury and secured by a cable lug under the top nut of one set of breakaway bolts. At cul-de-sacs, the wire shall be placed in the same trench with the last long side service lateral and extended into the meter box. All splices shall be made with splice kits, as manufactured by 3M, or approved equal. The wire shall be tied to the pipe at 10-foot intervals with plastic adhesive tape. The District will perform the initial electrical continuity test at no additional expense to the Developer. All subsequent testing required, due to failure of the tracer wire to be electrically continuous, shall be at the expense of the Developer.

PART 3 - CONSTRUCTION METHODS

300-4 UNCLASSIFIED FILL

300-4.7 Compacting

Delete second paragraph and add new paragraph to read: "Each layer of earth fill shall be placed in 8-inch lifts and compacted to obtain a relative compaction of not less than 90% as determined by ASTM D-1557, latest revision, or as specified by the Soils Engineer."

302-5 ASPHALT CONCRETE PAVEMENT

The provisions of this section are revised as appropriate to include the following: "Asphalt concrete pavement shall meet the requirements of Standard Plan 1805 of the Orange County Environmental Management Agency, latest revision."

306-1 OPEN TRENCH OPERATIONS

306-1.2.2 Pipe Laying

Add the following paragraph: "Unless otherwise specified, all pipe shall be transported, handled, and installed in strict accordance with the pipe manufacturer's recommendations."

306-1.2.3 Field Jointing of Clay Pipe

Revise the first paragraph to read: "Only Type "G" joints are acceptable for vitrified clay pipe (VCP)."

306-1.2.6 Field Jointing of Iron Pipe

(a) General

Delete paragraph and add new paragraph to read: "The type of joint to be used shall be as indicated on the plans or in the specifications and shall conform to the latest edition of AWWA C111 and C115."

306-1.2.12 Mandrel Test of PVC Sewer Pipe

Add new paragraphs to read "Mandrel testing will be performed only in the presence of the District Inspector and only after all adjacent wet and dry utilities have been installed, backfilled and compacted."

All material, equipment and labor to perform the test shall be provided by the Contractor at no cost to the District.

If obstructions are encountered which require repair of the pipeline, labor to perform the retest shall be provided by the Contractor at no cost to the District”.

306-1.2.13 Installation of Plastic Pipe and Fittings

Installation of PVC Pressure Pipe shall conform to Section 207-27.6 of these Standard Specifications. Installation of Plastic Sewer Pipe shall conform to the Standard Drawings.

306-1.2.14 Field Jointing of Steel Pipe

Field-welded joints shall conform to the Standard Drawings and the latest edition of AWWA C206.

306-1.2.15 Filling Pipelines from Existing Water Facilities

No connection shall be made to a District facility for the purpose of filling a pipeline unless a properly tested and certified backflow assembly is installed between the District facility and the pipeline to be filled.

306-1.2.16 Connections to Existing Facilities

All connections shall be made by the Contractor unless otherwise shown on the plans or specified herein. The Contractor shall give the District a minimum of two working days notice before the time of any proposed shutdown of existing mains or services. If any proposed shutdown of existing watermains or services will result in customer outages, a minimum of 5 working days notice shall be given to the District Inspector. Connections shall be made only in the presence of the District Inspector, and no connection work shall proceed until the District has given notice to proceed. The Contractor shall furnish all pipe and materials, including furnishing all labor and equipment necessary to make the connections, all required excavation, backfill, pavement replacement, lights, and barricades, and the Contractor may be required to include a water truck, highline hose, and fittings as part of their equipment for making the connections. In addition, the Contractor shall assist the District in alleviating any hardship incurred during the shutdown for connections. Standby equipment or materials may be required by the District Inspector.

Where connections are made to existing valves, the Contractor shall furnish and install all temporary blocking, steel clamps, shackles, and anchors as required by the District Inspector, and the Contractor shall replace the valve well and cover and adjust the valve cover to the proper grade in accordance with the Standard Drawings.

The District will operate all existing valves. The Contractor will dewater existing mains, per all permits and applicable regulations, as required, in the presence of the District Inspector. All valves, existing or newly installed, shall be readily accessible at all times to the District Inspector for emergency operation.

Prior to connection, all existing stub-outs will be thoroughly flushed by the Contractor until water is clean and system chlorine residual is detected. After the connection is complete, the closure pipe and new system will be thoroughly flushed. Valves at the points of connection will be shutdown and additional bacterial samples will be taken from the new system. Valves at the points of connection can be opened by the District only with satisfactory bacterial test results.

In the event that customer outages are necessary in order to make a connection, the existing stub-out will be thoroughly flushed and a bacterial sample taken. The connection will be permitted only with satisfactory bacteria test results.

The District Inspector may postpone or reschedule any shutdown operation if for any reason he feels that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection work. If progress is inadequate during the connection operations to complete the connection in the time specified, the District Inspector shall order necessary corrective measures. All costs for corrective measures shall be paid by the Contractor.

The Contractor shall be responsible for determining in advance the grade of all existing pipelines to which connections are to be made. Connections shall be made with as little change as possible in the grade of the new main. If the grade of the existing pipe is below that of the new pipeline, a sufficient length of the new line shall be deepened so as to prevent the creation of any high spot or abrupt changes in grade of the new line. Where the grade of the existing pipe is above that of the new pipeline, the new line shall be laid at specified depth, except for the first joint adjacent to the connection, which shall be deflected as necessary to meet the grade of the existing pipe. If sufficient change in direction cannot be obtained by the limited deflection of the first joint, a fitting of the proper angle shall be installed. Where the connection creates a high or low spot in the line, a standard air release or blowoff assembly shall be installed as directed by the District Inspector.

In no event shall the new pipelines be connected to existing facilities until the new pipelines have been successfully pressure tested and disinfected.

The District does not guarantee the condition of existing facilities. It is the Contractor's sole responsibility to provide acceptable pressure testing at his new installation.

306-1.3 Backfill and Densification

The compaction provisions of this section are amended as follows: "Unless otherwise specified, all trench backfill and bedding shall be compacted to 90 percent minimum relative compaction."

306-1.3.2 Mechanically Compacted Backfill

Add the following to the last sentence of the first paragraph:

". . . , except under the following situations;

- a. Sewerline Trenches -
The Contractor shall place backfill in accordance with Section 300-4.7, as amended herein, to a minimum depth of five (5) feet above the pipe before using impact, free-fall, or "stomping" type equipment.
- b. Waterline Trenches -
Where densities are required which cannot be attained by water densified backfill in accordance with Section 306-1.3.3, the Engineer may authorize the use of impact, free-fall or "stomping" type equipment to supplement the densification of the backfill."

306-1.4.4 Air Pressure Test

Add new paragraph to read "A final air pressure test of gravity sewer pipelines will be performed only in the presence of the District Inspector and only after all adjacent wet and dry utilities have been installed, backfilled and compacted."

306-1.4.8 Video Inspection

District personnel will not perform the required video inspection for developer funded tract or District funded sewer pipelines. It shall be the responsibility of the Contractor to contract with an independent video inspection company to perform the required video inspection of developer funded tract pipelines. This video inspection shall be performed after the successful completion of the air pressure test and mandrel test for PVC sewer or air pressure test for VCP sewer and prior to the certificate of occupancy by the District. All mains and sewer laterals shall be video inspected. Video inspection of laterals will be permitted only after the house connection has been made. The Contractor shall give the District Inspector a minimum of 48 hours notice prior to this video inspection. A digital copy of the video inspection of the inspected pipeline shall be delivered to the District inspector for approval.

