



LACDPU White Rock Substation Transformer #1 Replacement

CONCRETE SPECIFICATIONS

January 2026 IFB

CONCRETE SPECIFICATIONS

I. GENERAL

A. DESCRIPTION OF WORK

The extent of the concrete work is shown on the drawings.

B. QUALITY ASSURANCE

1. Comply with appropriate ASTM, CRSI, and ACI codes and standards as referenced herein.
2. The Contractor will provide the initial testing of the concrete cylinders. This will involve (5) five test cylinders from the first truck of the day and for every 20 additional yards of concrete per day. Data that must be logged at time of truck arrival includes:
 - a. Truck Number
 - b. Batch Ticket Number
 - c. Specified Mix Strength and Mix ID
 - d. Slump at Start of Load
 - e. Percent Air Entrainment at Start of Load
 - f. Qty of water added after approval (retest air and slump record before and after values)
 - g. Which foundations are being poured

Lab data that must be obtained for each truck:

- a. 7, 14, and (2) 28, and (1) HOLD for 56 day compressive strength testing if needed
 - b. Fracture type
- Each break test report must have all of the above information reported on it. More data (time, temperature, local conditions, etc) is fine and commonly accompanies a concrete break test report.
3. Prior to pouring slabs-on-grade, spread footers, or other monolithic foundations, at least one compaction test will be performed under the pad location and the percent compaction reported.
 4. The Contractor will be provided a pour log to document the above data. At the end of foundation work, this log must filled out in its entirety and returned to The

Engineer along with copies of all batch tickets, break test reports, and compaction test reports.

5. The Contractor shall pay for retesting of rejected materials and installed work.

C. SUBMITTALS

The Contractor shall provide, prior to construction, the proposed concrete mix design to the Engineer for review along with recent test data indicating break strengths.

II. PRODUCTS

A. FORM MATERIALS

1. Forms

Provide forms that are metal, wood, or other materials as shown on the drawings. The Contractor shall use materials with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection. Provide forms for exposed surfaces that are free of holes, splits, surface voids, and other defects that can affect finished concrete surface.

2. Cylindrical Columns and Supports

Form round section members with paper or fiber tubes, constructed of laminated layers using water resistant adhesive, with wax impregnated exterior for weather and moisture protection. The Contractor shall provide units with sufficient wall thickness and support to resist loads imposed by wet concrete without deformation. Permanent steel casings of suitable materials are allowed below grade.

3. Form Coatings

Provide form coating compounds that will not bond with, stain, nor adversely effect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

4. Form Ties

Use factory fabricated, adjustable length, removable, or snap off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

- a. Unless otherwise indicated, provide ties so the portion remaining within concrete after removal is at least $\frac{1}{2}$ inch inside concrete for steel ties and $\frac{1}{4}$ inch for wire ties.
- b. Unless otherwise shown, provide form ties that will not leave holes larger than 1 inch diameter in concrete surface.

B. REINFORCING MATERIALS

1. Bar Reinforcement

Bar reinforcement shall conform to ANSI/ASTM A615, Grade 60, deformed for longitudinal reinforcement. Use grade 40 for stirrups and ties, or as shown on the drawings.

2. Wire

Cold-drawn steel wire shall conform to ANSI/ASTM A82.

3. Supports for Reinforcement

Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar-type supports complying with CRSI recommendations. Do not use wood, brick, stone, broken block, or pieces of concrete, etc.

- a. For slabs-on-grade and other applications, use supports with sand plates or horizontal runners where material will not support chair legs.
- b. For exposed to view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

4. Welding

Do not weld rebar for spacing, supporting, or fastening.

C. CONCRETE MATERIALS

1. Portland Cement

Provide cement that complies with ANSI/ASTM C150 Types IIA and IIIA, and II and III unless otherwise specified.

2. Aggregates

Provide aggregates that comply with ANSI/ASTM C33.

3. Water

Provide potable water for the concrete.

4. Admixtures

Use the following admixtures in the mix design after written review by the Engineer.

- a. Water-Reducing Admixture: ANSI/ASTM C 494, Type A, containing not more than 1% chloride ions.

