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SECTION TS-1 - EARTHWORK AND GRADING

TS-1.01 GENERAL

The Contractor shall furnish all labor, materials, tools, equipment, transportation, watering, compacting and all incidental work and services required for satisfactory completion of earthwork and grading.

Earthwork and grading shall conform to *Section 300 of the Standard Specifications for Public Works Construction (SSPWC)*, except as modified herein. The work shall consist of performing all operations necessary to excavate roadways, slopes, benches, ditches, channels or other items shown on the Drawings and to backfill depressions or ditches caused by removal of obstructions, construct embankments at the locations and to the elevations and form shown on the Drawings and to shape and compact all subgrade all in accordance with these Specifications. Unless otherwise provided in the Proposal as separate pay items, general site preparation, clearing and grubbing, removal of excess grass and weeds and grading of roadway shall be included in this item.

TS-1.02 PRESERVATION OF PROPERTY

Existing improvements or facilities and trees and shrubs that are not to be removed, shall be protected from injury or damage resulting from operations of the Contractor, and the Contractor shall be responsible for such damage. Only trees and shrubs specifically designated or marked for removal by the Engineer (or his Representative) shall be removed.

The Contractor shall provide such dust control equipment and methods as may be required to protect adjacent property from annoyance or damage from dust caused by his operations. Failure to control such dust shall be cause for the Engineer (or his Representative) to stop the work until said dust is controlled, and the Contractor shall have no recourse to collect from Santa Clarita Water Division for any loss of time or expense sustained by him due to such suspension of work.

TS-1.03 CLEARING AND GRUBBING

Except as otherwise specified, all trees, stumps, large roots, buried logs, decayed vegetable matter, buried junk piles, heavy growth of grass and weeds and all other objectionable material shall be removed from the site of the work. None of the above materials shall be permitted to remain in or under embankment and fill areas.

TS-1.04 REMOVAL AND DISPOSAL OF MATERIAL

Material removed during clearing and grubbing, including any excess excavation, shall be removed from the site of the work and disposed of at a location acceptable to the Engineer (or his Representative). Burning of materials on the site will not be permitted.

TS-1.05 EXCAVATION

Excavation shall conform to the lines, grades and cross-sections shown on the Drawings and no payment will be made for quantities in excess of those shown or hereinafter specified. When solid rock, scale, hardpan or like materials are encountered in the excavation, it shall be excavated to not less than 6-inches below subgrade and replaced with select material approved by the Engineer (or his Representative). Said select material shall be compacted to not less than 90 percent maximum density. Whenever reference is made to maximum density, it refers to the maximum density as determined by *ASTM*.

All soft or unsuitable material that will not readily compact to the density specified shall be removed to the depths shown on the Drawings or ordered by the Engineer (or his Representative) and disposed of as directed by the Engineer (or his Representative). Excavation in areas not shown on the Drawings or authorized by the Engineer (or his Representative) will not be paid for and the Contractor shall, at his own

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expense, backfill and compact unauthorized excavation areas to the original ground elevation and to the density specified.

All rocks or lumps larger than 2-1/2 inches in size in the upper 6-inches of the subgrade which will not break up under the operation of grading equipment shall be removed and the resulting space refilled and compacted with selected material approved by the Engineer (or his Representative).

TS-1.06 EMBANKMENT

The area where an embankment is to be constructed shall be cleared of all vegetation, roots and foreign material. The surface shall be moistened, scarified to a depth of six inches and rolled or mechanically compacted to 95 percent of maximum density. Embankment shall be placed in horizontal layers not to exceed eight inches in thickness measured prior to compaction, where compaction is by sheepsfoot rollers. The thickness shall be limited to six inches if compaction is by means of power driven tampers. Each layer shall be moistened or dried as required and thoroughly compacted to the following densities:

1. The density of each layer placed within 2.5 feet of the finished surface shall be not less than 95 percent of maximum density if under asphaltic concrete with no base material and 90 percent if under asphaltic concrete on base material.
2. The density of layers greater than 2.5 feet below finished surface shall be not less than 90 percent of maximum density.

TS-1.07 SUBGRADE PREPARATION

Subgrade preparation shall consist of (1) preparing basement soil or original ground to receive embankment, aggregate base or pavement; (2) preparing basement soil in roadway excavation areas to receive aggregate base or pavement; or (3) of preparing embankment to receive aggregate base or pavement.

The area shall be graded to the approximate elevation and cross-section shown. All rocks and lumps of earth over 2-1/2 inches in size and other unsuitable material shall be removed and disposed of from the upper 6-inches of the roadbed. The subgrade then shall be watered, shaped to the required grade and cross-section and thoroughly compacted.

The surface of the finished subgrade shall be true and uniform and shall not vary more than 0.1 foot below and not more than 0.05 foot above the theoretical cross-section at any point thereon. Any subgrade that does not conform to these requirements immediately prior to placing subsequent material thereon, shall be reworked, watered and recompactd.

TS-1.08 FINISHING SLOPES AND SURFACES

The surface of all areas of earth and other materials shall be finished to a reasonably smooth and compact surface substantially in accordance with the surface lines and cross-sections shown and to the elevations indicated on the Drawings or as directed. The degree of finish for graded slopes shall be that ordinarily obtainable from either blade-grader, scraper or hand shovel operations.

TS-1.09 SUBGRADE AND EMBANKMENT PROTECTION

During construction and until final acceptance of the work, excavations, embankments and subgrades shall be kept shaped and effectively drained at all times. Where ruts develop in the subgrade, the subgrade shall be brought to grade, reshaped if required, and recompactd prior to the placing of any paving material. Storage or stockpiling of materials on the subgrade will not be permitted. No base course shall be placed until the subgrade has been approved by the Engineer (or his Representative). Base material shall not be placed on muddy or otherwise unsuitable subgrade.

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TS-1.10 WATERING

All water used for compacting original ground, embankments, structure and trench backfill, subgrade, base and for laying dust caused by grading or traffic, shall be included in the price bid for such items and separate payment will not be allowed for watering.

TS-1.11 SOIL TESTING

- A. General:
All soils testing shall be done in accordance with *SSPWC, Section 211*, and by a testing laboratory of Santa Clarita Water Division's choice at the Contractor's expense.
- B. Compaction Tests:
Where soil material is required to be compacted to a percentage of maximum density, the maximum density shall be determined in accordance with the requirements of *SSPWC, Subsection 211-2*. In case the tests of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to insure compliance. **Subsequent testing to show compliance shall be by a testing laboratory selected by Santa Clarita Water Division and shall be at the Contractor's expense.**

TS-1.12 PAYMENT

Earthwork and grading will be paid for at the unit or lump sum price listed in the Proposal or, if no separate item is included, in the other items of work to which it relates.

*****END OF SECTION TS-1*****

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SECTION TS-2 - ASPHALT CONCRETE PAVEMENT

TS-2.01 GENERAL

The Contractor shall furnish all plant, labor, materials, tools, equipment, transportation and all incidental work and services required to construct asphalt concrete pavement and asphalt concrete resurfacing in accordance with these specifications, applicable drawings and *Section 203- Bituminous Materials* and *302-Roadway Surfacing of the SSPWC*, except as modified herein.

TS-2.02 PRIME AND SEAL COATS

A prime coat or a seal coat will not be required unless specified in the Special Provisions. When specified, the prime and seal coats shall conform to *Section 203-Bituminous Materials* of the *SSPWC*.

TS-2.03 ASPHALT BINDER

A tack coat shall be applied to all concrete curb or gutter surfaces that will be in contact with the asphalt surfacing.

When the surface to be paved is an existing Portland cement, brick, or dry asphalt pavement, a tack coat shall be applied to said surface at the rate of from 0.05 gallon to 0.10 gallon per square yard of surface covered. The exact rate of application will be determined by Santa Clarita Water Division Engineer (or his Representative). The tack coat shall be applied only so far in advance of paving or surfacing as ordered by the Engineer (or his Representative).

The surface to be covered shall be thoroughly cleaned of all dirt and loose materials prior to application of the asphalt binder.

The tack coat shall consist of an emulsified asphalt, *Grade Hot AR4000* paving asphalt. It shall be furnished and applied in accordance with the requirements of *Section 203-3-Emulsified Asphalt* and *302-5-Asphalt Concrete Pavement* of the *SSPWC*.

TS-2.04 WEED KILLER

Polybor chlorate, a weed killer, shall be applied to all ground surfaces where pavement is to be placed. It shall be mixed at the rate of two pounds of chemical to one gallon of water and shall be applied at a coverage rate of one gallon per 50 square feet.

TS-2.05 ASPHALT CONCRETE

Asphalt concrete shall be the product of mixing mineral and/or crushed slag aggregate with asphalt binder at a central mixing plant.

The combined mineral aggregate shall be as follows:

Pavement Thickness	Max. Size	Aggregate Class
3" or Greater	¾-inch	B
1.5" to 3"	¾-inch	C2
1" to 1.5" cap	3/8-inch	D1

The asphalt binder shall be paving asphalt, viscosity grade *AR4000* and shall conform to the requirements of *Section 203.6-Asphalt Concrete* of the *SSPWC*. The temperature of the paving asphalt and the mineral aggregate at the time of mixing shall conform to *Section 203-1-Paving Asphalt* of the *SSPWC*.

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TS-2.06 PLACING ASPHALT CONCRETE PAVEMENT

Prime coat or plant mixed surfacing shall be placed on the base course or subgrade only after said base has been approved by the Engineer (or his Representative). All work shall conform to *Section 302-5-Asphalt Concrete Pavement* of the SSPWC except as modified herein.

The application temperature of asphalt shall conform to *Section 203-1.4* of the SSPWC. Distribution and spreading shall conform to *Section 302-5.4*.

The Contractor shall furnish to the Engineer (or his Representative) certified weight tickets for all asphalt concrete incorporated in the work.

TS-2.07 ROLLING

Asphalt concrete shall be thoroughly compacted by rolling in accordance with *Section 302-5.5 Distribution and Spreading* of the SSPWC.

Manholes and other structures shall be adjusted to grade per *Section 302-5.7-Joints* of the SSPWC.

TS-2.08 PAYMENT

Asphalt concrete will be paid for at the unit or lump sum price listed in the proposal, or if no separate item is included, in the other items of work to which it relates.

*****END OF SECTION TS-2*****

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SECTION TS-3 - AGGREGATE BASE

TS-3.01 GENERAL

The Contractor shall furnish all plant, labor, materials, tools, equipment, transportation and all incidental work and services required to construct aggregate base in accordance with these Specifications, applicable drawings and *Section 200-Rock Materials* and *301-Treated Soil*, Subgrade Preparation, and Placement of Base Materials, as modified herein.

TS-3.02 SUBGRADE

The subgrade shall be prepared as specified in *Section 301-1-Subgrade Preparation* of the SSPWC.

TS-3.03 UNTREATED BASE MATERIALS

The aggregate for untreated base shall conform to the requirements of *Section 200-2-Untreated Base Materials* of the SSPWC.

TS-3.04 PLACING UNTREATED BASE

Untreated base material shall be spread on the prepared subgrade in uniform layers in accordance with *Section 301-2-Untreated Base* of the SSPWC.

TS-3.05 COMPACTING UNTREATED BASE

Untreated base shall be compacted in accordance with *Section 301-2.3-Compacting* of the SSPWC. The finished base, where not controlled by adjacent structures, shall be not more than 0.02 foot above, and not more than 0.02 foot below the theoretical cross-section.

TS-3.06 PAYMENT

Aggregate base will be paid for at the unit or lump sum price listed in the Proposal.

*****END OF SECTION TS-3*****

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**SECTION TS-4
CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS,
ACCESS RAMPS AND DRIVEWAYS**

TS-4.01 GENERAL

The Contractor shall furnish all plant, labor, materials, tools, equipment transportation and all incidental work and services required to construct concrete curbs, walks, gutters, cross gutters, alley intersections, access ramps and driveways shown on the plans or specified, in accordance with these specifications and *Sections 201-Concrete, Mortar, and Related Materials* and *Section 303-5-Concrete Curbs, Walks, Gutters, Cross Gutters, Alley Intersections, Access Ramps and Driveways* of the SSPWC except as modified here-in.

TS-4.02 SUBGRADE

Subgrade shall be prepared in accordance with *Section 301.1-Subgrade Preparation* of the SSPWC. The completed subgrade shall be tested for grade and cross-section by means of a template extending the full depth of the section and supported between the side forms. The subgrade and forms shall be thoroughly watered in advance of placing concrete.

TS-4.03 MATERIAL

Unless otherwise specified all curbs, gutters sidewalks and driveways shall be constructed with Class 520-C-3200 concrete. Concrete aggregate shall be No. 3 grade unless specified otherwise by the Engineer (or his Representative). All concrete shall comply with *Section 201-Concrete, Mortar, and Related Materials* of the SSPWC.

