Supplemental Plan Check List for Prestress Concrete (2017 LABC)

Plan Check/PCIS Application No.: _____ **Date:** _____

Job Address: _____

Plan Check Engineer: _____

Telephone: _____ **E-mail:** _____

firstname.lastname@lacity.org

Supervisor Name: _____

Telephone: _____ **E-mail:** _____

firstname.lastname@lacity.org

Your feedback is important; please visit our website to complete a Custom Survey at http://www.ladbs.org/LADBSWeb/custom-survey.jsf.

If you have any questions or need clarification on any plan check matters, please contact your plan check engineer and/or his or her supervisor.

For instruction and other information, read the attached master plan check list.

Reference code is Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary unless otherwise noted in plan check list.

Obtain the following Information Bulletins, Affidavits or forms from our web site (www.ladbs.org)

A. Plan Detail

1. Provide 1-1/2 in. minimum cover for exterior span, and 3/4 in. minimum cover for interior span of the P/T slab for a 2-hour rating. (LABC 721.1, Table 721.1(1))

2. Provide schedule showing sequence of construction to insure free movement of prestressed elements before connecting into rigid elements. Specify number of elapsed days after pre-stressing prior to connection to rigid elements. (ACI 318-14 Sec 4.12.2.2)

3. Provide complete details of end anchorage and couplers including an approved anchor system with a L.A. Research Report.

4. Provide reinforcement in tendon anchorage zones; local and general zones - to resist bearing, bursting, splitting and spalling forces. (ACI 318-14 Sec 25.9.1.1, 25.9.4.1, 25.9.4.2)

5. Provide complete details of tendon layout. Profiles shall be exactly defined by providing dimensions at the high, low and at least one intermediate point. Show all tendon elongation and identify pulled ends and dead ends. Detail tendon placement around openings in slab. Call out tendon size and spacing in lieu of specifying design force.

6. For normal live load and uniform distributes loads, spacing of pre-stressing tendons or groups of tendons in one direction shall not exceed eight times the slab thickness, or 5 feet. In addition, spacing of tendons shall provide a minimum average effective prestress of 125 psi on the slab section tributary to the tendon or tendon group. For slabs with varying cross section along the slab span, either parallel or perpendicular to the tendon or tendon group, the minimum average effective prestress of 125 psi is required at every cross section tributary to the tendon or tendon group, the minimum average effective prestress of 125 psi is required at every cross section tributary to the tendon or tendon group along the span. Concentrated loads and opening in slab shall be considered when determining tendon spacing. (ACI 318-14 Sec 7.2.1, 8.2.2, 8.2.3, 8.6.2.1, 8.7.2.3, 8.7.2.4)

7. In slabs with unbonded tendons minimum of two tendons shall be provided shall be provided in each direction at

columns, either passing through or anchored within region bounded by the longitudinal reinforcement of the column. Outside column and shear cap faces, these two structural integrity tendons shall pass under any orthogonal tendons in adjacent span. Where the two structural integrity tendons are anchored within the region bounded by the longitudinal reinforcement of the column, the anchorage shall be located beyond the column centroid and away from the anchored span.

(ACI 318-14 Sec 8.7.5.6.1, 8.7.5.6.2)

8. Specify on plans:
   a. The minimum concrete strength at the time of initial prestress. (ACI 318-14 Sec 25.9, 26.4.2.2(a), 26.10)
   b. Permissible stresses in concrete at service loads after loss. (ACI 318-14 Sec 24.5.4.1)
   c. Effective stress in pre-stressing tendon jacking forces, initial anchorage forces and calculated elongations. (ACI 318-14 Sec 20.3.2.5.1, 25.9.2.1)
   d. The magnitude and location of prestressing forces. (LABC 91.1901.5, # 5)
   e. Stressing sequence for post tensioning tendons. (LABC 91.1901.5, #10)

