Appendix F: Response Plots of Model 1c: Effect of Vertical Component Ground Motions

Complete analysis of the baseline model—Model 1c—at both two-component and three-component conditions have been conducted in order to evaluate the effect of vertical component ground motions. As complimentary information to Section 7.7, more figures are presented in this appendix, which includes:

- Base shear versus roof displacement relationships under BSE-1E and BSE-2E hazard-level ground motions
- Roof displacement histories under BSE-1E and BSE-2E hazard-level ground motions
- Roof displacement orbits under BSE-1E and BSE-2E hazard-level ground motions

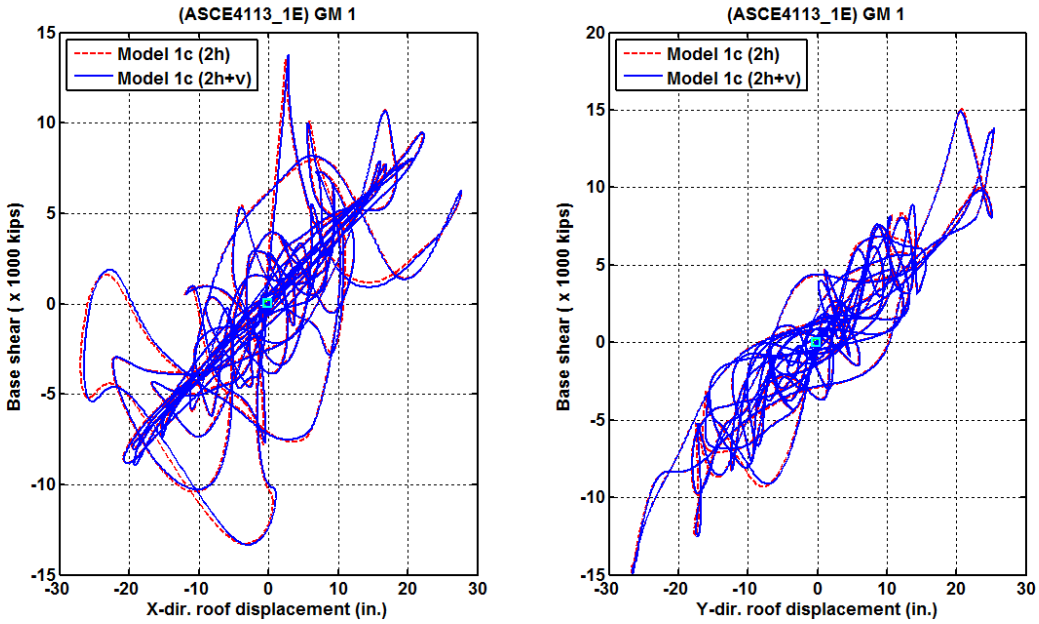

Figure F.1 Base shear versus roof displacement relationships under BSE-1E level ground motion number 1 with and without vertical component motions (Model 1c).

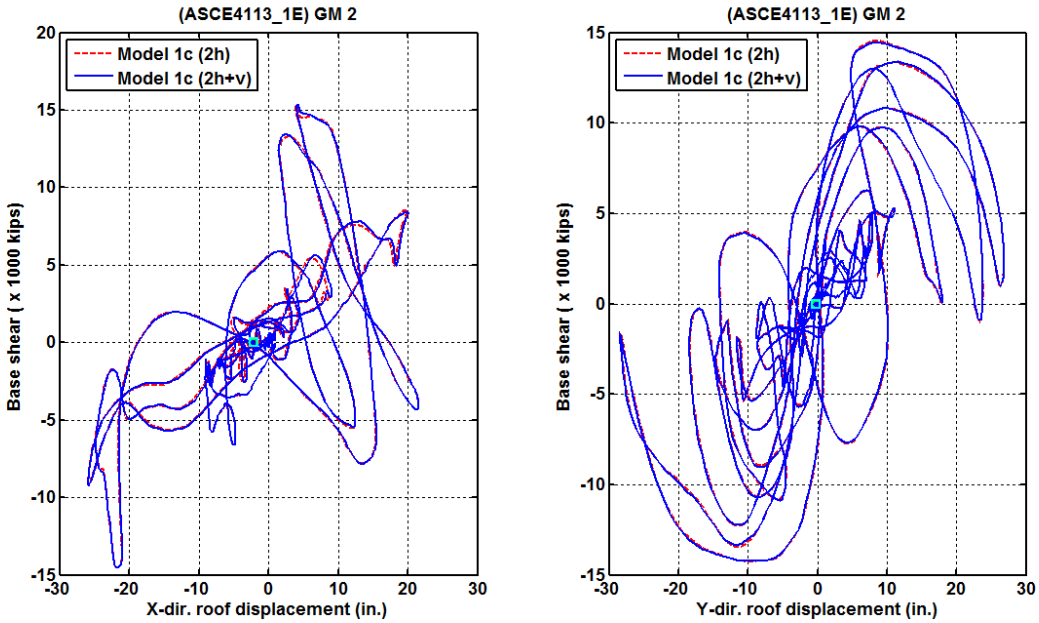

Figure F.2 Base shear versus roof displacement relationships under BSE-1E level ground motion number 2 with and without vertical component motions (Model 1c).