TS-4.04 MIXING, PLACING AND CURING

The mixing, placing and curing of concrete shall comply with *Section 303-5-Concrete Curbs, Walks, Gutters, Cross Gutters, Alley Intersections, Access Ramps, and Driveways* of the SSPWC.

TS-4.05 FORMS

All forms shall be set to the true lines and grades as shown on the plans and typical cross-sections. The depth of forms for curbs and gutters shall be equal to the full depth of the structure. The depth of forms for 4-inch sidewalk may be 3 5/8 inches. Timber forms, if used, shall be surfaced on the side next to the concrete and on the upper edge and shall be of the required size and strength to maintain their rigidity when the concrete is placed. Timber forms on all straight work shall not be less than 1 5/8-inch in thickness after being surfaced. The forms on the front of curbs shall be removed not less than 2 hours or more than 6 hours after the concrete has been placed. All other forms shall remain in place until the concrete is thoroughly set. Forms shall be cleaned thoroughly each time they are used and coated with light oil as often as necessary to prevent the concrete from adhering to them. Warped or rough forms will be rejected. Curb forms shall be held rigidly in place by the use of pairs of iron stakes placed at intervals not to exceed 4 feet. Clamps, spreaders and braces shall be used where required to insure rigidity in the forms.

TS-4.06 JOINTS

Transverse expansion joints in curbs, gutters and sidewalks shall be installed at all returns and shall be spaced at intervals not to exceed 60 feet between joints. An effort shall be made to space all joints in such a manner so as to create an appearance of uniformity. Expansion joints shall be filled with joint filler strips 1/2-inch thick and shall extend the full width and depth of curb, gutter and sidewalk.

The joint filler strips shall be in one piece, pre-cut to true cross-section and installed true to line and grade and at true angles to the curb and gutter line. Edges of expansion joints shall be rounded with an

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approved edging tool having a radius not to exceed 1/4-inch and all excess concrete shall be removed from around the joint.

When sidewalk is adjacent to curb the joint spacing pattern shall be identical and continuous.

Weakened plane joints shall be installed at regular intervals not exceeding 10 feet for walks and 20 feet for curb and gutters. Weakened plane joints shall be constructed in accordance with *Section 303-5.4.3-Finishing Plane Joints* of the SSPWC.

TS-4.07 FINISHING

Finishing of concrete curbs, walks, gutters, cross gutters, alley intersections, access ramps and driveways shall conform to *Section 303-5.5-Finishing* of the SSPWC.

TS-4.08 CURING

Exposed concrete surfaces shall be cured in accordance with *Section 303-5.6* of the SSPWC. Concrete curing compound shall be Type 2 and shall be applied at the rate of one gallon per 150 square feet.

TS-4.09 REMOVALS

When plans provide for reconstruction of existing sidewalks, curbs and driveways limits of the removal are to be saw cut to a depth of 1 ½-inches. Limits are to fall on the nearest full section of walk or curb at the next weakened plane or expansion joint.

TS-4.10 REPAIRS AND REPLACEMENTS

Any new work found to be defective or damaged prior to its acceptance shall be repaired or replaced by the Contractor at no expense to Santa Clarita Water Division in accordance with *Section 300-1.3-Removal and Disposal of Materials* of the SSPWC. The Contractor shall use epoxy to bond new construction to existing improvements which shall be applied at the rate of one gallon per 25 square feet.

TS-4.11 PAYMENT

Payment for concrete curbs, walks, gutters, cross gutters, alley intersections, access ramps and driveways will be made at the unit or lump sum price listed in the Proposal or, if no separate item is included, in the other items of work to which it relates.

*****END OF SECTION TS-4*****

**SANTA CLARITA WATER DIVISION
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SECTION TS-5 - WATER PIPELINES

TS-5.01 GENERAL - PIPING

The Contractor shall furnish and install all pipe, fittings, valves, supports, bolts, nuts, gaskets, jointing, materials and appurtenances as shown on the Drawings and as specified herein, and shall furnish and install all auxiliary piping and connection to equipment, all as required for a complete and workable piping system.

TS-5.02 STEEL PIPE

- A. **General:** Fabricated steel pipe and fittings, 6-inches in diameter and larger, shall conform to the requirements of the "Steel Water Pipe 6-Inches and Larger", (*AWWA C200*). Steel pipe, 4-inches in diameter and smaller shall conform to the "Specifications for Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses" (*ASTM A120*) and shall be schedule 40. Galvanized steel pipe shall not be cement mortar lined unless otherwise shown. Buried galvanized pipe shall be wrapped with polyvinyl chloride tape with a total thickness of 30 mils. The tape shall be *Plicoflex No. 340* or approved equal. The pipe first shall be primed following which the tape shall be applied strictly in accordance with the manufacturer's instructions.
- B. **Pipe:** Pipe 12-inch diameter and larger shall be fabricated from 8 gage steel sheet or plate, and pipe smaller than 12-inch diameter shall be fabricated from 10 gage steel sheet or plate, unless otherwise shown on the Drawings. The pipe shall be manufactured in sections having nominal lengths of 30 to 48 feet except where special sections are required. The pipe shall be furnished with rubber gaskets, butt straps, and closure pieces where shown or required.
- C. **Interior Lining:** Pipe and fittings shall be lined by one of the following two methods as indicated on the Drawings:
1. Cement mortar lined in conformance with the "*Standard for Cement Mortar Protective Lining and Coating for Steel Water Pipe - 4-inch and Larger-Shop Applied*", (*AWWA C205*). Mortar lining shall be ½" minimum thickness.
 2. Epoxy lined per Section TS-5.20 – Shop Applied Epoxy Coatings or in conformance with the "*Liquid Epoxy Coating Systems of the Interior and Exterior of Steel Water Pipes*", (*AWWA C210*).
- D. **Exterior Coating:** Steel pipe and fittings exposed to the atmosphere, inside structures and above ground shall be thoroughly cleaned and coated per Section TS-5.19, Epoxy Coatings of these Specifications. All buried, 4-inch and larger steel pipe and fittings shall be cement mortar coated in conformance with the above referenced *AWWA C205*. All buried, 3-inch and smaller steel pipe and fittings shall be coated with a tape coating system per *AWWA C214*.
- E. **Hand holes:** The pipe fabricator shall provide 5-inch diameter minimum hand holes, where required by the Engineer (or his Representative). For pipes 24-inch in diameter and smaller, mortaring the inside of joints may be accomplished by hand mortaring through handholes.
- F. **Trench Bearing:** Steel pipe 4 inches or larger in diameter shall be installed in trenches in such a manner that the pipe shall have uniform bearing along the bottom of the trench, except at bell holes for flanges and field-welded joints.
- G. **Jointing:** The pipe shall have welded or flanged joints, or bell and spigot joints with thrust blocks, as indicated on the Drawings. Where practicable, sections of pipe between flanges and/or couplings shall be shop-welded where indicated or required. Welding shall be as specified

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hereinafter.

- H. **Lining and Coating:** After welding jointing, the lining and coating of the pipe shall be made continuous by pointing the joint with mortar of one part portland cement, one part sand, and water through handholes.
- I. **Pipe Welding:** Circumferential joints in steel pipe shall be welded by use of electric arc in such a manner as to insure a connection equally or surpassing the strength of adjacent pipe. Care shall be taken to prevent spilling of the mortar lining and coating. All field welding shall be done in accordance with the applicable requirements of *AWWA Standard C206*, entitled "*Field Welding of Steel Water Pipe Joints*".

All shop and field welding, whether manual or by machine, shall be as specified herein. Welds to fabricate pipe shall be made in accordance with the requirements of the applicable reference specifications under which the pipe is fabricated as amended herein.

Welds specified herein, or shown on the Drawings, shall conform to the contours shown on these Drawings or indicated by standard welding symbols on such drawings. Welds, when tested, shall develop a tensile strength equal to that of adjoining parent metal.

Finished weld bead shall be centered in the seam, and the finished joints shall be reasonably smooth and free from depressions, cut edges, burrs, irregularities, and valleys. Each deposited layer of welded material shall be thoroughly wire brushed, and all slag, scale, and other loose material shall be removed before any additional weld metal is applied. Fillet welds shall have the full penetration into the corner of the fillet and shall be obtained with a minimum cutting back of the edge of the outside sheet. Fillet welds shall be of the size specified herein or shown on the drawings, and in any case, shall have a thickness of not less than that of the thinnest member to be joined. Welds considered by Santa Clarita Water Division to be deficient in quality, or made contrary to any mandatory provisions of these Specifications, shall be removed by chipping or cutting and re-made.

Weld metals shall be removed throughout its depth to expose clean base metal, but in no case shall the chipping or cutting extend into the base metal beyond the depth of weld penetration. Caulking of welds will not be permitted. Tack welds shall be removed if required by Santa Clarita Water Division.

Weld test specimens taken from materials fabricated for the work of these Specifications shall be taken in accordance with the respective reference specifications under which the particular item is being fabricated. Said specimens shall be furnished to Santa Clarita Water Division Inspector to enable Santa Clarita Water Division to ascertain that welds of the proper quality are being made. The furnishing of specimens in insufficient time so as to cause delay in the fabrication of materials shall not be cause for a time extension nor extra cost item to the Contract.

Santa Clarita Water Division shall have the right to request and witness the making of weld test specimens by a welder when, in the opinion of Santa Clarita Water Division, a satisfactory weld is not being made. Specimens shall be furnished by the Contractor and a weld of the type in question shall be made. The weld specimen shall then be submitted to a test laboratory approved by the Santa Clarita Water Division and subject to the appropriate test to determine the character of the quality in question. The expense of said test shall not be borne by the Contractor. If more than one test is to be performed, additional specimens shall be furnished by the Contractor as required. The requirements of this provision shall not be cause for a time extension nor extra cost item to the Contract.

- J. **Qualifications for Welding Operators:** Manual welders shall be qualified in accordance with the latest revision of *Section IX* of the *ASME Boiler Construction Code* entitled, *Welding Qualifications* or under the Standard Qualification Procedure of the *American Welding Society*.

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All welding operators shall be qualified under paragraph *U-69* of *ASME* Code for Unfired Pressure Vessels, or Paragraph *W.451* of *API-ASME* Code for Standard Qualification Procedure of the American Welding Society.

- K. **Welding Filler Material:** Electrodes for manual welding shall conform to the American Welding Society Standards. All welding electrodes shall be subject to the approval of Santa Clarita Water Division.
- L. **Welding Equipment:** Contractor's equipment for welding and flame cutting shall be so designed and manufactured to permit qualified welding operators to follow the procedures and obtain the results described in these Specifications.

TS-5.03 DUCTILE IRON PIPE

- A. Ductile iron pipe and fittings shall conform with AWWA C111 "*Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings*" and shall be cement mortar lined in conformance with AWWA C104/*ANSI A21.4*. The exterior of the pipe shall be asphaltic coated per AWWA C151. The pipe shall be Pressure Class Designation 350, unless otherwise shown on the Drawings. All ductile iron pipe shall be furnished in approximately 18 foot lengths with bell and spigot ends and shall conform to *ANSI A21.51* in all respects except details of the joint.
- B. Ductile iron pipe joints shall be of the push-on rubber gasket type conforming to AWWA C111/*ANSI A21.11*. Mechanical, restrained and flanged joints shall be provided where shown on the Drawings. All gasket material shall be EPDM rubber and compatible with chloraminated water.
- C. Ductile iron fittings for joining ductile iron pipe shall conform to AWWA C110/*ANSI A21.10* and AWWA C111/*A21.11* except that the ends shall be standard mechanical joints.
- D. Where restrained joints are specified, the joint shall be mechanical joint with set screws on the retainer gland. The set screws shall be square head, double heat tested steel screws designed to bite into the pipe surface to prevent joint separation.
- E. Polyethylene wrapping for ductile iron pipe shall be 8 mil thick polyethylene tubing or sheet material and shall comply with the requirement of AWWA C105.

TS-5.04 POLYVINYL CHLORIDE PIPE (PVC)

Polyvinyl Chloride (PVC) pipe shall be pressure rated conforming to AWWA C-900 or C-905 and rated for 165 psi minimum. The actual pressure class or pressure rating shall be indicated on the Drawings. PVC joints shall be bell and spigot push-on type joints for installations of long straight runs. Bell and spigot joints will require thrust restraint glands for above grade installations and concrete thrust blocks and/or mechanical restraints for below grade installations.

TS-5.05 SLEEVE-TYPE COUPLINGS AND FLANGE ADAPTERS

Sleeve-type couplings and flange adapters shall be furnished where shown and shall be *Romac* or approved equal. Couplings shall be of steel with stainless steel bolts, without pipe stop, and shall be sized to fit the pipe and fittings shown. The middle ring shall not be less than 1/4-inch in thickness and shall be either 5 or 7 inches long.

