WHE-PAGER PHASE 2: DEVELOPMENT OF ANALYTICAL SEISMIC VULNERABILITY FUNCTIONS

Author:	Kappos Andreas, Panagopoulos Georgios
Date:	7/23/2008
Structure type (describe as broadly as possible):	RC1LL RC frame, Low seismic code design (1959), Low-rise (2 storeys), No infill walls
Geographic or other limitations:	Greece, Southern Europe

Add rows as desired

Basic pushover curve for this structure type

Pushover X-axis:	Sd (cm)	Choose spectral displacement (Sd), inches; or Roof displacement (Deltar), inches. Change and state units if desired.
Pushover Y-axis:	Sa (g)	Choose spectra acceleration (Sa), g; or base shear (V), kip. Change and state units if desired.
Elastic damping ratio:		Small-amplitude damping ratio, fraction of critical
1st mode participation factor:	1.10	PFfR; generally 1.3 to 1.5; same as (effective height)/(total roof height)
Effective mass coefficient:	0.99	alpha1; generally 0.7 to 0.8
Building weight:	501.68	W, kN. Change and state units if desired
How were these values & pushover points derived?		

Add rows as desired

Pushover curve control point	X	Y	Damping	Comment	
0	0	0	5		Control point for plotting purposes
1	2.69	0.15			apparent yield point
2	10.93	0.17			ultimate point (25% drop in strength)
3					beginning of lower plateau
4					end of lower plateau

Optional: upper and lower-bound range of pushover curves for this structure type

Upper-bound pushover curve, e.g., 99 out of 100 buildings of this type would have pushover curve inside the area bounded between this curve and the Y-axis?
Author's meaning of "upper bound":
How were these values & pushover points derived?

Add rows as desired

Optional upper-bound pushover curve

Pushover curve control point	X	Y	Damping	Comment	
0	0	0			Control point for plotting purposes
1					E.g., yield point?
2					E.g., ultimate point?
3					E.g., beginning of lower plateau?
4					Add rows as desired

Lower-bound pushover curve, e.g., 99 out of 100 buildings of this type would have pushover curve inside the area bounded between this curve and the X-axis?
Author's meaning of "lower bound":
How were these values & pushover points derived?

Add rows as desired

Optional lower-bound pushover curve

Pushover curve control point	X	Y	Damping	Comment	
0	0	0			Control point for plotting purposes
1					E.g., yield point?
2					E.g., ultimate point?
3					E.g., beginning of lower plateau?
4					Add rows as desired

Other requested parameters

D14	10.93	median drift (in same units as pushover X-axis) associated with complete structural damage, i.e., drift with 50% chance that the structural component of the building cannot be economically repaired
B14	0.60-0.80	logarithmic standard deviation of drift associated with complete structural damage. May need to be guessed
Sdc	14.21	the median value of drift (in same units as pushover X-axis) associated with collapse, e.g., Sdc = (roof drift at collapse)/PFfR.
L15		indoor fatality rate given collapse. Many contributors may be unable to provide this value. Porter, Comartin, and Holmes will fill such gaps
PC		mean fraction of building area collapsed, given complete structural damage. Again Porter, Comartin, and Holmes will fill gaps
kshort		If HAZUS-style damping preferred, and author can judge, this is the degradation factor for short-duration (M <= 5.5) events
kmed		If HAZUS-style damping preferred, and author can judge, this is the degradation factor for medium-duration (5.5 < M < 7.5) events
klong		If HAZUS-style damping preferred, and author can judge, this is the degradation factor for long-duration (M >= 7.5) events
Explain how these values were arrived at, providing citations if appropriate	D14=Sd(4), Sdc/D14=1.3 for low, 1.4 for medium and 1.5 for high code design	

Add rows as desired