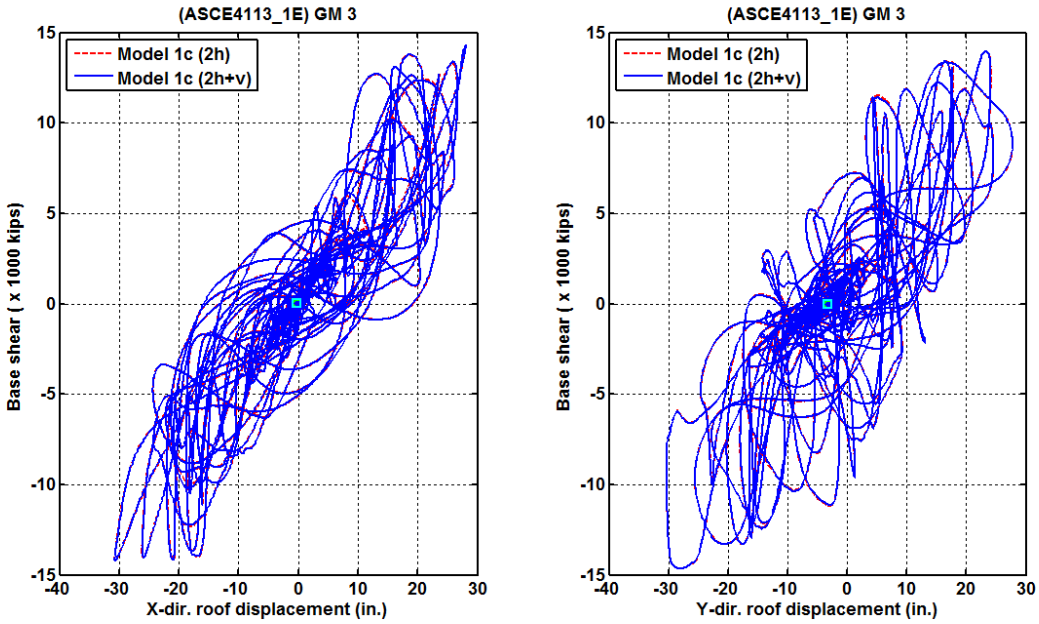

Figure F.3 Base shear versus roof displacement relationships under BSE-1E level ground motion number 3 with and without vertical component motions (Model 1c).

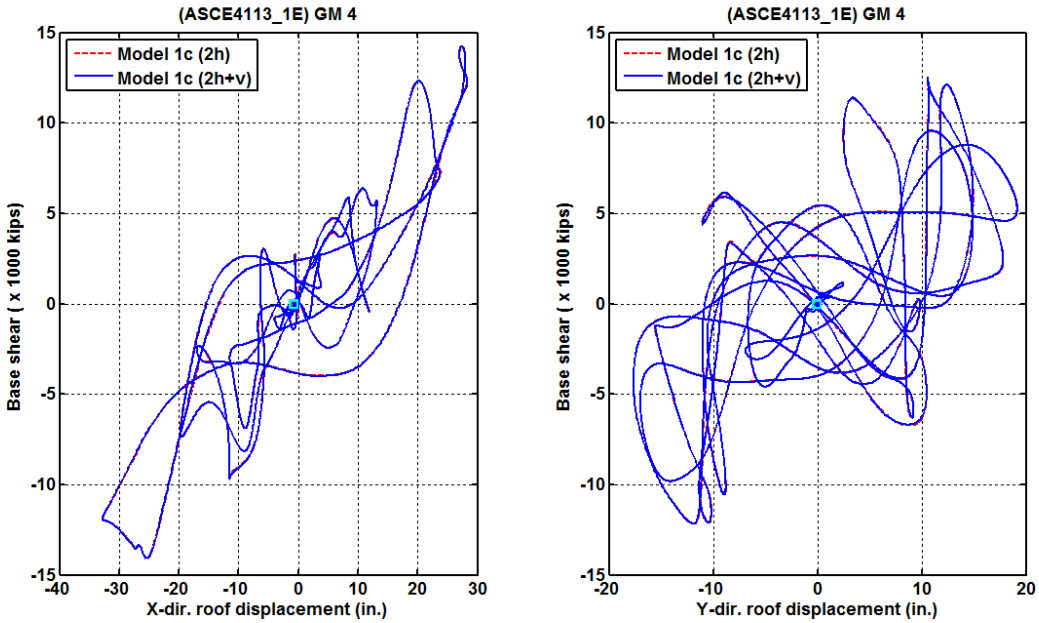

Figure F.4 Base shear versus roof displacement relationships under BSE-1E level ground motion number 4 with and without vertical component motions (Model 1c).