TS-5.06 FLANGE GASKETS AND BOLTS

Flange gaskets shall be full face type, with bolt holes pre-punched. All gasket material shall be EPDM rubber and compatible with chloraminated water. Gasket thickness shall be 1/16-inch for pipe 10 inches

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and smaller and 1/8-inch for 12-inch and larger pipe. Flanged assembly bolts shall be standard hex-head machine bolts with heavy, hot pressed, hexagon nuts. Threads shall conform to *ANSI B1.1*, coarse thread series, Class 2 fit. Bolt length shall be such that after joints are made up, the bolts shall protrude through the nut but not more than 2-inches. Bolts for use in buried installations shall be galvanized and coated in accordance with *Section TS-8.03* of these Specifications. Bolts for use in submerged installations shall be stainless steel *Type 304*.

TS-5.07 EXCAVATION AND BACKFILL

A. EXCAVATION:

The Contractor shall make all necessary excavation to construct the work as shown on the Drawings and shall remove all pipes, trees, stones, debris and other obstructions that may be encountered in making the excavation.

The trench at the end of each day shall not be excavated more than one hundred (100) feet in advance of the pipe laying, nor left unfilled for more than one hundred (100) feet where the pipe has been laid. The trench shall be excavated to a depth of six-inches below the bells and re-filled to invert grade with sand and thoroughly compacted into place at the Contractor's expense for all labor and material.

If any trench bottom, through neglect of the Contractor, is excavated below the grade as required by the Drawings and these specifications, it shall be re-filled to grade with sand thoroughly compacted into place at the Contractor's expense for all labor and material.

Excavation shall be supported in a safe manner meeting the requirements of *CAL OSHA*. Existing improvements of any kind, either on public or private property, shall be fully protected from damage. If any damage does result to such improvements, the Contractor shall make the necessary repairs or reconstruction at his own expense and as directed by the Engineer (or his Representative). Sheet piling or other timbers shall be removed in such a manner as to prevent caving of the walls of the excavation. The minimum width of the excavation shall be 12-inches (6-inches on each side) more than the exterior diameter of the pipe exclusive of joints and tees.

B. BACKFILL:

All pipe trenches shall be backfilled to twelve inches over the top of the pipe with sand conforming to *Section 200-1.5* of the *SSPWC*. The material shall be placed simultaneously on both sides of the pipe and shall be completely worked by tamping around the pipe. Such backfilling must be witnessed by the Engineer (or his Representative). It shall be compacted to not less than 90 percent of maximum density. Prior to placing the remaining backfill, all material that has inadvertently fallen into the excavation, shall be removed to twelve inches above the pipe before commencing trench backfilling. This requirement is mandatory. The remaining backfill shall be select material obtained from the excavation, shall not contain stones or boulders larger than 3-inches maximum dimension, and shall be placed in layers not exceeding two feet in thickness. Each layer shall be compacted to not less than 90 percent of maximum density.

TS-5.08 CUTTING AND RESTORING EXISTING PAVEMENT

Pavement destroyed in connection with performing the work required under the Contract shall be replaced with the same kind or better by the Contractor. If a strip of existing pavement less than five (5) feet is left between a trench and a gutter or edge of pavement, it shall be removed and new pavement placed in its stead. In cutting or breaking up street surfacing, the Contractor shall not use equipment which will damage the adjacent pavement. All concrete pavement surfaces shall be scored with concrete sawing equipment; provided, that any portland cement concrete base under an asphalt mix surface will not be required to be scored by sawing. Asphaltic-concrete pavement shall be removed to clean straight lines.

Concrete sidewalks, curbs and gutters required to be removed in connection with performing the work

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under the Contract shall be cut to the nearest score mark and shall be replaced with the same kind or better by the Contractor. Immediately after completing the backfilling of any section of pipeline in a paved area, temporary resurfacing at least 1-1/2 inches in thickness, shall be placed over the backfilled trench and maintained by the Contractor at his own expense. Upon completion of substantial parts of the project, but not before the pipeline is tested, the temporary resurfacing shall be placed with permanent resurfacing.

All work shall match the appearance of the existing improvements as nearly as practical. Lampblack or other pigments may be added to the concrete to attain the necessary result.

In all cases, the repaving and repairing shall be done in accordance with the requirements of the local authorities having jurisdiction in the area of the work.

TS-5.09 INSTALLATION OF PIPE

- A. The Contractor shall install pipe closure sections, fittings, valves and appurtenances shown, including bolts, nuts, gaskets, jointing materials and thrust blocks.
- B. At all times when the work of installing pipe is not in progress, all openings into the pipe and the ends of the pipe in the trenches or structure shall be kept tightly closed to prevent entrance of animals and foreign materials. The Contractor shall take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, shall assume full responsibility for any damage due to this cause and shall at his own expense restore and replace the pipe to its specified condition and grade if it is displaced due to floating. The Contractor shall maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until its acceptance by Santa Clarita Water Division.
- C. Where closure sections are required by the Contractor's laying operation, the sections shall be installed in accordance with the applicable section of these Specifications.
- D. The pipe sections shall be laid in the trench to true alignment and grade in accordance with the Drawings. Exceptional care shall be taken in placing the pipe and making the field joint. Bumping of the pipe in the trench will not be permitted. Steel pipe shall be welded, unless otherwise shown on the Drawings. Concrete thrust blocks and/or mechanical restraints shall be provided at the locations and of the sizes as shown on the Drawings.
- E. Special care shall be taken during unloading and placing the pipe in trenches. Fabric or other approved slings shall be used for steel pipe. Sandbags shall be used to support all stockpiled pipe. Bell holes shall be dug under each bell to permit even bearing of the pipe along the entire length.
- F. Pipe ends shall be reamed to the full bore of the pipe. Threads shall conform to *ANSI B2.1*. In making up threaded joints, an accepted thread lubricant shall be applied to the male threads only.
- G. Flanged joints shall be made up square with even pressure upon the gaskets and shall be perfectly watertight.
- H. Bell and spigot joints shall be made up concentrically with the rubber gasket completely retained by the bell or spigot groove. A feeler gage shall be used to determine if each joint has been properly assembled.
- I. When steel pipe is not to be welded, concrete thrust blocks shall be constructed at all changes in direction. Thrust blocks shall be constructed against undisturbed earth. Each thrust block shall be placed so that valves and fittings are accessible for repair. Size of thrust blocks shall be as shown or as directed by the Engineer (or his Representative).

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TS-5.10 INSULATING BUSHINGS AND UNIONS

Pipe and fittings made of non-ferrous metals shall be isolated from ferrous metals by nylon insulating pipe bushings or unions as manufactured by Smith Blair, Corrosion Control Products, Co., or approved equal.

TS-5.11 SERVICE LATERALS

- A. New service laterals are to be installed of the size and at the location shown on the Drawings.
- B. Service lateral material shall be HDPE.
- C. Service laterals are to be installed, chlorinated, pressure tested and flushed before connection is made to meters.
- D. No joints shall be made in service lateral runs without Santa Clarita Water Division Inspector's permission.
- E. All existing services shall be reconnected after new mains are pressurized and chlorinated.
- F. Meter boxes or services shall be located a minimum of four feet from a tree or top of "X" of a driveway.

TS-5.12 VALVES - GENERAL

- A. All valves and gates shall be of new manufacture. The flanges may be either raised or plain faced and shall be faced and drilled to 125-pound American Standard dimensions, unless otherwise shown on the Drawings. Each valve body shall be tested to a pressure equal to twice its design water working pressure, except that gate valves shall be tested in accordance with "*Standard for Gate Valves for Ordinary Water Works Service*" (*AWWA C509-latest edition*).
- B. All interior parts of valves manufactured of bronze or brass except valve stems shall conform to the requirements of *ASTM B62*. Gate valve stems shall be of bronze, containing aluminum and having a minimum tensile strength of 60,000 psi, a yield strength of 40,000 psi and elongation of at least 100 percent in two inches, as determined from a test coupon poured from the same ladle from which the valve stems to be furnished are poured.
- C. Except as otherwise provided, all ferrous surfaces (excluding non-corrosive surfaces) in the water passages of all valves, 4-inch and larger, shall be coated with an epoxy coating meeting the requirements of *Section TS-5.19 – Epoxy Coating* of these Specifications. All buried valves shall be provided with an exterior protective coating in accordance with *Section TS-15.20 – Shop Applied Epoxy Coatings* of these Specifications.

TS-5.13 RESILIENT SEAT GATE VALVES

- A. Gate valves shall conform to the above referenced *AWWA C509(latest edition)*. Gate valves shall be designed for a water working pressure of 175 psi and shall be iron-bodied, bottom-wedging, double-disc with parallel seats and shall have 2-inch square operating nut or handwheel, as shown, opening to the left. In addition, non-rising stem gate valves shall be equipped with "O" ring seals. Unless otherwise shown, gate valves shall have non-rising stems and shall be furnished with flanged ends. Gate valve shall be new and of current manufacture and shall be as manufactured by **Mueller Co.** only.
- B. All interior parts of gate valves shall be constructed of bronze conforming to the requirements of *Section TS-5.12 – Valves - General* of these Specifications.

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- C. Ferrous surfaces in the water passages of valves 4-inches in diameter and larger shall be epoxy coated in accordance with *Section TS-5.19 – Epoxy Coatings* of these Specifications. The coating shall not be applied to stainless steel, brass or bronze surfaces.
- D. Resilient seat gate valves shall be used for installations up to 12-inches in size exclusively.
- E. All valve seatings and wetted materials shall be either EPDM material or certified compatible with chloraminated water.

TS-5.14 BUTTERFLY VALVES

- A. **BUTTERFLY VALVES:**
Butterfly valves shall conform to the "*Standard for Rubber-Seated Butterfly Valves*" (AWWA C504-latest edition), except that butterfly valves, 24-inch and smaller, may be of the shorter laying length and the seat may be bonded into a groove in the valve body. The valves shall be of the class indicated on the Drawings. Valve bodies shall be cast iron conforming to the "Specification for Gray Cast Iron Casting for Valves, Flanges and Pipe Fittings" (ASTM A126), Class B. Valve shafts shall be of *Type 304 stainless steel*, running in "oilite", or approved equal, sleeve-type bearings and fitted at the outer end for connection to operating gearing. Ferrous surfaces in the water passages of all valves (excluding those surfaces manufactured of non-corrosive materials) shall be coated in accordance with *Section TS-9-Painting and Protective Coatings* of these Specifications. Butterfly valves shall be ***Pratt Groundhog or approved equal***.
- B. **MANUAL OPERATORS:**
The type of manual operator to be provided with each butterfly valve shall be as shown. Manual operation shall be through totally-enclosed, permanently-lubricated gear reducers. Gear reducers shall have a self-locking worm or spur and rack-type gearing and shall be equipped with handwheel or with a 2-inch square operating nut on the input shaft as noted on the drawings. Open and close stops shall be provided to limit valve disc travel. Handwheel operators shall be equipped with position indicators. The operators for buried butterfly valves shall be totally-enclosed, have fully-gasketed, sealed and grease-packed operator cases suitable for and expressly designed for installation and operation in a buried location. The maximum torque rating for a buried service operator shall be 8,000 inch-pounds.
- C. Butterfly valves shall be used for installations of 14-inch and larger only and at the direction of the Engineer (or his Representative).

TS-5.15 MISCELLANEOUS SMALL VALVES

Miscellaneous small valves shall be as shown. Where not specifically labeled, valves smaller than 4-inch shall be lever-operated, rubber-faced, eccentric plug valves as manufactured by ***De Zurik or approved equal***.

TS-5.16 VALVE BOXES

Valve boxes shall be as shown on the Drawings.

TS-5.17 CORPORATION STOPS

Corporation stops shall be shown on the Drawings.

TS-5.18 INSTALLATION OF VALVES

All buried valves shall have the operating nuts in a vertical position except as otherwise noted. Valve boxes, where called for, shall be centered over the operating nuts and shall be set plumb. Butterfly

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valves with handwheel operators shall be installed with the handwheels in the position shown.

TS-5.19 EPOXY COATINGS

- A. SURFACE PREPARATION:
All oil and grease shall be removed from the metal, using an oil-free solvent (methyl ethyl ketone or trichloroethylene) and clean dry rags. The surface shall be sandblasted to white metal. In order to obtain maximum adhesion of epoxy coating, the grit used for blasting shall be coarse enough to impart a tooth in the metal equal to 25 percent of the thickness of the coating to be applied. The metal shall be cleansed after sandblasting with clean, dry compressed air.
- B. PRIME COATING:
The prime coat shall be a *Devoe* product or approved equal applied to the prepared surface.
- C. FINISH COATING:
One or more finish coats of a *Devoe* product or approved equal shall be applied to the primed surface.
- D. THICKNESS OF COATING:
The minimum dry coating thickness shall be 10 mils, provided, however, that the thickness of coating in the grooves of valves or fittings designed to receive a rubber gasket shall be approximately 5 mils.

