

# **PART 3**

**CITY OF CHINO HILLS**

**STANDARD SPECIFICATIONS**

**FOR**

**CONSTRUCTION OF DOMESTIC WATER SYSTEMS**

**AND**

**RECYCLED WATER SYSTEMS**

## PART 3

### STANDARD SPECIFICATIONS FOR CONSTRUCTION OF DOMESTIC WATER SYSTEMS AND RECYCLED WATER SYSTEMS

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**PART 3**  
**SECTION 1 – GENERAL PROVISIONS**

1-01 GENERAL

Construction of all water system improvements intended to be dedicated to the City of Chino Hills will be governed by plans and specifications approved by the City Engineer. All work shall be subject to fees as provided for in the City's Water Rates, Rules and Regulations and shall be inspected by the City Engineer to insure conformity to these specifications.

In cases of conflict of information, the following documents will have precedence in the order listed:

1. Permits and licenses from affected agencies issued for the improvements.
2. Special Provisions (modifying the City Standard Plans, the City Standard Specifications, or the Standard Specifications for Public Works Construction) for the improvements.
3. Construction plans for the improvements.
4. City of Chino Hills Standard Specifications.
5. City of Chino Hills Standard Plans.
6. American Water Works Association (AWWA) Standards.
7. Standard Specifications for Public Works Construction (SSPWC), "Green Book".

Conflicts and discrepancies noted by the Contractor shall be brought to the attention of the City Engineer. The City Engineer will review the conflicts or discrepancies and determine the appropriate course of action to follow, if any. Unless otherwise determined by the City Engineer, the most stringent/restricted conditions shall govern over all.

Provisions of reference specifications noted in these specifications and plans shall have the same effect as if written herein, unless expressly modified by these specifications.

Any reference specification, in the absence of designation to the contrary, shall be understood to refer to the latest revision at the time the plans and specifications are approved by the City Engineer.

If construction of the project does not commence within one year after approval of the plans and specifications by the City Engineer, the City Engineer's approval is void. The plans and specifications will then require re-approval by the City Engineer and the reference specifications shall refer to the latest revision at the time the plans and specifications are re-approved by the City Engineer.

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**SECTION 1 – GENERAL PROVISIONS**

1-02 DEFINITIONS

Whenever the following terms or corresponding pronouns are used in these specifications or plans, the intent and meaning shall be interpreted as follows:

- a. City: The City of Chino Hills, California.
- b. Contractor: The agent of the developer or independent contractor who furnishes labor, material, equipment, method, etc. to perform the requirements of these specifications in the construction of water systems.
- c. Developer: The person or organization having legal responsibility for construction of water systems in conjunction with development of property.
- d. Drawings: The words “DRAWINGS” or “CONTRACT DRAWINGS” or “PLANS” shall mean those drawings accompanying the specifications which show the location, nature, extent and form of the work, together with applicable details.
- e. City Engineer: The City Engineer or his authorized representative.
- f. Private Engineer: The agent of the developer or independent engineer who has responsibility for the design and drawing of construction documents.
- g. Or approved equal: An equivalent product to that specified in these standard specifications, approved by the City Engineer before beginning of construction. No approved equal product is intended, unless so stated in these standard specifications.
- h. Superintendent: The field representative of the Contractor, present on the job site at all times during work, who is authorized to receive and fulfill instructions from the City.

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1-03 ABBREVIATIONS

Whenever the following abbreviations are used in these specifications, the meaning shall be interpreted as follows:

- |              |  |
|--------------|--|
| a. ANSI:     | American National Standards Institute  |
| b. APWA:     | American Public Works Association  |
| c. ASTM:     | American Society for Testing and Materials   |
| d. AWWA:     | American Water Works Association   |
| e. CAL-OSHA: | California Occupational Safety and Health Administration                                 |
| f. DIPRA:    | Ductile Iron Pipe Research Association   |
| g. NSF:      | National Sanitation Foundation   |
| h. SSCDWS:   | Standard Specifications for Construction of Domestic Water Systems (City of Chino Hills) |
| i. SSPC:     | Steel Structures Painting Council  |
| j. SSPWC:    | Standard Specifications for Public Works Construction (Green Book) – Latest Edition      |
| k. SSS:      | Standard Specifications Supplement (City of Chino Hills)                                 |
| l. UBC:      | Uniform Building Code  |
| m. UFC:      | Uniform Fire Code  |
| n. UPC:      | Uniform Plumbing Code  |

**PART 3**  
**SECTION 2 – MATERIALS**

2-00 **GENERAL**

All materials and equipment installed in the City of Chino Hills’s water system shall meet all state and federal standards, as well as standards developed by nationally recognized organizations such as AWWA, ANSI and NSF. In order to protect human health, all materials and equipment shall meet ANSI/NSF 60, *Drinking Water Treatment Chemicals & Additives*, and ANSI/NSF 61, *Drinking Water System Components & Materials* standards, and shall be so certified by an ANSI accredited certification program.

2-00.01 **PROTECTIVE WRAPPING**

All buried ductile and gray cast iron pipe, fittings, valves, and appurtenances shall be coated with a dielectric coating: A liquid epoxy coating system per AWWA C-210 at 24 mils minimum dry film thickness (MDFT), or a cold applied three part system petroleum wax tape per AWWA C-217, or a 100% polyurethane coating of 24 mils MDFT suitable for buried use.

2-01 **PIPE MATERIALS**

2-01.01 **GENERAL**

Water mains shall be constructed of AWWA C-900 PVC Pipe, Class 200 for pipe sizes up to and including 12” diameter. Water mains of 16” and 20” in size shall be AWWA C-905 PVC Pipe, Class 235. Pipeline materials for water mains larger than 20” shall be determined at the time of the pre-design meeting.

2-01.02 **POLYVINYL CHLORIDE PIPE**

Polyvinyl Chloride Pipe (PVC) shall meet the requirements of AWWA C900, “Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch for Water Distribution”, and shall be furnished in cast-iron pipe equivalent outside diameters with rubber-gasketed separate couplings as listed in the Standard. Pressure class shall be 200 psi minimum. Pipe shall be furnished in 20-foot laying lengths except for curves where short joints will be required due to deflection. PVC pipe shall be PW Pipe or Johns-Manville Blue Brute with high deflection couplings.

Polyvinyl Chloride Pipe (PVC) shall meet the requirements of AWWA C905, “Polyvinyl Chloride (PVC) Pressure Pipe, greater than 12-inch for Water Distribution”, and shall be furnished in cast-iron pipe equivalent outside diameters with rubber-gasketed separate couplings as listed in the Standard. Pressure class shall be 235 psi. Pipe shall be furnished in 20-foot laying lengths except for curves where short joints will be required due to deflection. PVC pipe shall be PW Pipe or Johns-Manville Blue

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**SECTION 2 – MATERIALS**

Brute with high deflection couplings.

Each length of PVC pipe shall pass a hydrostatic integrity test at the factory at four times the pressure class of the pipe for five seconds. PVC pipe shall be delivered to the job site in palletized units or bundles to prevent unnecessary deflection prior to installation. If pallet units are stored more than 90 days, they shall be covered with opaque material to protect it from the sun's rays.