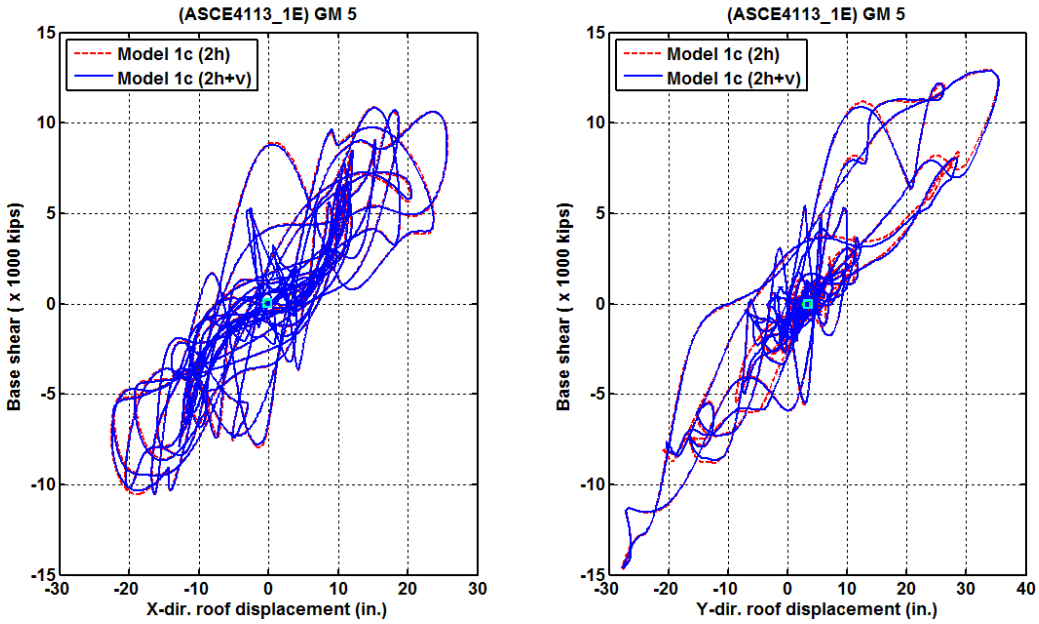

Figure F.5 Base shear versus roof displacement relationships under BSE-1E level ground motion number 5 with and without vertical component motions (Model 1c).

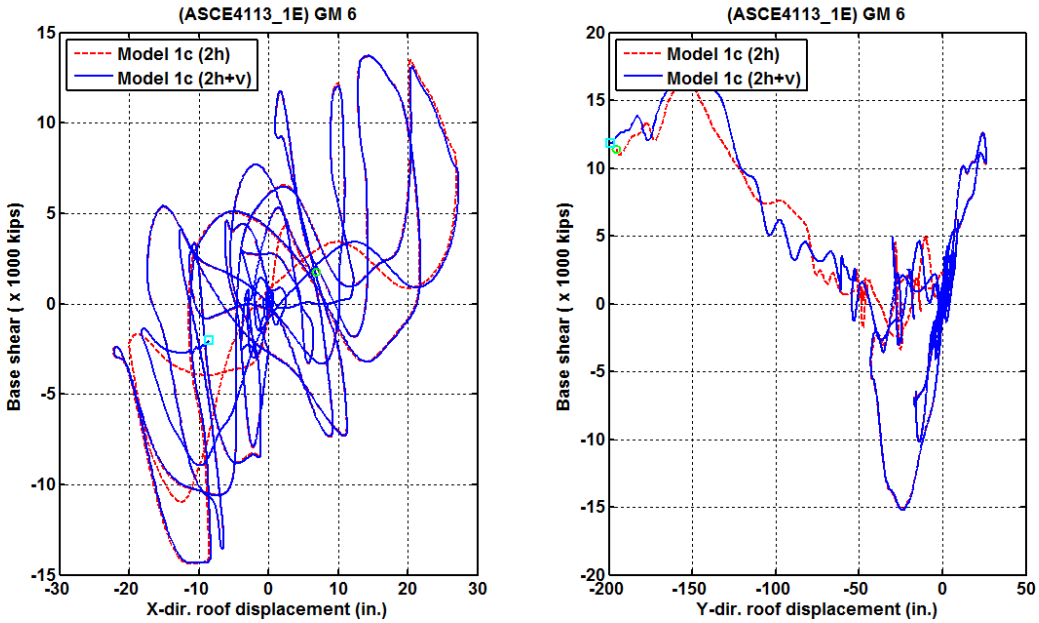

Figure F.6 Base shear versus roof displacement relationships under BSE-1E level ground motion number 6 with and without vertical component motions (Model 1c).

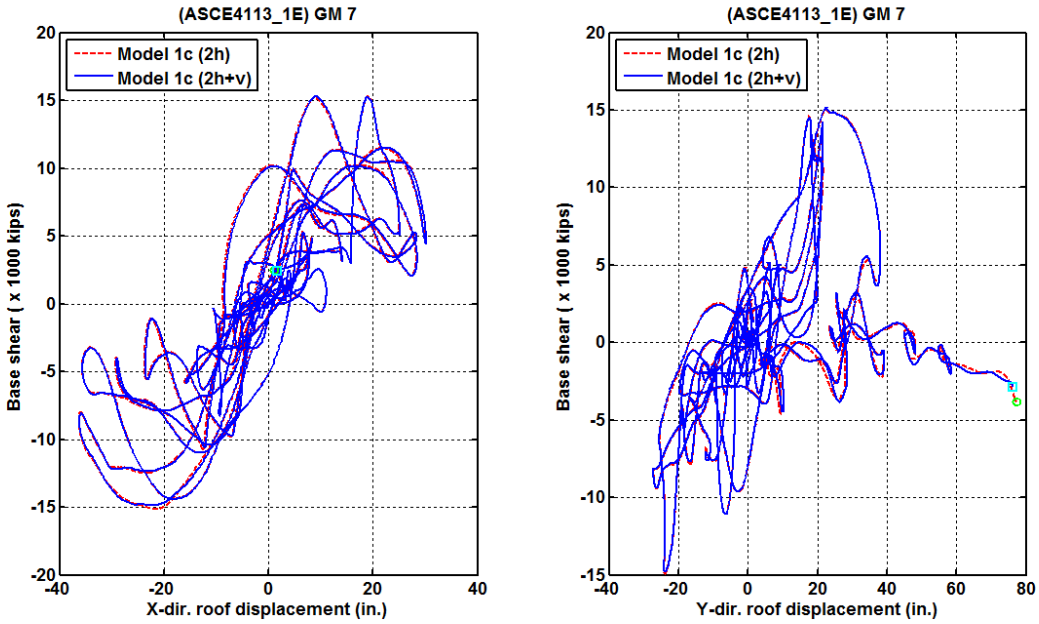

Figure F.7 Base shear versus roof displacement relationships under BSE-1E level ground motion number 7 with and without vertical component motions (Model 1c).

