MATERIAL SPECIFICATIONS

A. PIPES AND FITTINGS

A.1. Unplasticized Polyvinyl Chloride (uPVC)

A.1.1. Pipes and fittings shall conform to the requirements of AWWA C900, ISO 1452 or PNS 65 or the latest revision or its equivalent and shall be pressure Class 150 (Series 8) with machine installed **Integral Fixed Seal**. The seal should be polypropylene (PP) with flexible EDPM Rubber homogenously bonded to stiff piping

A.1.2. PVC Pipes and fittings shall be made from clean, blue-pigmented, virgin, NSF approved Class 12454-A or 12454-B PVC compound conforming to the requirements of ASTM D1784.

A.1.3. All pipes shall be furnished in lengths of 6 meters.

Table 1. uPVC Pipe Dimensions

Nominal Pipe Size, in	2	3	4	6	8	10	12
Nominal Diameter, mm	50	75	100	150	200	250	300
Outside Diameter, mm							
Min	63	90	110	160	225	280	315
max	63.3	90.3	110.4	160.5	225.7	280.9	316.0
Wall Thickness, mm							
min	3.6	5.2	6.6	9.5	13.4	16.6	18.7
max	4.16	5.92	7.13	10.32	14.39	17.80	20.00

A.2. Galvanized Iron (GI)

A.2.1. Pipes shall conform to the requirements of the ASTM A53/A53M (Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless) or the latest revision or its equivalent and shall be Schedule 40.

Pipe fittings shall conform to the requirements of ASME/ANSI B16.3 (Malleable Iron Threaded Fittings Class 150 and 300) and shall be Class 150.

A.2.2. The pipe shall be practically straight and both ends of the pipe shall be at right angle to the axis of the pipe. The inside and outside surfaces of the pipe shall be free from injurious defects. Unless otherwise specified, the length of the pipe shall be 6 meters. The tolerance shall be plus 6 meters without negative tolerance. Pipes shall be clearly marked with Trademark, Nominal Size, Length and Class of Pipe.

A.2.3. The pipe and fitting threads shall be made according to "American Standard Pipe Taper Thread (NPT) with taper angle equal to 1°47'.

A.2.4. Pipes and fittings shall be coated with zinc, both inside and outside surfaces, in accordance to ASTM A153/A153M–05 (Standard Specification for Zinc Coating (Hot–Dip) on Iron and Steel Hardware)

Table 2. GI Pipe and Fitting Dimensions

Nominal Pipe Size, in	½	¾	1	1¼	1½	2	3	4
Nominal Diameter, mm	15	20	25	32	40	50	75	100
Pipes								
Outside Diameter, mm	21.3	26.7	33.4	42.2	48.3	60.3	88.9	114.3
Wall Thickness, mm	2.8	2.9	3.4	3.6	3.7	3.9	5.49	6.02
Tolerance								
outside diameter,	±0.397	±0.397	±0.397	±0.397	±0.397	±1%	±1%	±1%

