GENERAL PROJECT INFORMATION

PLAN CHECK NO. _____   DISTRICT NO _____

JOB ADDRESS _____   CITY _____   ZIP _____

NOTE: Numbers in the parenthesis ( ) refer to sections of the 2017 edition of the Los Angeles County Building Code, Table (T), Building Code Manual (BCM), 2010 Minimum Design Loads for Buildings and Other Structures (3rd Printing) including Supplimenta No. 1(ASCE7), 2014 ACI Building Code Requirements for Structural Concrete (ACI318-14).

INSTRUCTIONS

- Corrections with circled item numbers apply to this plan check.
- In the left-hand margin of the circled corrections, please indicate the sheet number and detail or note number on the plans where the corrections are made. Resubmit marked original plans and two corrected sets of plans, calculations and this plan review list.
- For notations and definitions used in the review sheet see ACI318 Chapter 2.
- Incomplete, unclear, or faded drawings or calculations will not be accepted.
- Incorporate all comments as marked on checked set of plans and calculations and these correction sheets.

STRUCTURAL CALCULATIONS

GENERAL

1. Design forces shall be in accordance with the Load and Resistance Factor Design specified in LACBC 1605.2 and ASCE7 §12.4.2.3.

2. The R value used in determining the base shear for **bearing wall systems** shall not exceed 5.0 for special reinforced concrete shear walls and 4.0 for intermediate precast concrete shear walls.
   (ASCE7 T-12.2-1)

3. The R value used in determining the base shear for **building frame systems** shall not exceed 6.0 for special reinforced concrete shear walls and 5.0 for intermediate precast concrete shear walls.
   (ASCE7 T-12.2-1)

4. In storage and warehouse occupancies, include a minimum 25% of the floor live load for the seismic dead load, W.   (ASCE7 12.7.2.1)

5. The shear strength reduction factor, "Φ", shall be per ACI318 §21.2.4. Use Φ = 0.60 unless nominal shear strength of the member is greater than shear corresponding to the development of nominal flexural strength.   (ACI318 21.2.4.1)

SHEAR

6. Walls shall have nominal shear strength per the following formula: (ACI318 Eq18.10.4.1)

$$V_n = A_{cv}(\alpha_c \sqrt{f_c'} + \rho_t f_y)$$

   Where: $\alpha_c = 3.0$ for $h_w / \ell_w \le 1.5$,
   $\alpha_c = 2.0$ for $h_w / \ell_w \ge 2.0$
   α_c varies linearly between 3.0 and 2.0 for h_w / ℓ_w between 1.5 and 2.0

7. h_w / ℓ_w used in determining V_n for segments of a wall shall be the larger of the ratios for the entire wall and the segment of wall considered.   (ACI318 18.10.4.2)

8. For h_w / ℓ_w ratios < 2.0, the reinforcement ratio shall be $\rho_\ell \ge \rho_t$ (ACI318 18.10.4.3)

9. Nominal shear strength, V_n, of all walls segments shall not exceed $8A_{cv}\sqrt{f_c'}$ for the entire wall and $10A_{cw}\sqrt{f_c'}$ for individual wall piers.   (ACI318 18.10.4.4)

FLEXURE AND AXIAL LOADS

10. Shear walls subject to combined flexural and axial loads shall be designed in accordance with ACI318 §22.4. The effects of openings shall be considered.
    (ACI318 18.10.5.1)

11. Effective flange widths of flanged sections shall extend from the face of the web to a distance equal to the smaller of 1/2 the distance to an adjacent wall web and 25% of the total wall height.   (ACI318 18.10.5.2)

SPECIAL BOUNDARY ELEMENTS

12. Special boundary elements at the edges of structural walls are required per ACI318 § 18.10.6.2 and 18.10.6.3.
    (ACI318 18.10.6.1)

13. Walls that are effectively continuous from the base of the structure to the top of the wall and are designed to have a single critical section for flexure and axial loads shall meet the following: (ACI318 18.10.6.2)

    a. Compression zones shall be reinforced with special boundary elements where:

$$c \ge \frac{\ell_w}{600(\delta_u / h_w)} \text{ and } \delta_u / h_w \ge 0.005 \text{ (Eq18.10.6.2)}$$

b. Boundary reinforcement shall extend vertically above and below the critical section a distance not less than the larger of ℓ_w or $M_u / 4V_u$.

14. Structural walls not designed to the provisions of ACI318 § 18.10.6.2 shall have special boundary elements at boundaries and edges around the openings of the wall where the maximum extreme fiber compressive stress exceeds $0.2f'_c$. The special boundary element could be discontinued where compressive stress is less than 0.15 f'c.
(ACI318 18.10.6.3)

WALL PIER

15. Transverse reinforcement in wall piers not designed as part of special moment frame shall be designed per section 18.10.8. (ACI318 18.14.6.1)

16. Wall pier with a horizontal length-to-thickness ratio less than 2.5 shall be designed as columns.
(ACI318 18.7.2.1(b))