9. Prestressing, where used for flexural members of special moment frame, shall satisfy (a) through (d):
   a. The average prestress, fpc calculated for an area equal to the smallest cross-sectional dimension of the member multiplied by the perpendicular cross-sectional dimension shall not exceed the smaller of 500 psi and f'c/10.
   b. Prestressing steel shall be unbonded in potential plastic hinge regions, and the calculated strains in prestressing steel under the design displacement shall be less than 1 percent.
   c. Prestressing steel shall not contribute to more than one-quarter of the positive or negative flexural strength at the critical section in a plastic hinge region and shall be anchored at or beyond the exterior face of the joint.
   d. Anchorages of the post-tensioning tendons resisting earthquake-induced forces shall be capable of allowing tendons to withstand 50 cycles of loading, bounded by 40 and 85 percent of the specified tensile strength of the prestress steel. (ACI 318-14 Sec 18.6.3.5)

10. Plans indicate over **balanced load** conditions:
    a. Extreme bends over short distance
    b. Displaced strands due to conduit or other penetrations
    c. Abrupt change of chair height in adjacent strands
    d. Provide special detailing with supplemental reinforcement to prevent potential concrete blowout locations

B. CALCULATIONS

1. Provide design calculations which consider the effects of creep shrinkage and elastic shortening on rigidly connected elements. (ACI318-14 Sec 4.12.2.2)

2. Provide minimum bonded reinforcement for all flexural members with unbonded tendons as required by ACI 318-14. (Sec 8.6.2.3)

3. Provide minimum bonded reinforcement for all P/T two-way flat plates with tensile stress in concrete at service load exceeding $2\sqrt{f'c}$. (ACI 318-14 sec 8.6.2.3, 8.7.5.3)

4. Computer Solutions show P/T beams and/or slabs with stresses in excess of that allowed for serviceability requirements. Provide design which shows conformity with serviceability requirement for flexural members at right after prestress transfer and at service loads per ACI 318-14, Sec 24.5.3.1, 24.5.3.2, 24.5.3.2.1, 24.5.4.1

5. Should be designed for special seismic load combinations due to the irregularity (ASCE 7-10 12.3.3, Table 12.3-1).

6. The resulting forces and moments induced by PΔ shall be considered in the design in accordance with ASCE 7-10 Sec 12.8.7. The base shear used to determine the story shears and the story drifts shall be determined in accordance with ASCE 7-10 Sec 12.8.6. (ASCE 7-10 Sec 12.9.6)

7. In structures assigned to seismic design category D,E, or F, horizontal cantilever structural components shall be designed for a minimum net upward force of 0.2 times the Dead load in addition to the applicable load combinations of

ASCE 7-10 Sec 12.4 (ASCE 7-10 sec 12.4.4)

8. Except for walls, members with average prestress fpc (due to effective prestress force only) equal to or greater than 225 psi (1.55 MPa) shall have all pre-stressing tendons enclosed by spirals or lateral ties per ACI 318-14. Section 10.7.6.1.3.

9. Pre-stressing force shall be determined per ACI 318-14, Section 26.1.2 (e) & (f).

10. Provide minimum shear reinforcement for all prestressed and non-prestressed reinforced concrete flexural members where Vu exceed 0.5 Vc per ACI 318-14, Section 9.6.3.1, 9.6.3.3, 10.6.2.2, 15.4.2.

11. Provide calculation for prestressed beam subject to torsion. (ACI 318-14, Sec 9.5.4.4)

12. Provide calculation to show total amount of prestressed and non-prestressed in members with bonded prestressed reinforcement shall be adequate to develop a factored load at least 1.2 times the cracking load per ACI 318-14, Sec 7.6.2.1, 7.6.2.2, 8.6.2.2, 8.6.2.2.1, 9.6.2.1, 9.6.2.2.

C. NOTES ON PLANS

1. Provide note on plan stating that power driven steel anchors shall not be used in prestressed or post-tensioned concrete members. (LA information Bulletin: IB P/BC 2014-015)

2. Provide material specifications for (____) post-tensioning strands, (____) reinforcing bars, and (____) concrete.

3. Calcium chloride or admixture containing chloride shall not be used in post-tensioning concrete. (ACI 318-14, Sec 26.4.1.4.1(c))

Additional Corrections	Code Section