Care shall be taken during the transporting of the pipe to insure that the binding and the tie down methods do not damage or deflect the pipe in any manner. Pipe that is bent, deflected or otherwise damaged during shipping shall be rejected.

Each rubber-gasketed standard coupling and repair coupling shall pass a hydro-static integrity test at the factory at four times the pressure class of the coupling for five seconds. Joint material shall meet the requirements of ASTM F477, "Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe".

Pipe and couplings shall not fail when subjected to sustained pressure, burst pressure, flattening and extrusion quality as outlined in AWWA C900 or C905 as applicable. All special fittings, such as elbows, 45° bends, saddles and tees shall be ductile iron, lined with cement mortar lining, and shall conform to the requirements of AWWA Standards.

**2-02 COPPER TUBING**

**2-02.01 GENERAL**

This specification shall cover the requirements for 1-inch and 2-inch seamless, annealed, Type "K" or Type "L", copper water tube. Copper tubing shall meet the requirements of ASTM B-88, "Specifications for Seamless Copper Water Tube". Solders for joining copper tubing shall meet the requirements of ASTM B-32, "Standard Specification for Solder Metal". 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. All copper tubing shall be installed with polyethylene protective wrapping in accordance with Section 2-00.01, "Protective Wrapping".

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2-02.02 DIMENSIONS

Copper tubing shall be furnished in coils or straight lengths as follows:

SIZE	FORM	LENGTH
1"	Coils	60' to 100'
2"	Straight Lengths	20'

Coils shall be wound in a single layer flat with a minimum 24-inch inside diameter.

2-02.03 TEMPER

Copper tubing shall be furnished in the annealed condition in accordance with the technical property requirements of ASTM B-88. Straight lengths shall be annealed after being drawn.

2-03 RED BRASS PIPE

Brass pipe shall conform to the requirements of ASTM B-43, "Standard Specification for Seamless Red Brass Pipe, Standard Sizes", and referenced in the appendix to AWWA C800, "Underground Service Line Valves and Fittings". Fittings shall be made from copper alloy No. C83600, in accordance with chemical and mechanical requirements of ASTM B584. "Standard Specifications for Copper Alloy Sand Castings for General Applications". This alloy contains nominally 85% copper and 5% each tin, lead, and zinc.

2-04 MAIN LINE VALVES

2-04.01 GENERAL

Valves shall be iron-body fusion bonded, epoxy lined, non-rising stem, butterfly or fully encapsulated resilient wedge disk type and shall not have more than two internal moving parts. All valves shall open by turning the wrench nut counter-clockwise. Operating nut for butterfly valves shall be placed at the north or east side of the water line.

When required, above ground installations shall be resilient seat/wedge disk type valves with outside screw and yoke.

All bronze parts shall contain not more than 7% zinc, or more than 2% aluminum.



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Stems shall be bronze, and equipped with a 2-inch operating nut conforming to AWWA C509, “Resilient-Seated Gate Valves for Water Supply Service”. The valve manufacturer shall employ a positive physical means of indicating the specified stem material to insure ready recognition during inspection.

The bolts and nuts on the bonnet shall be stainless steel type 316, conforming to ASTM F593, “Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs” and ASTM F594, “Standard Specification for Stainless Steel Nuts”.

The cast or ductile iron exterior of all valves shall be fusion-bonded, epoxy coated conforming to ANSI/AWWA C116, “Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service”.

For valves in above ground or vault installation, see Section 2-13, “Painting-Above Ground Installations”, for coating.

The cast or ductile iron interior of all valves shall be protected with fusion-bonded epoxy. Coating shall conform to AWWA C550, “Protective Epoxy Interior Coatings for Valves and Hydrants”.

Resilient wedge type valves with a flanged end may be used as “tapping valves”.

All valves shall be provided with a stem extension if depth of valve nut exceeds 5 feet. All valve extensions shall be centered in the valve well by use of a guide and shall operate freely without binding after installation.

All valves shall be provided with a valve can, slip can, debris cap, and cover. The valve can shall be Schedule 40 PVC. The slip can shall be galvanized x 12-inch split. The cover shall be Alhambra Foundry No. 29608 or approved equal and shall be stamped in accordance with Standard Plans W-4 and W-5.

**2-04.02 GATE VALVES**

Gate valves shall conform to the requirements of AWWA Standard C509, “Resilient-Seated Gate Valves for Water Supply Service”, with fully encapsulated disk and as supplemented herein. All gate valves shall be equipped with double o-ring stem seals.

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**SECTION 2 – MATERIALS**

**2-04.03 APPROVED GATE VALVE MANUFACTURERS**

- American Flow Control Series 500 and Series 2500
- M & H 4067
- Clow Resilient Wedge Valve Series 6100
- Mueller A-2360
- American AVK Series 25

**2-04.04 BUTTERFLY VALVES**

Butterfly valves shall conform to the requirements of AWWA C504, "Rubber-Seated Butterfly Valves", as supplemented herein.

**2-04.05 APPROVED BUTTERFLY VALVE MANUFACTURERS**

Mueller B-3211 (Linesal XP)

Pratt Ground hog

**2-04.06 END CONNECTIONS & GASKET MATERIAL**

Valves shall have push-on joints or flanged ends, or a combination of both. Gaskets shall conform to the requirements of Section 2-07.03, "Gaskets".

Unless otherwise shown on plans, all valves installed at fittings shall be flanged by push-on ends, with the flange abutting the fitting.

**2-05 AIR AND VACUUM, AIR RELEASE, AND COMBINATION AIR VALVES**

Air and Vacuum, Air Release and Combination Air Valves shall conform to AWWA C512, "Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Services", and be designed for a working pressure of 150 psi, unless otherwise specified. Float, linkage and all internal parts shall be 8-18 stainless steel. Interior coating for cast iron body shall be approved fusion bonded epoxy conforming to NSF/ANSI 61, "Drinking Water System Components and Materials". Valves shall be as listed below, or approved equal.

	<b>APCO</b>	<b>CRISPIN</b>	<b>CLA-VAL</b>
Air Vacuum	Series 140	Series AL	Series 35
Air Release	50/200A	Series AR/PL	Series 34
Combination Air	Series 140C	Series UL	Series 36

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2-06 FIRE HYDRANTS

2-06.01 GENERAL

Fire hydrants shall be of the wet-barrel type, conforming to AWWA C503, "Wet Barrel Fire Hydrants", and as supplemented herein. All fire hydrant assemblies shall include an L.B. 400 break-off check valve.

2-06.02 MATERIALS AND PARTS

Fire hydrants shall have a 2½-inch hose outlet and one 4-inch pumper outlet.

Fire hydrants shall be equipped with plastic outlet nozzle caps attached to the body of the fire hydrant with non-kinking electro-galvanized steel chains and fitted with appropriate neoprene rubber gaskets.

Fire hydrants shall be furnished with a pentagon shaped operating nut, and opening shall be counterclockwise.

