



**GENERAL PROJECT INFORMATION**

PLAN CHECK NO. \_\_\_\_\_ DISTRICT NO \_\_\_\_\_  
JOB ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_ ZIP \_\_\_\_\_

NOTE: Numbers in the parenthesis ( ) refer to sections of the 2008 edition of the Los Angeles County Building Code, Table (T), Plumbing Code (PC), Mechanical Code (MC), Electrical Code (EC), Fire Code (FC), Building Code Manual (BCM), 2005 National Design Specifications (NDS), 2005 Minimum Design Loads for Buildings and Other Structures including Supplement No. 1 (ASCE7), ACI Building Code Requirements for Structural Concrete (ACI318).

**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.
- 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 Factored Load and Combinations specified in 1605.2.  
(ASCE7 12.4.2.3, ACI318 21.7.3)
2. The R value used in determining the base shear for bearing wall system 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 system shall not exceed 6.0 for special reinforced concrete shear walls and 4.5 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 §9.3.4. Use Φ = 0.60 unless nominal shear strength is greater than shear corresponding to the development of nominal flexural strength. (ACI318 9.3.4)

**SHEAR**

6. Walls shall have nominal shear strength per following formula: (ACI318 21.7.4.1)

$$V_n = A_{cv}(\alpha_c \sqrt{f'_c} + \rho_t f_y) \quad (21-7)$$

Where:  $\alpha_c = 3.0$  for  $h_w / \ell_w \leq 1.5$ ,  
 $\alpha_c = 2.0$  for  $h_w / \ell_w \geq 2.0$   
 $\alpha_c$  varies linearly between 3.0 and 2.0 for  $h_w / \ell_w$  between 1.5 and 2.0

7.  $h_w / \ell_w$  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 21.7.4.2)
8. For wall height to length ratio < 2.0 reinforcement ratio shall be  $\rho_t \geq \rho_t$  (ACI318 21.7.4.3)
9. Nominal shear strength,  $V_n$ , of all wall shall not exceed  $8A_{cv}\sqrt{f'_c}$  for the entire building and  $10A_{cv}\sqrt{f'_c}$  for individual wall pier. (ACI318 21.7.4.4)

**FLEXURE AND AXIAL LOADS**

10. Shear walls subject to combined flexural and axial loads shall be designed in accordance with ACI318 § 10.2 and 10.3 except that ACI318 § 10.3.6 and the nonlinear strain requirements of ACI318 § 10.2.2 shall not apply. The effects of openings shall be considered. (ACI318 21.7.5.1)
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 21.7.5.2)

**SPECIAL BOUNDARY ELEMENTS**

Special boundary elements at the edges of structural walls are required per ACI318 § 21.7.6.2 and 21.7.6.3.

12. Walls that are effectively continuous from the base of the structure to top of wall and designed to have a single critical section for flexure and axial loads shall meet the following: (ACI318 21.7.6.2)

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

$$c \geq \frac{\ell_w}{600(\delta_u / h_w)} \text{ and } \delta_u / h_w \geq 0.007 \quad (21-8)$$

- b. Reinforcement shall extend vertically a distance not less than the larger of  $\ell_w$  or  $M_u / 4V_u$ .
13. Structural walls not designed to the provisions of ACI318 § 21.7.6.2 shall have special boundary elements at boundaries and edges around the openings of the wall where the maximum extreme fiber compressive stress exceeds  $0.2 f'_c$ . (ACI318 21.7.6.3)

### WALL PIER

14. Transverse reinforcement in wall piers, not designed as part of special moment frame, shall be designed to resist probable shear strength.  
(1908.1.8, ACI318 21.7.10.2)