TS-5.20 SHOP APPLIED EPOXY COATINGS

- A. SURFACE PREPARATION:
All oil and grease shall be removed from the metal, using an oil-free solvent (methyl-ethyl-ketone or trichloroethylene) and clean dry rags. The surface shall be sandblasted to white metal. In order to obtain maximum adhesion of epoxy coating, the grit used for blasting shall be coarse enough to impart a tooth in the metal equal to 25 percent of the thickness of the coating to be applied. The metal shall be cleaned after sandblasting with clean, dry compressed air.
- B. POWDER EPOXY:
The epoxy shall be one hundred percent epoxy material and shall be *3M Company's Scotchcoat No. 134* or approved equal.
- C. PREHEATING:
Areas that are not to be coated shall be masked using 500-degree masking tape, similar to 3M Company's Permacel. The part to be coated shall be placed in an oven and preheated to the temperature specified by the epoxy manufacturer. An accurate temperature measuring device such as a pyrometer shall be used to determine the substrate temperature.
- D. APPLICATION:
The epoxy shall be applied as a powder to the heated metal by one of the following methods:
1. ELECTROSTATIC METHOD: The powder shall be applied to the heated, grounded metal part which has been electrostatically charged by means of a current of approximately 1-½ amperes at approximately 400 volts. After application of the epoxy, the part shall be reheated as specified by the manufacturer to fuse the epoxy. Equipment for applying the epoxy powder shall be the Sames Electrostatic Powder Spray, or approved equal. Particular care shall be given to protection of non-ferrous masked parts. The finished product shall be carefully examined for epoxy interference on working parts.
 2. HEAT FUSION METHOD: The part shall be prepared as outlined above and heated for a sufficient period to drive out all moisture from the metal. Epoxy powder shall be

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supplied using an air spray device designed to exclude moisture from the spray air. The part must be preheated to maintain a surface temperature high enough to cause instant epoxy fusion during the entire application process. After coating, the part shall be reheated as specified by the manufacturer. Particular care shall be taken to protect non-ferrous masked parts. The finished product shall be carefully examined for epoxy interferences on working parts.

- E. **THICKNESS OF COATING:**
The minimum dry coating thickness shall be 8 mils, provided, however, that the thickness of coating in the grooves of valves or fittings designed to receive a rubber gasket shall be approximately 5 mils.
- F. **INSPECTION:**
Coating thickness shall be checked with a nondestructive magnetic type thickness gage. Coating integrity shall be tested with an 87-volt Tinker Razor holiday tester or spark testing unit operating at approximately 2,700 volts.
- G. **FIELD REPAIRS:**
If small local repairs are necessary, they shall be made using 3M Company's Scotchclad 134 field repair kit, or approved equal. The surface must first be cleaned with an oil-free solvent (methyl-ethyl-ketone or trichlorethylene) and clean dry rags.

TS-5.21 TESTING AND DISINFECTING - GENERAL

The Contractor shall furnish all equipment, labor and materials required for testing and disinfecting the piping system. Water for testing and disinfecting will be furnished by Santa Clarita Water Division (SCWD) without charge to the Contractor, but shall be metered through a fire hydrant meter provided by SCWD. Disinfection shall be accomplished by chlorination. Chlorine dosages will be computed by the Engineer (or his Representative), who will furnish the Contractor with detailed instructions for proper application of the chlorine. All chlorinating and testing operations shall be performed in the presence of the Engineer (or his Representative). Prior to testing and disinfecting, the pipeline shall be thoroughly flushed through fire hydrant connections or Contractor provided SCWD approved vertical flushing points and at no time through existing valves connected into a SCWD water main.

TS-5.22 TESTING PIPELINES

The Contractor shall test the piping after backfilling operations are completed. The test shall be made by placing a temporary bulkhead in the pipe and filling the lines slowly with water. At no time during pipeline construction will heavily chlorinated water be pressure tested against a valve connected to a SCWD water main. Care shall be used to see that air is permitted to escape during filling. After the line has been completely filled, it shall be allowed to stand under slight pressure for a sufficient length of time to allow the mortar lining to absorb what it will and to allow the escape of air from any air pockets, but for not less than 24 hours. During this period, bulkheads, valves and connections shall be examined for leaks. If any are found, these shall be stopped or in case of leakage through valves in the main line or through bulkheads, provision shall be made for measuring such leakage during the test. The test shall consist of holding the test pressure on each section of the line for a period of 4 hours. **The test pressure at the lowest point in the line shall be 150 psi.** The water necessary to maintain this pressure shall be measured through a meter or by other means satisfactory to the Engineer (or his Representative).

The leakage shall be considered the amount of the water entering the pipeline during the test, less the measured leakage through valves and bulkheads. The leakage shall not exceed 5 gallons per inch of diameter per 1000 L.F. per 24 hours. Any noticeable leaks shall be replaced with new pipe or equipment until the leakage is reduced to permissible limits.

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TS-5.23 DISINFECTING THE PIPELINES

- A. Chlorination shall be by means of a chlorine-water mixture applied by means of a solution-fed chlorination device. The maximum chlorine dosage entering the pipeline shall be 80 mg/L. Chlorinated water shall be retained in the pipeline long enough to destroy all nonspore-forming bacteria and, in any event, for at least 24 hours. After the chlorinated water has been retained for the required time, the chlorine residual in the line shall be at least 40 mg/L or one half of the initial chlorine dosage. If less than 40 mg/L or one half of the initial chlorine dosage is indicated the line shall be flushed and the chlorination process shall be repeated until a test has indicated a residual of at least 40 mg/L of chlorine. All valves within the scope of the project shall be operated while the lines are filled with the heavily chlorinated water.
- B. After the specified retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water leaving the main is no higher than that generally prevailing in the system. The heavily chlorinated water flushed from the pipeline shall be reduced to 1.0 mg/L chlorine prior to discharging into a storm drain system. The Contractor shall perform this at his own expense. A chlorine residual determination shall be made to ascertain that the heavily chlorinated water has been removed from the main.
- C. Santa Clarita Water Division will collect water samples for analysis prior to placing the new facilities in service. The Contractor shall provide approved sampling points at least every 500 L.F. of pipeline main as specified by Santa Clarita Water Division. Should any sample fail to meet the requirements of Santa Clarita Water Division, the chlorination procedures shall be repeated. The Contractor will be responsible for the cost of additional water analyses. After final flushing and before the new main is connected to the existing distribution system, two consecutive sets of acceptable samples, taken 24 hours apart, shall be collected from the new main.
- D. The water main and all existing services shall be flushed out until the chlorine residual is not greater than that prevailing in the system prior to placing back in service.
- E. Existing water mains that have been shut down and cut into for connections or installation of tees and valves shall be sterilized to the satisfaction of the Water Manager or his duly authorized representatives.
- F. As an optional procedure, water mains and appurtenances must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. Sanitary construction practices must be followed during the installation of the final connection, so that there is no contamination of the new or existing water main with foreign material or groundwater.
- G. As another optional procedure, the new pipe, fittings and valve(s) required for the connection may be spray-disinfected or swabbed with a minimum 1 percent solution of chlorine just prior to being installed, if the total length of connection from the end of a new main to the existing main is equal to or less than 18 feet. This option must be approved by Santa Clarita Water Division prior to implementation.
- H. As another optional procedure, the pipe required for the connection must be set up aboveground, disinfected, and bacteriological samples taken if the total length of connection from the end of a new main to the existing main is greater than 18 feet. After satisfactory bacteriological sample results have been received for this "pre-disinfected" pipe, the pipe can be used in connecting the new main to the active distribution system. Between the time that satisfactory bacteriological sample results are received and the time that the connection piping is installed, the ends of this piping must be sealed with plastic wraps or watertight plugs or caps. This option must be approved by Santa Clarita Water Division prior to implementation.

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TS-5.24 COMPACTION TESTS

- A. **GENERAL:**
All soils testing shall be done in accordance with Section 211-Soils and Aggregate Tests of the SSPWC, and by a testing laboratory of Santa Clarita Water Division's choice at the Contractor's expense.
- B. **COMPACTION TESTS:**
Where soil material is required to be compacted to a percentage of maximum density, the maximum density shall be determined in accordance with *Section 211-1-Compaction Tests* of the SSPWC. In case the tests of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to insure compliance. **Subsequent testing to show compliance shall be by a testing laboratory selected by Santa Clarita Water Division and shall be at the Contractor's expense. Compaction test shall be performed every 100 feet unless stated otherwise by Santa Clarita Water Division or its representative.**

TS-5.25 SEPARATION OF WATER MAINS AND SANITARY SEWERS

The criteria for the separation of water mains and sanitary sewers shall be as specified by the latest edition of the State of California Department of Health Services "*Guidance Criteria for the Separation of Water Mains and Non-Potable Water Lines*". A copy of the criteria is on file in the office of the Engineer (or his Representative).

TS-5.26 PAYMENT

Pipe shall be paid for at the Contract price per linear foot or shall be paid for at the unit or lump sum price indicated in the bidding schedule. If no bid item is indicated, then the item shall be considered in the Contract price for the work in which it relates.

*****END OF SECTION TS-5*****

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SECTION TS-6 - CONCRETE

TS-6.01 GENERAL

Concrete work includes all concrete complete with metal reinforcement, and construction embedments as shown and specified.

TS-6.02 MATERIALS

A. CEMENT:

All cement used in the work shall be standard brand Portland cement Type II, conforming to the "Specifications for Portland Cement", (*ASTM C150*). Only one brand of cement shall be used. All cement used in the work shall be taken from stock bins at the place of manufacture in which bins the cement shall have been tested and found to conform strictly to the terms of these Specifications. Results of certified tests by a recognized testing laboratory, acceptable to the Engineer (or his Representative), shall be furnished by the cement manufacturer.

B FINE AGGREGATE

1. Fine aggregate for concrete shall consist of natural sand obtained from pits approved by the Engineer (or his Representative), and in all cases shall be washed. The grading of the fine aggregate, as determined in accordance with the "Method for Sieve Analysis of Fine and Coarse Aggregates" (*ASTM C136*), shall be approximately as follows:

<u>Sieve Size</u>	<u>Percentage Passing Sieves</u>
3/8 inch	100
No. 4	80-100
No. 8	60-90
No. 16	45-70
No. 30	25-45
No. 50	10-25
No. 100	2-9
No. 200	0-5
No. 270 wash	0-3

2. Fine aggregate shall meet the requirements of *ASTM C33*, "Specifications for Concrete Aggregates" and shall be tested in accordance with *ASTM C40* "Test Method for Organic Impurities in Fine Aggregates for Concrete". Fine aggregate departing in any respect from the foregoing requirements shall not be used in the work. In case the finer particles from the crushed coarse aggregate are permitted or requires to be mixed with the sand from natural deposits, the two products shall be uniformly blended before washing or screening to insure a combined product of constantly uniform composition.

C. COARSE AGGREGATE

1. Coarse aggregate shall meet the requirements of *ASTM C33* "Specifications for Concrete Aggregates" with the additional provision that it shall contain not more than 25 percent of crushed material. All coarse aggregate shall be obtained from pits approved by the Engineer (or his Representative). When tested in accordance with the "Test Method for Resistance to Degradation of Small Size Coarse Aggregate by abrasion and Impact in the Los Angeles Machine" (*ASTM C131*) and the "Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate" (*ASTM C88*), the loss in the respective tests shall not exceed the following:

Los Angeles Rattler Test after: 500 revolutions 35 percent

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Soundness test (sodium sulfate): 10 percent

The coarse aggregate used shall be graded approximately as follows:

Percentage Passing Sieves

Sieve Size	<u>No. 2 size</u> 1 ½-inch max.	<u>No. 3 Size</u> 1-in. max.	<u>No. 4 Size</u> ¾-in. max
2-in.	100	-	-
1 ½-in.	90-100	100	-
1-in.	20-55	90-100	-
¾-in.	0-15	60-85	-
½-in.	-	-	-
3/8-in.	0-5	14-40	90-100
No. 4	-	0-15	0-15
No. 8	-	0-5	0-5
No. 200	0-2	0-2	-

2. The relative amount of coarse aggregate to be used in the concrete mix will be determined by the Contractor and approved by the Engineer (or his Representative) prior to use. The amount used will be based on securing a well-graded aggregate and producing concrete having the required workability, density, and strength without the use of excess sand, water, or cement.
3. Unless otherwise directed and/or approved by the Engineer (or his Representative), No. 2 size mix shall be used for all footings, slabs, walls and beams. Other mixes shall be used only when approved by the Engineer (or his Representative).

