SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION.

Requirements specified in Conditions of Contract and in Division 1 form a part of this Section. Provide cast-in-place concrete work, complete as indicated, specified and required.

A. Work Included in This Section. Principal items are:

1. All cast-in-place concrete.
2. Concrete finishing, patching, grouting, and crack repair.
3. Concrete curing.

B. Related Work Not Included in This Section.

1. Formwork and reinforcing work.
2. Site preparation and earthwork.

1.02 REFERENCE STANDARDS.

Except as herein modified, concrete work shall conform to requirements of ACI 301-05 Specifications for Structural Concrete for Buildings, and to requirements of ACI Standards and ACI Recommended Practices as contained therein.

1.03 SOURCE QUALITY CONTROL.

A. Code Requirements. Unless more stringent requirements are specified herein and/or shown on the Drawings, all work shall conform to the applicable requirements of the Governing Building Code.

B. Testing. Materials shall be tested as hereinafter specified and, unless specified otherwise, all sampling and testing shall be performed by Owner selected Testing Laboratory with cost borne by the Contractor.

1. Portland Cement. Submit notarized Mill Certificates, provided by the cement manufacturer, including full compliance with requirements specified. In the absence of certificates, Testing Laboratory shall perform tests for each 250 barrels of cement at Contractor's expense, tests made in accordance with ASTM C150 with tensile strength test made at 7 days. Cement shall be tagged for identification at location of sampling.
2. Aggregate for Stone Concrete. Test aggregate before and after concrete mix is established and whenever character or source of material is changed. Include a sieve analysis to determine conformity with limits of gradation. In accordance with ASTM D75, take samples of aggregates at source of supply or at the ready-mix concrete plant.
    a. Sieve Analysis. ASTM C136
    b. Organic Impurities. ASTM C40. Fine aggregate shall develop a color not darker than reference standard color.
    c. Soundness. ASTM C88. Loss resulting therefrom, after 5 cycles, shall not exceed 8% of coarse aggregate, 10% for fine aggregate.

d. Abrasion of Concrete Aggregate. ASTM C131; loss shall not exceed 10-1/2% after 100 revolutions, 42% after 500 revolutions.

e. Deleterious Materials. ASTM C33.

f. Material Finer Than 200 Sieve. ASTM C117; not to exceed 1% for gravel, 1.5% for crushed aggregate per ASTM C33.

g. Reactivity Potential. ASTM C289. Ratio of silica released to reduction in alkalinity shall not exceed 1.0.

h. Cleanliness and Sand Equivalent. For all aggregate, not less than 75 for average of 3 samples tested according to Test Method No. California 217E (Materials Manual, Testing and Control Procedures - Materials and Research Department, State of California).

1.04 CONCRETE MIX DESIGNS AND PRELIMINARY TESTS.

At Contractor's expense, Testing Laboratory shall prepare mix designs for all cast-in-place concrete to have 28-day compressive strength exceeding 2,000 psi and shall perform preliminary testing in accordance with the following requirements. Test results shall be submitted to the Owner.

A. Mix Designs.

1. Basis for Mix Designs. Design concrete mixes for workability of mix and durability of concrete. Concrete mixes shall be rigidly controlled in accordance with laboratory trial batch method or combinations of materials previously evaluated as required by Section 5.2, Standard Building Code Requirements for Reinforced Concrete (ACI 318-05) of the American Concrete Institute and to satisfy herein specified concrete strength requirements. When in the opinion of Owner it becomes necessary to increase the cement content to gain the required strength, such adjustment shall be made at the Contractor's expense.

2. Compressive Strength Requirements. Unless otherwise shown on the Structural Drawings or otherwise specified herein, normal weight aggregate concrete mixes shall provide the following minimum compressive strength for use in various locations:

   a. Class 2, 3,250 psi Concrete shall be provided for concrete used in: on-grade walks, paving, stairs, curbs, gutters, thrust blocks, and similar miscellaneous concrete structures not occurring in waterbearing structure.

3. Water/Cement Ratios. Mixes for normal weight aggregate concrete shall be designed within the following maximum water/cement ratios when concrete is to be used in the various locations:

   a. For all other concrete, water/cement ratios shall be no greater than 0.53.

