

**VALLECITOS WATER DISTRICT  
SECTION 03300 – CONCRETE**

**PART 1 – GENERAL**

**1.1 DESCRIPTION**

- A. This section describes concrete materials, mixing, placement, form work, reinforcement and curing.

**1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).
- B. Other sections of the Standard Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.
  - 1. Section 02223 – Trenching, Backfilling, and Compacting

**1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS**

- A. The following standards have been referenced in this Section:
  - 1. ASTM C33 Concrete Aggregates
  - 2. ASTM C94 Ready-Mixed Concrete
  - 3. ASTM C150 Portland Cement
  - 4. ASTM C494 Chemical Admixtures for Concrete
  - 5. ASTM A615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
  - 6. ASTM C881 Epoxy-Resin-Base Bonding Systems for Concrete
  - 7. ASTM A1064 Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
  - 8. Concrete Reinforcing Steel Institute – “Recommended Practice for Placing Reinforcing Bars”
  - 9. Concrete Reinforcing Steel Institute – “Manual of Standard Practice”
  - 10. COE CRD C621 Packaged Dry, Hydraulic-Cement Grout (Nonshrinkable)

**1.4 SUBMITTALS**

- A. Delivery Tickets: Where ready-mix concrete is used, the Contractor shall furnish delivery tickets at the time of delivery for each load of concrete. Each ticket shall show the state certified equipment used for measuring and the total quantities, by weight, or cement,

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sand, each class of aggregate, admixtures, and the amounts of water in the aggregate added at the batching plant, and the amount allowed to be added at the site for the specific design mix. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the site, when unloading began, and when unloading was finished.

**PART 2 – PRODUCTS**

**2.1 CONCRETE**

- A. All Portland cement concrete shall conform to the provisions of Section 201 of the SSPWC (Green Book), except as herein modified.
- B. Portland cement concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, and water proportioned and mixed to produce a smooth dense workable mixture. It can of the ready-mix variety as produced by any reliable ready-mix concrete firm.
- C. Portland cement, including Portland cement used in precast products, shall be Type II & V conforming to ASTM C150.
- D. In certain circumstances, rapid-setting concrete may be required. Accelerating admixtures shall conform to ASTM C494 and may be used in the concrete mix as permitted by the District Engineer or their designee. Calcium chloride shall not be used in concrete.
- E. 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. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a delivery ticket furnished to the District Engineer or their designee.
- F. Concrete mix design shall conform to ASTM C94. Use classes of concrete as described in the following table:

Class	Type of Work	28-Day Compressive Strength (in psi)	Minimum Cement Content (in lbs. Per C.Y.)
A (560-C-3250) *	Concrete for encasements, plugs, slope protection	3,000	564 (6 sack)
B (450-C-2000) *	Concrete for anchors, manhole cover ring, cutoff walls, cradles and miscellaneous unreinforced concrete	2,000	470 (5 sack)
C (650-CW-4000) *	Concrete for thrust blocks, manhole bases, all reinforced structures, piers, and vaults, and precast manhole and vault sections	4,000	677 (7 sack)

\*concrete class per SS PWC

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2.2 REINFORCING STEEL

- A. Reinforcement shall conform to ASTM A615, Grade 40.
- B. Fabricate reinforcing steel in accordance with the current edition of the Manual of Standard Practice, published by the Concrete Reinforcing Steel Institute. Bend reinforcing steel cold.
- C. Deliver reinforcing steel to the site bundled and tagged with identifying tags.
- D. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

2.3 WELDED WIRE FABRIC

- A. Welded wire fabric shall conform to ASTM A1064.

2.4 TIE WIRE

- A. Tie wire shall be 16-gage minimum, black soft annealed.

2.5 BAR SUPPORTS

- A. Bar supports in beams and slabs exposed to view after form stripping shall be galvanized or plastic coated. Use concrete supports for reinforcing in concrete placed on grade.

2.6 FORMS

- A. Forms shall be accurately constructed of clean lumber and shall be of sufficient strength and rigidity to hold the concrete and to withstand the necessary pressure and tamping without deflection from the prescribed lines.
- B. The surface of forms against which concrete is placed shall be smooth and free from irregularities, dents, sags, or holes. The surface shall leave uniform marks conforming to the general lines of the structure.

2.7 CURING MATERIALS

- A. All curing compounds shall be white pigmented and resin based. Sodium silicate compounds shall not be allowed. Water based curing compounds shall be Hunt Process Corporation or equal.