Nominal Pipe Size, in	½	¾	1	1¼	1½	2	3	4
Nominal Diameter, mm	15	20	25	32	40	50	75	100
wall thickness	-12.5%	-12.5%	-12.5%	-12.5%	-12.5%	-12.5%	-12.5%	-12.5%
Weight per meter, kg	1.27-1.34	1.68-1.78	2.50-2.62	3.38-3.55	3.75-4.23	5.00-5.43	10.3-11.3	14.5-16.1
Fittings								
90° Elbow								
Length	28.45	33.27	38.10	44.45	46.74	57.15	78.23	96.27
Weight, kg	0.11	0.18	0.29	0.43	0.56	0.79	2.34	4
45° Elbow								
Length	22.35	24.89	28.45	32.77	36.32	42.67	55.12	66.29
Weight, kg	0.07	0.10	0.15	0.38	0.52	0.77	2.11	3.46
St. Elbow								
Length, ME	40.89	48.01	54.10	61.98	67.82	83.06	114.55	114.27
Length, FE	28.45	33.02	38.10	44.45	49.28	57.15	78.23	96.27
Weight, kg	0.11	0.18	0.29	0.49	0.66	1.06	2.99	4.94
Tee								
Length	28.45	33.27	38.10	44.45	49.28	57.15	78.23	96.27
Weight, kg	0.16	0.25	0.41	0.59	0.78	1.19	3.22	5.12
Cross Tee								
Length	28.45	33.27	38.10	44.45	49.28	57.15	78.23	96.27
Weight, kg	0.20	0.29	0.44	0.72	0.86	1.33	3.7	6.76
Coupling								
Length	34.04	38.61	42.42	49.02	54.61	64.26	80.77	93.73
Weight, kg	0.09	0.13	0.22	0.34	0.45	0.66	1.5	2.56
Union Patente								
Length	43.69	51.31	55.63	57.40	62.74	69.85	89.92	97.79
Weight, kg	0.21	0.26	0.41	0.54	0.74	1.09	2.47	4.31
Thickness, mm	2.54	3.05	3.30	3.56	3.81	4.32	5.84	6.60
Tolerance								
Dimension, CF, mm	±1.50	±1.50	±1.80	±1.80	±2.00	±2.00	±2.50	±3.00
Thickness	-10%	-10%	-10%	-10%	-10%	-10%	-10%	-10%

Notes: (1) All dimensions are in millimeters except where otherwise shown.
(2) Center-to-Face dimensions apply to elbows, tees & crosses
(3) Face-to-Face dimensions apply to couplings, unions, etc.
(4) ME – Male End, FE – Female End, CF – Center-to-Face

A.3. Cast Iron (CI)

A.3.1. Cast iron pipe shall conform to the requirements of AWWA C106 (Cast Iron Pipe Centrifugally Cast in Metal Molds for Water or other Liquids) or AWWA C108 (Cast Iron Pipe Centrifugally Cast in Sand-Lined Molds for Water or other Liquids) and shall be Class 100 or Class 150 where shown in the Drawing; or ISO Recommendation R-13 (Cast Iron Pipes, Special Castings and Cast Iron Parts for Pressure Main Lines) and shall be Class LA, however, the hydrostatic test pressure shall be 2.45MPa (355 psi) for all sizes.

A.3.2. Pipe shall be furnished with bell and spigot ends with rubber "push-on" joints, flange joints, or flexible coupling.

B.4. Gate Valves

Cast Iron (CI)

B.4.1. All valves shall conform to the AWWA Specifications C509 (Standard for Resilient Seated Gate Valves) or the latest revision or its equivalent. Component parts are constructed of heavy, rugged proportions for extra strength to withstand pipe strain and possible shifting in underground service. Gate valves shall be designed for minimum water working pressure of 1.0 MPa (150 psi).

B.4.2. The gate valve shall be flanged and mechanical joint. Flanges and drilling shall conform to ISO 7005 – 2.

B.4.3. All resilient gate valves have a full bore with same nominal diameter as the pipeline. The full bore ensures minimum pressure loss, as the valve does not cause any reduction in the flow path, other great advantages are that the full bore allows drilling and facilitates pipe pigging to ensure high quality potable water.

B.4.4. The ductile iron core is fully vulcanized with EPDM rubber internally and externally. No iron parts are exposed to the medium and the excellent rubber vulcanization prevents creeping corrosion underneath the rubber.

B.4.5. The fixed integral wedge nut reduces the number of moveable valve parts and risk of malfunction.

B.4.6. The valve shall be encapsulated and shall be non-rising stem with a minimum two "O" ring seals (at least one above the stem collar).

B.4.7. The valve shall have 50mm (2 in) square operating nut with cast arrow showing direction in which the nut is to be turned open the valve.

B.4.8. The body and cover bolts and nuts shall meet specifications of ASTM A-307 (rust proofed).

B.4.9. All valve casting to be shot blasted prior to epoxy coating. Epoxy coating shall conform to AWWA C550 (Protective Epoxy Interior Coatings for Valves and Hydrants) specifications. Body and bonnet are coated internally and externally. Layer thickness shall be 250-400 microns on flat and pressurized parts and 150-300 microns on convex outer edge.