All fire hydrant burys shall be ductile iron, asphalt-coated and cement lined. Fire hydrant burys shall be provided with a mechanical joint end at the shoe.

Wet barrel type fire hydrants shall have a nominal six-inch (6") base flange with a six-hole bolt pattern. All internal working parts, including stem, shall be bronze containing no more than 7% zinc or 2% aluminum or 316 stainless steel.

2-06.03 APPROVED FIRE HYDRANT MANUFACTURERS

Clow	LB-125
James Jones Co.	J-3700R
James Jones Co.	J-3760R
Or Approved Equal	

2-07 MAIN LINE PIPE FITTINGS

2-07.01 GENERAL

Main line pipe fittings shall conform to the requirements of AWWA C110, "Ductile Iron and Gray-Iron Fittings for Water".

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Short body type fittings conforming to AWWA C153, "American National Standard for Ductile-Iron Compact Fittings for Water Service", may be used for sizes 4-inch through 24-inch.

All fittings shall be made of ductile iron. Fittings up to 24-inch size shall be 350 psi pressure rated and over 24-inch size shall be 150 psi pressure rated. Fittings shall be cement mortar-lined in accordance with AWWA C104, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water".

2-07.02 END CONNECTIONS

2-07.02.1 PUSH-ON JOINTS

Push-on joints shall conform to the requirements of AWWA C111, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings".

2-07.02.2 FLANGED FITTINGS

Flanged fittings shall be flat-faced and shall conform to the requirements of AWWA C110 or C153, "American National Standard for Ductile-Iron Compact Fittings for Water Service".

2-07.03 GASKETS

Gaskets for flanged fittings shall be either ring or full-faced, 1/8-inch thick, vulcanized styrene butadiene rubber (SBR) or neoprene rubber gaskets. The full-faced gaskets shall extend from the inside diameter of the flange to beyond the outside edge of the bolt holes. Use ring type gaskets for 14-inch and larger sizes. Whenever blind flanges are shown, the gasket shall consist of 1/8-inch thick SBR or neoprene rubber sheet, which shall cover the entire inside surface of the blind flange and shall be cemented to the surface of the blind flange. In lieu of a rubber gasket, the 1/16-inch polytetrafluoroethylene (PTFE) GORE-TEX GR sheet gasketing material, applied full-faced, is an approved equal.

2-07.04 BOLTS AND NUTS FOR MECHANICAL JOINTS AND FLANGED FITTINGS

Tee-head bolts and hexagonal nuts for all mechanical joints shall be type 316 stainless steel conforming to ASTM F593 and ASTM F594.

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Hexagonal bolts, nuts and washers for flanged fittings shall be type 316 stainless steel conforming to ASTM F593 and ASTM F594.

2-07.05 TAPPING SLEEVES

All tapping sleeves for tapping a water main under pressure shall conform to the following requirements:

2-07.05.1 DUCTILE IRON, GRAY IRON, POLYVINYL CHLORIDE PIPE, AND ASBESTOS CEMENT PIPE

Tapping sleeves shall be of the full circle split body, fabricated steel type. The body shall be fabricated from steel conforming to ASTM A36/A36M, “Standard Specification for Carbon Structural Steel”, and shall be fusion-bonded epoxy coated after fabrication. Nuts, bolts and washers shall be type 316 stainless steel conforming to ASTM F593 and ASTM F594. Tapping sleeves shall be rated for a working pressure of 150 psi. For working pressure above 150 psi, special approval must be obtained from the City Engineer. For applications where the tap size is equal to the main size or when tapping asbestos cement pipe, only Romac FTS 425, or Mueller Model H-615 shall be used.

2-07.05.2 APPROVED TAPPING SLEEVE MANUFACTURERS DUCTILE IRON, GRAY IRON, AND POLYVINYL CHLORIDE

APAC	Model 512
Ford	FTSC – 4” and Larger
JCM	Model JCM-412
Mueller	Model H-615
M & H	Style 1574 (CI & DI, 4” thru 12” only)
Romac	FTS 420
Romac	FTS 425
Smith-Blair	622 – 4” and Larger
Smith-Blair	623 Carbon Steel MJ – 4” and Larger
Tyler	C.I. Mech. Jt. Tapping Sleeve (6” thru 12”)
Or Approved Equal	

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2-07.05.3 CEMENT MORTAR LINED & COATED (CML&C) PIPE

Tapping outlets for CML&C pipe shall be of the weld-on type in accordance with Standard Plan W-12. Welding shall be performed by a State certified pipe welder.

2-07.05.4 APPROVED TAPPING OUTLETS (WELD-ON TYPE) FOR CEMENT MORTAR LINED AND COATED (CML&C) PIPE

APAC	Style 504
Ford	826
Koppl	Model CN-100
Romac	FTS 445
Smith-Blair	626
Superior	Style 826
Or Approved Equal	

2-08 MAIN LINE COUPLINGS

2-08.01 SLEEVE TYPE COUPLINGS

Sleeve type couplings shall provide a flexible, water tight connection between two plain ends as described on the construction drawings.

For polyvinyl chloride, ductile iron and gray iron pipe, all couplings shall be ductile iron solid sleeve type couplings conforming to AWWA C 110, with mechanical joint ends and body not less than 12 inches long.

For steel or asbestos cement pipe, all couplings shall be standard steel couplings, with body not less than 12 inches long. Bolts and nuts for steel couplings shall be of type 316 stainless steel conforming to ASTM F593 and ASTM F594. All sleeve type steel couplings shall be fusion bonded epoxy lined. Steel couplings shall be epoxy primed with a minimum thickness of 3.0 mils prior to shipment.

Steel sleeve type couplings shall also be encased in protective wrapping in accordance with Section 2-00.01, "Protective Wrapping".

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2-08.01.1 APPROVED SLEEVE TYPE COUPLINGS MANUFACTURER FOR POLYVINYL CHLORIDE

Clow - MJ Solid Long Sleeves

Tyler Corporation - 5-144L Long Solid Sleeves

Or approved equal

2-08.01.2 APPROVED SLEEVE TYPE COUPLING MANUFACTURERS FOR STEEL

Dresser Industries, Inc.	Style 38
Romac	501
Smith-Blair, Inc.	411 Steel Couplings
Smith-Blair, Inc.	461 Ductile Iron Couplings
Or Approved Equal	

2-08.02 MECHANICAL GROOVED-TYPE COUPLINGS

Mechanical grooved-type couplings shall provide a positive thrust restraint by locking two grooved or shouldered ends of pipe together. The couplings shall be Style 77 as manufactured by Victaulic Company, or approved equal. These couplings shall have Grade H rubber gaskets and the interior shall be lined with fusion bonded epoxy. Mechanical grooved-type couplings shall be used in above ground or vault installation only.