TS-6.03 WATER FOR CONCRETE

The water for concrete shall be potable and/or meet the requirements of *ASTM C94 "Chemical Limits for Wash Water used as Mixing Water"*.

TS-6.04 MEASUREMENT OF CEMENT AND AGGREGATE

The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment and approved by the Engineer (or his Representative).

TS-6.05 MEASUREMENT OF WATER

The quantity of water entering the mixer at the batch plant shall be measured by a suitable water meter or other measuring device of a type approved by the Engineer (or his Representative). The operating mechanism must be such that leakage will not occur when the valve is closed.

TS-6.06 CONSISTENCY

The quantity of water required for the proper consistency of the concrete shall be determined by the slump test in accordance with the "Test Method for Slump of Portland Cement Concrete" (*ASTM C143*). Slump allowances shall be 4-inches maximum.

TS-6.07 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall meet the requirements as to materials, batching, mixing, transporting, and placing as specified herein and in the requirements of the "Specification for Ready-Mixed Concrete" (*ASTM C94*) including the supplementary requirements specified in

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Subsection (b) through (g), herein.

- B. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one hour after the addition of the cement to the aggregates before the drum has been revolved 250 revolutions, whichever is first. In hot weather, or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes.
- C. Truck mixers shall be equipped with electrically actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counters shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixing at mixing speeds.
- D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of the equipment. Subsequent to the addition of any water at the job site, the batch shall be mixed for a minimum period of 12 minutes at the speed designated by the manufacturer of the equipment at agitating speed.
- E. Truck mixers and their operation must be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If in the opinion of the Engineer (or his Representative) a truck mixer is operating improperly, for any reason, it shall be removed from the work and not permitted to return to the jobsite at any future time. The Engineer (or his Representative)s determination is final and precludes compensatory recourse by the Contractor.
- F. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a supplementary document furnished to the Engineer (or his Representative) and showing volume of concrete, the weight of cement, water, fine aggregate and coarse aggregate in pounds, and the weight of additive ingredients in ounces. A trip ticket shall show the time of day at which the materials were batched, arrived at the jobsite, commenced discharge, and completed discharge.
- G. The use of non-agitating equipment for transporting ready- mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Engineer (or his Representative).

TS-6.08 STRENGTH

The minimum compressive strength of reinforced concrete shall be not less than 3250 psi at 28 days and the minimum compressive strength of non-reinforced concrete shall be not less than 2500 psi at 28 days per *SSPWC Section 201-1.1.2 – Concrete Specified by Class and Alternate Class*. The Engineer (or his Representative) may order the cement content to be increased if he determines that such increase is necessary to attain the required strength. Such increased quantities of cement, if so ordered, shall be furnished at no additional cost to Santa Clarita Water Division.

TS-6.09 TESTS

The determination of compressive strength will be made by testing 6 inch diameter by 12 inch cylinders made and cured in accordance with the "Methods of Making and Curing Concrete Test Specimens in the Field" (*ASTM C31*) or the "Test Method for Compressive Strength of Cylindrical Concrete Specimens" (*ASTM C39*). Tests will be made by the Engineer (or his Representative) at one (1) test per each 50 cubic yards per 2-2604(d) of Title 24, C.A.C. and the mixes used shall be changed wherever, in the opinion of the Engineer (or his Representative) (or his Representative), such change is necessary or

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desirable to secure the required workability, density, impermeability, surface finish and strength, and the Contractor shall be entitled to no additional compensation because of such changes. The cost of all laboratory tests on cement, aggregates, and concrete will be borne by Santa Clarita Water Division, but the Contractor shall assist the Engineer (or his Representative) in obtaining and handling specimens and for providing facilities for storage at the job site.

TS-6.10 FORMS

- A. Forms to confine the concrete and shape it to the required lines shall be used. The Contractor shall assume full responsibility for the adequate design of all forms. However, any forms which in the opinion of the Engineer (or his Representative) are unsafe or inadequate in any respect may at any time be condemned by the Engineer (or his Representative) and the Contractor shall promptly remove the condemned forms from the work and replace them at his expense.

- B. Except as otherwise expressly approved by the Engineer (or his Representative), all lumber brought on the job site for use as forms, shoring, or bracing shall be new material. All forms shall be smooth surface forms.

Plywood shall be manufactured especially for concrete form work and shall be "Plyform" as manufactured by United States Plywood Corporation, or approved equal. Plywood, 5/8 of an inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. Concrete construction joints will not be permitted at locations other than those shown on the drawings or prescribed in these specifications, except as may be approved by the Engineer (or his Representative). When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of the ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required. Coring and/or blocking out for such items will not be permitted.

- C. All forms shall be true in every respect to the required shape and size; shall conform to the established alignment and grades; and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.

- D. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. The forms shall be tight in order to prevent the loss of water, cement, and fines during placing and vibrating of the concrete.

- E. Adequate cleanout holes shall be provided at the bottom of each lift of forms. The size and location of such cleanouts shall be subject to the approval of the Engineer (or his Representative).

- F. Exterior corners in concrete members shall be provided with 3/4-inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise shown on the Drawings.

- G. Adequate and suitable means shall be provided for removing all forms without injury to the surface of the finished concrete.

- H. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than one inch from the formed face of the concrete. The maximum diameter of removal cones for rod ties shall not exceed one inch, and all such fasteners shall be such as to leave holes of conical shape for reaming. Wire ties for holding forms will not be permitted. No form-tying device or part thereof other than metal shall be left embedded in the concrete, nor shall any tie be removed in such a manner as to leave a hole

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extending through the interior of the concrete member. The use of form ties or form-tying methods which cause spalling of the concrete upon form-stripping or tie removal will not be permitted. Form ties shall be provided with integral waterstops and shall be submitted to the Engineer (or his Representative) for approval.

- I. All vertical surfaces of concrete members shall be formed except where placement of the concrete against the ground is called for on the Drawings or explicitly authorized by the Engineer (or his Representative). In general, the practice of substituting excavated surfaces for forms is not acceptable.
- J. Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, the forms shall be thoroughly cleaned. Form surfaces shall be treated with a non-toxic non-staining mineral oil or other lubricant approved by the Engineer (or his Representative). Any excess lubricant shall be satisfactorily removed before placing the concrete. Form oil shall not be allowed to come in contact with existing concrete steel reinforcement or other materials to be embedded in concrete.
- K. Forms may be re-used if they are in good condition and if they are approved by the Engineer (or his Representative). In determining the extent to which forms may be re-used, particular attention shall be given to maintaining a uniform surface texture on all exposed concrete surfaces. Light sanding between uses will be required wherever necessary in the opinion of the Engineer (or his Representative) to obtain such uniform texture.

TS-6.11 PREPARATION OF SURFACES FOR CONCRETING

- A. Earth surfaces shall be thoroughly moistened, but not saturated, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris the day before and at the time of placing concrete.
- B. Existing concrete surfaces upon or against which concrete is to be placed where the placement of the old concrete has been stopped or interrupted, are defined as construction joints. The surfaces of horizontal joints shall be leveled with a wooden float to provide a reasonably smooth surface. A surface consisting largely of coarse aggregate shall be avoided. Edge surfaces of the interrupted concrete shall be bulkheaded at the time of placement to provide a surface perpendicular to the plane of the work.

Joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by wet sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

- C. The placing of concrete shall be continuous in any element of the work. In the event placing of concrete is to be interrupted long enough for the concrete to take a set, and an approved construction joint is not provided for or allowed by the Engineer (or his Representative), the working face shall be given a shape by the use of forms or other means that will secure proper joining upon continuing the work.
- D. No concrete shall be placed until all form work, installation of parts to be embedded, and preparation of surfaces involved in the placing have been approved by the Engineer (or his Representative). All surfaces that have become encrusted with dried grout from concrete previously placed shall be thoroughly cleaned by sand blasting and/or other approved method.

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TS-6.12 EXCLUSION OF WATER

No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes or other means and carried out of the forms, clear of the work. No concrete shall be deposited under water without the explicit permission of the Engineer (or his Representative), and then only in strict accordance with his directions; nor shall the Contractor, without explicit permission, allow flow or water to rise on any concrete until the concrete has attained its initial set.

TS-6.13 MIXING

The cement, sand, and coarse aggregate shall be so mixed, and the quantity of water added shall be such as to produce a homogeneous mass of uniform consistency. Dirt and other undesirable substances shall be carefully excluded. All concrete shall be thoroughly mixed in a batch mixer of an approved type and size, so designed to positively insure a uniform distribution of all the component materials throughout the mass during the mixing operation. Only sufficient water shall be used in mixing to give a workable mix conforming to the consistency requirements of *Section 201-1.4-Mixing* of the SSPWC. The mixing of each batch shall continue not less than 1 minute (1 ½ minutes for reinforced concrete) after all materials, including water, are in the mixer, during which time the mixer shall rotate at the speed for which it has been designed or at such speed as will produce a mass of uniform consistency at the end of the mixing period. Wherever necessary to secure proper results, the concrete shall be mixed for a longer period than herein specified, but over mixing of concrete or overloading of mixers shall not be permitted. A batch timer and counter including lock release and audible indicator shall be installed and used on each concrete mixer. Hardened concrete or mortar shall not be permitted to accumulate on the inner surfaces of the mixer. Re-tempering, i.e., remixing with the addition of water to concrete that has partially hardened, will not be permitted.

TS-6.14 TRANSPORTING AND PLACING

- A. Concrete which, upon or before placing, is found not to conform to the requirements specified herein shall be rejected and immediately removed from the work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality as determined by the Engineer (or his Representative) shall be removed and replaced by and at the expense of the Contractor. No concrete shall be placed except in the presence of a duly authorized representative of the Engineer (or his Representative). Prior to placing any concrete, the Contractor shall give the Engineer (or his Representative) 48 hours working day written notice.
- B. Concrete shall not be freely dropped into deep forms whether reinforcement is present or not. Hoppers, ducts of canvas, rubber, or metal, shall be used for placing concrete in the forms. In no case shall the free fall of concrete exceed 6 feet. Concrete shall be uniformly distributed during the process of depositing, and in no case after depositing shall any portion be displaced in the forms more than 6 feet in a horizontal direction. Concrete in forms shall be deposited in uniform, horizontal layers not deeper than 2 feet. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in wall forms shall not exceed 5 feet of vertical rise per hour.
- C. All ends of chutes, hopper gates, pump lines and all other points of concrete discharge throughout the Contractor's conveying, hoisting, and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Adequate head room provision must be made at such points for a vertical drop and for proper baffling. Conveyor belts, if used, shall be of a type approved by the Engineer (or his Representative). Chutes longer than 50 feet will not be permitted. Slopes of chutes shall be such that concrete of the specified consistency will readily flow in them.

If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that

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none of the mortar adhering to the belt will be wasted. Pumped concrete, if used, shall meet all requirements of these specifications.

Compression test and slump test samples shall be taken at the hose discharge. Lubricating grout used for start-up shall be wasted and not used as part of the concrete. Pumping equipment, layout and procedures shall be approved by the Engineer (or his Representative).

TS-6.15 ORDER OF PLACING CONCRETE

- A. The order of placing concrete in all parts of the work shall be subject to the approval of the Engineer (or his Representative). The concrete shall be placed in units as bounded by construction joints shown on the Drawings. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least 7 days before the contiguous unit or units are placed.
- B. The surface of the concrete shall be level whenever a run of concrete is stopped.

TS-6.16 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted by vibrating and/or tamping and rodding throughout the entire depth of the layer which is being consolidated into a dense, homogeneous mass filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement.
- B. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated.
- C. Concrete in walls shall be internally vibrated. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly. High-speed power vibrators of an approved immersion type shall be used in sufficient numbers, with stand-by units as required, to accomplish the results herein specified immediately after concrete is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Concrete shall not be vibrated excessively or worked in any manner that causes segregation of its constituents or tends to bring an excessive amount of water to the surface. Form vibrators are prohibited.

TS-6.17 CURING

- A. **General:** All concrete shall be cured for not less than 3 days after placing, in accordance with the method specified herein for the different parts of the work.
- B. CURING METHOD
 - 1. The surface shall be sprayed with a non-toxic, white pigmented liquid curing compound which will not affect the bond of paint to the concrete surface. It shall be applied in accordance with the manufacturer's instructions at a maximum coverage rate of 200 square feet per gallon in such a manner as to cover the surface with a uniform film which will seal thoroughly.
 - 2. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged during the curing period, the area affected shall be immediately resealed by the application of additional curing compound.
 - 3. Wherever curing compound may have been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, the said compound shall be entirely removed by wet sandblasting.

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4. Curing compound shall be applied within 2 hours after completion of the finish on unformed surfaces, and within 2 hours after removal of forms on formed surfaces. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as provided under *Section TS-6.18* of these Specifications.