306-1.4.9 Disinfecting Water Mains and Services

All water mains, water services, attached appurtenances, and connections, if any, shall be disinfected in accordance with AWWA C-651, latest revision, and as specified herein. Disinfection is required prior to connection to existing facilities.

Before being placed in service, all facilities shall be chlorinated. Chlorine shall be applied by the direct chlorine gas feed method unless otherwise authorized by the Engineer.

Chlorine gas shall be fed directly from the chlorine cylinder equipped with a suitable device for regulating the rate of flow and the effective diffusion of gas within the pipe. During the chlorination process, all valves and appurtenances shall be operated.

Two (2) inline check valves shall be installed between the injection device and the point of connection on the main being disinfected to prevent a cross-connection with the water supply source.

The chlorinating agent shall be applied at the beginning of the section to be chlorinated and shall be injected through a corporation stop, a hydrant, or other approved connection to ensure treatment of the entire system being disinfected. All required corporation stops and other plumbing materials necessary for chlorination or flushing of the main shall be installed by and at the expense of the Contractor.

Water shall be fed slowly into the pipeline with chlorine applied in amounts to produce a dosage of not less than 50 ppm or more than 100 ppm in all sections of the pipeline and appurtenances. Treated water shall be retained in the system for a minimum of 24 hours and shall produce at the end of the retention period not less than 35 ppm chlorine residual in all sections being disinfected. The Contractor shall furnish all equipment in good operating condition, labor and material, and water necessary for chlorinating and flushing the pipeline and for certification of the pipeline disinfection.

Disinfecting the mains and appurtenances, hydrostatic testing, and preliminary retention may run concurrently for the required 24-hour period, but in the event there is leakage and repairs are necessary, additional disinfection shall be made by injection of chlorine solution into the line as described above.

In the event groundwater is encountered and it is impossible to prevent its entrance into the mains, or the mains are not free from dirt, they shall be thoroughly flushed prior to disinfection. Only the direct chlorine gas feed method shall be used. After the required period of retention of the chlorine gas solution, a District representative will test the water for residual chlorine and will make any additional test that may be necessary, free of charge to the Contractor. Two working days' notice to the District is required for testing.

If the tests are not satisfactory, the Contractor shall provide additional disinfection as required.

Every service connection served by a main being disinfected shall be tightly shutoff at the curb stop before water is turned into the main. Care shall be taken to expel air from the main and service during the filling operation.

After chlorination, the water shall be flushed from the line at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. The chlorinated water may be used later for testing other lines, or if not so used, shall be dechlorinated, desilted and disposed of by the Contractor per applicable state and/or local regulations. The District will not be responsible for loss or damage resulting from such disposal.

306-1.4.10 Ball Test for VCP Gravity Sewers

After completion of all work, except street or trench resurfacing, a wayne sewer ball equal to the nominal diameter of the pipe and approved by the Engineer, shall be sent through VCP sewers from the uppermost structure. Use of a "free ball" will not be permitted. The Contractor shall, at his own expense, furnish all materials including water for carrying out the operation and removing any obstructions that prevent the ball from traveling through the pipe.

306-1.4.11 Electrical Continuity Test of Metal Pipelines and Non-Metallic Pipeline Tracer Wire

Unless otherwise approved by the Engineer, all metallic pipelines requiring joint bonding, including mortar lined and coated steel pipe (ML&C) and ductile-iron pipe (DIP), and non-metallic pipeline tracer wire, shall be tested for electrical continuity upon completion of construction and prior to acceptance by the District. The Contractor will contract with an independent continuity testing company to perform the testing at no expense to the District.

The testing shall be done by qualified personnel using Metrotech #850 pipe locator equipment by methods outlined below. The Electrolysis Test Stations (ETS) and Tracer Wire Access Stations (TWAS) are to be utilized for this purpose. Measurements are to be recorded beginning at each ETS or TWAS and at equally spaced intervals equal to or shorter than the pipe joint lengths. All measurements recorded shall be those taken over the pipe centerline as indicated on the Metrotech pipe locator display and with the locator held in a true vertical position with the instrument readout up and antennae pointed down.

The Metrotech #850 pipeline locator readings of "Signal Level" and "Pipe Depth to Centerline" when taken with the instrument in a vertical position over centerline of the pipe with the instrument nose placed in contact with earth is to be used to calculate "LOG Signal Level" at constant depth. A plot of LOG Signal Level (at constant depth) vs. Distance from ETS or TWAS is to be compared with that for an all welded pipe of similar diameter. Plots of data taken over a joint bonded pipeline are to have a "slope" with Distance from ETS that is unvarying and similar to that for welded pipe to demonstrate satisfactory electrical continuity of pipe joints. Only those data taken with the Metrotech #850 Signal Generator operating at a constant eight watts output are to be compared.

The Contractor shall correct all faults in electrical continuity and retest the pipeline in the manner described above at no additional cost to the District.

PART D APPENDICES

1. Application to the Santa Margarita Water District for Construction Development of Domestic Water, Sewer and Recycled Water Service
2. Bill of Sale - Domestic Water System Facilities
3. Bill of Sale - Sewer System Facilities
4. Bill of Sale – Recycled Water and Nondomestic Water System Facilities
5. Cost of Construction Statement - Domestic Water System
6. Cost of Construction Statement - Sewer System
7. Cost of Construction Statement – Recycled Water and Nondomestic Water System
8. An Ordinance of the Santa Margarita Water District Instituting a Cross-Connection Control Program to Protect the Public Water System
9. District Fire Flow Design Standards
- 10 Summary of Steps Required to Obtain "Will Serve" Letter and Process Improvement Plans

UPDATED

SANTA MARGARITA WATER DISTRICT

Appendix 1

**APPLICATION TO THE SANTA MARGARITA WATER DISTRICT
FOR CONSTRUCTION DEVELOPMENT OF DOMESTIC
WATER, SEWER, AND RECYCLED WATER SERVICE**

The undersigned, hereinafter referred to as "Applicant," hereby requests approval for the extension of certain sewer service and the extension of certain water service by the Santa Margarita Water District, hereinafter referred to as the "District", in accordance with the Rules and Regulations of the District, as amended from time to time including, but not by way of limitation, its "Design Criteria and Standard Drawings for Water and Sewer Facilities," to that certain real property of said Applicant, in the County of Orange, State of California, consisting of approximately _____ acres, and described as follows:

Applicant hereby applies for that domestic water, sewer, and recycled water service, which can be provided by the facilities described below, in accordance with the Rules and Regulations of the District, as amended from time to time, for the purpose of:

Residential _____ units Commercial _____ sq. ft.
Irrigation Domestic _____ acres Irrigation Recycled _____ acres

Applicant hereby represents that Applicant is the _____ of said real property. Applicant estimates that the total service to be required of the District upon ultimate development of said real property is as follows:

1. Applicant hereby agrees to build or cause to be built the facilities as designed in accordance with the approved master plan for the project and the final improvement plans, and agrees to pay all costs of installation of same, including, but not limited to, cost of labor, materials, equipment, Contractor's expense and profit, engineering, inspection, plan review, land and easement acquisition, condemnation, and attorney's fees.
2. Applicant agrees that the facilities described herein shall be constructed in accordance with plans approved by the District and applicable specifications of the District by a Contractor licensed by the State of California to install said facilities.
3. Applicant guarantees the facilities constructed under this Application against defects in workmanship and materials for a period of one year after the date of acceptance by the District. It is further agreed that these facilities shall be restored to full compliance with the requirements of the plans and specifications previously referred to herein, including any test determined to be deficient with respect to any provisions of the plans or specifications. This guarantee is in addition to any and all other warranties, express or implied, with respect to such facilities, including hidden and latent defects.