2-09 SERVICE LATERAL INSTALLATION

2-9.01 GENERAL

All valves and fittings for use in the buried service line from the main to the meter setting appurtenance shall conform to the requirement of AWWA C800 "Underground Service Line Valves and Fittings". Materials in contact with potable water shall be made from Copper alloy No. C83600, in accordance with the chemical and mechanical requirements of ASTM B584. This alloy contains nominally 85% copper and 5% each tin, lead, and zinc. All corporation stops and angle meter valves used for copper installations shall be ball-type and shall have compression connection of copper tubing. Approved manufacturers are James Jones, Ford, and Mueller.

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2-9.02 FITTINGS

2-9.02.1 CORPORATION STOPS (BALL-TYPE)

Corporation stops shall have inlet threads per AWWA I.P. threads as specified by AWWA C800. Outlet shall be compression connection for copper tube.

2-9.02.2 ANGLE METER VALVES (BALL-TYPE)

All angle meter valves shall be full port “ball” type, have a locking wing on the key operator, and with full 360-degree rotation of tee head.

All valves for 1-inch meters shall have a compression connection inlet and a meter swivel nut outlet. All 2-inch valves shall have a compression connection inlet for 2-inch copper tubing and a meter flange outlet slotted to accommodate 1½-inch and 2-inch meters. Slot should not extend to the outside edge – open slot will not be accepted.

2-9.02.3 COUPLINGS AND SOLDER

Couplings required in 2-inch service laterals shall be made with copper tube fittings. The diametral clearance between the tube and fitting shall be .004 to .010 inches. 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.

2-9.02.4 BOLTS AND NUTS FOR METER FLANGE CONNECTIONS

All bolts, nuts and washers for flanged fittings shall be type 316 stainless steel conforming to ASTM F593 and ASTM F594.

2-9.03 SERVICE SADDLES

All service saddles shall be bronze made from copper alloy No. C83600, double strap, and tapped for AWWA iron pipe thread as specified by AWWA C800.



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**SECTION 2 – MATERIALS**

2-9.03.1 SERVICE TAPPING TO CEMENT MORTAR LINED & COATED (CML&C) PIPES

Service tapping to CML&C pipes shall only be made under special approval by the City Engineer. Unless specified otherwise, tapping shall be a minimum of 2-inch NPT with bushing, as needed, in accordance with Standard Plan No. W-12.

2-9.04 METER BOXES

Meter boxes shall be precast concrete or polymer concrete having a compressive strength of 4000 psi. Meter boxes shall have a polymer concrete cover and reading lid. Body of the meter box shall be constructed with a “ring” at the top to prevent settlement. Where required, meter boxes shall have traffic load rating covers. Meter boxes shall be manufactured by Armorcast Products Company, J&R Concrete Products, Inc., or approved equal, as indicated below.

Meter Size	Armorcast Traffic Box / Cover	J & R Box / Cover	Brooks Box / Cover
1”	A6000484R	No. W5-1/4	#38
1-1/2”	A6001419	No. W6-F	#66
2”	A6001420R	No. W6-F	#66

2-10 FLANGE ADAPTERS

Flange adapters shall be manufactured from ductile iron per ASTM A536, “Standard Specifications for Ductile Iron Fittings”. Flange adapters shall be as manufactured by Romac Restraint Systems, EBAA IRON, Inc., Uni-Flange by Ford Meter Box Company, Inc., Tyler Corporation, or approved equal.

2-11 CONCRETE

Concrete for thrust blocks shall conform to Concrete Class 500-C-2500. If thrust block is to be disturbed or backfill is to be placed prior to developing its required strength, additional mechanical thrust restraining devices approved by the City Engineer shall be installed.

2-12 SHOP DRAWINGS AND MATERIAL SUBMITTALS

The Contractor shall furnish to the City Engineer such working drawings, data on materials, certifications of materials, and equipment and samples as are required for the proper control of the work, including, but not limited to, those working drawings, data and samples specifically required in Subsection 2-5.3 of the Standard Specifications for Public Works Construction ( SSPWC) and on the

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Drawings. All working drawings, data and samples shall be subject to review by the City Engineer for conformity with the drawings and specifications. The shop drawings shall be submitted at least ten (10) working days before such drawings will be required for commencing the work.

**2-13 PAINING ABOVE GROUND INSTALLATIONS**

After ALL Testing and Disinfection has passed, but prior to final acceptance by the City of Chino Hills, all above ground installations shall be painted in accordance with the following:

Remove ALL dirt, oil, grease, rust, bituminous coating, and other contaminants from surfaces to be painted by sandblasting, pickling, or wire brushing as required. Clean all surfaces with solvent then apply primer to all surfaces to be painted. Allow primer to dry, then apply intermediate coat to all surfaces; allow intermediate coat to dry, then apply finish coat.

The underlined generic terms in the above paragraph shall be considered together as a painting system and shall be supplied by a single manufacturer selected from the list of Approved Painting Systems at the end of this section.

The above specified work shall be accomplished per the appropriate sections of SSPC Painting Manual published by the Society for Protective Coatings (SSPC) of Pittsburgh, Pennsylvania AND strict adherence to the manufacturer's recommendations.

Approved Painting Systems by Manufacturer:

Manufacturer	Aerovoe	Rustoleum
Surface Cleaner	400 Cleaner and Degreaser	3599 Industrial Cleaner/Degreaser
Primer	135 Red Oxide @ 4-6 mils DFT	5269 Red Primer @ 3-5 mils DFT
Intermediate Coat	128 Gray @ 4-6 mils DFT	5381 Gray @ 4-6 mils DFT
Finish Coat	Supreme Rust Shield @ 2-3 mils DFT	5200 High Performance Acrylic @ 2-3 mils DFT

(DFT = Dry film thickness)

From the following approved list, use the semi-gloss topcoat color that corresponds with the application, or, as directed by the City Engineer.

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Approved Finish Coat Colors:

	Aervoe	Rustoleum
Fire Hydrants	5008 Safety Yellow	Safety Yellow
Guard Posts	5008 Safety Yellow	Safety Yellow
Air Release Valve Covers	5008 Safety Yellow	Safety Yellow
Water Sampling Station	5014 Sand	Dunes Tan
Valve Marker	5008 Safety Yellow	Safety Yellow

2-14 ACCESS TO MANUFACTURING AND TEST FACILITIES

The City Engineer shall, at all times, have access to the manufacturing and test facilities, and the right to inspect the work and materials. The manufacturer shall furnish the City Engineer with reasonable facility access for obtaining such information, as necessary, to assess the progress of the work and the character and quality of materials used. When requested by the City Engineer, the manufacturer shall submit a certificate of compliance that the product meets the requirements of these specifications.

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**3-01 INSPECTION**

The construction of any water system improvement intended for dedication to the City of Chino Hills and used by the City for public water service shall be subject to inspection by the City Engineer. Such inspection is to assure the City of Chino Hills that all phases of the work are in compliance with these specifications.

The City Engineer shall have access to the work and shall be furnished with every reasonable facility for ascertaining full knowledge of the progress, material, and workmanship used to complete the work. The City Engineer shall be given 24-hours advance notice of major phases of construction for purposes of inspection. All material shall be inspected prior to placement and all workmanship shall be visually inspected prior to backfilling. Reasonable aid shall be given to ascertain the exact location of all work.