STRUCTURAL DETAIL

REINFORCEMENT

17. Longitudinal and transverse reinforcement ratios, ρ_ℓ and ρ_t for shear walls shall not be less than 0.0025 except when Vu ≤ $A_{cv}\lambda\sqrt{f'_c}$, (ACI318 18.10.2.1)

18. Reinforcement spacing each way in shear walls shall not exceed 18". (ACI318 18.10.2.1)

19. Two curtains of reinforcement shall be used if the in-plane factored shear force, V_u, exceeds $2A_{cv}\lambda\sqrt{f'_c}$ or $h_w/\ell_w ≥ 2.0$ (ACI318 18.10.2.2)

20. All continuous reinforcements in shear walls shall be anchored or spliced for f_y in tension in accordance with Chapter 2.5.4, 2.5.5 of ACI318 and (a) through (c):
(ACI318 18.10.2.3)

a. Longitudinal reinforcement shall extend beyond the point at which is no longer required to resist flexure by at least 0.8 l$_w$, except at the top pf the wall.

b. At locations where yielding of longitudinal reinforcement is likely to occur as a result of lateral displacements, development lengths of longitudinal reinforcement shall be 1.25 times the values calculated for f_y in tension.

c. Mechanical splices of reinforcement shall conform to ACI318 § 18.2.7 and welded splices of reinforcement shall conform to ACI318 § 18.2.8.

21. Two #5 bars shall be provided around all window and door opening (in walls having two layers of reinforcement in both directions). Such bars shall be anchored to develop f_y in tension at the corners of openings extended or extended of the corners of the openings not less than 24". (ACI318 11.7.5.1)

22. For wall piers and wall segments, spacing of transverse reinforcement with seismic hooks shall not exceed 6" and shall be extended beyond the pier clear height for at least 12". (1905.1.4, ACI318 18.10.8.1 (d) and (e))

23. Reinforcing bars used in shear walls shall comply with ACI318 § 20.2.1 and 20.2.2.

24. Columns supporting discontinuous shear wall elements shall be reinforced in accordance with ACI318 § 18.7.5.6.

25. Tilt-up panels shall be detailed to conform to requirements of intermediate precast special structural walls. (LACBC 1905.1.3)

SPECIAL BOUNDARY ELEMENTS

26. Where special boundary elements are required, the following shall be satisfied:(ACI318 18.10.6.4)

a. The boundary elements shall extend horizontally from the extreme compression fiber minimum (c-0.1 ℓ_w) or c/2, whichever is larger.

b. In flanged sections, the boundary element shall include the effective flange width in compression and shall extend at least 12" into the web.

c. Transverse reinforcements shall be in accordance Table 18.10.6.4(f)

i. For spiral or circular hoops greater of:
$\rho_s ≥ 0.45 (A_g / A_{ch} -1) f'_c / f_{yt}$

ii. For rectangular hoops greater of:
$A_{sh} ≥ 0.09\ s\ b_c\ f'_c / f_{yt}$
$A_{sh} ≥ (0.3\ s\ b_c f'_c / f_{yt}) [(A_g / A_{ch}) - 1]$

d. Spacing of transverse reinforcement shall not exceed the smallest of:

i. 1/4 of minimum member dimension,

ii. 6 bar diameters of smallest longitudinal reinforcement,

iii. Minimum S$_o$ spacing
$(S_o = 4 + (14 - h_x)/3) ≤ 6$ (18.7.5.3)
When h_x shall comply with Section 18.10.6.4 (e) limitations

e. Horizontal spacing of crossties or legs of overlapping hoops, h_x, shall not exceed 14" o.c.
(18.7.5.2)

f. Special boundary element transverse reinforcement at the wall base shall extend minimum 12" into the footing or mat. (18.10.6.4(g))

g. Horizontal reinforcement in the wall web shall be anchored to develop f_y within the confined core of the boundary element using standard hooks or heads. (18.10.6.4(h))

27. Where special boundary elements are not required by ACI318 § 18.10.6.2 or 18.10.6.3, the following shall be satisfied:

a. If longitudinal reinforcement ratio at wall boundary exceeds $400/f_y$, the boundary transverse reinforcement shall satisfy ACI318 § 18.7.5.2 (a) through (e).

b. Except when V_u is less than $A_{cv}\lambda\sqrt{f'_c}$, horizontal reinforcement terminating at the edges of shear walls without boundary elements shall have a standard hook engaging the edge reinforcement or "U" stirrup of the same size and spacing as, and spliced to, the horizontal reinforcement.

(ACI318 18.10.6.5 (b))

STRUCTURAL NOTES

GENERAL NOTES

The following general structural notes shall be made part of the construction documents.

28. Construction documents shall include the following information as applicable to the project:

a. Specify concrete compressive strength.
b. Specify grade of reinforcement.
c. Size and location of structural elements, reinforcement and anchors.
d. Reinforcement anchorage length, location and length of lap splice.
e. Type and location of mechanical and/or welded splices of reinforcement.

29. Minimum compressive strength for concrete shear walls is $f'_c = 3000$ psi. (ACI318 19.2.1.1)

30. Continuous Special Inspection by a registered deputy inspector is required for concrete with strength $f'_c > 2500$ psi. (1705.3)

ADDITIONAL COMMENTS

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