4. Applicant agrees to provide the District with a report of the costs of such facilities on the standard bill of sale form of the District, and upon request from the District, to substantiate such report with evidence satisfactory to the District.
5. Applicant agrees to grant, or cause to be granted, to the District, without cost to the District, all necessary easements for the construction, installation, and maintenance of said facilities across all privately owned lands to be traversed by said facilities, which easements shall be in a form and condition of title satisfactory to the District and shall be executed by all necessary parties having an interest in said lands.
6. Applicant agrees to provide to the District, prior to acceptance of the facilities described herein, a digital graphics file as outlined in the District's Design Criteria and Standard Drawings for Water and Sewer Facilities and a complete set of reproducible mylars, or .004 mil (which may be corrected construction drawings, i.e., street improvement plans for a tract), of said facilities, signed by the civil engineer who prepared the drawings.
7. Applicant agrees that he will execute and deliver a proper bill of sale, on the standard form of the District, of the facilities described herein to the District, its successors and assigns; and such facilities will become the property of the District when said bill of sale is accepted by its Board of Directors. However, it is also understood and agreed that Applicant hereby disclaims in favor of the District all right, title, an interest in and to said systems, appurtenances, and easements; and that Applicant hereby covenants and agrees to execute and deliver to the District any documents required to complete the transfer of the said facilities concurrently with the acceptance by the District; and that Applicant hereby agrees that Applicant is holding any title to said facilities, pending acceptance by the District, as trustee, acknowledging Applicant's obligation to complete said facilities and transfer the same debt-free to the District.
8. Applicant agrees that the above provisions shall not preclude the use of said facilities by the property owners within the developed area or outside of said development prior to such delivery of bill of sale to the District, as long as the quality of said water and sewage is acceptable to the District under its Rules and Regulations and approval has been obtained from the District for permission to connect to said facilities or to existing facilities. Applicant agrees that the use of said facilities by the Applicant, transferee, or assignee of the Applicant, or others within the District will not constitute acceptance of such facilities by the District.
9. Applicant agrees to hold the District harmless from any expense or liability resulting from construction of the facilities described herein, and further agrees that Applicant will indemnify the District and will hold it, its agents, employees, officers, and representatives free and harmless from and against any and all liabilities for death, injury, loss damage, or expense (including reasonable attorney's fees) to person or property which may arise or is claimed to have arisen as a result of any work or action performed by Applicant or on behalf of Applicant with respect to the construction and in the installation or repair of such facilities. Applicant shall not be responsible for claims resulting from District's sole negligence.

District makes no representation, warranty or guarantee of any kind with respect to the suitability of its water supply for use with, compatibility with, or interaction of its water supply with any materials, components, products or fixtures which are incorporated into or utilized in any improvements upon the real property which is the subject of this Application. Applicant and Property owner assume all risk of, responsibility and liability for and further agree to fully defend, indemnify and hold harmless the District, its agents, employees, officers and representatives with respect to, any and all consequences, conditions, injury, damage, loss or expense, including reasonable attorney's fees, which may arise or are claimed to have arisen as a result of unsuitability of use with, compatibility with, or interaction of the District's water supply with any materials, components, products or fixtures which are incorporated into or utilized in any improvements upon the real property which is the subject of this Application.

10. Applicant hereby agrees to pay all administration and engineering fees (including inspection and plan review costs) calculated as a percentage of the total cost used for bonding purposes, as established by the District, as well as water meter charges, and any other applicable fees and charges as established by the District Board of Directors and presently in effect. Fees and charges indicated herein are not subject to adjustment or refund.

Applicant further agrees to pay all fees and charges as set forth in this section as a condition of approval by the District of the improvement plans for the proposed development. In the event Applicant fails to pay said charges as specified herein, this Application shall be of no further force and effect.

11. Applicant agrees to accept such conditions of pressure and service as are provided for by District's sewer and water supply systems at the location of all proposed connections thereto and to hold the District harmless from and against any and all damages, liability, and expense arising out of high- or low-pressure conditions with respect thereto or from interruptions of service. The District does not guarantee pressure or flow rates which may vary from time to time.
12. Applicant further agrees that any rights hereunder shall be assignable only after giving notice to the District.
13. Applicant agrees, if District employs an attorney to enforce this Application, to pay District for all attorneys' fees so incurred; provided, however, if Applicant is contesting one or more of the provisions of the Application, and a court of competent jurisdiction rules in favor of Applicant on all of its contentions, District shall pay its own attorneys' fees.
14. Applicant agrees to abide by all of the foregoing provisions. Applicant agrees that the District may enter upon the hereinabove described property for the purpose of ascertaining whether the provisions of this Application are being performed.
15. Applicant agrees to use recycled water when it is available.

IN WITNESS WHEREOF, the parties have duly caused their authorized signatures to be attached hereto. SIGNATURES MUST BE NOTARIZED.

APPLICANT:

PROPERTY OWNER:

By _____

By _____

By _____

By _____

Date _____

Date _____

SANTA MARGARITA WATER DISTRICT

Appendix 2

BILL OF SALE

DOMESTIC WATER SYSTEM FACILITIES

For good and valuable consideration, receipt of which is hereby acknowledged, the undersigned does hereby transfer and convey to the Santa Margarita Water District, a California Water District organized under State Law, and its successors and assigns, all right, title, and interest in and to the water installation, including pipelines, valves, service connections, fire hydrants, meters, other appurtenances to said water installation, constructed, installed, and located in the property described below, and further warrants that the same is free and clear of any encumbrances.

Said property is described as follows:

Executed this ____ day of _____, 20__.

Company or Corporation Name:

By _____

President

By _____

Secretary

CERTIFICATE OF ACCEPTANCE

As per Resolution No. ____ as set forth in the minutes of a meeting of the Board of Directors of the Santa Margarita Water District held on _____, the above Bill of Sale of Domestic Water System Facilities, dated _____, is hereby accepted by order of the Board of Directors of the Santa Margarita Water District, a California Water District organized under State Law.

Date of Acceptance _____.

SANTA MARGARITA WATER DISTRICT

Appendix 3

BILL OF SALE

SEWER SYSTEM FACILITIES

For good and valuable consideration, receipt of which is hereby acknowledged, the undersigned does hereby transfer and convey to the Santa Margarita Water District, a California Water District organized under State Law, and its successors and assigns, all right, title, and interest in and to the sewer installation, including mains, manholes, laterals and other appurtenances to said sewer installation, constructed, installed, and located in the property described below, and further warrants that the same is free and clear of any encumbrances.

Said property is described as follows:

Executed this ____ day of _____, 20__.