The inspection of the work shall not relieve the Contractor of any obligation to complete the work as prescribed by these specifications. Defective work shall be made good, and unsuitable materials may be rejected notwithstanding the fact that such defective work and unsuitable materials have been previously accepted by the City Engineer.

The City Engineer shall have the authority to suspend the work wholly, or in part, for such time as he may deem necessary due to the failure of the Contractor to perform any provisions of the plans or specifications. The work can only continue when the defective material or method is recognized as corrected by the City Engineer.

**3-02 PRE-CONSTRUCTION DETAILS**

**3-02.01 EMERGENCY CONTACTS**

Prior to construction, the Contractor shall submit to the City Engineer, for emergency contact purposes, a list of personnel by name, address, residence phone number, pager number, and cellular phone number.

The 24-hour emergency number for the City of Chino Hills is (909) 364-2860.

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**3-02.02 PERMITS AND LICENSES**

The Contractor shall have a Class “C-34” (Pipeline) or Class “A” (General Engineering) Contractor’s License valid in the State of California and shall meet all the applicable requirements of the City of Chino Hills Municipal Code.

The Contractor shall have a current, valid City of Chino Hills business license. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency. An encroachment permit from the City Engineer shall be required for work in the public right-of-way within the City of Chino Hills.

A copy of ALL licenses and permits required for the project shall be provided to the City Engineer prior to starting work.

The Contractor shall observe all safety procedures as required by CAL-OSHA. All provisions of these permits, licenses, or agreements shall be binding upon the Contractor as though stated herein. The City of Chino Hills will not be responsible for actions involving the agencies controlling such permits, licenses, or agreements.

**3-02.03 TRAFFIC CONTROL**

The Contractor shall furnish all materials, labor and traffic controls necessary to safeguard the work and the public safety.

Traffic and pedestrian control shall comply with the applicable provisions as contained in the latest edition of the APWA Work Area Traffic Control Handbook (WATCH Manual) as sold by Building News, Inc., 1612 S. Clementine Street, Anaheim, CA 92802, (888) BNI-BOOK, unless otherwise directed by the City Engineer.

**3-02.04 SURVEYING**

The Contractor shall provide equipment, method, and labor to locate, accurately, all proposed water facilities. The Contractor shall further guarantee the accurate location of all water facilities by constructing curb and gutter prior to the beginning of any water improvements. If, in the opinion of the City Engineer, this sequence of construction cannot be followed, the Contractor will assume all responsibility and costs for correcting any resulting errors or omissions.

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**3-03 REMOVALS AND TRENCH EXCAVATION**

**3-03.01 REMOVAL OF PAVEMENT**

Asphalt concrete paving shall be removed after saw cutting or mechanically breaking the edge of the removal area. Concrete paving shall be saw cut prior to removal. All edges shall be as straight as possible. Contractor shall dispose of the pavement off the work site to a permitted facility.

**3-03.02 REMOVAL OF UTILITIES**

Utilities shall be removed only as stated on the construction plans. Structures or piping not shown on the construction plans shall be brought to the attention of the City Engineer. Disposition of these structures shall be determined by the City Engineer prior to proceeding with the work. The Contractor shall notify and coordinate with representatives of any utility, which structures must be removed or relocated.

**3-03.03 TRENCH EXCAVATION**

Trench excavation shall include any excavation in which the depth is greater than the width at the bottom of the excavation. Such excavations as required for vaults, thrust blocks, boring pits and service laterals shall be considered as trench excavations. All earthen material and water that will interfere with the placement of the pipe shall be removed. Contractor shall use sufficient means to protect any existing utilities from damage during trench excavation.

Trench shall be backfilled by the end of the working day unless otherwise approved by the City Inspector.

The width of the trench at the bottom of the excavation shall not be less than six (6) inches nor greater than twelve (12) inches on either side of the pipe. Bell and coupling holes shall be used, as required, to complete a satisfactory pipe joint.

Water main installation will not be permitted until subgrade is established and the storm drain and sewer installation has been completed. Pipe shall be placed to the grade and depth specified on the construction drawings.

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In all cases, pipe shall be installed so there is a minimum of 24" cover between top of pipe and bottom of pavement structural section. The minimum cover and clearance herein stated applies to construction where there are existing underground facilities. These minimums are not intended as "design minimums" where all new underground facilities or two or more conflicting facilities are installed at the same relative time. The design shall attempt to maximize clearance between conflicting facilities and provide standard cover as the minimum. The City Engineer shall approve cover less than the standard.

The trench bottom shall be graded to provide a smooth, firm, and stable foundation, which is free of rocks and other obstructions. All soft, spongy, and unstable material shall be over-excavated to a depth of two feet, replaced with backfill material per Section 3-07 of these specifications, and compacted to provide a firm and stable foundation.

**3-04 CONNECTION TO EXISTING FACILITIES**

**3-04.01 GENERAL**

The Contractor shall make connection to the existing public facilities as shown on the construction drawings. All connections must be made under inspection of the City Engineer. The City Engineer shall consider the means of chlorinating those sections of main, fittings, or valves in contact with the public system. When such connection provides a direct closure between the existing public system and that under construction, such valves shall become the property of the City of Chino Hills and shall be operated only by the City of Chino Hills.

**3-04.02 PRESSURE TAPPING**

All pipe may be tapped under pressure if approved by the City and then only by a City approved Contractor. The exterior surface of the pipe shall be cleaned to provide a smooth surface for the tapping sleeve. The tapping sleeve shall be secured to the pipe to prevent movement during the tapping process. Tapping nozzles for Cement Mortar Lined and Coated (CML&C) Pipe shall be welded on.

**3-04.03 SHUTDOWN OF MAIN**

All work necessary to shut down an existing public water main for the benefit of a Contractor shall be by City personnel. Under no circumstances shall the Contractor operate valves, hydrants, and other

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appurtenant equipment on the existing public system. It shall be the Contractor's responsibility to coordinate the necessary shutdown schedules through the City Engineer. Scheduled shutdowns shall require sufficient time (minimum of 2 working days) to allow operations personnel to review, approve, and develop an appropriate Operation Program. The Contractor shall be responsible for maintaining all schedules current and coordinating all deviations, which may occur from time to time, with the City Engineer.

The City of Chino Hills will make a concerted effort to isolate the system as planned with the Contractor. However, the Contractor shall be prepared to employ pumping equipment if a water tight seal cannot be achieved. The City of Chino Hills will not be responsible for any delays due to system shutdown and isolation.

All emergency situations shall be reported immediately to the City of Chino Hills' 24-hour emergency number: 909-364-2860.

When extensive main shutdown is required, the City Engineer will determine what temporary service connections may be required. The Contractor shall furnish all necessary hose, piping, valves, water trucks and associated labor required to provide such temporary service. All piping, hoses and associated equipment used in temporary service connections shall be flushed and disinfected in accordance with Section 3-09, TESTING, DISINFECTION, AND FLUSHING.