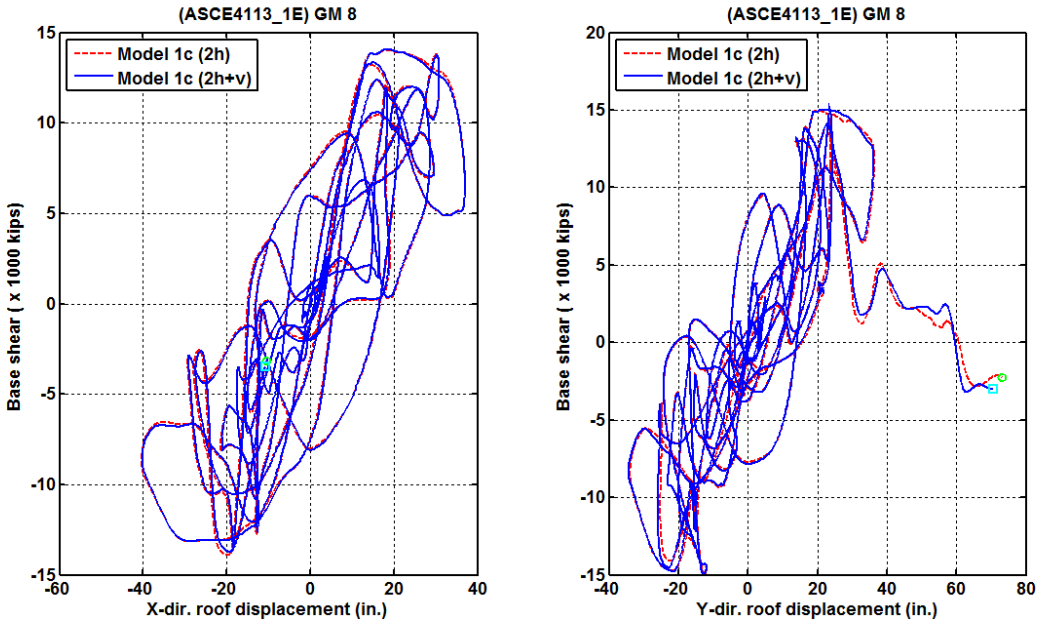

Figure F.8 Base shear versus roof displacement relationships under BSE-1E level ground motion number 8 with and without vertical component motions (Model 1c).

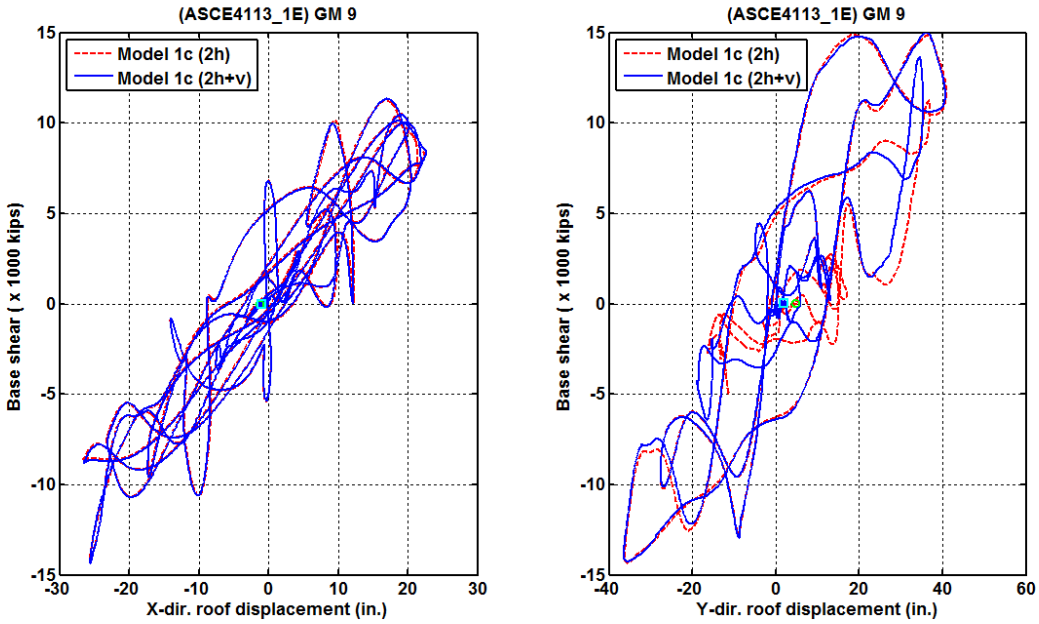

Figure F.9 Base shear versus roof displacement relationships under BSE-1E level ground motion number 9 with and without vertical component motions (Model 1c).