4. Admixtures. Add to concrete mixes, upon approval prior to use, and modify mix design proportions accordingly.

B. Preliminary Strength Tests. In laboratory, prepare 9 compression test cylinders for each concrete mix design (unless more tests are required for an earlier age). Fabricate and cure cylinders in accordance with ASTM C31. Use concrete, aggregates and admixtures proposed for the concrete work. In accordance with ASTM C39, test three sets of two cylinders at 28-day age. For each mix, the average of all sets of three consecutive strength test results shall equal or exceed the required f'_c and no individual strength test result shall fall more than 500 psi below the required f'_c.

C. Reports. File 3 copies of each mix design, preliminary strength test report, and drying shrinkage test report with Owner for review and approval. Contractor shall submit a letter of certification that the concrete materials, mixes, properties, and work conform to the requirements indicated and specified.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING.

Deliver materials in a timely manner to ensure uninterrupted progress of work. Store materials in a manner that will preclude damage and permit ready access for inspection and identification.

PART 2 - PRODUCTS

2.01 MATERIALS.

A. Portland Cement. Standard brand of domestic portland cement, ASTM C150, Type II, low alkali. Do not change brand of cement during progress of work without written approval of Owner.

B. Normal Weight (Stone) Aggregates. Furnish natural aggregates from approved pits, free from opaline, chert, feldspar, mica (fools gold), siliceous magnesium limestone or other deleterious or reactive substances. Conform to ASTM C33 except as modified herein. Fine aggregates shall pass a #4 sieve.

1. Coarse Aggregates. Clean, hard, fine-grained sound crushed rock or washed gravel which does not contain in excess of 5% in weight of flat, chip-like, thin, elongated, friable or laminated pieces, or more than 2% by weight of total amount of cherty material and soft particles, or more than 1% of chert as soft material as defined in Table 3 of ASTM C33. Consider any piece having a major dimension in excess of 5 times its average dimension to be flat or elongated.
2. Maximum Sizes. Maximum aggregate size shall be as indicated on Drawings. In addition, course aggregate nominal maximum size shall not exceed one-fifth the narrowest dimension between sides of forms, one-third the depth of slabs, or three fourths of minimum clear spacing between reinforcing bars. No pozzolan or other additives may be used to compensate for alkali reactivity. Coarse aggregate nominal maximum size shall not exceed one-third the depth of slabs, or three-fourths of minimum clear spacing between reinforcing bars.

C. Admixtures. Use one manufacturer's products throughout. Upon Owner's approval of use and of a particular brand, assure that use is reflected in mix designs.

1. General. Use no admixture containing calcium chloride or triethanolamine. Admixtures used in combination shall be physically and chemically compatible and shall be so certified by each admix manufacture and by Testing Laboratory that prepared respective mix designs.
2. Air Entrainment. Use air entrainment additive conforming to ASTM C260 as approved by the Owner.

D. Water. From a domestic potable source.

E. Grout. Grout to be applied to the concrete surface shall consist of one part Portland Cement to three parts dry, washed sand to sufficient water to allow placement, screeding, and finishing.

F. Nonshrink Grout. Use "Sika-Grout 212" manufactured by Sika Corp., "Sauereisen F-100" produced by Sauereisen Cements Co., or approved equal nonmetallic, nonshrinking, nonstaining, premixed, water and oil resistant, high-strength grout.

G. Deferred Bolting Devices (D.B.D.) may be used in lieu of anchor bolts and expansion bolts where approved, and shall consist of the following except as otherwise indicated. Install in accordance with current I.C.B.O. Research Report approval.

1. For Interior Dry Locations anchorages shall be snap-off or flush shell concrete anchors as Phillips Self-Drilling Concrete Anchors, Star Selfdrill Shields, or approved equal. All anchors shall be zinc coated.
2. For exterior or Wet Locations anchorages shall consist of all stainless steel, Type 316, Molly Parabolt Concrete Anchors, Phillips Wedge Anchors, or an approved equal.
3. D.B.D. will not be acceptable for anchorage of any vibrating machinery or equipment.

H. Epoxy. Epoxies for grouting, crack repair, patching, bonding, or other uses as shown on the Drawings shall be as manufactured by Sika Chemical Co., or shall be epoxies by any other manufacturer that will meet the same ASTM requirements and will equal the performance. In general, epoxies applied in locations where the concrete is dry shall be Sika Dur Hi Mod 32, Sika Dur Hi Mod 35 LV, Hi Mod GEL 31, while Sikadur Hi-Mod shall be used when concrete is damp.

