11 SMRF

- Joint Shear
- Anchorage
- Column Shear
- $\sum M_{nc} \geq \frac{6}{5} \sum M_{nb}$ (Check one floor below roof)

Columns

SEE JOINT SECTION

Beams

Shear

$V_u = f(M_pr)$

$V_c = 0$ in plastic hinge regions.

12 Walls

δ_c Wall displacement capacity at top of wall

13.1

13.2

13.3

13.4 Behavioral Observations

Slender vs Squat

Flexural Response

Lateral stability

$\lambda_c = \frac{c}{b}\frac{l_w}{b} > 40$

$b \geq \sqrt{0.025 c l_w}$ **for SBEs**.

Dynamic response

13.6 Resistance Factors

Axial/Moment:
$\phi = 0.65 - 0.9$

Shear:
$\phi = 0.75$, For V_u amplified by Ω_v
$\phi = 0.60$ if $V_n < V(M_n)$
for squat walls, take $\phi = 0.6$

Coupling beam shear:
$\phi = 0.85$ diagonally reinforced
$\phi = 0.75$ otherwise

13.7.1 Preliminary Proportioning for V_b

assume $l_{be} = 0.2 l_w$

long. bar fracture:
$A_s f_y \geq A_{be} f_r \therefore \rho_l \geq 6\sqrt{f_c'}/f_y$

13.8 Slender Walls w/ C. Section

Moment

SBE

Required if

$$c \geq \frac{l_w}{900(\delta_u/h_w)} \quad \text{or} \quad \sigma \geq \frac{f_c'}{5}$$

use given graph to determine c.

for min. height of $h_{be} = \max(l_w, \frac{M_{u,cs}}{4V_{u,cs}})$

- $A_{sh} \geq 0.09 s b_c \frac{f'_c}{f_y} \geq 0.3 \left(\frac{A_g}{A_{ch}} - 1 \right) s b_c \frac{f'_c}{f_y}$
-

13.9 Walls w/o C. Section

13.10.1 Conventional Squat Walls

13.16 - Openings

Tie region: $A_s = T_u / \phi f_y$
Strut region: $P_u \leq \phi P_o$

$\phi = 0.65$ in wall piers
$\phi = 0.60$ for wall shear
$\phi = 0.75$ otherwise

13.12 Coupled Walls

Coupling beams

$$V_n = 2 A_{vd} f_y \sin\alpha \leq 10 \sqrt{f'_c} A_{cw}$$

Each group of diagonal bars shall consist of a minimum of four bars provided in two or more layers.

13 Gravity Framing

Columns

Confinement

if $P_u \geq 0.35 A_g f'_c$:

- Support all bars with 135^o hook.
- $\frac{A_{sh}}{s b_c} \geq 0.3 \ldots, 0.09 \ldots, 0.2 \ldots$

Shear

$V_u = f(M_{pr}(P_u))$, often $\frac{2M_{pr}}{l_w}$

Beams

FIGURE FROM NOTES PAGE 200

Slabs

$V_n = 4\lambda_s\sqrt{f_c'}b_o d$

DRIFT CAPACITY

14 Diaphragms

Moment

$M_u = \dfrac{wl^2}{8} \leq \phi M_n = 0.9(A_s f_y 0.9d)$

$T_u = C_u = \frac{M_u}{jd}$

$T_u \leq Tn = 0.9 A_s fy$

$C_u \leq \phi\alpha P_{no} = (0.65)(0.8)(A_s f_y + 0.85 A_c f_c')$

Collectors

Shear friction

$\Omega_o V_u \leq \underbrace{\phi}_{0.75}\underbrace{\mu}_{1.4} A_{sf} f_y$

- Give A_{sf} as in^2/ft

Openings

Comp. Zone

- Confine if