Company or Corporation Name:

By _____

President

By _____

Secretary

CERTIFICATE OF ACCEPTANCE

As per Resolution No. ____ as set forth in the minutes of a meeting of the Board of Directors of the Santa Margarita Water District held on _____, the above Bill of Sale of Domestic Water System Facilities, dated _____, is hereby accepted by order of the Board of Directors of the Santa Margarita Water District, a California Water District organized under State Law.

Date of Acceptance _____.

SANTA MARGARITA WATER DISTRICT

Appendix 4

BILL OF SALE

RECYCLED WATER AND NONDOMESTIC WATER SYSTEM FACILITIES

For good and valuable consideration, receipt of which is hereby acknowledged, the undersigned does hereby transfer and convey to the Santa Margarita Water District, a California Water District organized under State Law, and its successors and assigns, all right, title, and interest in and to the water installation, including pipelines, valves, service connections, fire hydrants, meters, other appurtenances to said nondomestic water installation, constructed, installed, and located in the property described below, and further warrants that the same is free and clear of any encumbrances.

Said property is described as follows:

Executed this ____ day of _____, 20__.

Company or Corporation Name:

By _____

President

By _____

Secretary

CERTIFICATE OF ACCEPTANCE

As per Resolution No. ____ as set forth in the minutes of a meeting of the Board of Directors of the Santa Margarita Water District held on _____, the above Bill of Sale of Domestic Water System Facilities, dated _____, is hereby accepted by order of the Board of Directors of the Santa Margarita Water District, a California Water District organized under State Law.

Date of Acceptance _____.

SANTA MARGARITA WATER DISTRICT

Appendix 5

**COST OF CONSTRUCTION STATEMENT
DOMESTIC WATER SYSTEM**

Developer's Name _____

Tract No. _____ Date Prepared _____

Item Quantity

GRAND TOTAL INSTALLATION COST* \$ _____

* Excludes fees paid directly to Santa Margarita Water District.

Prepared by _____

My signature as witnessed here below attests that the above statement is true and correct to the best of my knowledge.

Date: _____

Developer

Official Title

SANTA MARGARITA WATER DISTRICT

Appendix 6

**COST OF CONSTRUCTION STATEMENT
SEWER SYSTEM**

Developer's Name _____

Tract No. _____ Date Prepared _____

Item Quantity

GRAND TOTAL INSTALLATION COST* \$ _____

* Excludes fees paid directly to Santa Margarita Water District.

Prepared by _____

My signature as witnessed here below attests that the above statement is true and correct to the best of my knowledge.

Date: _____

Developer

Official Title

SANTA MARGARITA WATER DISTRICT

Appendix 7

**COST OF CONSTRUCTION STATEMENT
RECYCLED WATER AND NONDOMESTIC WATER SYSTEM**

Developer's Name _____

Tract No. _____ Date Prepared _____

Item

Quantity

GRAND TOTAL INSTALLATION COST* \$_____

* Excludes fees paid directly to Santa Margarita Water District.

Prepared by _____

My signature as witnessed here below attests that the above statement is true and correct to the best of my knowledge.

Date: _____

Developer

Official Title

SANTA MARGARITA WATER DISTRICT

Appendix 8

AN ORDINANCE OF THE SANTA MARGARITA WATER DISTRICT INSTITUTING A CROSS-CONNECTION CONTROL PROGRAM TO PROTECT THE PUBLIC WATER SYSTEM

The Santa Margarita Water District does ordain as follows:

SECTION I - PURPOSE

The purpose of this ordinance is (1) to protect the public water supply against actual or potential cross connection by isolating within the premise contamination that may occur because of some undiscovered or unauthorized cross-connection on the premises; (2) to eliminate existing connections between drinking water systems and other sources of water that are not approved as safe and potable for human consumption; (3) to eliminate cross-connections between drinking water system and sources of contamination; (4) to prevent the making of cross-connections in the future.

These regulations are adopted pursuant to the State of California Administrative Code, Title 17 - Public Health entitled "Regulations Relating to Cross-Connections."

It is unlawful for any person, firm, or corporation at any time to make or maintain or cause to be made or maintained, temporarily or permanently, for any period of time whatsoever, any cross-connection between plumbing pipes or water fixtures being served with water by the District and any other source of water supply or to maintain any sanitary fixture or other appurtenances or fixtures which by reason of their construction may cause or allow backflow of water or other substances into the water supply system of the District and/or the service of water pipes or fixtures of any consumer of the District.

SECTION II - DEFINITIONS

A. Air-Gap Separation

The term "air-gap separation" shall mean a physical separation between the free flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An "approved air-gap separation" shall be at least double the diameter of the supply pipe measured vertically above the overflow rim of the vessel - in no case less than one inch (2.54 cm).

B. Approved

1. The term "approved" as herein used in reference to a water supply shall mean a water supply that has been approved by the health agency having jurisdiction.
2. The term "approved" as herein used in reference to air-gap separation, a double check valve assembly, a reduced pressure principle backflow prevention assembly or other backflow prevention assemblies or methods shall mean an approval by the regulatory agency having jurisdiction.

C. Atmospheric Vacuum Breaker

The term "atmospheric vacuum breaker" (also known as the 'non-pressure type vacuum breaker') shall mean an assembly containing a float-check, a check seat and an air inlet port. The flow of water into the body causes the float to close the air inlet port. When the flow of water stops the float falls and forms a check valve against backsiphonage and at the same time opens the air inlet port to allow air to enter and satisfy the vacuum. A shut-off valve immediately upstream may be an integral part of the assembly. An atmospheric vacuum breaker is designed to protect against a health hazard (i.e., contaminant) under a backsiphonage condition only.

D. Backflow

The term "backflow" shall mean the undesirable reversal of flow of water or mixtures of water and other liquids gases or other substances into the distribution pipes of the potable supply of water from any source or sources.

E. Backflow Prevention Assembly - Approved

The term "approved backflow prevention assembly" shall mean an assembly that has been investigated and approved by the regulatory agency having jurisdiction. The approval of backflow prevention assemblies by the regulatory agency should be on the basis of a favorable laboratory and field evaluation report by an "approved testing laboratory" (See Section II 2).

F. Backflow Prevention Assembly - Type

A "backflow prevention assembly" shall mean any effective assembly used to prevent backflow into a potable water system. The type of assembly used should be based on the degree of hazard either existing or potential. The types are:

- a. Double Check Valve Assembly - See Section II-0.
- b. Double Check Valve – Detector Assembly – See Section II-P.
- c. Pressure Vacuum Breaker - See Section II-DD.
- d. Reduced Pressure Principle Assembly - See Section II - EE.
- e. Atmospheric (non-pressure) Vacuum Breaker - See Section II-C.

f. Reduced Pressure Principle – Detector Assembly – See Section II – FF.

G. Backflow Prevention Assembly Tester - Certified

The term "certified backflow prevention assembly tester" shall mean a person who has proven his/her competency to the satisfaction of the regulatory agency having jurisdiction. Each person who is certified to make competent test or to repair, overhaul and make reports on backflow prevention assemblies shall be conversant with applicable laws, rules and regulations and have had experience in plumbing or pipe fitting or have other equivalent qualifications in the opinion of the regulatory agency having jurisdiction.