- b. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G containing not more than 1% chloride ions.
- c. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, containing not more than 1% chloride ions.
- d. Calcium chloride is not permitted.
- e. Fly ash: ASTM C618, Class F.

D. RELATED MATERIALS

1. Expansion Joint Materials

Provide pre-molded strips of a bituminous mastic composition conforming to ASTM D 994.

2. Non-Shrink Grout

Provide grout that complies with CRD-C 621. Provide factory pre-mixed non-metallic grout.

3. Liquid Membrane-Forming Curing Compound

Provide liquid membrane forming curing compound that complies with ASTM C 309, Type I or I-D, Class A, and clear. Provide a curing compound that is compatible with future uses and/or finishes of the concrete.

4. Bonding Compound

If needed, provide polyvinyl acetate, wetable-type bonding compound.

E. CONCRETE MIX DESIGN

1. General

- a. **Unless otherwise specified on the drawings, provide concrete that is 4000 psi at 28 days.**
- b. Concrete mixtures shall produce the necessary workability in fresh concrete and the desired strength.
- c. Unless otherwise approved or specified, provide "Ready-Mixed" concrete in accordance with ANSI/ASTM C94.
- d. The water-cement ratio selected shall produce a 28-day strength corresponding to an over designed mix that is supported by sufficient experience data to ensure that test results will fall within the limits

established in this specification. Unless otherwise specified, the following proportions apply:

Min. Cement <u>Strength</u>	Max. W/C <u>Bag/C.Y.</u>	Max. Water <u>Ratio</u>	<u>Gal./Bag Cement</u>
4000	6.0	.448	5.06

- e. Allowable slump (without admixtures): min-max
- Massive section, pavement or slabs on ground 2 - 5 inches
- Slabs, beams, walls, and columns 2 - 5 inches

2. Coarse Aggregate shall conform to ACI 302. Provide aggregate grading as follows:

Aggregate Retained on each Sieve	
<u>Aggregate Size</u>	<u>Distribution</u>
1½ inches	8% – 18%
¾ - 1 inch	8% – 22%
#30	8% – 15%
#50	8% – 15%
0-4% on top sieve	
1½% to 5% on the #100 sieve	

3. Fine Aggregate shall conform to ACI 302.

When Produced	
<u>Sieve Size</u>	<u>Percent Passing</u>
3/8 inch	100
#4	85 – 100
#8	80 – 90
#16	50 – 75
#30	30 – 50
#50	10 – 20
#100	2 – 5

4. Admixtures
 - a. Water-reducing admixture or high range water-reducing admixture (super plasticizer) is allowed in concrete.
 - d. Fly Ash - Unless otherwise specified, a maximum of 18 pounds of fly ash per bag of cement is permitted.
5. High Early Strength Concrete shall have a compressive strength at 7 days equal to that specified for ordinary concrete at 28 days.

III. EXECUTION

A. FORMS

1. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads that might exist until such loads are supported by the concrete structure. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Provide for openings, keyways, chamfers, inserts, and other features required in work.
2. Design formwork that is readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
3. Chamfer exposed corners and edges to produce uniform smooth lines and tight edge joints. Use 3/4 inch chamfers.
4. Do not remove the forms for any portion of the structure until the concrete is strong enough to withstand damage when the forms are removed. Remove forms within 24 hours of concrete placement.
5. Do not place loads on or against load carrying members, floor slabs, or retaining walls until a 2500 psi compressive strength has been attained and after review by the Engineer.
6. Maintain the shape, strength, rigidity, water-tightness, and surface smoothness of reused forms. Re-size any warped or bulged lumber before being used. Do not use unsatisfactory forms.

B. PLACING REINFORCEMENT

1. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified. Do not field bend grade 60 bars.
2. Clean reinforcement of loose rust, mill scale, earth, ice, oil, concrete splatter from previous pours, and other materials that reduce or destroy bond with concrete.
3. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
4. Provide the following minimum cover for reinforcement of cast-in-place concrete.