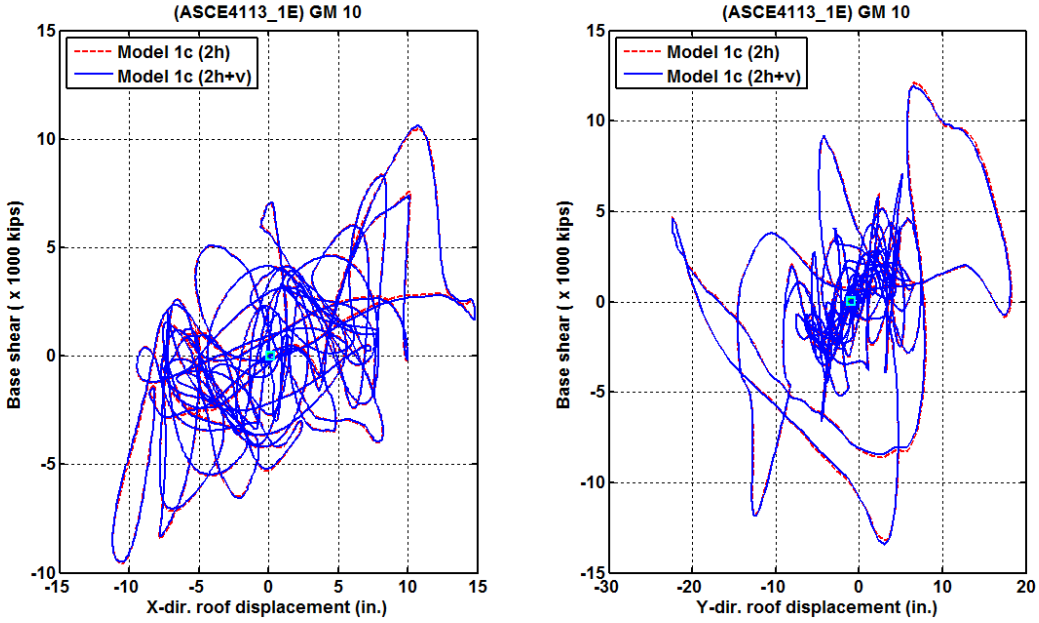

Figure F.10 Base shear versus roof displacement relationships under BSE-1E level ground motion number 10 with and without vertical component motions (Model 1c).

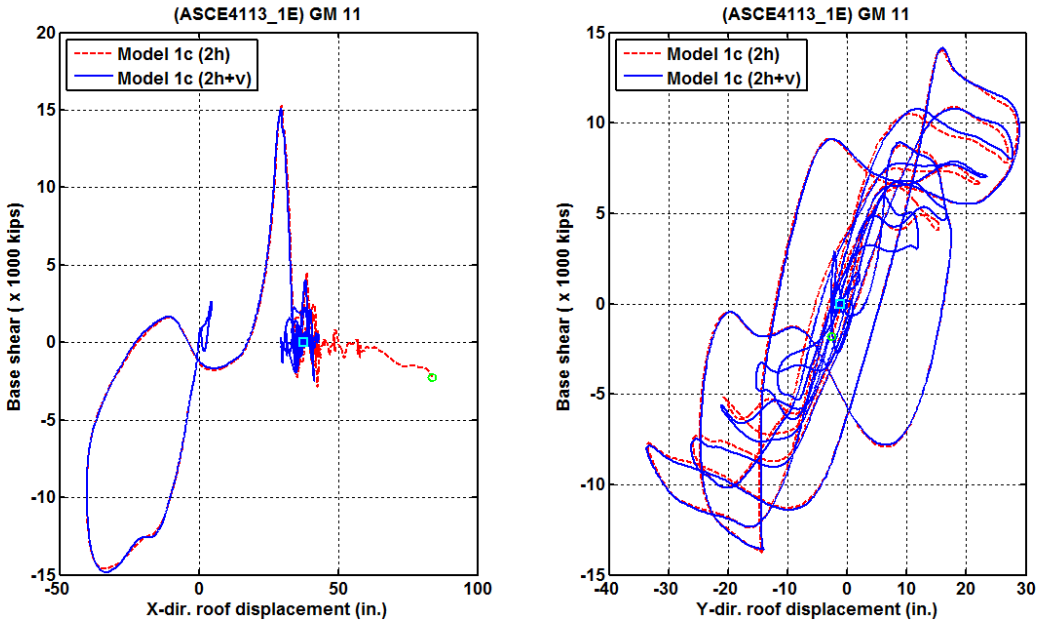

Figure F.11 Base shear versus roof displacement relationships under BSE-1E level ground motion number 11 with and without vertical component motions (Model 1c).

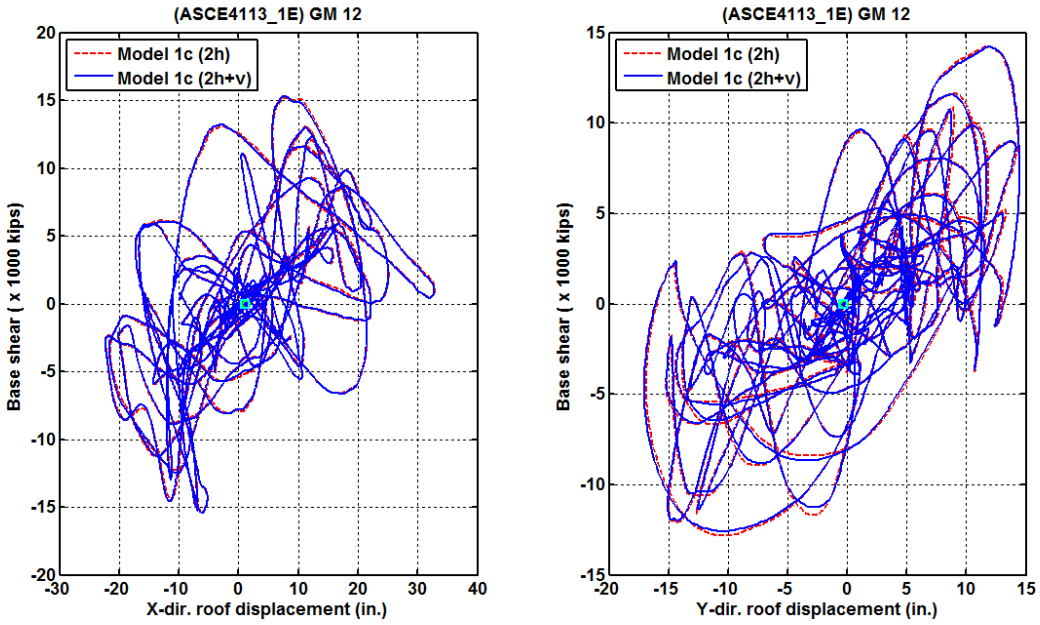

Figure F.12 Base shear versus roof displacement relationships under BSE-1E level ground motion number 12 with and without vertical component motions (Model 1c).