H. Backpressure

"Backpressure" shall mean any elevation of pressure in the downstream piping system (by pump, elevation of piping, or steam and/or air pressure) above the supply pressure at the point of consideration which would cause - or tend to cause - a reversal of the normal direction of flow through the backflow prevention assembly.

I. Backsiphonage

"Backsiphonage" shall mean a form of backflow due to a reduction in system pressure which causes a negative or sub-atmospheric pressure to exist at a site in the water system.

J. Check Valve - Approved

The term "approved check valve" shall mean a check valve that is drip-tight in the normal direction of flow when the inlet pressure is at least one psi and the outlet pressure is zero. The check valve shall permit no leakage in a direction reverse to the normal flow. The closure element (e.g. clapper, poppet or other design) shall be internally loaded to promote rapid and positive closure. An approved check valve is only one component of an approved backflow prevention assembly - i.e. pressure vacuum breaker, double check valve assembly or reduced pressure principle assembly (See Specifications Section for more details).

K. Consumer

The term "consumer" shall mean the owner or operator of a private water system having a service from a public potable water system.

L. Contamination

"Contamination" shall mean an impairment of the water which creates an actual hazard to the public health through poisoning or through the spread of disease by sewage, industrial fluids or waste.

M. Cross-Connection

A "cross-connection" shall mean any unprotected actual or potential connection or structural arrangement between a public or a consumer's potable water system and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied. By-pass arrangements, jumper connections, removable sections, swivel or change-over assemblies and other temporary or permanent assemblies through which or because of which "backflow" can or may occur are considered to be cross-connections.

N. Cross-Connection - Point of

The term "point of cross-connection" shall mean the specific point or location in a public or a consumer's potable water system where a cross-connection exists.

O. Double Check Valve Assembly

The term "double check valve assembly" shall mean an assembly composed of two independently acting, approved check valves, including tightly closing shut-off valves attached at each end of the assembly and fitted with properly located testcocks (see Specifications Section for additional details). This assembly shall only be used to protect against a non-health hazard (i.e., pollutant).

P. Double Check Valve – Detector Assembly

The term "Double Check Valve – Detector Assembly" shall mean an assembly composed of a line-size approved double check valve backflow prevention assembly with a specified bypass water meter and meter sized approved Double Check Valve Assembly. The meter shall register accurately for only very low rates of flow and shall show a registration for all rates of flow. (See Specifications Section for additional details). This assembly shall be used to protect against a nonhealth hazard (i.e., pollutant).

Q. Water Supervisor

The term "water supervisor" shall mean the consumer or a person on the premises appointed by the consumer charged with the responsibility of maintaining the consumer's water systems(s) on the property free from cross-connections and other sanitary defects, as required by regulations and laws. A certified backflow prevention assembly tester may not act as a water supervisor unless he/she is a full-time employee of the consumer having the day-to-day responsibility for the installation and use of pipelines and equipment on the premises and for avoidance of cross-connections.

R. Hazard - Degree of

The term "degree of hazard" shall be derived from the evaluation of conditions within a system which can be classified as either a "pollutional" (non-health) or a "contamination" (health) hazard.

S. Hazard - Health

The term "health hazard" shall mean an actual or potential threat of contamination of a physical or toxic nature to the public potable water system or the consumer's potable water system that would be a danger to health.

T. Hazard - Plumbing

The term "pollutional hazard" shall mean an internal or plumbing type cross-connection in a consumer's potable water system that may be either a pollutional or a contamination type hazard. This includes, but is not limited to, cross-connections to toilets, sinks, lavatories, wash trays, domestic washing machines and lawn sprinkling systems. Plumbing type cross-connections can be located in many types of structures including homes, apartment houses, hotels and commercial or industrial establishments. Such a connection, if permitted to exist, must be properly protected by an appropriate type of cross-connection control assembly.

U. Hazard - Pollutional

The term "pollutional hazard" shall mean an actual or potential threat to the physical properties of the water system or the potability of the public or the consumer's potable water system but which would not constitute a health or system hazard, as defined. The maximum degree or intensity of pollution to which the potable water system could be degraded under this definition would cause a nuisance or be aesthetically objectionable or could cause minor damage to the system or its appurtenances.

V. Hazard - System

The term "system hazard" shall mean an actual or potential threat of severe danger to the physical properties of the public or the consumer's potable water system or of a pollution or contamination which would have a protracted effect on the quality of the potable water in the system.

W. Health Agency

The term "health agency" shall mean the health authority having jurisdiction.

X. Hospital

The term "hospital" shall mean any institution, place, building, or agency which maintains and operates facilities for one or more persons for the diagnosis, care and treatment of human illness, including convalescence and care during and after pregnancy or which maintains and operates organized facilities for any such purpose, and to which persons may be admitted for overnight stay or longer. The term "hospital" includes sanitarium, nursing home and maternity home.

Y. Industrial - Fluids

The term "industrial fluids" shall mean any fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a health, system, pollutional or plumbing hazard if introduced into an approved water supply. This may include, but not be limited to, polluted or contaminated used waters; all types of process waters and "used waters" originating from the public potable water system which may deteriorate in sanitary quality; chemicals in fluid form; plating acids and alkalis; circulated cooling waters connected to an open cooling tower and/or cooling waters that are chemically or biologically treated or stabilized with toxic substances; contaminate natural waters such as from wells, springs, streams, rivers, bays, harbors, seas, irrigation canals or system, etc., oils, gases, glycerine, paraffins, caustic and acid solutions and other liquid and gaseous fluids used for industrial or other process or for firefighting purposes.

Z. Industrial Piping System - Consumer's

The term "consumer's industrial piping system" shall mean any system used by the consumer for transmission of or to confine or store any fluid, solid or gaseous substance other than an approved water supply. Such a system would include all pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey or store substances which are or may be polluted or contaminated.

AA. Laboratory - Approved Testing

Reference to an "approved testing laboratory" shall mean the Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California or another laboratory having equivalent capabilities for both the laboratory and field evaluation of the assemblies.

BB. Point of Delivery

(See "Service Connection" - Section II-FF.)

CC. Pollution

The term "pollution" shall mean an impairment of the quality of the water to a degree which does not create a hazard to the public health, but which does adversely and unreasonably affect the aesthetic qualities of such waters for domestic use.

DD. Pressure - Vacuum - Breaker

The term "pressure vacuum breaker" shall mean an assembly containing an independently operating internally loaded check valve and an independently operating loaded air inlet valve located on the discharge side of the check valve. The assembly is to be equipped with properly located test cocks and tightly closing shut-off valves attached at each end of the assembly (see Specifications Section for additional details). This assembly is designed to protect against a health hazard (i.e., contaminant) under a backsiphonage condition only.

EE. Reduced Pressure Principle Backflow Prevention Assembly

The term "reduced pressure principle backflow prevention assembly" shall mean an assembly containing two independently acting approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The unit shall include properly located testcocks and tightly closing shut-off valves at each end of the assembly (see Specifications Section for additional details). This assembly is designed to protect against a health hazard (i.e., contaminant).

FF. Reduced Pressure Principle-Detector Assembly

The term "reduced pressure principle-detector assembly" shall mean a specially designed assembly composed of a line-size approved reduced pressure principle backflow prevention assembly with a specific bypass water meter and a meter sized approved reduced pressure principle backflow prevention assembly. The meter shall register accurately for only very low rates of flow and shall show a registration for all rates of flow. (See Specifications Section for additional details). This assembly shall be used to protect against a health hazard (i.e., contaminant).