2.8 BONDING AGENT

- A. The epoxy bonding agent shall be an epoxy-resin-based product intended for bonding new concrete to hardened concrete and shall conform to ASTM C881. The bonding agent shall be Sikadur 32 Hi-Mod Epoxy Adhesive, as manufactured by Sika Corporation; Concrete Liquid (LPL), as manufactured by Master Builders; BurkEpoxy MV as manufactured by The Burke Company; or equal.

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2.9 GROUT

- A. Cement Grout: Cement grout shall be composed of one part cement, three parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white Portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28-days shall be 4000 psi.
- B. Non-Shrink Grout:
  - 1. Non-shrink grout shall be prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout specified herein shall be that recommended by the manufacturer for the particular application.
  - 2. Class A non-shrink grouts shall have a minimum 28-day compressive strength of 5000 psi; shall have no shrinkage (0.0 percent) and a maximum 4.0 percent expansion in the plastic state when tested in accordance with ASTM C827; and shall have no shrinkage (0.0 percent) and a maximum of 0.2 percent expansion in the hardened state when tested in accordance with CRD C621.
  - 3. Application: Class A non-shrink grout shall be used for the repair of all holes and defects in concrete members which are water bearing or in contact with soil or other fill material, grouting under all equipment base plates, and at locations where grout is specified on the Approved Plans.

2.10 MORTAR

- A. Cement mortar shall consist of a mixture of Portland cement, sand and water. One part cement and two parts sand shall first be combined, and then thoroughly mixed with the required amount of water.

2.11 EPOXY MORTAR

- A. Epoxy mortar shall be a two-component, cement-based product specifically designed for structurally repairing damaged concrete surfaces. The repair mortar shall exhibit the properties of high compressive and bond strengths and low shrinkage. A medium-slump repair mortar shall be used on horizontal surfaces, and a non-sag, low-slump repair mortar shall be used on vertical or overhead surfaces. The prepared mortar shall wet the contact surface and provide adhesion, or a bonding agent shall be applied prior to placement. SikaTop 122 or approved equal.

**PART 3 – EXECUTION**

3.1 FORM WORK

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- A. The Contractor shall notify the District Engineer of their designee a minimum of one working day before the placement of concrete to enable the District to check the form lines, grades, and other required items for approval before placement of concrete.
- B. Unless otherwise indicated on the plans, all exposed sharp edges shall be chamfered with at least 3/4- by 3/4-inch triangular fillets.
- C. Before placing concrete, the form surface shall be clean and coated with form oil of high penetrating qualities.
- D. The forms shall be braced to provide sufficient strength and rigidity to hold the concrete and to withstand the necessary fluid pressure and consolidation pressures without deflection from the prescribed lines.

**3.2 REINFORCEMENT**

- A. Place reinforcing steel in accordance with the current edition of “Recommended Practice for Placing Reinforcing Bars”, published by the Concrete Reinforcing Steel Institute.
- B. All reinforcing steel shall be of the required sizes and shapes and placed where shown on the drawings or prescribed by the District Engineer of their designee.
- C. Do not straighten or bend reinforcing steel in a manner that will injure the material. All steel shall be cold bent - do not use heat. Do not use bars with bends not shown on the drawings.
- D. All bars shall be free from rust, scale, oil, or any other coating which would reduce or destroy the bond between concrete and steel.
- E. Position reinforcement steel in accordance with the drawings and secure by using annealed wire ties or clips at intersections and support by concrete or metal supports, spacers, or metal hangers. Do not place metal clips or supports in contact with the forms. Bend tie wires away from the forms in order to provide the specific concrete coverage. Bars, additional to those shown on the drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position, shall be provided and paid for by the Contractor.
- F. Place reinforcement a minimum of 2-inches clear of any metal pipe or fittings.
- G. The reinforcement shall be so secured in position that it will not be displaced during the placement of concrete.
- H. All reinforcing steel and wire mesh shall be completely encased in concrete.
- I. Reinforcing steel shall not be welded unless specifically required by the Approved Plans or otherwise directed by the District Engineer or their designee.
- J. Secure reinforcing dowels in place prior to placing concrete. Do not press dowels into the concrete after the concrete has been placed.