TS-6.18 CARE AND REPAIR OF CONCRETE

The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, abuse, or any other cause until final acceptance by the SCWD. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surfaces. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which for any other reason does not conform to the Specifications, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense.

TS-6.19 FINISH OF CONCRETE SURFACES

- A. All finished or formed surfaces shall conform accurately to the shape, alignment, grades, and sections as shown on the Drawings or as prescribed by the Engineer (or his Representative). Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth continuous hard surface.
- B. Except as otherwise provided herein, unformed top surfaces of concrete shall be brought to uniform surfaces and worked with suitable tools to a reasonably smooth finish. Excessive floating of surfaces while the concrete is plastic will not be permitted. All surfaces shall be placed monolithically with the base slab. Dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. The top of all unformed finished surfaces shall be given a steel trowel finish. At the Contractor's option, surfaces may be finished with a power float after bull floating or darbying.

TS-6.20 TREATMENT OF SURFACE DEFECTS AND HOLES

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined, and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering, coating or "Sacking" of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the Engineer (or his Representative), and then only in strict accordance with his directions. Concrete containing voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. Defective surfaces to be repaired shall be cut back from true line a minimum depth of 2-inch over the entire area. Feathered edges will not be permitted. In no case will extensive patching of honeycombed concrete be permitted. The Contractor shall advise the Engineer (or his Representative) as to the corrections or changes in his construction operations he plans to employ to preclude future honeycomb or punky concrete. All repairs and replacements herein specified shall be promptly executed by the Contractor at his sole cost and expense. The material used for repair purposes shall consist of a mixture of one sack of cement to three cubic feet of sand.
- B. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough. Holes shall be thoroughly washed with potable water and filled in an approved manner with dry-packed mortar and cured in accordance with the requirements of *Section TS-6.17 - Curing* of these Specifications.
- C. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of *Section TS-6.18 - Care and Repair of Concrete* of these Specifications,

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using approved methods which will not disturb the bond or cause sagging or horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

TS-6.21 CONSTRUCTION JOINTS

General:

Construction joints shall be provided where shown on the Drawings. Special care shall be used in preparing concrete surfaces at joints where bonding between two sections of concrete is required. Unless otherwise indicated on the Drawings, such bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with *Section TS-6.11 – Preparation of Surfaces for Concreting* of these Specifications. Joint separation "controlled cracking" occurs naturally at the interface of the slab edges.

TS-6.22 ADMIXTURES

- A. An air-entraining agent meeting the requirements of "*Specifications for Air-Entraining Admixtures for Concrete*" (*ASTM Designation C260*) shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 4 ½ percent (+1 ½ percent) at the point of placement. Santa Clarita Water Division reserves the right at any time to sample and test the air-entraining agent received on the job by the Contractor. In no event shall any of said agent be used for work under the Contract without approval by the Engineer (or his Representative). The air-entraining agent shall be added to the bath in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.
- B. A calcium lignosulfonate or hydroxylated carboxylic acid type admixture may be added to the concrete mixture to improve workability, effect water reduction, increase the ultimate strength and provide a controlled rate of hardening. The quantity of admixture used and the method of mixing shall be in strict accordance with the manufacturer's recommendations and a manufacturer's representative shall provide job consultation prior to use.

TS-6.23 DRY-PACKED MORTAR

Mortar used to dry-pack concrete surface imperfections or to patch existing concrete openings shall be *Class E* per *Section 201-5.1 – General (Cement Mortar)* of the *SSPWC*. The mortar shall also be quick setting per *Section 201-7.2 – Quick-Setting Grout*. The Contractor shall add an epoxy bonding agent to the mortar as manufactured by *Concrete Tie, GP-1000* and shall be added to the mortar per *Concrete Tie* specification.

END OF SECTION TS-6

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SECTION TS-7 – REINFORCING STEEL

TS-7.01 GENERAL

The Contractor shall furnish, fabricate, and install all reinforcement steel shown and specified.

TS-7.02 MATERIALS

Materials shall conform in quality to the requirements of the "Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," (*ASTM A615*) Grade 60.

TS-7.03 INSTALLATION

- A. **Cleaning:** Reinforcement steel, before being positioned, shall be free from loose mill and rust scale, and from coatings that may destroy or reduce the bond. Immediately prior to placing concrete reinforcement steel shall be re-inspected and cleaned as necessary in a manner acceptable to the Engineer (or his Representative) including sandblasting.

- B. **Fabrication:** Reinforcement steel shall be accurately formed to the dimensions and shapes indicated on the applicable Drawings, and the fabricating details shall be prepared in accordance with the ACI Building Code (*ACI 318*), except as modified herein or by the Drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than 2 times the minimum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than 6 times the minimum thickness, except for bars larger than 1 inch, in which case the bends shall be made around a pin of 8 bar diameters. Bars shall be bent cold.

- C. **Straightening:** Reinforcement steel shall not be straightened or re-bent in a manner that will injure the material. Bars with kinks or bends not shown on the Drawings shall not be used. Heating of the reinforcement will be permitted only when approved by the Engineer (or his Representative).

- D. **Placing:** Reinforcement steel shall be accurately positioned in accordance with the Drawings and secured by using annealed iron wire ties or suitable clips at intersections, and shall be supported by concrete or metal supports, spacers, or metal hangers. Metal clips or supports shall not be placed in contact with the forms. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage. Bars in addition to those shown on the Drawings that may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position, shall be provided by the Contractor at his own expense. The practice of "burying" selected bars shall be done only with the Engineer (or his Representative)s approval.

- E. **Splicing:** When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be determined by the Engineer (or his Representative). Unless otherwise shown, splices of horizontal bars shall be staggered. The lapping of splices shall be 30 bar diameters unless otherwise shown. Reinforcement bars, other than tie bars, shall not be spliced at points other than shown on the approved shop bending diagrams and placement lists. Laps of wire mesh shall be one width of wire spacing, and adjoining sheets shall be securely tied together with No. 14 wire, one tie for each two running feet. Wires shall be staggered and tied in such a manner that they cannot be misplaced.

*****END SECTION TS-7*****

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SECTION TS-8 - MISCELLANEOUS METALWORK

TS-8.01 GENERAL

The Contractor shall furnish, fabricate, and install all miscellaneous metalwork required by these Specifications and the accompanying Drawings. Miscellaneous metalwork, as used herein, is defined as all items required to be fabricated from structural steel shapes, plates, bars and their products. Except for miscellaneous metalwork items manufactured of stainless steel, all structural steel shapes, plates, bars and their products shall conform to the "Specifications for Structural Steel" (*ASTM A36*) or the "Specifications for Low and Intermediate Tensile Strength Carbon Steel Plates of Structural Quality" (*ASTM A283*), (*Grade B or C*). All miscellaneous items shall be galvanized after fabrication. Shop drawings of all miscellaneous metalwork shall be furnished. Fabrication shall not be commenced prior to approval of shop drawings.

TS-8.02 BOLTS

The Contractor shall furnish and set all bolts and anchor bolts. All bolts and anchor bolts shall be low-carbon steel, galvanized after fabrication or they shall be stainless steel. Steel for bolts shall meet the requirements of the "Specifications for Carbon Steel Externally and Internally Threaded Standard Fasteners", Grade B (*ASTM A307*). Steel for anchor bolts shall meet the requirements of "Specifications for Steel Structural Rivets", (*ASTM A502*) with the following exceptions and additions: (1) the nut material shall be free cutting steel and (2) the nuts shall be capable of developing the full strength of the anchor bolts. Threads shall be *Coarse Thread Series* conforming to the requirements of the *American Standard for Screw Threads*. All bolts shall have hexagon heads and nuts shall be Heavy Hexagon Series.

TS-8.03 GALVANIZING

All structural steel plates, shapes, bars and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the "Specifications for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips" (*ASTM A123*). Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Bolts, anchor bolts, and similar threaded fasteners, after being properly cleaned shall be galvanized in accordance with the "Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware" (*ASTM A153*).

TS-8.04 PAYMENT

Miscellaneous metal work that is identified on the Drawings or in the Special Provisions shall be paid for at the unit price bid either by lump sum or as listed in the Proposal.

***** END OF SECTION TS-8 *****

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SECTION TS-9 - PAINTING AND PROTECTIVE COATINGS

TS-9.01 GENERAL

- A. The Contractor shall furnish all labor, material and equipment necessary to complete the painting as specified or required. Equipment shall include brushes, spray guns, drop cloths, scraping and sanding equipment, masking material, ladders and any scaffolding that may be required.
- B. Spray painting shall be conducted under controlled conditions and the Contractor shall be fully responsible for any damage occurring from spray painting.
- C. Each coat of paint shall be of the proper consistency and shall be well brushed, rolled or sprayed to obtain a uniform and evenly applied finish. Work shall be free from "runs", "bridges", "shiners" or other imperfections due to faulty intervals. Paint shall not be applied in extreme heat nor in dust or smoke-laden air nor in damp or humid weather. Unless otherwise specified, each coat shall have a minimum drying time of 48 hours before the next coat is applied.
- D. Only good clean brushes and equipment shall be used.

TS-9.02 FERROUS SURFACES NOT BURIED

- A. **SURFACE PREPARATION.** Deposits of dirt, grease, tar and oil shall be removed and all sharp edges and weld splatter shall be ground smooth. The surface to be painted shall be prepared in accordance with *SSPC-SP-3 (Power Tool Cleaning)* or *SSPC-SP-2 (Hand Tool Cleaning)* to remove all rust, mill scale, paint or other foreign matter. All dust shall be removed from the surface by brush or industrial vacuum.

Galvanized metal surfaces shall be cleaned of all foreign matter and treated with an Engard barrier primer or approved equal then coated in accordance with this Section.

- B. **PRIME COATING.** The prime coating shall be applied immediately after the surface has been prepared. The surface shall receive one coat of *Devoe Catha-Coat 302H* reinforced zinc (2 mils) or approved equal. The primer shall dry for a minimum time of 24 hours in dry weather before the finish coating is applied.
- C. **FINISH COATING.** The primed surface shall receive two finish coats of *Devoe Deevthane 379H* polyurethane (5 mils each) or approved equal. The color of the finish coat shall be selected by the Engineer (or his Representative).

TS-9.03 SHOP APPLIED INTERIOR EPOXY COATINGS

- A. **SURFACE PREPARATION:**
All oil and grease shall be removed from the metal, using an oil-free solvent (methyl-ethyl-ketone or trichloroethylene) and clean dry rags. The surface shall be sand- blasted to white metal. In order to obtain maximum adhesion of epoxy coating, the grit used for blasting shall be coarse enough to impart a tooth in the metal equal to 25 percent of the thickness of the coating to be applied. The metal shall be cleaned after sandblasting with clean, dry compressed air.
- B. **POWDER EPOXY:**
The epoxy shall be one hundred percent epoxy material and shall be *3M Company's Scotchcoat No. 134* or approved equal.
- C. **PREHEATING:**
Areas that are not to be coated shall be masked using *500-degree masking tape*, similar to *3M Company's Permaceel*. The part to be coated shall be placed in an oven and preheated to the temperature specified by the epoxy manufacturer. An accurate temperature measuring device

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such as pyrometer shall be used to determine the substrate temperature.

D. APPLICATION:

The epoxy shall be applied as a powder to the heated metal by one of the following methods:

1. ELECTROSTATIC METHOD:

The powder shall be applied to the heated, grounded metal part which has been electrostatically charged by means of a current of approximately 1-1/2 amperes at approximately 400 volts. After application of the epoxy, the part shall be reheated as specified by the manufacturer to fuse the epoxy. Equipment for applying the epoxy powder shall be the *Sames Electrostatic Powder Spray*, or approved equal. Particular care shall be given to protection of non-ferrous masked parts. The finished product shall be carefully examined for epoxy interference on working parts.

2. HEAT FUSION METHOD:

The part shall be prepared as outlined above and heated for a sufficient period to drive out all moisture from the metal. Epoxy powder shall be applied using an air spray device designed to exclude moisture from the spray air. The part must be preheated to maintain a surface temperature high enough to cause instant epoxy fusion during the entire application process. After coating, the part shall be reheated as specified by the manufacturer. Particular care shall be taken to protect non-ferrous masked parts. The finished product shall be carefully examined for epoxy interferences on working parts.

E. THICKNESS OF COATING:

The minimum dry coating thickness shall be 8 mils, provided, however, that the thickness of coating in the grooves of valves or fittings designed to receive a rubber gasket shall be approximately 5 mils.

F. INSPECTION:

Coating thickness shall be checked with a nondestructive magnetic type thickness gage. Coating integrity shall be tested with an *87-volt Tinker Razor holiday tester* or a *spark testing unit* operating at approximately 2,000 volts.

