

Test 1 - Transamerica Pyramid (505 Sansome Street)

Constructed in 1980

Structural System : Steel Ordinary Moment Frame

CODE : UBC 1979

$$\begin{aligned}h &:= 261 \\T &:= 0.05 \cdot \frac{h}{\sqrt{150}} = 1.07 \\C &:= \frac{1}{15 \cdot \sqrt{T}} \\S &:= 1.5 \\CS &:= C \cdot S = 0.1 \\CS &:= \min(0.14, CS) = 0.1 \\Z &:= 1 \\I &:= 1 \\K &:= 0.67 \\C_{s.1979} &:= Z \cdot I \cdot K \cdot CS = 0.06\end{aligned}$$



CODE : ASCE 7-16

$$\begin{aligned}h &:= 261 \\S_{DS} &:= 1.2 \\R &:= 3.5 \\I &:= 1 \\C_s &:= \frac{S_{DS}}{\left(\frac{R}{I}\right)} = 0.34 \\T &:= 0.028 \cdot h^{0.8} = 2.4 \\C_{s.max} &:= \frac{1}{T \cdot \left(\frac{R}{I}\right)} = 0.12 \\C_{s.2016} &:= \frac{\min(C_s, C_{s.max})}{1.4} = 0.08\end{aligned}$$

$$\frac{C_{s.2016} - C_{s.1979}}{C_{s.1979}} = 30.93\%$$

Test 2 - 121 Spear Street

Constructed in 1990

Structural System : Ordinary Reinforced Concrete Shear Walls

CODE : UBC 1988

$$h := 280$$

$$C_t := 0.020$$

$$T := C_t \cdot h^{0.75} = 1.37$$

$$Z := 0.4$$

$$I := 1$$

$$S := 1.5$$

$$C := \min \left(1.25 \cdot \frac{S}{T^{\frac{2}{3}}}, 2.75 \right) = 1.52$$

$$R := 8$$

$$C_{s.1988} := \frac{Z \cdot I \cdot C}{R} = 0.08$$

CODE : ASCE 7-16

$$h := 280$$

$$S_{DS} := 1.2$$

$$R := 5$$

$$I := 1$$

$$C_s := \frac{S_{DS}}{\left(\frac{R}{I} \right)} = 0.24$$

$$T := 0.02 \cdot h^{0.75} = 1.37$$

$$C_{s.max} := \frac{1}{T \cdot \left(\frac{R}{I} \right)} = 0.15$$

$$C_{s.2016} := \frac{\min(C_s, C_{s.max})}{1.4} = 0.1$$



$$\frac{C_{s.2016} - C_{s.1988}}{C_{s.1988}} = 37.23\%$$