

This is based on the following reference:
Haselton, C.B. and G.G. Deierlein (2007). Assessing Seismic Collapse Safety of Modern Reinforced Concrete Frame Buildings, Blume Earthquake Engineering Research Center Technical Report No. 156, Stanford University, 313 pp.

ASCE 7-02 Designs

Design Information				Period and Pushover		Collapse Capacity/Risk Predictions				Collapse Drifts	
Design ID	Stories	Framing System	Design Case*	First Mode Period (T ₁) [sec]	Static Ω	Margin Against 2% in 50 Year Motion	$\sigma_{LN}(Sa_{col})$	P[C Sa _{2/50}]	λ_{col} [10 ⁻⁴]	Median IDR _{col}	Median RDR _{col}
2061	1	Space	Baseline	0.42	4.0	2.40	0.46	0.10	2.6	0.071	0.071
2062			Base: P	0.42	4.9	2.62	0.44	0.07	1.7	0.075	0.075
2063			Base: F	0.42	4.0	2.40	0.46	0.10	2.6	0.069	0.069
2069		Perimeter	Baseline	0.71	1.6	1.69	0.39	0.20	7.0	0.078	0.078
1001	2	Space	Baseline	0.63	3.5	3.07	0.42	0.04	1.0	0.097	0.075
1001a			Base: P	0.56	4.4	3.00	0.40	0.04	1.0	0.080	0.061
1002			Base: F	0.63	3.1	2.55	0.43	0.08	2.0	0.083	0.059
2064		Perimeter	Baseline	0.66	1.8	2.19	0.43	0.12	3.4	0.075	0.061
1003	4	Perimeter	Baseline	1.12	1.6	2.04	0.37	0.13	3.6	0.076	0.039
1004			Uniform	1.11	1.7	2.37	0.41	0.09	2.5	0.085	0.047
1008		Space	Baseline	0.94	2.7	2.56	0.38	0.07	1.7	0.080	0.045
1009		Perimeter	Bays: 30'	1.16	1.6	2.51	0.41	0.08	2.1	0.078	0.050
1010		Space	Bays: 30'	0.86	3.3	3.42	0.42	0.03	0.7	0.083	0.053
1011	8	Perimeter	Baseline	1.71	1.6	1.77	0.40	0.19	6.3	0.054	0.021
1012		Space	Baseline	1.80	2.3	2.29	0.37	0.09	2.4	0.068	0.027
1022			Uniform	1.80	2.6	2.25	0.36	0.09	2.5	0.077	0.033
2065			WS-1 (65%)	1.57	3.3	2.44	0.39	0.08	2.3	0.069	0.021
2066			WS-1 (80%)	1.71	2.9	2.78	0.40	0.05	1.7	0.074	0.027
1023			WS-2 (65%)	1.57	2.9	1.97	0.39	0.14	4.3	0.066	0.018
1024			WS-2 (80%)	1.71	2.7	1.95	0.40	0.15	4.6	0.067	0.020
1013	12	Perimeter	Baseline	2.01	1.7	1.84	0.37	0.16	5.2	0.053	0.016
1014		Space	Baseline	2.14	2.1	1.91	0.38	0.15	4.7	0.055	0.018
1015			Uniform	2.13	2.1	2.20	0.39	0.11	3.1	0.060	0.021
2067			WS-1 (65%)	1.92	3.2	2.07	0.38	0.12	3.2	0.066	0.016
2068			WS-1 (80%)	2.09	2.5	2.07	0.37	0.12	3.1	0.057	0.018
1017			WS-2 (65%)	1.92	2.8	1.87	0.37	0.16	4.5	0.065	0.015
1018			WS-2 (80%)	2.09	2.5	1.89	0.38	0.15	4.9	0.058	0.016
1019		Space	Bays: 30'	2.00	2.4	2.54	0.41	0.07	2.1	0.059	0.021
1020	20	Perimeter	Baseline	2.63	1.6	2.00	0.36	0.13	3.7	0.051	0.013
1021		Space	Baseline	2.36	2.0	2.50	0.40	0.08	2.0	0.058	0.015
Legend and Notes: Note that collapse predictions are adjusted for spectral shape (epsilon) effects, according to Haselton et al. (ASCE JSE 2009), for epsilon = 1.5. Base - The baseline foundation case considers the rotational stiffness of the grade beam and any basement columns (in both the design and the structural model used for the collapse assessment). The two design alternatives are "P" for pinned based and "F" for fixed base. This only adjusts what is assumed in the design, and does not affect the model used for the assessment. Bays - The baseline designs have 20' bays, and the alternative designs have 30' bays Uniform - Conservative uniform design; neither member sizes nor reinforcement of beams/columns are decreased over building height WS - Weak story designs. WS-1 is for designs with only the first story being weak, and WS-2 is for the first and second stories being weak The percentage is the percentage of strength between the weakened stories and the story above.											

Comparsion to ASCE 7-05 Designs Before Reinstatment of Minimum Base Shear Requirements

Height/Design					Period and Collapse Risk Predictions			
Design ID	Number of stories	Perimeter or Space Frame System	Governing Design Provision	Design Base Shear Coefficient (C _s) [g]	First Mode Period (T ₁) [sec]	Margin Against 2% in 50 year Motion	P[C Sa _{2/50}]	λ_{col} [10 ⁻⁴]
1013	12	P	ASCE 7-02	0.044	2.01	1.84	0.16	5.2
5013			ASCE 7-05	0.035	2.40	1.29	0.35	16.9
1014		S	ASCE 7-02	0.044	2.14	1.91	0.15	4.7
5014			ASCE 7-05	0.035	2.18	1.85	0.16	4.9
1020	20	P	ASCE 7-02	0.044	2.63	2.00	0.13	3.7
5020			ASCE 7-05	0.022	3.77	0.95	0.53	40.7
1021		S	ASCE 7-02	0.044	2.36	2.50	0.08	2.0
5021			ASCE 7-05	0.022	3.45	1.43	0.27	9.2