**3-05 LAYING OF WATER MAIN**

**3-05.01 GENERAL**

Water main installation shall comply with City Standard Plans and the current State of California, Department of Health Services Criteria for The Separation of Water Mains and Sanitary Sewers.

Installations of Polyvinyl Chloride (PVC) pressure pipe and fittings shall be in accordance with AWWA Standard C605, "Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water" and the pipe manufacturer's installation manual.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting soil into it, the City Engineer may require that before lowering the pipe into the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations,



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no debris, tools, clothing or other materials shall be placed in the pipe.

At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the City Engineer. This provision shall apply during the lunch-hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

The cutting of pipe for inserting tees, fittings or closure pieces shall be done in a neat, workmanlike manner without damage to the pipe or cement lining, thereby leaving a smooth end at right angles to the axis of the pipe. No pipe shall be laid in water or when, in the opinion of the City Engineer, trench conditions are unsuitable. Field welding of Ductile Iron Pipe for repair or for joining is prohibited.

**3-05.02 THRUST RESTRAINT**

The Contractor shall be responsible for anchoring the pipe and fittings against movement due to water pressure.

Concrete thrust blocks shall be poured in place against an undisturbed earth-bearing surface. Concrete shall be placed so as not to interfere with the fitting joint. Concrete shall be per Section 2-11. Thrust block locations and dimensions shall be per Standard Plans.

Mechanical joint thrust restraints shall meet or exceed the minimum requirements of ASTM F1674 (Standard Test Method for Joint Restraint Products for use with PVC Pipe) be UL listed and FM approved. Acceptable restrainers are Grip Ring restrainers as manufactured by Romac Industries Inc., MJR restrainers as manufactured by Tyler Industries, Megalug retainer glands as manufactured by EBBA Iron Sales Inc. or approved equal.

**3-05.03 STANDARD ASSEMBLIES**

Fire hydrants shall be constructed per Standard Drawings. Fire hydrants shall be placed at a location as shown on Standard Drawings or as directed by the City Engineer. The determination will be based on several factors including, but not limited to, the American Disabilities Act (ADA) requirements and avoidance of specific locations. Specific locations to be avoided are those where, in the opinion of the City Engineer, a potential hazard could result from the fire hydrant being hit and broken. Guard posts, when required, shall be installed per Standard Plans.

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Water valves shall be installed at locations shown on the construction drawing, or as directed by the City Engineer. Valves shall be set plumb, and shall be stabilized and supported separately from the pipeline. Information regarding size, type, make, and number of turns to close, shall be supplied to the City Engineer by the Contractor in accordance with Section 2-12. All valves shall be covered with a valve box assembly. Valve boxes shall be plumb centered over the valve nut, and supported separately from the valve body per Standard Plans. Valve boxes shall be lowered to below paving grade level prior to street paving, and raised to final grade during the paving process. In any event, Contractor shall ensure that all valve boxes will provide access to the operation of the valve by City personnel. Valve boxes shall be flagged or barricaded during construction to divert traffic around their location.

**3-05.04 PROTECTION AND CLEANING OF PIPE AND FITTINGS**

The Contractor shall take extreme care to insure cleanliness and protection of the inside coatings of all piping and fittings. The interior surfaces of all pipe, fittings and other appurtenances shall be kept free of dirt or foreign matter at all times. All lumps, blisters, excess lining and coating materials shall be removed from the flanged end or bell and spigot end of each pipe or fittings. The outside of the spigot and the inside of the bell shall be wire brushed and wiped clean, and free from oil and grease before the pipe is laid.

**3-05.05 HANDLING PIPE AND OTHER MATERIALS**

Only proper clamps, nylon straps and tools satisfactory to the City Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipes, fittings and valves shall be carefully lowered into the trench in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.

**3-05.06 PROTECTION OF METAL SURFACES**

All exposed surfaces of the bolts, nuts, tie-rods, turn buckles, etc. that are not stainless steel and that are in contact with the earth and backfill materials, shall be coated with a minimum of 30 mils of bitumastic coating prior to backfilling.

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All buried ductile and gray cast iron pipe, fittings, valves and appurtenances shall have a protective wrapping in accordance with Section 2-00.01 of these Standard Specifications and be inspected prior to backfilling of the trench. Rocks or other material that would damage the wrapping shall not be included in the backfill.

**3-06 SERVICE LATERALS**

**3-06.01 GENERAL**

1-inch and 1-1/2 and 2-inch diameter service laterals shall be installed per Standard Drawings. Service laterals shall be installed perpendicular to the meter. A three-inch "plus" symbol shall be chiseled into the curb face opposite the location of the corporation stop if the corporation stop is more than 18" from perpendicular from meter. Meters will be supplied and installed by the City. Meter boxes shall be supplied and installed by the Contractor at such time and place as directed by the City Engineer. Meter boxes located in areas subject to traffic loading, or located behind a rolled curb shall be installed with an approved traffic bearing lid.

Bedding and backfill shall conform to Section 3-07 of these specifications. Backfill material shall be compacted under the service lateral so as to create a firm laying bed prior to placing and compacting any material over the top of the lateral. Compaction of backfill material by mechanical means directly over the exposed service tubing shall not be allowed.

**3-07 PIPE BEDDING AND BACKFILLING OF TRENCH**

**3-07.01 GENERAL**

The Contractor shall backfill the pipe trench as soon after placement of pipe as practical with due regard of the requirements in this Section. All fittings, valves, and assemblies shall be visually inspected by the City Engineer prior to backfilling. Pipe bedding shall be defined as that material supporting, surrounding and extending to a minimum of 12 inches above the top of pipe and shall consist of imported or native free draining material having a sand equivalent (SE) of not less than 30 or other material approved by the City Engineer. Bedding and backfill shall be placed in accordance with Sections 306-1.2.1 and 306-1.3 of the "Standard Specifications for Public Works Construction" and as supplemented herein. All backfill for pipe or conduit shall be densified to a relative compaction of 90% minimum.

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All buried valves and fittings are to be backfilled with clean sand. The sand shall be installed in such a manner that, after compaction, no earth or other backfill will be less than 6 inches from any part of the valve, fitting, flanges, bolts, or nuts. The sand shall be compacted as specified.

**3-07.02 PROCEDURE IN PIPE ZONE**

Selected backfill material consisting of granular material free from stone, clods, clay, or other deleterious material shall be placed in the trench simultaneously on each side of the pipe for the full width of the trench in layers of about 6 inches in depth. Granular backfill with a minimum sand equivalent of 30, when tested in accordance with the California Department of Transportation, Test Method No. California 217, will be required in the pipe zone and the water densification method shall be used to densify the material in the pipe zone. When the excavated material is not granular as mentioned above, the Contractor shall import, at his own expense, and place a suitable granular backfill material. Particular attention is to be given to the underside of the pipe and fittings to provide a firm bedding support along the full length of the pipe. Care shall be exercised in backfilling to avoid damage to the pipe. The pipe zone shall be considered to extend to 12 inches above the top of pipe.