The following is taken from ACI 318:

Concrete cast against earth	3 inches
Concrete exposed to earth or weather	
#6 and larger	2 inches
#5 and smaller	1 1/2 inches
Concrete not exposed to weather or earth	
Slabs, walls, joints	3/4 inch
Beams, columns	1 1/2 inches

C. JOINTS

1. Construction Joints
 - a. Locate and install construction joints not shown on drawings so as not to impair strength and appearance of the structure and in a manner acceptable to the Engineer.
 - b. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed for this purpose are allowed for slabs.
 - c. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.
 - d. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, and grade beams. Unless otherwise detailed, install 90# felt paper between slab and vertical surface.

2. Tooled or Contraction Joints
 - a. Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Form contraction joints in floor slabs with preformed metal bulkheads.
 - b. In sidewalk, unless otherwise shown, provide tooled joints at 5 feet to 6 feet on center.
3. Expansion Joints
 - a. Unless otherwise specified, provide preformed joint filler expansion material that is 1/2 inch thick running the full thickness of the concrete.
 - b. Unless specified otherwise, use expansion joints in at least the following conditions:
 - Between back of curb or end of curb and adjacent rigid structure.
 - Between new concrete slab and adjacent masonry.
 - Around utility access openings within slab, to include clean outs and utility valves.
 - Transverse sidewalk joints not to exceed 30 feet spacing.

D. PREPARATIONS FOR PLACING CONCRETE

1. Remove water from excavations. Remove wood chips, shavings, and hardened concrete from the forms before any concrete is placed. Clean equipment. Wet all forms, except in freezing weather. Oil all forms except those where the surface is to receive stucco or plaster.
2. Unless waterproof subgrade or base course cover material is specified, uniformly moisten the earth where the concrete is placed. Do not wet to the point of creating mud or pools of water. Watering the subgrade immediately prior to placing the concrete is not sufficient to make the soil uniformly moist.
3. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
4. Notify the Engineer both *one week and one day* before placing concrete to allow for review the reinforcement prior to placing concrete.

E. PLACING CONCRETE

1. Field Review by Engineer

- a. Do not place concrete until the Engineer has reviewed forms and reinforcing steel.

- b. Place Ready-Mix concrete within the following specified delivery times:

Below 40°	see cold weather placing
40°-85°	90 minutes
86°-90°	75 minutes
Above 90°	60 minutes

The Engineer may reject concrete exceeding delivery time.

- c. Adding Water: Do not add water after the initial introduction of mixing water for the batch except, when on arrival at the job site, the slump of the concrete is less than that specified, and the maximum water/cement ratio for the mix has not been exceeded. Add additional water to bring the slump within limits. Turn the drum at least 30 additional revolutions at mixing speed. Notify the Engineer before adding any water. Do not add water to the batch at any later time. The Contractor shall ensure that the concrete strength meets specifications, and that the maximum amount of water as noted in the concrete mix design is not exceeded. Comply with ASTM C 94.

2. General

- a. Comply with ACI 304. Deposit concrete continuously or in layers of such thickness that no concrete is placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. Provide construction joints, as specified, for sections that are not placed continuously. Deposit concrete to its final location to avoid segregation.
- b. Deposit concrete in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while the preceding layer is still plastic to avoid cold joints.
- c. Consolidate placed concrete by high frequency mechanical vibrating equipment supplemented as necessary by hand spading, rodding, or

tamping. Use equipment and procedures for consolidation of concrete according to ACI recommended practices.

- d. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into proceeding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- e. Do not allow the concrete to free fall more than 5 feet unless confined by a closed chute, except that concrete being placed in walls 10 inches or less in thickness may free fall a maximum of 8 feet.
- f. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
- g. Bring slab surfaces to correct level as above, and use bull floats to provide a smooth surface that is free of humps or hollows. Do not use tools that force the aggregate away from the surface.
- h. Maintain reinforcing in proper position during concrete placement operations.

3. Cold Weather Placing

Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures; comply with ACI 306 and these specifications.