Table 3. CI Gate Valve Dimensions

Nominal Pipe Size, in	2	3	4	6	8	10	12
Nominal Diameter, mm	50	75	100	150	200	250	300
Length (Face to Face), mm	178 – 180	203 – 205	221 – 229	267 – 268	292 – 295	330 – 335	356 – 365
Height (above CL), mm	241 – 326	297 – 378	334 – 430	443 – 549	544 – 646	627 – 750	785 – 835
Weight, kg	13 – 18	20 – 23	26 – 33	51 – 53	75 – 83	125 – 133	174 - 193

Brass

B.4.10. Brass valves shall be full port, screwed-in bonnet and non-rising stem.

B.4.11. The valve body, bonnet and solid wedge disc shall be brass conforming to ASTM B584 Alloy C84400-1996 or the latest revision or its equivalent. The minimum pressure rating shall be 125psi saturated steam pressure and 200psi non-shock water, oil or gas.

B.4.12. The valve shall be threaded end conforming to ASME B1.20.1 (NPT)

Table 4. Brass Gate Valve Dimensions

Nominal Pipe Size, in	½	¾	1	1¼	1 ½	2
Nominal Diameter, mm	15	20	25	32	40	50
Length, mm	35 – 43	39 – 45	43 – 54	48 – 61	54 – 63	58 – 72
Height, mm	71 – 72	77 – 84	88 – 98	103 – 116	114 – 125	134 – 153
Handwheel Diameter, mm	54 – 55	54 – 55	60 – 61	72 – 77	72 – 77	80 – 83

C. FIRE HYDRANTS

C.1.1. Fire hydrants heads shall be cast iron body conforming to the requirements of AWWA C503 (Wet-Barrel Fire Hydrants) or the latest revision or its equivalent, with bronze working parts.

C.1.2. Fire hydrants shall be designed for a minimum pressure of 1.0MPa (150 psi) and have a 100mm (4-in) flanged inlet and two (2) 63mm (2½-in) fire hose outlet.

C.1.3. The outlets shall have National Standard Hose Threads with hose caps and chains.

C.1.4. The stem shall be provided with at least two (2) O-rings.

C.1.5. Hydrant valves shall open counter clockwise.

C.1.6. Breakable piece and extension elbow shall be provided.

C.1.7. Epoxy lining and coatings for valves shall conform to AWWA C550 (Protective Epoxy Interior Coatings for Valves and Hydrants).

D. STRAINER

D.1.1. The strainer should be designed for minimum weight and pressure loss.

D.1.2. The screen shall be made of perforated stainless steel plate and shaped to give maximum rigidity against the flow stream forces.

D.1.3. The effective straining area shall be at least double that of the meter main case inlets.

D.1.4. An access cover plate shall be provided.

D.1.5. Strainers shall be furnished with dual round-type flanged connections which are faced and drilled. Bolt circle, length and diameters shall be compatible with meter connection dimensions in conformance to ISO 7005 – 2. Sufficient flange bolts; nuts and gaskets shall be furnished.

D.1.6. The housing and cover shall be cast iron. Raised letters indicating the flow direction will be clearly visible.

D.1.7. Casing bolts, nuts, screws and washers shall be made of a copper alloy containing not less than 57 percent copper or stainless steel.

E. MANHOLE FRAME AND COVER

E.1.1. The manhole frame and cover shall be round manufactured from cast iron or ductile iron conforming to ASTM A-126, Class B or ASTM A-536-80, Class 400 respectively.

E.1.2. The frame depth shall not exceed 200mm and four (4) bolt holes shall be provided for anchoring purposes.

E.1.3. The cover shall be 575mm – 625mm in diameter. The face of the cover shall include the name and/or logo of Calamba Water District. The name/logo shall be cast into the cover during manufacture.

E.1.4. The cover shall be connected to the frame with a hinged. A locking mechanism shall be included to prevent unauthorized access.

E.1.5. The cover shall be one-man operable and shall be designed for a maximum highway loading.