**3-07.03 PROCEDURE ABOVE PIPE ZONE**

From the top of the pipe zone backfill to ground surface, the material for backfill may contain stones ranging in size up to 6 inches in diameter, in quantity not exceeding 40 percent of the volume when said coarse materials are well distributed throughout the finer materials and the specified compaction may be attained.

**3-07.04 COMPACTION ABOVE PIPE ZONE**

- a. Subgrade Zone. This zone is from the bottom of the AC base paving to the top of the pipe zone. Backfill in this zone shall be compacted to 90 percent relative compaction except the upper 6 inches which shall be compacted to 95 percent relative compaction.
- b. Compaction in Easements. Easements in open terrain where the degree of compaction is less important, the backfill, if sufficiently granular in nature (sand equivalent of 20 or greater), shall be consolidated by a water densification method. If the backfill shall

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be consolidated by a method approved by the City, backfill in easements and open terrain shall be compacted to 85 percent relative compaction except where easements enter public streets, in which case, the last 50 feet shall be compacted per street work requirements.

**3-07.05 MECHANICALLY COMPACTED BACKFILL**

Mechanically compacted backfill shall be placed in horizontal layers of such depths compatible to the material being placed and the type of equipment being used. All such equipment shall be of a size and type approved by the soils engineer. Each layer shall be evenly spread, moistened (or dried, if necessary), and then tramped or rolled until the specified relative compaction has been attained. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed under the contract. The Contractor shall make his own determination in this regard. Any damage which results shall be the responsibility of the Contractor and repaired or replaced at the Contractor's expense.

**3-07.06 WATER DENSIFIED BACKFILL**

As used in these specifications, flooding shall mean the inundation of backfill with water, puddled with poles or bars to insure saturation of the backfill material for its full depth.

**3-07.07 JETTING**

Jetting of backfill in public right-of-way will not be permitted.

**3-07.08 COMPACTION TEST**

Compaction shall be tested in accordance with the methods specified by the State of California Department of Transportation Method No. California 216, or ASTM D1557.

Compaction test of the backfill will be required approximately every 250 feet, or more often if tests indicate the need, along the alignment on the main pipeline and, in addition, approximately 33 percent of all laterals within the street rights-of-way. The tests shall be made at varying depths.

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The Contractor, at his expense, shall excavate the holes for all of the tests, backfill the holes, compact this backfill, and pave the surface after the test.

Compaction tests of the backfill which meet the specified requirements shall be at the Owner's expense. All compaction tests which do not meet the specified requirements shall be at the Contractor's expense without any compensation therefor.

**3-08 REPAVING AND FINISHING**

The Contractor shall replace all removed or damaged pavement in accordance with the City's Standard Drawings and Specifications. The Contractor shall only place pavement following final compaction of the backfill and upon approval of the City Engineer.

**3-09 TESTING, DISINFECTION, AND FLUSHING**

**3-09.01 GENERAL**

The Contractor shall supply all material, labor, equipment and methods necessary to conduct the required tests. All tests shall be made in the presence of the City Engineer, except that bacteriological tests shall be performed at laboratories certified by the California Department of Health Services. All constructed facilities shall be isolated from the existing public system while being tested.

**3-09.02 HYDROSTATIC PRESSURE TESTING**

After all thrust blocks have been placed for at least two days in the particular portion to be tested, a pressure test shall be conducted by the Contractor.

Each section of main, up to but not exceeding 4,000 feet in length, and all fire hydrants and fittings connected thereto, shall be subjected to a hydrostatic pressure test in accordance with AWWA Standard C600 and C605 for Ductile Iron Pipe and Polyvinyl Chloride (PVC) Pipe respectively and as modified herein, while all pipe, fittings and joints are inspected for leakage. The section of pipe under test shall be allowed to stand at 40-psi minimum pressure for one (1) hour prior to the beginning of the test. The pressure shall then be increased to 1.5 times the local static pressure, or 150 psi, whichever is greater, to a maximum of 300

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psi. Pressure shall be measured at, or corrected to, the lowest point in the portion of the line being tested.

After the entire section under test has been inspected and no leaks have been found, or if found, have been repaired and re-subjected to the pressure test, the pressure shall be maintained for four hours, during which time the amount of leakage shall be determined by measuring the quantity of water which must be added to maintain the test pressure.

The maximum allowable leakage for PVC pipe shall be in conformance with AWWA Standard C605.

**3-09.03 DISINFECTION**

**3-09.03.1 GENERAL**

All water mains, attached appurtenances and connections shall be disinfected in accordance with AWWA Standard C651 "Disinfecting Water Mains", and as modified herein.

Contractor shall furnish all equipment, labor, materials, safety requirements, and water necessary for chlorinating and flushing the pipeline. Disinfection of new mains, including all chlorination, chlorine residual measurements, collection of samples, and certification of the pipeline disinfection shall be performed by trained personnel with a minimum of three (3) years experience. Gauges and apparatus used for chlorine injection shall bear the current State certification. Bacteriological tests shall be performed by a State certified laboratory. All costs for disinfection, including laboratory fees, shall be paid for by the Contractor.

Contractor shall insure that all pipe, fittings, and appurtenances are kept free from dirt and foreign matter at all times. During construction, all open pipe ends and fittings shall be fitted with a watertight plug. At the end of the workday, the open pipe in the trench shall be plugged in an equally suitable manner.

During the chlorination or chlorinating process, all valves shall be operated, and the chlorine solution shall be drawn through all laterals and appurtenances. Disinfection of mains and appurtenances, hydrostatic testing, and chlorine retention may run concurrently for the required minimum 24-hour period only if prior approval is obtained from the City Engineer.

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In the event of leakage or where repairs are necessary, added disinfection shall be made only by injecting chlorine into the line whereby adequate mixing is assured. If the test results are not satisfactory, the Contractor shall provide additional disinfection, as required. Such additional disinfection shall be at the Contractor's expense. Disinfection of pipelines 12-inch or smaller shall be accomplished by chlorination using either direct chlorine gas or calcium hypochlorite tablets as specified herein. All pipelines larger than 12 inches shall be disinfected using chlorine gas.

When cutting into or repairing existing mains, the Contractor shall swab the interior surfaces of the new valves, pipes and appurtenances as well as interior surfaces of the existing main, both upstream and downstream of the new pipe section, with a minimum five percent concentration of hypochlorite disinfection solution before installation. Except as modified herein, the provisions of AWWA C651, Section 4.7, "Disinfection Procedures When Cutting Into or Repairing Existing Mains" shall apply.

**3-09.03.2 CHLORINE GAS FEED**

The new system, that is being disinfected, shall be thoroughly pre-flushed, utilizing a minimum velocity of 2.5 feet per second throughout the entire system. The chlorinating agent shall be applied at a point not more than ten feet from 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 all parts of the main being disinfected shall be installed by, and at the expense of, the Contractor. Chlorine gas shall be fed directly from the chlorine cylinder equipped with a suitable device capable of regulating the rate of flow and diffusion of gas within the pipe. Water shall be concurrently fed into the pipe at a rate which produces a residual of not less than 50 PPM (parts per million) of chlorine in all sections of the pipeline and appurtenances being disinfected. Chlorinated water shall be retained in the system for a minimum duration of 24 hours, and shall produce, at the end of the retention period, not less than 25 PPM of chlorine in all sections of the pipeline being disinfected.