G. FIELD REPAIRS:

If small local repairs are necessary, they shall be made using *3M Company's Scotchclad 134* field repair kit, or approved equal. The surface must first be cleaned with an oil-free solvent (methyl-ethyl-ketone or trichlorethylene) and clean dry rags.

TS-9.04 BURIED MISCELLANEOUS FERROUS SURFACES

Buried valves and flanged joints, sleeve-type and victaulic couplings and other buried miscellaneous ferrous piping and metal surfaces (excluding any cast iron pipe) shall be thoroughly cleaned and field-coated with a 1/8-inch thick coating of *Scotch-Clad No. 244* as manufactured by *3M*, or approved equal. The coating shall be applied in strict accordance with the manufacturer's recommendations.

*****END OF SECTION TS-9*****

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SECTION TS-10 - STORM WATER BEST MANAGEMENT PRACTICES

TS-10.01 GENERAL

In the Los Angeles area, more than 100 million gallons of polluted urban runoff water enter our rivers and ocean, each day. This runoff water can also carry a huge load of sediment. Sediment can clog storm drains and silt up harbors and bays, costing millions of dollars each year in maintenance and dredging costs.

In compliance with the Los Angeles County *NPDES (National Pollutant Discharge Elimination System) Permit*, Santa Clarita Water Division is committing its best effort to help save our oceans and keep our drinking water safe for future generations. While completing all Santa Clarita Water Division work, the Contractor is responsible for implementing the general *Storm Water Best Management Practice for Water Line Construction, Repair and Cleaning Work*, outlined per the permit by the *American Water Works Association*, to comply with *NPDES* mandated requirements and protect our waterways.

TS-10.02 DISCHARGE OF WATER FROM EXCAVATION

If, at any time during the Contractor's work, water must be pumped from an excavation, the pump discharge hose end must be covered with a burlap bag or other effective screening material, to collect dirt and debris and prevent it from entering the street gutters and/or the storm drains. In addition, it may be necessary to use sandbags to divert sediment laden waters away from storm drain and to create settlement areas, preventing significant amounts of sediment and debris from entering the storm drains. The Contractor shall dispose of this sediment in a way appropriate to its composition: if it is clean silt, it may be used as backfill in the excavation. However, if it is contaminated with substances containing chemicals which could harm the environment, it must be treated as a hazardous material and disposed of in an appropriately safe manner.

TS-10.03 DECHLORINATION DURING FLUSHING OF MAINS

Flush water that has been super chlorinated to disinfect water mains, following construction, repair or physical cleaning, shall be adequately dechlorinated, prior to discharge into the street gutter and/or storm drain system or may be discharged directly into the sanitary sewer (with proper authorization) or into a tank truck.

*****END OF SECTION TS-10*****

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SECTION TS-11 – PRECAST CONCRETE VAULTS

TS-11.01 PRECAST CONCRETE VAULTS

- A. Precast concrete vaults shall be installed as shown and shall be sized as dimensioned on the Drawings. Locations and number of pipe penetrations and dimensions of penetrations shall be as shown on the Drawings.
- B. Contractor shall submit detail plans for the vaults and structural calculations stamped and signed by a registered civil or structural Engineer (or his Representative) licensed in the State of California for review by the Engineer (or his Representative).
- C. Pre-cast concrete vaults shall be furnished in one or more sections without a base. Design loads are those anticipated for use within a public parkway and/or traffic area, *AASHTO H-20*, live loads of 8000 lbs. with a 30% impact factor. The minimum compressive concrete strength shall be 4000 psi at 28 days.
- D. The vault lid shall be double-leaf, ¼" thick aluminum plate cover with a diamond pattern. The channel frame shall be ¼" thick aluminum with an anchor flange all around the perimeter. The door shall be equipped with heavy forged brass hinges having minimum 3/8" diameter stainless steel pins. The doors shall automatically lock into the vertical position by means of a heavy steel hold-open arm with a release handle. A type 316 SS snap lock with a gasketed cover plug and removable turn handle shall be provided. Compression spring operators enclosed in telescopic tubes shall be provided for smooth and controlled door operations. The vault lid shall be a *Type JD* as manufactured by the Bilco Company, or approved equal.
- E. Sectional pre-cast concrete vault structures shall be sealed on the outside with a polyurethane sealant.
- F. Sealing of Joints: Contractor shall seal all concrete joints with a polyurethane sealant to be approved by the Engineer (or his Representative).
- G. The pre-cast concrete vaults shall be steel reinforced, where required and shall be billet steel conforming to *ASTM A-615* or *A-706*.
- H. All piping penetrations shall be sealed with a non-shrink grout placed in the annular space between the pipe O.D. and the vault opening.

*****END OF SECTION TS-11*****

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SECTION TS-12 – SPECIAL VALVES

TS-12.01 AIR RELEASE AND VACUUM VALVES

All air release and vacuum valves shall be so designed as to insure the release of air from a pipeline when such air is above atmospheric pressure. They shall also assure the entrance of air into the pipeline when the pressure inside the line is below atmospheric pressure. Both of these functions shall be automatically performed by the valve in conjunction with operating conditions of the pipeline.

Valves shall be designed for a maximum water working pressure of 300 psi, and shall have the joining of all parts so designed to withstand any stresses developed by the working pressures.

All materials used in the valves shall conform to *ASTM* Standards. All surfaces subject to moving contact by other surfaces, including valve seats, shall be made of corrosion resistant material and of material as durable as possible under the conditions to which the valves will be subjected.

The interior of the valve body shall be epoxy coated as follows:

A 10 mil or thicker even coat of holiday-free, high-impact, non-shattering, high-adhesive, tasteless, odorless, non-toxic epoxy resin shall be applied on all ferrous metal surfaces of the valves according to manufacturer's instructions, after irregularities, burrs and grease have been removed and immediately after sandblasting to white metal, followed by air blowing to remove dust. The epoxy resin shall be either "*Scotchcote No. 302*", "*Keysite 740*", or other approved equivalent recognized and used by the waterworks industry.

Air release and vacuum valves shall be capable of exhausting entrapped air in the water line under normal operating conditions at a rate of at least 150 cubic feet of free air per minute. Air release and vacuum valves shall be capable of venting and exhausting air into and from the line during draining and filling of the line at a rate of 1,000 cubic feet of free air per minute. The above functions shall be performed without water leakage.

Valves shall be designed so that through flow of air or water will not interfere with the designed performance of the valving mechanism.

The following air release and vacuum valves are acceptable: "***APCO Combination Air Release Valves***", or ***approved equal***.

*****END OF SECTION TS-12*****

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SECTION TS-13 - NPDES REQUIREMENTS

**TS-13.01 WASTE DISCHARGE REQUIREMENTS FOR DISCHARGE OF STORM WATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY**

- A. The Contractor is required to adhere to the provisions of the Federal Clean Water Act as regulated by the *U.S. Environmental Protection Agency in Code 40, Code of Federal Regulations (CFR) Parts 122, 123, 124*, the *Porter-Cologne Act (California Water Code)*, the Waste Discharge Requirements for Municipal Storm Water Discharges within the County of Los Angeles and the *City of Santa Clarita Municipal Code*. Copies of suitable Best Management Practices (*BMPs*) from the California Storm Water Best Management Practice Handbook (*CSWBMP*) for Construction Activities are on file at the SCWD office.

- B. Saw Cutting:
Shovel or vacuum saw-cut slurry and remove from site. Downstream catch basins, storm drains and sewer manholes are to be barricaded or covered to contain slurry during saw cutting operations. Refer to *BMP CA2* in the *CSWBMP* Handbook or the appended material in these Technical Specifications for more information.

- C. Concrete Truck Washout:
Washout of concrete trucks will not be allowed in the gutters, paved street or catch basins. Washout on the subgrade will be allowed only if the runoff from such a discharge can be contained and not be allowed to enter any catch basin, storm drain or sewer manhole. Refer to *BMP CA23* in the *CSWBMP* Handbook or the appended material in these Technical Specifications for more information.

*****END OF SECTION TS-13*****

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SECTION TS-14 - MASONRY

TS-14.01 GENERAL

- A. This section includes all labor, materials, equipment, and appliances required to complete the masonry work as indicated on the Drawings and specified herein. Masonry Work shall include, but is not limited to, concrete masonry units, mortar, grout, and miscellaneous materials, complete in place.
- B. Before moving any materials to the site or commencing any of the work in this section, the Contractor shall submit the following items:
1. Contractor shall submit two samples of each size and type of concrete masonry units to be used on the Work. Samples shall show the range of texture and color of the exposed surface for all units, and all units delivered to the job shall fall within this range. Samples shall include special units such as bond beam units, pilaster units, units with an end web removed, and other special units.
 2. Contractor shall submit certified test reports of three sample concrete masonry units of each type proposed to be used on the job, performed by an independent testing laboratory acceptable to the Santa Clarita Water Divisions indicating that the materials proposed for use meet the requirements of these Specifications. Test results shall include, but not be limited to, compressive strength, linear shrinkage, total absorption, moisture content as a percent of total absorption, and unit weight. Tests shall be performed in accordance with ASTM C 90, ASTM C 140, and ASTM C 426.
 3. The Contractor shall submit a wall elevation drawing for each wall, indicating the type of masonry unit to be used and layout of masonry units. Special units such as bond beam units, open ended web units, pilaster units, and other special units shall be identified.

TS-14.02 MATERIALS

A. Concrete Masonry Units

Interior Walls: Concrete masonry units shall be manufactured to meet ASTM C 90, Grade N-1 with minimum compressive strength of 1,900 psi and UBC (Chapter 24) requirements for hollow load bearing concrete masonry units. Concrete masonry units shall be medium weight type having a dry density of not more than 105 pounds per cubic foot of concrete. Where indicated on the Drawings or specified herein, masonry units shall be integrally colored. Color shall be as selected by Santa Clarita Water Division from the Manufacturer's standard colors. All masonry units for new above ground structures shall be integrally colored.

Exterior Walls: Concrete masonry units: shall be Orco Block-Tan, ASTM C90 Grade N-1 medium weight units with minimum face shell thickness of 1-1/4-inches. Size as indicated on Drawings. CMU to be 16" x 8" x thickness as shown on Drawings. Unless shown otherwise on the Drawings, CMU shall be Precision cast units. Aggregate shall conform to ASTM C 331 for lightweight and ASTM C 33 for aggregate other than lightweight. Units shall be precise in form and dimension. Unit moisture content as delivered shall not exceed 25 percent of total absorption. Units shall have a maximum linear shrinkage not to exceed 0.05 of 1 percent from a saturated to oven dry condition when tested in accordance with ASTM C 426. Units shall be ordered well before commencement of work to assure adequate time for manufacturing and not less than 28 days of curing before use. Units shall be from a uniform run.

The basic nominal sizes of masonry units shall be 8 inches high and 16 inches in length unless otherwise indicated on the Drawings. The width shall be as indicated on the Drawings. Proper sizes shall be used to provide for all window and door openings, bond beams, piers, lintels, and other special applications with a minimum of block cutting.

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B. Masonry Mortar and Grout

1. General:

The following sections establish the minimum requirements for masonry mortar and grout. Contractor shall provide mixes which comply with the specified strength requirements.

2. Mortar:

Mortar for concrete masonry units shall be Type S mortar in accordance with ASTM C 270 and shall consist of 1 part of Portland cement, 1/4 part to 1/2 part of lime putty or hydrated lime, sand equal to not less than 2-1/4 and not more than three times the sum of the separate volumes of the cementitious materials, and water repellent admixture. Water repellent admixture shall be added to all mortar in the quantity recommended by the water repellent manufacturer.

Mortar shall develop a 28-day compressive strength of not less than 1,800 pounds per square inch.

Contractor shall have compressive strength tests performed on trial batches of mortar in accordance with Uniform Building Code Standard 24-22 by an independent testing laboratory acceptable to Santa Clarita Water Division. Certified copies of test results shall be submitted by Contractor. Cost of tests shall be paid by the Contractor.

All mortar shall be mixed on the job site. No mixing off the job site, either complete or in part, will be allowed, except that lime putty may be mixed off the job site. Materials for mortar shall be measured by volume. Mortar shall be mixed in a mechanical mixer and only in such quantities as are needed for immediate use. Mortar shall be mixed for at least five minutes after all materials have been added to the mixer. No mortar which has been mixed for more than one hour shall be used. The mixer drum shall be completely emptied of materials and washed down before the next batch of materials is placed therein whenever the mix time has exceeded 90 minutes.

3. Grout:

Measured by volume, grout shall consist of 1 part Portland cement, not more than 1/10 part lime putty or hydrated lime, and fine aggregate equal to 2-1/4 to 3 times the sum of the volumes of the cementitious materials. Sufficient water shall be added to produce consistency for pouring without segregation of the constituents of the grout. Grout which is used in grout spaces 4 inches or more in both horizontal dimensions may contain an addition of pea gravel equal to 1 to 2 times the sum of the volumes of the cementitious materials. Grout shall attain a compressive strength of 2,000 pounds per square inch at 28 days. Tests to verify compressive strength in accordance with Uniform Building Code Standard 24-28 shall be performed by an independent testing laboratory acceptable to the Santa Clarita Water Division. Certified copies of test results shall be submitted by Contractor. Cost of tests shall be paid by the Contractor.