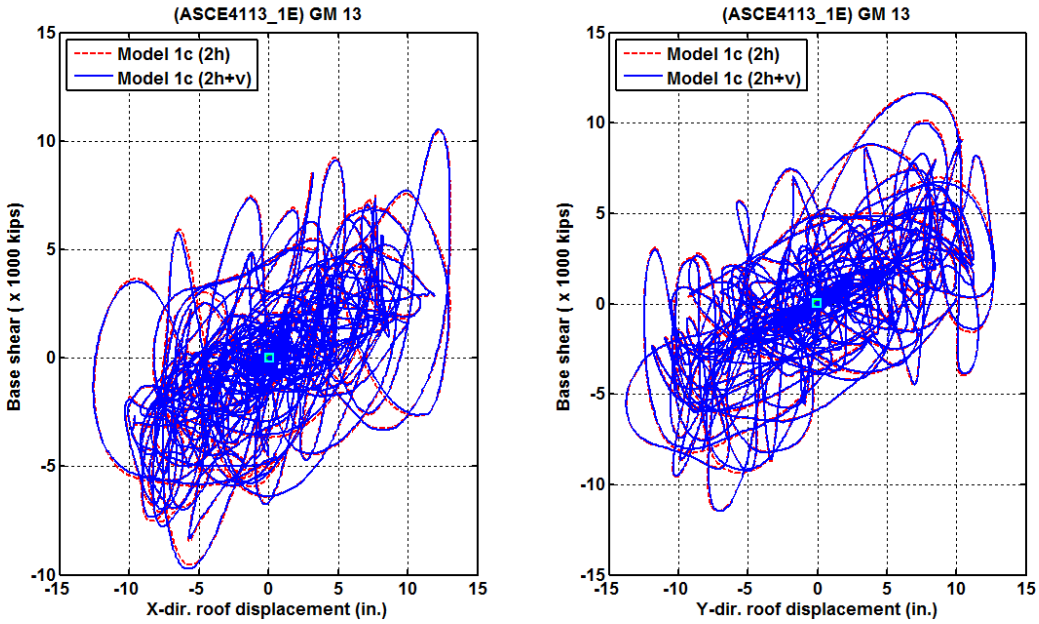

Figure F.13 Base shear versus roof displacement relationships under BSE-1E level ground motion number 13 with and without vertical component motions (Model 1c).

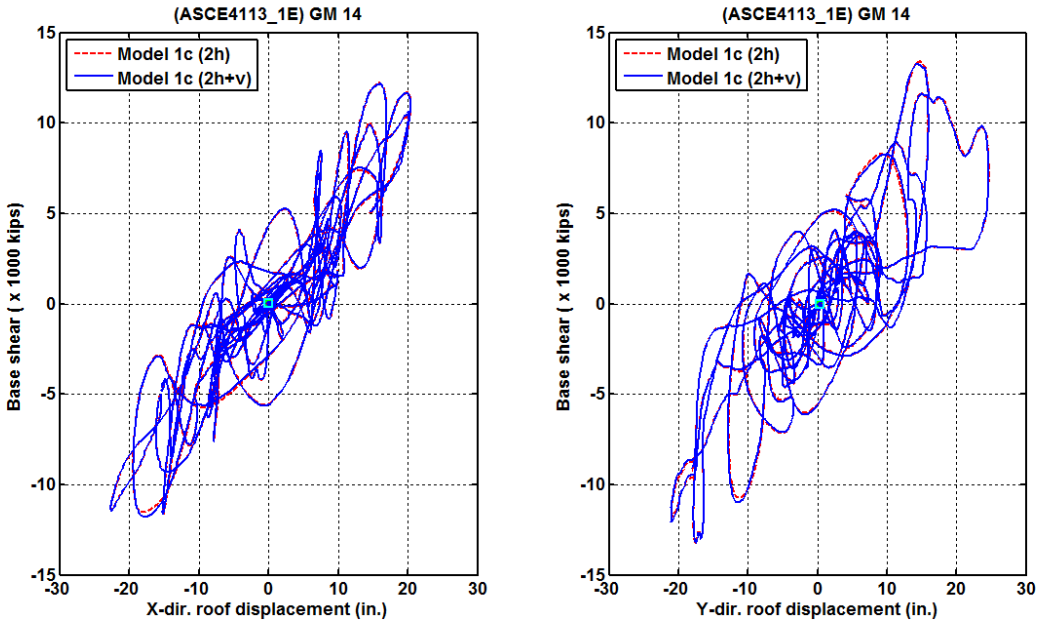

Figure F.14 Base shear versus roof displacement relationships under BSE-1E level ground motion number 14 with and without vertical component motions (Model 1c).