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- K. Minimum lap for all reinforcement shall be 40 bar diameters.
- L. Place additional reinforcement around the pipe or opening as indicated in the drawings.
- M. Wire mesh reinforcement is to be rolled flat before being placed in the form. Support and tie wire mesh to prevent movement during concrete placement.
- N. Extend welded wire fabric to within 2-inches of edges of the slab. Lap splices at least 1-1/2 courses of fabric and a minimum of 6-inches. Tie laps and splices securely at ends and at least every 24-inches with 16-gage black annealed steel wire. Pull the fabric into position as the concrete is placed by means of hooks, and work concrete under the steel to ensure that it is at the proper distance above the bottom of the slab.

3.3 EMBEDDED ITEMS

- A. All embedded bolts, dowels, anchors, and other embedded items shall be held correctly in place in the forms before concrete is placed.

3.4 EMBEDMENT OF DRILLED REINFORCING STEEL DOWELS TO EXISTING STRUCTURES

A. Hole Preparation:

1. The hole diameter shall be as recommended by the epoxy manufacturer, but shall be no larger than 1/4-inch greater than the diameter of the outer surface of the reinforcing bar deformations.
2. The depth of the hole shall be as recommended by the epoxy manufacturer to fully develop the bar but shall not be less than 12 bar diameters, unless noted otherwise.
3. The hole shall be drilled by methods which do not interfere with the proper bonding of epoxy.
4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes to be drilled shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.
5. The hole shall be blown clean with clean, dry compressed air to remove all dust and loose particles.
6. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets. The hole shall be filled to a depth that insures that excess material will be expelled from the hole during dowel placement.

- B. Dowels shall be twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy. The bar shall be inserted slowly enough to avoid developing air pockets.

- C. Adhesive for concrete shall be Hilti RE 500-SD or approved equal.

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- D. Drilled reinforcing dowels shall only be used where specifically detailed on the Approved Plans or when permitted by the District Engineer or their designee.

**3.5 MIXING AND PLACING CONCRETE**

- A. No concrete shall be placed except in the presence of duly authorized representative of the District. The Contractor shall notify the District in writing at least 24 hours in advance of placement of any concrete. 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, shall be removed and replaced by and at the expense of the Contractor.
- B. All concrete shall be placed in the forms by mechanical means before taking its initial set.
- C. No concrete shall be placed in water except with permission of the District Engineer of their designee.
- D. As the concrete is placed in the forms, or in excavations to be filled with concrete, it shall be thoroughly settled and compacted throughout the entire layer, which is being consolidated, into a dense, homogenous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, by internal vibration and tamping bars.
- E. Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 8 feet below the ends of ducts, chutes, or buggies.
- F. All concrete surfaces upon which or against which the concrete is to be placed, and to which new concrete is to adhere, shall be roughened, thoroughly cleaned, wet, and grouted before the concrete is deposited.
- G. The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 55 degrees F for sections less than 12 inches thick nor less than 50 degrees F for all other sections. The Contractor shall employ effective means as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F at no additional cost to the District.
- H. Where the District allows casting new concrete against old concrete, an epoxy adhesive bonding agent shall be applied to the old surfaces according to the manufacturer's written recommendations.

**3.6 CONCRETE FINISHING**

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- A. Immediately upon the removal forms, all voids shall be reamed with suitable toothed reamers, so as to leave the surfaces of the holes clean and rough, and neatly filled with dry-packed cement grout.
- B. The surfaces of concrete to be permanently exposed to view must be smooth, free from projections, and thoroughly filled.
- C. Exposed surfaces of concrete not finished against forms, such as horizontal or sloping surfaces, shall be screened to a uniform surface and worked with suitable tools to a smooth finish.

**3.7 PROTECTION AND CURING OF CONCRETE**

- A. All concrete shall be cured for not less than 7 days. No material shall be deposited against concrete structures until the concrete has reached its designated compressive strength in accordance with this Standard Specification.
- B. The Contractor shall protect all concrete against damage, including damage due to rain. Exposed surfaces of new concrete shall be protected from the direct rays of the sun and from frost by being kept damp for at least two weeks after the concrete has been placed, or by using Hunt Process White Pigmented Concrete Curing Compound or approved equal.

**3.8 GROUTING PROCEDURES**

- A. Prepackaged Grouts: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- B. Base concrete must have attained its design strength before grout is placed, unless authorized by the District Engineer or their designee.
- C. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

**\*\*END OF SECTION\*\***