C. Cement

Portland cement shall conform to ASTM C 150, Type II, low alkali. Low alkali cement shall contain not more than 0.6 percent total alkali. The alkali shall mean the sum of sodium oxide and potassium oxide calculated as sodium oxide.

D. Lime

Hydrated lime shall conform to ASTM C 207, Type S.

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E. Aggregate

Except as specified elsewhere, sand for mortar shall conform to ASTM C 144 and fine aggregate for grout shall conform to ASTM C 404. Coarse aggregate (pea gravel) for grout shall be clean, hard, fine grained, and shall be free of flat, chiplike, thin, elongated, friable, or laminated pieces. Pea gravel shall be uniformly graded with not more than 5 percent passing the No. 8 sieve and with 100 percent passing the 3/8-inch sieve. Coarse grout and fine grout are defined by aggregate size in accordance with ASTM C 476.

F. Water

Water shall be clean, potable water, free from oil, soluble salts, chemicals, and other deleterious substances.

G. Reinforcement

Reinforcement shall be as indicated on the Drawings and specified herein.

Wire joint reinforcement shall be Ladder type manufactured by Masonry Reinforcing Corporation of America; Ladur-type manufactured by Dur-O-Wall Inc.; or equal. Wire joint reinforcement shall consist of side wires and cross wires of No. 9 gauge galvanized steel unless otherwise indicated on the Drawings. Wire shall conform to the requirements of ASTM A 82 and shall be galvanized in accordance with ASTM A 641, Class 1. Side wires for 8-inch wide masonry units shall be 6 inches wide and cross rods shall be 16 inches on center.

Reinforcing bars in masonry shall be as specified in Section 03000.

H. Control Joint Filler

Premolded joint filler shall be wide flange Rapid Poly-Joint manufactured by Dur-O-Wal; wide flange Vert-A-Joint manufactured by Vert-A-Joint Company; or equal.

I. Caulking

Caulking for masonry control joints, around door jambs, window frames, at roof decks, and at other locations in masonry construction shall be done with a 1 part, nonsag, high performance, polysulfide base sealant. Caulking shall conform to requirements of Interim Federal Specification TT-S-00230C, Type 2, Class A, and shall be Chem Calk 100 manufactured by Woodmont Products, Inc.; PRC 7000 manufactured by Products Research and Chemical Corp.; or equal. Color shall be selected by the Santa Clarita Water Division from manufacturer's standard colors.

Application, including necessary primer and backer rod, shall be in accordance with manufacturer's recommendations. Sealant shall not be applied on wet or frosty surfaces or when surface temperature is higher than 130 degrees F. The depth of sealant in a joint shall not be greater than its width nor less than 1/4-inch. Sealant depths shall be as follows:

<u>Joint Width</u>	<u>Sealant Depth</u>
1/4 inch to 3/8 inch	1/4 inch
1/2 inch to 1 inch	3/8 inch

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TS-14.03 EXECUTION

A. General

All work shall be executed in a workmanlike manner and in full compliance with all applicable codes and local ordinances.

Sills, ledges, offsets, and other projections shall be protected from droppings of mortar, and the construction of other trades shall be protected from effects of masonry work.

Concrete masonry walls shall be laid in uniform and true courses, level, plumb and without projection or offset of adjacent block. The foundation shall be thoroughly cleaned of laitance, grease, oil, mud, dirt, mortar droppings, or other objectionable matter by means of heavy sandblasting before placing the first course of masonry units.

Full mortar coverage of joints shall be provided on webs of cells that will be grouted solid and all face shells. Vertical head joints shall be buttered for a thickness equal to the face shell thickness of the masonry unit, and these joints shall be shoved together tightly so that the mortar bonds to both masonry units. Joints shall be solidly filled from the face of the masonry units to the inside face of the face shell.

Masonry units shall be laid in the wall to the desired height with joints of uniform thickness. Units shall be leveled, plumbed, and straightened before the mortar has stiffened. Bond shall be plumb throughout.

Masonry units shall be laid to preserve the unobstructed vertical continuity of the cells to be filled with grout or insulation.

Masonry units shall be laid so that cracks are not formed at the time the masonry unit is placed in the wall.

Masonry units shall be adjusted to their final position in the wall while the mortar is still soft and plastic enough to insure a good bond. If the position of the masonry unit is shifted after the mortar has stiffened, or bond is broken or cracks are formed, the masonry unit shall be relaid in new mortar.

Masonry units shall be cured and dried before being used and the surface of the units shall be clean and free from dirt when laid in the walls. Masonry units shall not be wetted before use, but shall be laid dry. Exterior building color shall be per Santa Clarita Water Division.

B. Mortar Joints

Mortar joints shall be straight, clean, smooth, and uniform in thickness and, unless otherwise indicated on the Drawings, shall be tooled slightly concave. Joint thickness shall be 3/8-inch for both vertical and horizontal joints unless otherwise indicated on the Drawings. Where fresh masonry joins totally or partially set masonry, the set masonry shall be cleaned and roughened before laying new work.

C. Wire Joint Reinforcement

Longitudinal wire joint reinforcement shall be lap spliced at least 75-wire diameters.

Longitudinal wires shall rest in the approximate centers of the mortar beds and shall have not less than 5/8-inch mortar cover on the exposed face.

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Intersecting masonry walls shall be provided with prefabricated wire joint reinforcement tees. Intersecting wall joints shall be raked 1/2-inch and caulked.

D. Bond Pattern

Bond pattern shall be as indicated on the Drawings. Where no bond pattern is indicated, the wall shall be laid up in a straight, uniform course with regular running bond.

E. Grouting and Reinforcement

All spaces and cells shall be filled solidly with grout. Vertical cells to be grouted shall be filled solidly with grout in lifts not exceeding 8 feet in height. When the grouting is stopped for one hour or longer, horizontal construction joints shall be formed by stopping the placement of grout 1-1/2 inches below the top of the uppermost unit containing grout.

Vertical cells to be filled with grout shall have vertical alignment sufficient to maintain a clear, unobstructed continuous vertical cell measuring not less than 2 inches by 3 inches. The grout in the cells shall have full contact with the concrete foundation. Mortar, mortar droppings, or other materials that may prevent the grout from bonding directly to the concrete foundation shall be removed before the grouting operation begins. For grout pours in excess of 4 feet in height, cleanouts shall be provided at the bottom of each pour for each cell to be filled with grout. Overhanging mortar or other obstruction or debris shall be removed from the inside of such cell walls. The cleanouts shall be sealed after inspection and before grouting. After grout has been placed, it shall be consolidated by use of a mechanical immersion vibrator designed for the purpose.

Vertical reinforcement shall be held in position at top and bottom and at intervals not exceeding 200 diameters of the reinforcement, nor 10 feet. Bars shall be held in position by steel wire bar positioners or tied to dowels with wire ties.

Where horizontal and vertical bars are spliced and adjacent lap splices are separated by more than 3 inches, the lap splice length shall not be less than 72 bar diameters. Where adjacent lap splices are separated by 3 inches or less, the lap splice length shall be increased by 1.3 times or the lap splices may be staggered at least 24 bar diameters with no increase in length.

Reinforcing bars shall be in place and reviewed by the Santa Clarita Water Division before grouting shall begin.

F. Bond Beams

Bond beams shall be made up of special bond beam block with horizontal bar reinforcement. Horizontal bar reinforcement shall be solidly grouted in place. Wire mesh shall be provided at openings in the bottom of bond beams to support the grout.

G. Cutting of Masonry Units

Concrete masonry units shall be cut as required to form chases, for anchorage, or for other appurtenances. All cutting and fitting of exposed block units shall be done with a power driven carborundum or diamond disc blade saw.

H. Control Joints

Control joints shall be full height and continuous in appearance. Bond beams and bond beam reinforcing bars shall be continuous through the control joint. The control joint shall be caulked and shall be mortar joint in appearance. Fill material for control joints shall be premolded, wide

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flange control joint filler as specified elsewhere herein. Caulking shall also be as specified elsewhere herein. All joints shall be caulked to produce a weathertight structure.

I. Openings and Lintels

Openings in masonry walls, unless indicated on the Drawings or specified otherwise, shall have lintels made up of like units (bond beam units) reinforced and filled solidly with grout to properly span the opening. Solid bottom bond beam block shall be used where the underside of lintel is exposed. Contractor shall provide a minimum of 8 inches bearing at each end of lintel. Reinforcing bars shall extend not less than 24 inches nor less than 40 bar diameters into the wall past the edge of the opening, on each side of the opening unless a greater length is indicated on the Drawings. At corners, Contractor shall provide a 90 degree bend with an equivalent total embedment.

J. Door Frames

Jambs and head of metal door frames connected to masonry shall be anchored and fully grouted. Filling of frames shall be done as each 2 feet lift of masonry is laid.

K. Bearing Plates

A 12-inch minimum depth of grouted hollow masonry shall be provided below all steel bearing plates or beams bearing on masonry walls.

L. Anchor Bolts

A 6-inch minimum width of grouted hollow masonry shall be provided all around anchor bolts and other attachment locations. Anchor bolts shall be held in place by a template to assure precise alignment of anchor bolts. Cutting or reaming of members being anchored or other means of accommodating misaligned anchor bolts in support angles will not be accepted.

M. Handling of Masonry Units

All masonry units shall be transported and handled as required to prevent discoloration, chipping and breakage. Storage piles, stacks, or bins shall be located to protect materials from heavy traffic. Chipped, cracked, or otherwise defective units shall be removed from the work. Units that are chipped, cracked, broken, or otherwise defective, whether before or after setting, will be rejected and shall be removed and replaced.

N. Ties

Where two or more units are used to make up the thickness of a wall, the units shall be bonded with 3/16-inch diameter hot-dip galvanized steel rods or metal ties of equivalent stiffness embedded in the horizontal joints. Rods shall be bent in a rectangular shape. There shall be one metal tie for not more than each 4-1/2 square feet of wall area. Ties in alternate courses shall be staggered and the maximum vertical distance between ties shall not exceed 18 inches and the maximum horizontal distance shall not exceed 36 inches.

O. Enclosures

Where concrete masonry is to enclose conduits, pipes, stacks, ducts, and similar items; chases, cavities, and similar spaces shall be constructed as required, whether indicated on the Drawings or not. Openings around flush mounted electrical outlet boxes including the flush joint above the box, shall be pointed with mortar. No such work shall be covered until advised by the Santa Clarita Water Division that the work has been inspected and tested.

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P. Patching

Patching of exposed concrete masonry units shall be done at the conclusion of the general work and shall be done so the patching will be indistinguishable from similar surroundings or adjoining work.

Q. Protection of Masonry

Temporary protection shall be provided for all exposed masonry corners subject to injury. Concrete scum and grout stains on masonry shall be removed immediately. The wall shall be adequately braced against wind and other forces during construction, and bracing shall remain in place until the roof has been erected. When rain or snow is imminent, the tops of unfinished walls shall be fully covered and protected with waterproof paper, polyethylene, or other means acceptable to the Santa Clarita Water Division.

R. Water Curing

Masonry shall be protected against too rapid drying by frequently fogging or sprinkling so that walls will always be visibly damp for a period of not less than three days.

S. Miscellaneous

All items as required, including all anchors, flashings, sleeves, frames, structural steel, lintels, anchor bolts, miscellaneous iron, and all other items required shall be built in for a complete job.

T. Cold Weather Protection of Masonry

Masonry work to be done when the mean daily air temperature is 40 degrees F, or less, shall comply with the following requirements: mixing water and aggregate shall be heated to a minimum of 70 degrees F and a maximum of 160 degrees F. Temperature of masonry units shall be a minimum of 35 degrees F when laid. Masonry temperature shall be maintained above 50 degrees F for three days by use of enclosures and supplemental heat.

U. Cleanup

Extreme care shall be taken to prevent mortar splashes. No construction supports shall be attached to the wall except where specifically permitted by the Santa Clarita Water Division. Concrete and grout spilled on the wall shall be washed off before it sets. Grout stains shall be removed from walls. At the conclusion of the masonry work, the Contractor shall clean all masonry walls, remove scaffolding and equipment used in the work, clean up all debris, refuse, and surplus material, and remove them from the premises. The Contractor shall be responsible for correcting any efflorescence on exposed masonry units or joints.

TS-14.04 PAYMENT

Payment of the work in this section shall be included as part of the lump sum bid amount for which such work is appurtenant.

*****END OF SECTION TS-14*****