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**3-09.03.3 CALCIUM HYPOCHLORITE TABLETS**

This method may be used only if the pipes and appurtenances have been maintained in a clean and dry condition during construction. The number of tablets used shall produce a residual of not less than 50 PPM of chlorine in all sections of the pipeline and appurtenances being disinfected when filled with water. During construction, five-gram calcium hypochlorite tablets shall be placed in each hydrant, hydrant branch, and other appurtenances.

All tablets shall be attached, using an approved adhesive, on the inside and at the top of the main, with approximately equal numbers of tablets at each end of a given pipe. Adhesive shall be a type that will not impart detrimental compounds into the water supply. The following table may be used as a guideline for the number of five-gram tablets needed to achieve 50 PPM chlorine residual for each 18-foot length of pipe section, based on 3.25-g available chlorine per tablet, and with any portion of tablet rounded to next higher integer.

Pipe Diameter (Inches)	Suggested Number of 5-g Tablets
4	1
6	2
8	4
10	5
12	7

The fill rate when using tablets shall be regulated so that the velocity does not exceed one foot per second through the smallest main line being disinfected. If required by the City Engineer, water used to fill the new main during the application of chlorine shall be supplied through a temporary connection that shall include an appropriate cross-connection control device, consistent with the degree of hazard, for backflow protection of the active distribution system.

Chlorinated 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 25 PPM of chlorine in all sections of the pipeline being disinfected.

**3-09.03.4 FINAL FLUSHING**

Following the chlorination period of 24 hours, the newly laid line shall be thoroughly flushed to remove any foreign material. A suitable

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connection shall be provided by the Contractor at the end of each new line at the invert large enough to achieve a flushing velocity in the line of at least 5 feet per second. Water shall be flushed from the line at its extremities and at all outlets until the chlorine residual of the water system being flushed is less than 1.0 PPM, or the system residual. When calcium hypochlorite tablets are used, the system shall be flushed thoroughly utilizing a minimum velocity of 2.5 feet per second.

**3-09.03.5 BACTERIOLOGICAL TESTS**

Twenty-four hours after the system has been flushed, the Contractor shall have tests conducted for chlorine residual. Should the chlorine residual in any part of the disinfected system be higher than 1.0 PPM or the system residual, the Contractor shall repeat the flushing procedure. If the chlorine residual, after flushing, is less than 1.0 PPM or the system residual, the Contractor may proceed with the bacteriological tests. Samples shall be taken at the direction of the City Engineer with at least one set of samples collected at 1,200-foot intervals along the new water main, plus one set at each dead-end main section, and at least one set from each branch (i.e., laterals 4 inches and larger). Samples shall be taken 24 or more hours after final flushing. All samples shall be collected and tested for bacteriological quality in accordance with *Standard Methods for the Examination of Water and Wastewater*, and shall show the absence of coliform organisms.

The following tests are required to provide information for water quality evaluation:

- 1) Total coliform by membrane filters
- 2) Heterotrophic plate count

The Test Report shall include:

- 1) Coliform bacteria count per 100 ml.
- 2) Non-coliform bacteria count per 100 ml.
- 3) Heterotrophic plate count per ml.
- 4) Total and free chlorine residual, taken at time of sample collection

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All coliform test results must be negative. The non-coliform bacteria count by membrane filters shall be 100 or less per 100 ml. The heterotrophic plate count shall not exceed 200 per ml.

The results of these tests must be approved in writing by the City Engineer prior to activating any new water facilities. Should the test results from the State certified laboratory disclose that the water from the new line does not meet drinking water bacteriological standards, or is not of equal or better quality than that in the distribution system, the disinfection process shall be repeated until it meets the required standards.

**3-09.04 DISPOSAL OF TEST WATER**

All water used in testing and disinfecting the portions of pipeline, including that used for retesting, shall be disposed of following such testing, retesting, and disinfecting by the Contractor at his sole expense. The disposal of water shall, in all cases, be carried out in strict observance of the water pollution control requirements of the California Regional Water Quality Control Board - Santa Ana Region, 3737 Main Street - Suite 500, Riverside, CA 92501; Telephone: (909) 782-4130.

For contracts administered by the City of Chino Hills, the Contractor will be authorized to discharge under the National Pollution Discharge Elimination System (NPDES) permit, issued to the City of Chino Hills, if all requirements and procedures per such permit are followed. For all other projects, including Developer projects, Contractor or Developer shall obtain an NPDES permit and comply with that permit.

When necessary, the Contractor shall apply a reducing agent to the solution to neutralize residual chlorine or chloramine remaining in the water. Dechlorinated water shall not exceed 0.1 PPM of total residual chlorine. Compliance with this requirement shall be determined at the first catch basin and before the dechlorinated water mixes with any receiving water. Additionally, the flow of water from the portions of pipeline shall be controlled to prevent erosion of surrounding soil, damage to vegetation, and altering of ecological conditions in the area.

The Contractor's attention is directed to that portion of the pipe with a low elevation. All water used in testing and disinfecting in that portion of the pipe shall be pumped out by the Contractor, at his expense, as specified in the paragraph hereinbefore. The Contractor shall furnish

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and operate all necessary pumps, pipelines, valves, hoses and all other appurtenances needed for pumping out water from the said low portion.

**3-10 SPECIAL CONDITIONS**

**3-10.01 SHEETING AND SHORING**

All trench excavation shall be adequately protected to provide a safe, working condition and protection to adjacent facilities and structures. The Contractor shall work in such a manner and install such protective devices, shoring, and bracing to comply with all rules, regulations, and orders of CAL-OSHA, Division of Occupational Safety and Health.

Sheeting and shoring shall not place any undue strain on existing utilities or structures, or on completed sections of construction. Sheeting and shoring may be removed during backfilling, provided adequate protection is provided at all times. The Contractor shall be responsible for any damage to existing utilities or structures due to placement, removal, or failure of any sheeting and/or shoring system. The Contractor shall repair, or have repaired, any damage as soon as practical.

**3-10.02 JACKING OF STEEL CASING**

Steel casing shall be placed at the location, elevations, and limits shown on the construction drawings. Any utilities or structures encountered, which will interfere with construction, shall be brought to the attention of the City Engineer. Only new steel casing shall be used for jacking. Jacking shall be at a rate that will not over stress the casing, causing failure. Any damage to the casing during placement of the pipe shall be brought to the attention of the City Engineer. The jacking and receiving pit shall be sheeted and shored as required by CAL-OSHA and as provided in Section 3-10.01 of these specifications. The excavated area ahead of the casing shall not be larger than 0.1 foot greater than the outside diameter of the casing. Over excavation beyond the above described limits shall be sanded or pressure grouted as directed by the City Engineer. Sluicing or jetting ahead of the jacking casing shall not be permitted.