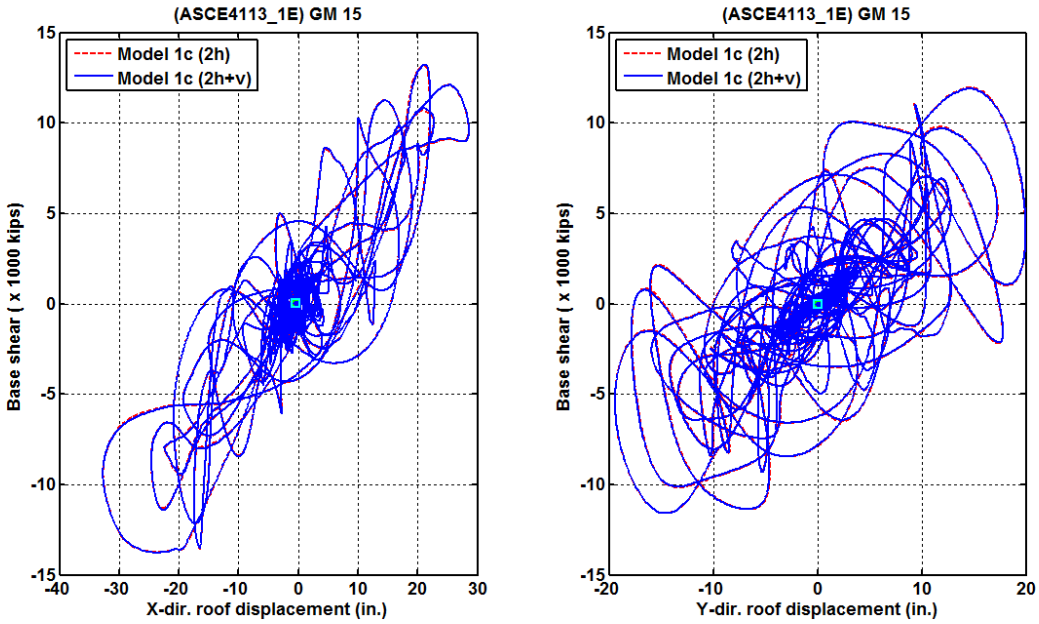

Figure F.15 Base shear versus roof displacement relationships under BSE-1E level ground motion number 15 with and without vertical component motions (Model 1c).

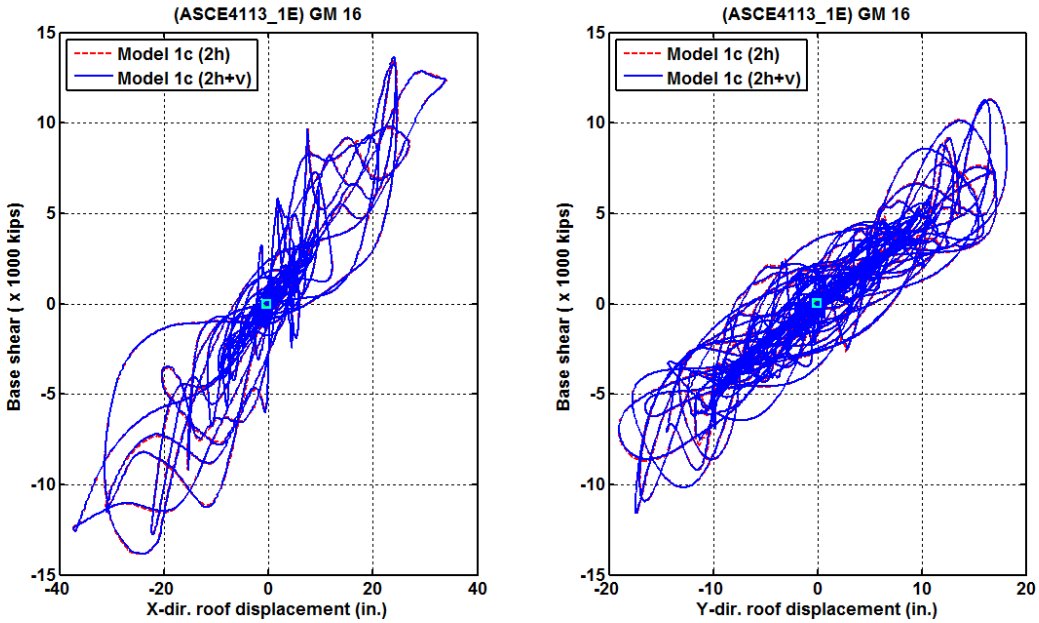

Figure F.16 Base shear versus roof displacement relationships under BSE-1E level ground motion number 16 with and without vertical component motions (Model 1c).