GG. Service Connection

The term "service connection" shall mean the terminal end of a service connection from the public potable water system, i.e., where the water purveyor may lose jurisdiction and sanitary control over the water at its point of delivery to the consumer's water system. If a meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the meter.

HH. Water - Potable

The term "potable water" shall mean water from any source which has been investigated by the health agency having jurisdiction, and which has been approved for human consumption.

II. Water Purveyor

The term "water purveyor" shall mean the public or private owner or operator of the potable water system supplying an approved water supply to the public.

JJ. Water Supply - Approved

The term "approved water supply" shall mean any public potable water supply which has been investigated and approved by the State of California Department of Public Health or the local health agency having jurisdiction. The system must be operating under a valid health permit. In determining what constitutes an approved water supply, the State of California Department of Public Health has reserved final judgment as to its safety and potability.

KK. Water Supply - Auxiliary

The term "auxiliary water supply" shall mean any water supply on or available to the premises other than the purveyor's approved public potable water supply. These auxiliary waters may include water from another purveyor's public potable water supply. These auxiliary waters may include water from another purveyor's public potable water supply or any natural source such as a well, spring, river, stream, harbor, etc. or "used waters" or "industrial fluids." They may be polluted or contaminated or they may be objectionable and constitute an unacceptable water source over which the water purveyor does not have sanitary control.

LL. Water Supply - Unapproved

The term "unapproved water supply" shall mean a water supply which has not been approved for human consumption by the health agency having jurisdiction.

MM. Water System(s) - Consumer's

The term "consumer's water system(s)" shall include any water system located on the consumer's premises whether supplied by a public potable water system of any auxiliary water supply. The system or systems may be either a potable water system or an industrial piping system.

NN. Water Systems - Consumer's Potable

The term "consumer's potable water system" shall mean that portion of the privately owned potable water system lying between the point of delivery and the point of use. This system will include all pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey, store or utilize the potable water.

OO. Water System - Public Potable

The term "public potable water system" shall mean any publicly or privately owned water system operated as a public utility under a valid health permit to supply water for domestic purposes. This system will include all sources, facilities and appurtenances between the source and the point of delivery such as valves, pumps, pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey, treat or store a potable water for public consumption or use.

PP. Water - Used

The term "used water" shall mean any water supplied by a water purveyor from a public potable water system to a consumer's water system after it has passed through the service connection and is no longer under the control of the water purveyor.

QQ. Water Supervisor

The term "water supervisor" shall mean the consumer or a person on the premises appointed by the consumer charged with the responsibility of maintaining the consumer's water system(s) on the property free from cross-connections and other sanitary defects, as required by regulations and laws. A certified backflow prevention assembly tester may not act as a water supervisor unless he/she is a full-time employee of the consumer having the day-to-day responsibility for the installation and use of pipelines and equipment on the premises and for avoidance of cross-connections.

SECTION III - CROSS-CONNECTION PROTECTION REQUIREMENTS

A. General Provisions

1. Unprotected cross-connections with the public water supply are prohibited.
2. Whenever backflow protection has been found necessary, the District will require the water user to install an approved backflow prevention assembly by and at his/her expense for continued services or before a new service will be granted.
3. Wherever backflow protection has been found necessary on a water supply line entering a water user's premises, then any and all water supply lines from the District's mains entering such premises, building, or structures shall be protected by

an approved backflow prevention assembly. The type of device to be installed will be in accordance with the requirements of this ordinance.

B. Where Protection is Required

1. Each service connection from the District water system for supplying water to premises having an auxiliary water supply shall be protected against backflow of water from the premises into the public water system unless the auxiliary water supply is accepted as an additional source by the District, and is approved by the public health agency having jurisdiction.
2. Each service connection from the District water system for supplying water to any premises on which any substance is handled in such fashion as may allow its entry into the water system shall be protected against backflow of the water from the premises into the public system. This shall include the handling of process waters and waters originating from the District water system which have been subjected to deterioration in sanitary quality.
3. Backflow prevention assemblies shall be installed on the service connection to any premises having (a) any internal cross-connections that cannot be permanently corrected and controlled to the satisfaction of the state or local health department and the District, or (b) intricate plumbing and piping arrangements or where entry to all portions of the premises is not readily accessible for inspection purposes, making it impracticable or impossible to ascertain whether or not cross-connections exist.

C. Type of Protection Required

1. The type of protection that shall be provided to prevent backflow into the approved water supply shall be commensurate with the degree of hazard that exists on the consumer's premises. The type of protective device that may be required (listing in an increasing level of protection) includes: Double Check Valve Assembly (DC), Double Check-Detector Assembly (DCD), Reduced Pressure Principle-Detector Assembly (RPD), Reduced Pressure Principle Backflow Prevention Assembly (RP), and an Air-gap separation (AG). The water user may choose a higher level of protection than required to protect the approved water supply at the user's water connection to premises with varying degrees of hazard are given in Table 1. Situations which are not covered in Table 1 shall be evaluated on a case by case basis and the appropriate backflow protection shall be determined by the District or health agency.

TABLE 1

TYPE OF BACKFLOW PROTECTION REQUIRED

Degree of Hazard	Minimum Type of Backflow Prevention
(a) Sewage and Hazardous Substances	
(1) Premises where the public water system is used to supplement the reclaimed water supply.	AG
(2) Premises where there are wastewater pumping and/or treatment plants and there is no interconnection with the potable water system. This does not include a single family residence that has a sewage lift pump. An RP may be provided in lieu of an AG if approved by the health agency and the District.	AG
(3) Premises where nondomestic or recycled water is used and there is no interconnection with the potable water system. An RP may be provided in lieu of an AG if approved by the health agency and the District.	AG
(4) Premises where hazardous substances are handled in any manner in which the substances may enter a potable water system. This does not include a single family residence that has a sewage lift pump. An RP may be provided in lieu of an AG if approved by the health agency and the District.	AG
(5) Premises where there are irrigation systems into which fertilizers, herbicides, or pesticides are, or can be, injected.	RP
(b) Auxiliary Water Supplies	
(1) Premises where there is an unapproved auxiliary water supply which is interconnected with the public water system. An RP may be provided in lieu of an AG if approved by the health agency and the District.	AG

	(2)	Premises where there is an unapproved auxiliary water supply and there are no interconnections with the public water system.	RP
(c)		Fire Protection Systems	
	(1)	Premises where the fire system is directly supplied from the public water system and is not interconnected with any auxiliary water supply.	DCD
	(2)	Premises where the fire system is directly supplied from the public water system and interconnected with an unapproved auxiliary water supply.	RPD
	(3)	Premises where the fire system is supplied from the public water system and interconnected with an unapproved auxiliary water supply. An RP may be provided in lieu of an AG if approved by the health agency and the District.	AG
	(4)	Premises where the fire system is supplied from the public water system and where either elevated storage tanks or fire pumps which take suction from the private reservoirs or tanks are used.	RPD
(d)		Dockside Watering Points and Marine Facilities	
	(1)	Pier hydrants for supplying water to vessels for any purpose.	RP
	(2)	Premises where there are marine facilities	RP
(e)		Premises where entry is restricted so that inspections for cross-connections cannot be made with sufficient frequency or at sufficiently short notice to assure that cross-connections do not exist	RP
(f)		Premises where there is a repeated history of cross-connections being established or re-established.	RP

2. Two or more services supplying water from different street mains to the same building, structure or premises through which an interstreet main flow may occur, shall have at least a standard check valve on each water service to be located adjacent to and on the property side of the respective meters. Such check valve shall not be considered adequate if backflow protection is deemed necessary to protect the District's mains from pollution or contamination; in such cases the installation of approved backflow assemblies at such service connections shall be required.