## STRUCTURAL DETAIL

### REINFORCEMENT

15. Longitudinal and Transverse reinforcement ratio,  $\rho_l$  and  $\rho_t$  for shear walls shall not be less than 0.0025  
(ACI318 21.7.2.1)
16. Reinforcement spacing each way in shear walls shall not exceed 18". (ACI318 21.7.2.1)
17. Two curtains of reinforcement shall be used if the in-plane factored shear force,  $V_u$ , exceeds  $2A_{cv}\sqrt{f'_c}$ .  
(ACI318 21.7.2.2)
18. All continuous reinforcements in shear walls shall be anchored or spliced for  $f_y$  in tension in accordance with Chapter 12 of ACI318, except: (ACI318 21.7.2.3)
- The effective depth of the member referenced in ACI318 § 12.10.3 shall be permitted to be  $0.8 \ell_w$  for walls.
  - The requirements of ACI318 § 12.11, 12.12, and 12.13 need not be satisfied.
  - 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.
  - Mechanical splices of reinforcement shall conform to ACI318 § 21.2.6 and welded splices of reinforcement shall conform to ACI318 § 21.2.7.
19. Two #5 bars shall be provided around all window and door openings. Such bars shall be extended to develop the bar beyond the corners of the openings but not less than 24", or be anchored to develop  $f_y$  in tension at the corners of openings. (ACI318 14.3.7)
20. 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".  
(1908.1.8, ACI318 21.7.10.2)
21. Reinforcing bars used in shear wall shall comply with ACI318 § 21.2.5.

22. Columns supporting discontinuous shear wall elements shall be reinforced in accordance with 1908.1.12 and ACI318 § 21.4.4.5.
23. Concrete structural wall reinforcement shall be terminated with required development length beyond the boundary reinforcing at the vertical and horizontal end faces of wall sections. (ACI318 21.7.2)
24. Tilt-up panels shall be detailed to conform to requirements of special structural walls.  
(ACI318 21.2.1.4)

### SPECIAL BOUNDARY ELEMENTS

25. Where special boundary elements are required, the following shall be satisfied:  
(ACI318 21.7.6.4, 21.4.4.2, 21.4.4.3)
- The boundary elements shall extend horizontally from the extreme compression fiber minimum ( $c-0.1 \ell_w$ ) or  $c/2$ , whichever is larger.
  - In flanged sections, the boundary element shall include the effective flange width in compression and shall extend at least 12" into the web.
  - Transverse reinforcements shall be:
    - For spiral or circular hoops  
( $\rho_s \geq 0.12 f'_c / f_{yt}$ ) (21-2)
    - For rectangular hoops  
( $A_{sh} \geq 0.09 s b_c f'_c / f_{yh}$ ) (21-4)
  - Spacing of transverse reinforcement shall not exceed the smallest of:
    - 1/4 of minimum member dimension,
    - 6 bar diameters of longitudinal reinforcement,
    - Minimum  $S_o$  spacing  
( $S_o = 4 + (14 - h_x) / 3$ ) (21-5)
  - Horizontal spacing of crossties or legs of overlapping hoops,  $h_x$ , shall not exceed 14" o.c.
  - Special boundary element transverse reinforcement at the wall base shall extend minimum 12" into the footing or mat.
  - Horizontal reinforcement in the wall web shall be anchored to develop  $f_y$  within the confined core of the boundary element.
26. Where special boundary elements are not required by ACI318 § 21.7.6.2 or 21.7.6.3, the following shall be satisfied:
- If longitudinal reinforcement ratio at wall boundary exceeds  $400/f_y$ , the boundary transverse reinforcement shall satisfy ACI318 § 21.4.4.1(c), 21.4.4.3, and 21.7.6.4(a). The maximum longitudinal spacing of transverse reinforcement in the boundary shall not exceed 8".
  - $V_u$  exceeding  $A_{cv}\sqrt{f'_c}$  shall have horizontal reinforcement terminating at the edges of shear walls with a standard hook engaging edge reinforcement or "U" stirrup of the same size and spacing as, and spliced to, the horizontal reinforcement. (ACI318 21.7.6.5)