1. All epoxy mixing, surface preparation and applications shall be made in strict accordance with manufacturer's specifications.
2. All existing concrete that is cut or chipped and is left exposed shall receive two coats of Sikagard 62 100% solids at 4-7 mils per coat.
3. All existing concrete that is cut or chipped and is to receive new concrete or mortar shall receive one coat of Sikadur Hi-Mod immediately before applying new materials.

I. Curing Sheet Materials. ASTM C171, waterproof paper, polyethylene film, or white burlap-polyethylene sheet, non-staining.

2.02 CONCRETE MIXES.

A. 28-Day Compressive Strength. It shall be the sole responsibility of the Contractor to mix, place, and cure concrete which shall be of 150 lb/cu.ft. nominal density and which shall attain the compressive strengths at 28 days as designated on Structural Drawings for use in various locations.

B. Maximum Aggregate Size. Use 1” max. size aggregate unless otherwise stated in latest edition of the governing Code. In no case shall the size of the coarse aggregate exceed 75% of the horizontal space between reinforcing bars or between reinforcing bars and forms.

C. Mix Designs. Conform with requirements of Article "Concrete Mix Designs and Preliminary Tests." At least 60 days before any Class concrete is to be placed the Contractor shall submit, for approval, mix designs for each proposed mix made by an approved testing laboratory.

2.03 CONCRETE MIXING.

A. Concrete shall be ready-mixed, supplied from an off-site commercial ready-mix plant approved by Owner, each load accompanied by a bonded weightmaster's certificate listing the quantity of each concrete ingredient, admixture quantity, water content and slump, and time of

loading and departure from ready-mix plant. Also include notations to indicate equipment was checked and found to be free of contaminants prior to batching.

B. Ready-Mixed Concrete. Unless approved otherwise in advance of batching, all concrete of a single design mix for any one day's pour shall be from a single batch plant of a single supplier. Conform to ASTM C94, except materials, testing and mix design shall be as specified herein. Use transit mixers equipped with automatic devices for recording number of revolutions of drum.

C. Mixing Water Limitations. If water is added at the batching plant, ready-mixed concrete shall not be held in the mixer for more than one and one-half hours from the time the water is added. Do not deliver ready-mixed concrete to job with the total specified amount of water incorporated therein. Withhold 2-1/2 U.S. gal. of water per cubic yard, then incorporate in mix before concrete is discharged from mixer truck. If no water is added at the batching plant, measured quantities of water shall be added at the site and a minimum of fifteen minutes mixing given, or mixing to overcome segregation. Adding of water shall be under observation of Inspector. Each mixer truck shall arrive at the job site with its water container full. In the event container is not full, the load shall be rejected.

D. Job Mixed Concrete. Contractor shall obtain the approval of the Owner for equipment and procedures proposed for job mixed concrete.

E. Consistency. Adjust quantity of water so concrete does not exceed maximum slumps specified when placed; use minimum necessary for workability required by the part of the structure being cast. Measure consistency of concrete in accordance with ASTM C143.

Part of Structure	Maximum Slump
Encasement	2 to 3 inches

PART 3 - EXECUTION

3.01 PREPARATION BEFORE PLACING.

A. Remove excess water from forms before concrete is deposited. Divert any flow of water without washing over freshly deposited concrete. Remove hardened concrete, debris, and foreign materials from interior of forms and from inner surfaces of mixing and conveying equipment.

B. Reinforcement shall have been secured under work of Sections 03100 and 03200, and inspected and approved. Embedded metal shall be free of old mortar, oils, mill scale, and other encrustations or coatings that might reduce bond. Wheeled concrete-handling equipment shall not be wheeled over reinforcing nor shall runways be supported on reinforcing.

C. Wetting. Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce suction and maintain concrete workability.

D. Earth Subgrade. Lightly dampened 24 hours in advance of concrete placing, but not muddied. Re-roll where necessary for smoothness and remove all loose materials.

E. Existing Concrete Surfaces. For those surfaces to which new work is to be bonded, conform with requirements herein specified in Paragraph entitled, "Joints in Concrete." For abutting surfaces which are not to be bonded to new work, prior to forming, clean surfaces to remove dirt and other deleterious substances which may contaminate or interfere with new work.

3.02 JOINTS IN CONCRETE.

A. Locate joints in concrete where indicated unless otherwise approved. Obtain approval of points of stoppage of any pour.