SECTION IV - BACKFLOW PREVENTION ASSEMBLIES

A. Approved Backflow Prevention Assemblies

1. Only backflow prevention assemblies which have been approved by the District shall be acceptable for installation by a water user connected to the District's potable water system.
2. The District will provide, upon request, to any affected customer, a list of approved backflow prevention assemblies.

B. Backflow Prevention Assembly Installation

1. Backflow prevention assemblies shall be installed in a manner prescribed in Section 7603, Title 17 of the California Administrative Code. Location of the assemblies should be as close as practical to the user's connection. The District shall have the final authority in determining the required location of a backflow prevention assembly.
 - a. Air Gap separation (AG) - The air gap separation shall be located on the user's side of and as close to the service connection as is practical. All piping from the service connection to the receiving tank shall be above grade and be entirely visible. NO water use shall be provided from any point between the service connection and the air-gap separation. The water inlet piping shall terminate at a distance of at least two (2) pipe diameters of the supply inlet, but in no case less than one (1) inch above the overflow rim of the receiving tank.
 - b. Reduced Pressure Principle Backflow Prevention Device - (RP) and Double Check Valve Assembly (DC). The assemblies shall be installed on the user's side of and as close to the service connection as is practical. The assembly shall be installed at a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade measured from the bottom of the assembly and with a minimum of twelve inches (12") side clearance. The assembly shall be installed so that it is readily accessible for maintenance and testing. Water supplied from any point between the service connection and the DC or RP assembly shall be protected in a manner approved by the District.

- c. Reduced Pressure Principle - Detector Assembly (RPD) and Double Check-Detector Assembly (DCD) - The approved assembly shall be installed on the user's side of and as close to the service connection as is practical. The assembly shall be installed at a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade measured from the bottom of the assembly and with a minimum of twelve inches (12") side clearance. The assembly shall be installed so that it is readily accessible for maintenance and testing. Water supplied from any point between the service connection and the RPD or DCD assembly shall be protected in a manner approved by the District.
2. The District's Cross-Connection Control Specialist must be notified prior to installation of a assembly.

C. Backflow Prevention Assemblies Testing and Maintenance

1. The owners of any premises on which, or on account of which backflow prevention assemblies are installed, shall have the assemblies tested by a certified tester. Backflow prevention assemblies must be tested at least annually and immediately after installation, relocation or repair. The District may require a more frequent testing schedule if it is determined to be necessary. No device shall be placed back in service unless it is functioning as required. A report in the form acceptable to the District shall be filed with the District each time a device is tested, relocated or repaired. These assemblies shall be serviced, overhauled or replaced whenever they are found to be defective and all costs of testing, repair and maintenance shall be borne by the water user.
2. The District will supply affected water users with a list of persons acceptable to the District to test backflow prevention assemblies. The District will notify affected customers by mail when annual testing of a assembly is needed and also supply users with the necessary forms which must be filled out each time a assembly is tested or repaired.

D. Backflow Prevention Assembly Removal

1. Approval must be obtained from the District before a backflow prevention assembly is removed, relocated or replaced.
 - a. Removal: The use of a assembly may be discontinued and the assembly removed from service upon presentation of sufficient evidence to the District to verify that a hazard no longer exists or is not likely to be created in the future.
 - b. Relocation: A assembly may be relocated following confirmation by the District that the relocation will continue to provide the required protection

and satisfy installation requirements. A retest will be required following the relocation of the assembly.

- c. Repair: A assembly may be removed for repair, provided the water use is either discontinued until repair is completed and the assembly is returned to service, or the service connection is equipped with other backflow protection approved by the District. A retest will be required following the repair of the assembly; and
- d. Replacement: A assembly may be removed and replaced provided the water use is discontinued until the replacement assembly is installed. All replacement assemblies must be approved by the District and must be commensurate with the degree of hazard involved. A test will be required following the installation of the new device.

SECTION V - USER SUPERVISOR

At each premises where it is necessary, in the opinion of the District, a user supervisor shall be designated by and at the expense of the water user. This user supervisor shall be responsible for the monitoring of the backflow prevention assemblies and for avoidance of cross connections. In the event of contamination or pollution of the drinking water system due to a cross-connection on the premises, the District shall be promptly notified by the user supervisor so that appropriate measures may be taken to overcome the contamination. The water user shall inform the District of the user supervisor's identity on, as a minimum, an annual basis and whenever a change occurs.

SECTION VI - ADMINISTRATIVE PROCEDURES

A. Water System Survey

1. The District shall review all requests for new services to determine if backflow protection is needed. Plans and specifications must be submitted to the District upon request for review of possible cross-connection hazards as a condition of service for new service connections. If it is determined that a backflow prevention device is necessary to protect the public water system, the required assembly must be installed before service will be granted.
2. The District will notify each affected water user when it is time for the backflow prevention assembly installed on their service connection to be tested. This written notice shall give the water user 30 days to have the device tested and supply the water user with the necessary form to be completed and resubmitted to the District.
3. A second notice shall be sent to each water user which does not have his/her backflow prevention assembly tested as prescribed in the first notice within the 30 day period allowed. The second notice will give the water user a two week period to have his/her backflow prevention assembly tested. If no action is taken within the 2 week period, the District may terminate water service to the affected water user until the subject assembly is tested.

B. Approval of a Reduced Pressure Principle Backflow Assembly (RP) in lieu of an Air gap separation at premises with recycled or nondomestic water.

1. There shall be no interconnection between the potable water system and any recycled or nondomestic system within any premises.
2. The District shall require each Recycled or Nondomestic User or user Contractor to appoint a user supervisor to ensure that cross connections are not made during the installation, operation and maintenance of the recycled piping and equipment.
3. All new recycled or nondomestic systems installed will comply with District standards for recycled and nondomestic systems.
4. Any conversion of domestic systems to recycled or nondomestic systems shall not be approved until a comprehensive feasibility study has been completed and reviewed by the District as well as State and County Health Departments.
5. Upon approval of the feasibility study for a system conversion, and prior to activation for a new or converted system, the District must conduct a water system survey of the site to determine the appropriate level of cross connection protection necessary to protect the domestic water supply. The water system survey constitutes the minimum requirement for conversion of a domestic water system. Additional steps (dye tests, physical inspection, etc.) may be necessary, depending upon field

conditions. The water system survey will include a pressure test of both the Potable water system and the recycled or nondomestic system to determine whether a cross connection exists.

6. The District will conduct on-site cross connection surveys following activation of any system approved for in lieu status. This survey will include, as a minimum, the pressure test as outlined above, and will assure conformance with all District Rules and Regulations.

SECTION VII - WATER SERVICE TERMINATION

A. General

When the District encounters water uses that represent a clear and immediate hazard to the potable water supply that cannot be immediately abated, the District shall institute the procedure for discontinuing the District water service.

