

Supplementary materials to STRUCS\_2018\_395 Manuscript Submitted  
for Review in the Journal of Structural Safety

The polynomial function  $g(\cdot)$ , in Eq. 2, for the SEA 3, LA9, and LA3 M1 building models are shown below:

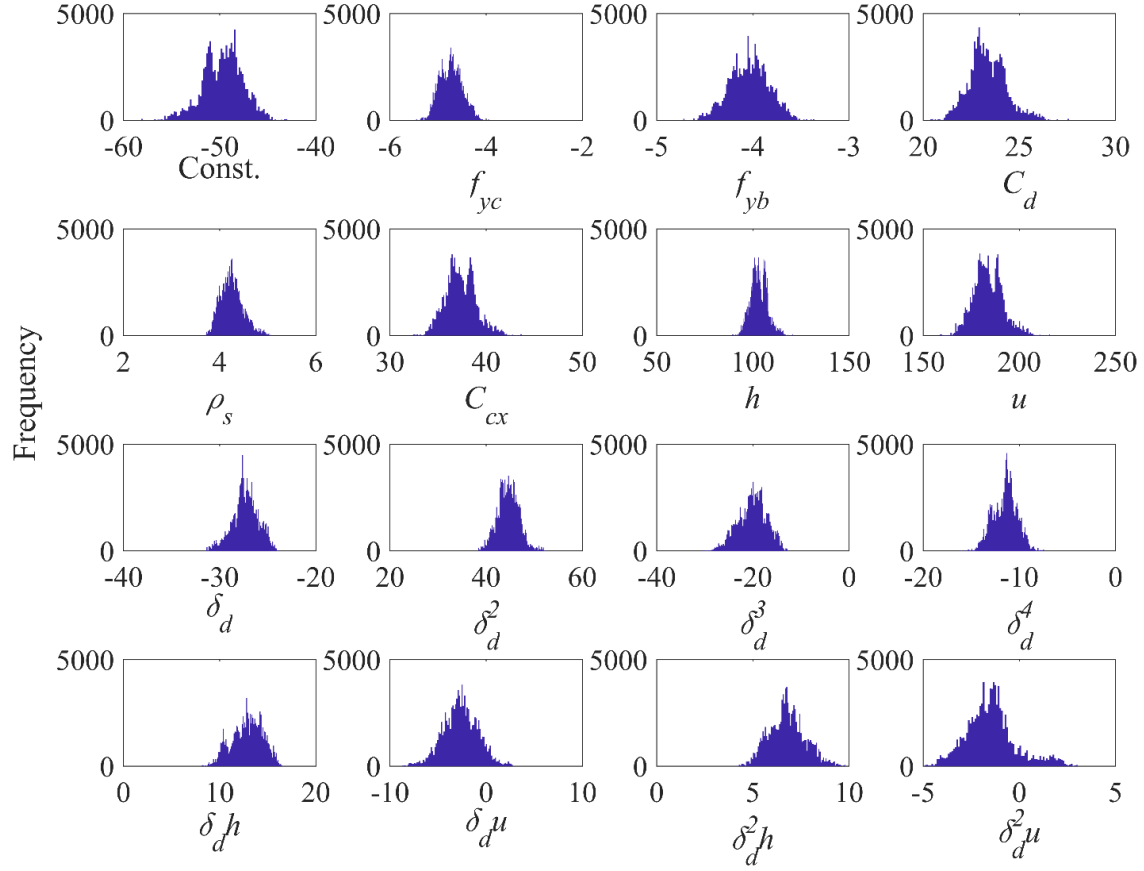
$$g_{SEA\ 3}(f_{yc}, f_{yb}, \rho_s, C_d, C_{cx}, H, V, \delta_d) = -55.3 - 2.31 \ln(f_{yc}) - 0.65 \ln(f_{yb}) + 6.01 \ln(C_d) + 2.42 \ln(\rho_s) + 5.7 \ln(C_{cx}) + 10.6 \ln(h) + 17.1 \ln(u) + 1.30 \ln(\delta_d) + 0.13 \ln(h) \ln(\delta_d) + 1.83 \ln(u) \ln(\delta_d) - 0.045 \ln(h) \ln(\delta_d)^2 + 0.124 \ln(u) \ln(\delta_d)^2 + 4.21 \ln(\delta_d)^2 + 1.47 \ln(\delta_d)^3 + 0.223 \ln(\delta_d)^5 + 0.011 \ln(\delta_d)^5 \quad (S1)$$