B. Construction Joints. Unless otherwise shown, all construction joints shall be provided with suitable keyways or other keying methods. Clean and roughen contact surfaces of construction joints be removing entire surface and exposing clean aggregate solidly embedded in mortar matrix. Use mechanical chipping, sandblasting, or application of surface mortar retarder followed by washing and scrubbing with stiff broom. Cover and protect waterstops and other inserts from damage. The hardened concrete shall be watered and kept wet for at least 24 hours before placing new concrete. Just prior to placing adjoining concrete, slush face of construction joints with 1:2 mix of cement and sand mixed to paint consistency. At construction joints not containing waterstops, the coarseness amplitude of the prepared surface shall be 1/4" min. in accordance with ACI 318-05.

3.03 CONVEYING AND PLACING CONCRETE.

A. Do not pour concrete until reinforcing steel and forms have been inspected and approved. Notify Owner not less than one full working day in advance of readiness for inspection of forms and reinforcing. Handle or pump no concrete utilizing aluminum equipment.

B. Weather. Do not place concrete during rain or freezing weather unless approved measures are taken to prevent damage to concrete. Concrete placed during periods of dry winds, low humidity, high temperatures, and other conditions causing rapid drying shall be initially cured with a fine fog spray of water applied immediately after finishing and maintained until final curing operations are begun. Also, under hot weather conditions, steps shall be taken to reduce concrete temperature and water evaporation by proper attention to ingredients, production methods, handling, placing, protection, and curing. Subject to Owner's approval, applicable preventative measures conforming to ACI Standards 305 and 306 shall be taken for placing concrete during hot or cold weather.

C. Conveying. Do not drop concrete from its point of release at mixer, hoppers, tremies, or conveyances more than 4 feet, nor through reinforcing bars in a manner that causes segregation. Provide form windows, tremies, elephant trunks, and equivalent devices as required. The use of chutes for conveying or depositing concrete is not allowed except for small isolated portions of the work and only with prior approval of Owner. Deposit concrete directly into conveyances and from conveyances to final points of repose. Deposit concrete so that the surface is kept level throughout, a minimum being permitted to flow from one portion to another.

D. Placing Concrete. Concrete shall be placed and compacted within 60 minutes after water is first added to the mix, and no concrete shall be placed after there is evidence of initial set. Retempering of concrete is not allowed.

1. Horizontal Construction Joints. Horizontal surfaces of previously placed and hardened concrete shall be wet and covered with specified brush coat of sand/cement mix then covered with a 6" thick layer of concrete of the same mix with 50% of coarse aggregate omitted just before balance of concrete is placed.
2. Lifts. Pour concrete into forms immediately after mixing in a manner that will prevent separation of ingredients and in horizontal layers not over 18 in. thick.
    a. Slabs. Pour slabs as one continuous operation between indicated or approved construction joints. Cure in-place slabs as required elsewhere in

these Specifications prior to pouring alternate slabs, then continue to cure until required curing time is attained.

3. Pumping Concrete. No increase in the specified slumps will be allowed and required water/cement ratios shall be maintained for concrete pumping. Aluminum tubes are not acceptable for conveying concrete. Equipment shall be capable of maintaining the specified pour rates. Conform with requirements of ACI 304.2R-96 except as more stringent requirements are specified herein. Minimum conduit (tube) diameter shall be 4 inches.

4. Pour Rates.

   a. Slabs. Place concrete at a rate that ensures all deposits are joined to concrete that is still plastic and within 10 minutes of the previous placing.

   b. Concrete adjoining a construction joint shall not be placed until the adjoining concrete has cured for at least seven days unless approved by the Owner.

E. Compaction. Effective compaction shall be obtained by vibration, agitation, spading, and rodding until the concrete is free from voids, air bubbles, or rock pockets. Vibrators shall not be used to transport concrete within the forms. No less than two vibrators in good working condition shall be kept on the job during pours. One experienced workman shall be assigned to the operation of each vibrator as his only duty. Operations not deemed to be satisfactory by the Owner shall be immediately corrected.

1. Vibration. All concrete, with the exception of concrete slabs 4" or less in depth, shall be compacted with high frequency, internal mechanical vibrating equipment supplemented by hand spading and tamping. Concrete slabs 4" or less in depth shall be consolidated by wood or metal grid tampers, spading and settling with a heavy leveling straight edge. Carefully vibrate concrete around waterstops and ensure the waterstops are not bent or damaged.

   a. Vibrators shall be designed to operate with vibratory element submerged in the concrete, and shall have a frequency of not less than 7,000 impulses per minute when submerged. The vibrating equipment shall be adequate at all times in number of units and power of each unit to consolidate the concrete properly.

   b. Operation of Vibrators. Do not allow vibrators to contact forms or reinforcing. In vibrating a freshly placed layer of concrete, the vibrator shall be pushed down vertically into the preceding layers that are still completely plastic and slowly withdrawn, producing the maximum obtainable density in the concrete without creating voids. Under no circumstances shall the vibrator enter or disturb concrete that has stiffened or partially set. The interval of vibrator placing shall not exceed 2/3 the effective visible vibration diameter of the submerged vibrator. Avoid excessive vibration that causes concrete segregation.