- a. Mix concrete only when the temperature is at least 40°F and rising unless permission to pour is obtained from the Engineer.
- b. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
- c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

- d. When approval is obtained to place concrete at or below an atmospheric temperature of 40°F, heat the water or aggregates, or both. Provide suitable enclosures and heating devices. The mixed concrete shall have a temperature of at least 50°F and not more than 90°F at the time of placing. Provide heating equipment or methods that are capable of heating the water and aggregates uniformly. Do not heat these materials above 150°F.
 - e. After any concrete is placed, the Contractor shall provide suitable measures to maintain a concrete surface temperature of 40°F or above for not less than 7 days.
4. Hot or Windy Weather Placing
- When hot or windy weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
- a. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F.
 - b. Cover reinforcing steel with water-soaked burlap when required to ensure that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 - c. Wet forms thoroughly before placing concrete.
 - d. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

F. CONCRETE FINISHING

- 1. General
 - a. Do not use tools that force the aggregate away from the surface.
 - b. Do not spray or sprinkle water onto a concrete surface to aid in finishing.
 - c. The finisher should avoid bringing more water than necessary to the surface and avoid working the surface any more than necessary to obtain the required finish.
 - d. Unless otherwise noted on drawings or specifications, provide finishes as follows:

Sidewalks –	Light Broom
Driveways --	Light Broom
Foundations exposed to weather –	Steel Trowel
Interior exposed floors –	Steel Trowel

- e. Remove forms within 24 hours. Immediately after removing forms, cut back form ties and remove fins and loose material. Cut honeycombs and voids to solid concrete, then thoroughly wet, and fill with cement mortar composed of one part cement and three parts sand.

G. CONCRETE CURING

1. General

Immediately after placing or finishing, and when the operation will not mar the finish, protect concrete surfaces not covered by forms against moisture loss. Membrane Curing Compound is the preferred method. Since the forms are removed before the end of the curing period, continue curing as on unformed surfaces, using the curing materials specified. Maintain such protection for at least 11 days. Keep surfaces free of foot and vehicular traffic during the curing period.

2. Curing Methods

a. Membrane Forming Curing Compound

Apply this compound in a two coat continuous operation, using the manufacturer recommended rate of application. Spray the coats at 90° to each other. If the application rate is not known, apply the curing compound at 1 gallon per 200 square feet for each coat. Re-spray surfaces damaged by construction operations during curing.

b. Polyethylene Coated Burlap Mats

Cover surfaces with the specified mat lapped 12 inches. Weight the mat to prevent displacement. Repair tears or holes immediately by patching.

c. Water Curing

Use water curing on surfaces that are to receive additional concrete fill, dust proofing and hardening treatments, stucco, plaster, or painting.

IV. TOLERANCES

This section establishes tolerances that are consistent with modern construction practices. These tolerances are governed by the effect that permissible deviation will have upon the function of the structure. Allowable deviations from the established lines, grades, and dimensions follow this paragraph. The Contractor is responsible for setting and maintaining concrete forms within the tolerance limits to ensure the complete work is within the tolerance limits. The Contractor will remedy, remove, and/or replace concrete work that exceeds the tolerance limits at the contractor's expense.

- A. Variation from plumb in the lines and surfaces of trench walls, embedded conduits, foundations, and footings:

In four feet	1/4 inch
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- B. Variation of the level from the grades indicated on drawings for floors and slabs:

In ten feet	minus zero inches
	Plus 1/8 inch

- C. Footing variation of dimensions in plan:

Minus zero inches
Plus two inches

- D. Footing misplacement or eccentricity:

Two percent of the footing width in direction of the misplacement but not more than two inches

- E. Reduction of footing thickness:

Minus 5% of specified thickness

- F. Placement of reinforcing steel relative to protective cover:

With two inches of cover	1/4 inch
With three inches of cover	1/2 inch

- G. Placement of reinforcing steel from indicated spacing:

1 inch

V. SUMMARY

A. Concrete

Concrete strength: **4000 psi @ 28 days**

Slump: three (3) to five (5) inches (without admixtures)

Air entraining: four (4) to six (6) percent (%).

B. Forms

Chamfer: exposed edges and corners

Chamfer size: 3/4 inches

Removal: within 24 hours

Rub out: immediately after form removal

Curing: apply curing compound immediately after rub out

C. Finish

Type: steel trowel

D. Curing

Time: immediately after finishing

Type: clear membrane curing compound.