$$g_{LA\ 9}(f_{yc}, f_{yb}, \rho_s, C_d, C_{cx}, H, V, \delta_d) = -53.4 - 4.94 \ln(f_{yc}) - 1.91 \ln(f_{yb}) + 9.63 \ln(C_d) + 7.71 \ln(\rho_s) + 9.3 \ln(C_{cx}) + 6.93 \ln(h) + 22.3 \ln(u) + 42.9 \ln(\delta_d) - 3.02 \ln(h) \ln(\delta_d) + 1.42 \ln(u) \ln(\delta_d) - 0.33 \ln(h) \ln(\delta_d)^2 + 0.14 \ln(u) \ln(\delta_d)^2 + 18.4 \ln(\delta_d)^2 + 4.19 \ln(\delta_d)^3 + 0.51 \ln(\delta_d)^4 + 0.02 \ln(\delta_d)^5 \quad (S2)$$

$$g_{LA\ 3\ M1}(f_{yc}, f_{yb}, \rho_s, C_d, C_{cx}, H, V, \delta_d) = -546.0 - 24.6 \ln(f_{yc}) - 5.78 \ln(f_{yb}) + 37.9 \ln(C_d) + 41.4 \ln(\rho_s) + 38.3 \ln(C_{cx}) + 63.9 \ln(h) + 75.0 \ln(u) - 0.41 \ln(\delta_d)^4 - 8.06 \ln(\delta_d)^3 - 51.2 \ln(\delta_d)^4 - 137.0 \ln(\delta_d) \quad (S3)$$

Figure S1 shows 100,000 samples of the normalized coefficients are obtained using affine invariant MCMC sampler [1] with a burn-in period of 500,000 samples; recall that during logistic regression all the variables were scaled to have zero mean and 0.5 standard deviation and all variables are transformed to the log scale.

Table S1 lists the LA 3 building model limit state specific fragility models'  $g(\cdot)$  functions for exceeding drift capacity ranging from 0.5% to 8.0%.



**Figure S1.** Histogram of the simulated coefficients in  $g_{LA3}(\cdot)$ .

**Table S1.**  $g(\cdot)$  functions for the LA 3 building model limit state specific fragility models

Variable	Drift capacity limit state (%)								
	0.5	1.0	1.5	2.0	2.5	4.0	5.0	6.0	7.0
$Const.$	-282	-215	-183	-162	-209	-133	-142	-95.4	-120
$\ln(f_{ye})$	-0.37	-7.94	-9.8	-10	-8.52	-8.16	-6.32	-7.72	-6.52
$\ln(f_{yb})$	-0.64	-3.22	-4.36	-5.5	-4.12	-6.52	-8.16	-8.76	-9.02
$\ln(C_d)$	17.8	19.4	18.3	17.5	16.1	16.9	17.7	16.8	17.6
$\ln(\rho_s)$	22.1	18.7	18.6	16	20	11.4	11.3	5.27	8.26
$\ln(C_{cx})$	17	18	16.7	17.7	17.5	15.8	17	16.5	17.4
$\ln(h)$	30.8	33.3	28	30.4	30.3	29.3	30.9	33.6	33.8
$\ln(u)$	35.5	37	33.8	34.2	34.9	32.9	34.7	36.3	34.6

## References

- [1] Goodman J, Weare J. Ensemble samplers with affine invariance. Commun Appl Math Comput Sci 2010;5:65–80. doi:10.2140/camcos.2010.5.65.