F. Slabs. Set screeds at maximum 8 ft. centers and verify correct elevations with instrument level. Compact and tamp concrete to bring 3/8" mortar to surface, and wood float to straightedges and screeds. Make finished surfaces level or sloped as detailed, with maximum deviation of 1/4" from 10 ft. straightedge for exposed finishes. Do not use steel or plastic floats of any kind for initial floating operations. Unless otherwise specified, do not apply hereinafter specified finishes until surface water disappears and surface is sufficiently hardened. Remove all bleed water and laitance as it appears.

3.04 INSTALLATION OF NUTS AND BOLTS.

A. Work from approved setting Drawings. Use steel or plywood templates and apply nuts above and below, to hold bolts in vertical position. During the course of the placement of any concrete, the Contractor shall have sufficient personnel, of whatever skill or trade required, available to check the location of all embedded anchor bolts, edge angles for grating, or any other item which may be deemed appropriate by the Engineer. This check shall be made immediately after the work has progressed to a point such that the item shall not be subject to disturbance and prior to the concrete having obtained sufficient set such that adjustment of the items, if necessary, cannot be made with unacceptable damage to the concrete. If the operation is such that repeated checks are required, they shall be made.

B. Size. Generally the size indications and dimensions of bases shown on Drawings are approximate. The actual size, in all cases, shall be determined from the equipment furnished. Work from approved equipment supplier's drawings.

3.05 FINISHING SLABS AND FLATWORK.

A. As specified above, initially compact, bring 3/8" mortar to surface and float surfaces. Finished surfaces shall be "puddle-free" and level or sloped as indicated to above specified maximum deviation limits. Surfaces which are not within these limits shall be removed and replaced at no additional cost to Owner. Patching is not acceptable. Keep surface moist with fine fog spray of water to prevent drying during finishing operations and until curing media is applied. Dusting with cement or sand during finishing operations is not permitted.

B. Precautions. Slabs have not been designed for heavy construction loads. Contractor shall repair or replace damaged slabs resulting from his use of heavy equipment or loadings.

C. Monolithic Trowel Finish. For all floor, slab, and flatwork surfaces not otherwise indicated or specified. After surface water disappears and floated surface is sufficiently hardened, steel trowel and retrowel to smooth surface. After concrete has set enough to ring trowel, retrowel to a smooth uniform finish free of trowel marks or other blemishes. Avoid excessive troweling that produces burnished areas.

D. Wood Float Finish. Float to screeds. When ready, finish with wood floats to a uniformly textured surface. Apply on following areas and surfaces:

1. Exterior walking surfaces exceeding 1:10 slope.

3.06 CURING SLABS AND FLATWORK.

A. Apply curing media as soon as feasible after finishing operations without marring surfaces, and in any case on same day. Keep surfaces moist until curing is applied. Apply liquid compounds in strict accordance with material manufacturer's published application rates; apply 2 spray coats, second coat sprayed at right angle direction from first coat. Carefully mask and protect adjoining surfaces where compound is used.

B. Curing Period and Protection. Maintain curing materials in proper sealed condition for minimum of 14 days after application. Keep traffic on curing surfaces to minimum possible, and completely off liquid compound cured surfaces. Immediately restore any damaged or defective curing media.

C. Liquid Membrane-Forming Curing Compound. Except as restricted above, use liquid curing compound for all slabs, floors, and flatwork.

D. Sheet Curing. Use concrete curing sheet material, all joints sealed with pressure-sensitive tape; immediately repair any tears during curing period. Verify that surfaces remain damp for full curing period; if necessary or directed, lift sheeting and wet surfaces with clean water, and replace sheeting. Use on surfaces where liquid curing is not permitted.

E. Water Curing. Alternative to either liquid curing compound or sheet curing method. Keep concrete continuously wet by ponding, sprinklers, or equivalent for entire curing period.