B. Basis for Termination

Conditions or water uses that create a basis for water service termination shall include, but are not limited to, the following items:

1. Refusal to install a required backflow prevention assembly,
2. Refusal to test a backflow prevention assembly,
3. Refusal to repair a faulty backflow prevention assembly,
4. Refusal to replace a faulty backflow prevention assembly,
5. Direct or indirect connection between the public water system and a sewer line,
6. Unprotected direct or indirect connection between the public water system and a system or equipment containing contaminants,
7. A situation which presents an immediate health hazard to the public water system.

C. Water Service Termination Procedures

1. For conditions 1, 2, 3 or 4, the District will terminate service to a customer's premises after two written notices have been sent specifying the corrective action needed and the time period in which it must be done. If no action is taken within the allowed time period, water service may be terminated.
2. Conditions 5, 6, or 7, the District will take the following steps:
 - a. Make reasonable effort to advise the water user of intent to terminate water service;
 - b. Terminate water supply and lock service valve. The water service will remain inactive until correction of violations has been approved by the District.

SECTION VIII - SEVERABILITY

If any section, subsection, subdivision, paragraph, sentence, clause or phrase of this Ordinance, or any part thereof, is for any reason held to be invalid, such decision shall not affect the validity of the remaining portions of this Ordinance or any part thereof. The subsection, subdivision, paragraph, sentence, clause or phrase thereof, irrespective of the fact that any one or more sections, subdivisions, paragraphs, sentences, clauses or phrases be declared invalid.

SANTA MARGARITA WATER DISTRICT

Appendix 9

DISTRICT FIRE FLOW DESIGN STANDARDS

I. INTRODUCTION

The Santa Margarita Water District service area includes four public agencies responsible for fire protection. These are the County of Orange, City of Rancho Santa Margarita, City of Mission Viejo and the City of San Clemente. The Orange County Fire Authority (OCFA) serves all of these areas.

It is the policy of the SMWD that the District's water distribution facilities shall be sized in accordance with the requirements of the agency responsible for providing fire protection within each service area, subject to the following service level limitations.

II. SMWD MAXIMUM SERVICE LEVELS

In future development areas, the District will plan its distribution system in the Plan of Works to provide fire flow based upon the land use information available at the time.

Within undeveloped Improvement Districts, the Plan of Works system will be sized to provide fire flows as determined in Table I. In the event that the OCFA fire flow requirement exceeds these service levels, it shall be the responsibility of the developer to provide any additional onsite or offsite facilities necessary to either reduce the requirement or upgrade the District's water system.

Within existing developed areas, the District has attempted to provide fire flow capabilities consistent with the agency requirements and proposed land uses in effect at the time of adoption of the Plan of Works. In the event that fire flow requirements for proposed developments (including redevelopment) exceed the capability of the District's system, it shall be the responsibility of the developer to provide any additional facilities necessary to either reduce the requirement or upgrade the District's water system.

TABLE I
 SANTA MARGARITA WATER DISTRICT
 MAXIMUM FIRE FLOW SERVICE LEVELS
 WITHIN
 ORANGE COUNTY FIRE AUTHORITY SERVICE AREA

Land Use Designation	Maximum Fire Flow ¹ (gpm)	Maximum Duration (hrs.)	Number of Hydrants
Single Family Detached Residential	2,500	3	2
Multi-Family Attached Residential	3,000	3	2
Schools: Elementary, Intermediate and High	3,500	4	3
Neighborhood/Local Commercial	5,000	5	4
Regional Shopping Centers, Business/Industrial Parks	6,000	6	4

SANTA MARGARITA WATER DISTRICT

Appendix 10

SUMMARY OF STEPS REQUIRED TO OBTAIN "WILL SERVE" LETTER AND PROCESS IMPROVEMENT PLANS

1. The purpose of this summary is to describe the steps and their sequence necessary for an Applicant to obtain District approvals for development. These steps are described in detail in three District documents: (1) "Procedures and Design Criteria for Water and Sewer Facilities," (2) "Standard Special Provisions and Standard Drawings for Water and Sewer Construction," and (3) "Rules and Regulations for Nondomestic Water Service." It is recommended that copies of the documents be purchased and reviewed by the Applicant and his engineer. Please contact the District at (949) 459-6655 to make arrangements to purchase these documents.

2. Submit a written request for a "Will Serve" Letter to:

Santa Margarita Water District
P.O. Box 7005
Mission Viejo, CA 92690-7005
Attention: Chief Engineer

3. Complete two copies of the Application to SMWD for domestic water, sewer, recycled and nondomestic water service. Also, complete a Water and Sewer Service Form using the District's estimated Water and Sewage Generation Rates. Forms will be supplied by the District upon receipt of a request for a "Will-Serve" Letter.

4. Prepare a complete master plan of the development showing the proposed domestic water, sewer, and nondomestic water systems, per Section C-1 of The procedures and Design Criteria Manual. Submit the master plans to the District.

Allow 2-3 weeks for review.

5. Upon approval of the master plan and/or acquisition of all required permits for necessary District infrastructure improvements, and the application, the District will issue a preliminary "Will-Serve" Letter.

6. Submit two sets of improvement plans; the hydraulic calculations if required per part II, Design Criteria; a copy of the grading plan; a completed "Project Bond Data Sheet" and a copy of the record map to the District for review, allow two to four weeks for review.

7. During the review period, submit all necessary easement documents, per Section C-2 of the Procedures and Design Criteria Manual to the District.

8. The District will return one set of plans with comments for revision.
9. Revise the plans and resubmit 2 sets along with the check prints to the District.
10. When the "Project Bond Data Sheet" is approved, SMWD will calculate the appropriate fees and invoice the developer. The fees are due prior to the District signing the improvement plans. SMWD will notify the appropriate agency of the Water and Sewer Bond Amounts. If the bonds are held by the District, the necessary agreement and bond forms will be supplied by the District for the developer's execution. The agreement and bonds must be approved by the District's Board before the plans will be signed.
11. The District will review the easement documents for adequate coverage of the District Facilities and will notify the District in writing of approval. The Development Engineer at SMWD will arrange signature of any easement documents prior to approval of the improvement plans. The improvement plans will not be signed by the Chief Engineer until the easements are granted.
12. If the easements are dedicated by Tract or Parcel Map, the map must be signed by the owner(s) prior to the District. Approval of the improvement plans can occur prior to recordation, but not before signature of the record map.
13. When the improvement plans are ready for District approval, SMWD's Development Engineer will notify the engineer of any final changes, and arrange for signature of the plans by the Chief Engineer. Prior to signing of the plans, an accurate 1" = 80' scale composite map and CAD disk as specified in Section C-3.4, shall be provided to the District.
14. After signing of the plans, the review process is complete. The applicant must then submit two sets of the record map and four sets of the improvement plans for the District's use and records.
15. Revisions to plans will be processed in a similar manner.
16. Upon completion of the work, applicant shall submit record drawings and file a request for acceptance and release of bonds in accordance with Section A-9 of Procedures and Design Criteria Manual. At this time an inspection will be made by the District. When the work is acceptable to the District, the work will be submitted to the Board for acceptance and release of bonds.
17. For information please call SMWD Engineering, at (949) 459-6655.