3.07 JOINTS WITH SEALANT.

A. Sandblast joints to clean sound concrete, using oil-free air. Mix and place primer and sealant in strict accordance with manufacturers printed instructions. Install backing in grooves so sealant depth is between 1/2 and 2/3 of joint width.

B. Manufacturer's Supervision. A technical representative of the sealant manufacturer shall be present at the time sealant operations are started to supervise and approve preparation, sealant mixing, and sealant application procedures and applicators. The representative shall make frequent visits to the site to ensure the sealant installations conform to the manufacturer's instructions, and shall issue a written report to Owner covering each visit.

C. All locations where sealant is placed must be cleaned by sand blasting and be free from oil, foreign materials, and moisture. Lower surfaces of joints shall be isolated with a bond breaker such as polyethylene, wax paper, aluminum foil or polyethylene tape.

D. Unless specified otherwise, Sikaflex 1A type joint sealer shall be used where joint depth is equal to or greater than twice the joint width. Colma type joint sealer shall be used where the depth to width ratio is less than two to one.

E. All sealant shall be placed in strict accordance with the manufacturer's printed specifications by a firm specializing in this type of work for not less than five (5) years, or by the Contractor under direct supervision of the manufacturer's representative.

3.08 THRUST BLOCKS AND ANCHOR BLOCKS.

Concrete thrust and anchor blocks shall be poured against wetted, undisturbed soil in accordance with VCMWD Standard Drawing and as directed by the District. The concrete shall be placed so that fittings and valves will be accessible for repairs or replacement. Prior to filling the pipeline with water, the concrete for thrust and anchor blocks shall cure for the number of days:

Thrust Blocks	3 days minimum
Anchor Blocks	7 days minimum

3.09 VALVE SUPPORT BLOCKS.

A. Valve support blocks shall be installed as below and in accordance with VCMWD Standard Drawings

B. Support blocks below valves shall be cut into the side of the trench a minimum of 12”

C. Support blocks shall extend up to the height of adjoining pipe and shall have a minimum depth below the valve of 12”

D. Support blocks shall be installed so that the valves will be accessible for repairs.

3.10 FIELD QUALITY CONTROL.

A. Continuous Inspection. At Contractor's expense, concrete shall be placed under the continuous inspection of Owner's selected "Special Inspector" qualified by governing Building Code Authority or Inspector as otherwise qualified and approved by the Owner. Code required reports shall be submitted to Building Official, Owner and Contractor.

B. Concrete Tests. At Contractor's Expense, Owner's selected Testing Laboratory shall perform the following concrete tests:

1. Compression Tests. Make one set of at least three standard test cylinders from each day's placing and each 150 cubic yards, or fraction thereof, of each class of concrete. Date cylinder, number and tag, indicating location in structure from which sample was taken. Indicate slump test result of sample. Do not make more than one set of test cylinders from any one location or batch of concrete.
2. Test Cylinders. Owner or Testing Laboratory will make test cylinders at the job in accordance with ASTM C31; 24 hours after making, store cylinders under moist curing conditions at approximately 70 degrees F until tested. Test specimens in accordance with ASTM C39 at the age of 7 and 28 days. The remaining cylinder shall be held for testing at 45 days if the 28 day test does not reach design strength. Contractor shall furnish labor and assistance for casting cylinders, and shall furnish a moist curing cabinet conforming to ASTM C31 at the site.
3. Core Tests. Should strength of concrete, as indicated by tests, fall below required minimum, then additional tests of concrete which the unsatisfactory samples represent may be required by Owner. Testing Laboratory will make such test in accordance with ASTM C42. Contractor shall fill the holes made by curing cores with dry pack concrete. Tests for below-strength concrete shall be paid for by the Contractor even though such tests indicate the concrete has obtained the required minimum compressive strength.
4. Air Content. At the time that compression test cylinders are cast, test a sample of the same concrete for air content in accordance with ASTM C231.

3.11 ALTERATIONS AND REWORK.

Existing concrete surfaces to receive new concrete shall be heavily sandblasted to expose coarse aggregate and produce clean coarse textured surface. Such prepared surfaces shall be coated with epoxy bonding compound immediately prior to placing concrete. The compound shall be an approved equivalent to Sika Chemical Company's "Sikastix Adhesive," Hunt Process Company's "HB Series Epoxy Mortar," or approved equal of type, mix and application in strict accordance with manufacturer's printed recommendations and directions for various conditions.

END OF SECTION 03300