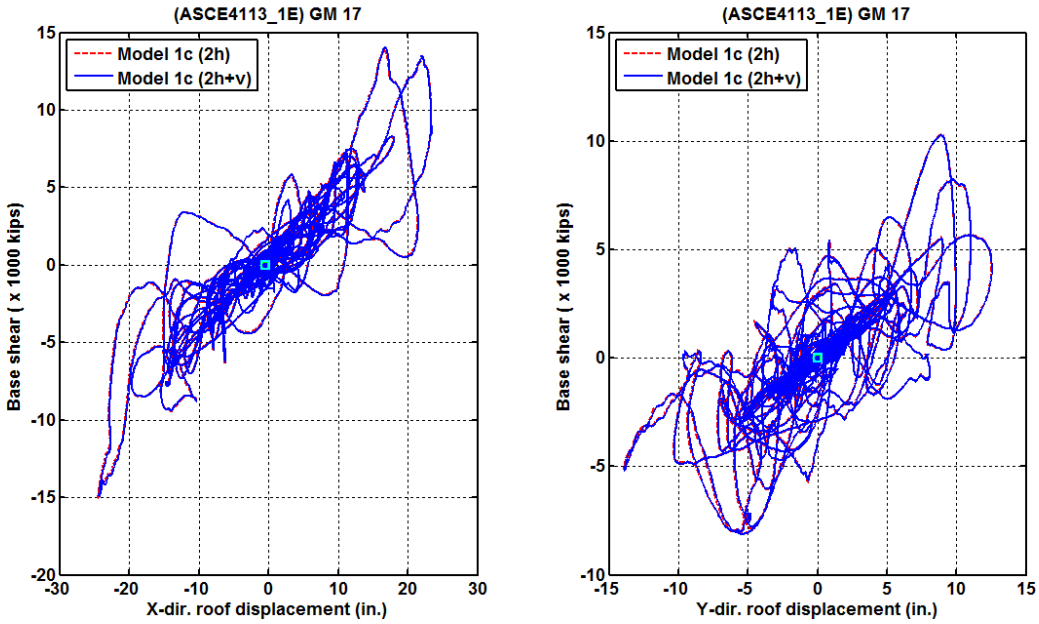

Figure F.17 Base shear versus roof displacement relationships under BSE-1E level ground motion number 17 with and without vertical component motions (Model 1c).

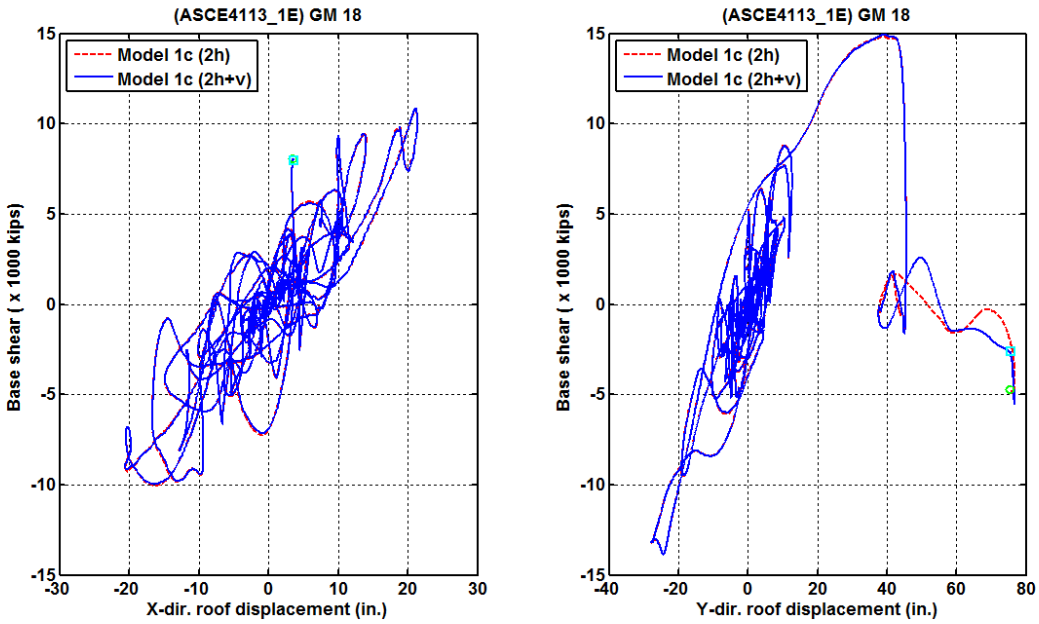

Figure F.18 Base shear versus roof displacement relationships under BSE-1E level ground motion number 18 with and without vertical component motions (Model 1c).

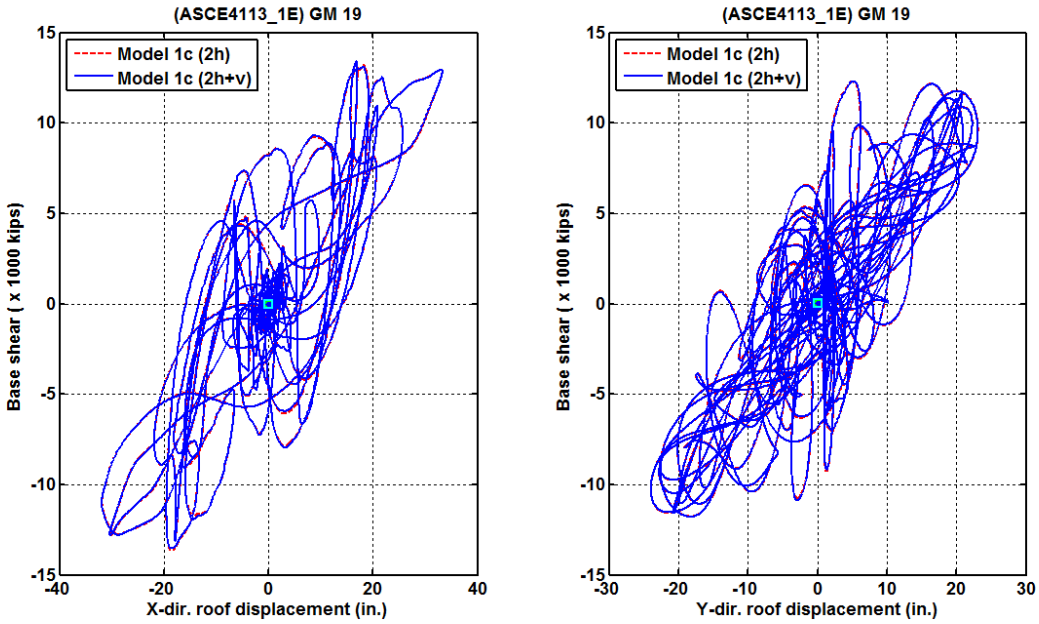

Figure F.19 Base shear versus roof displacement relationships under BSE-1E level ground motion number 19 with and without vertical component motions (Model 1c).

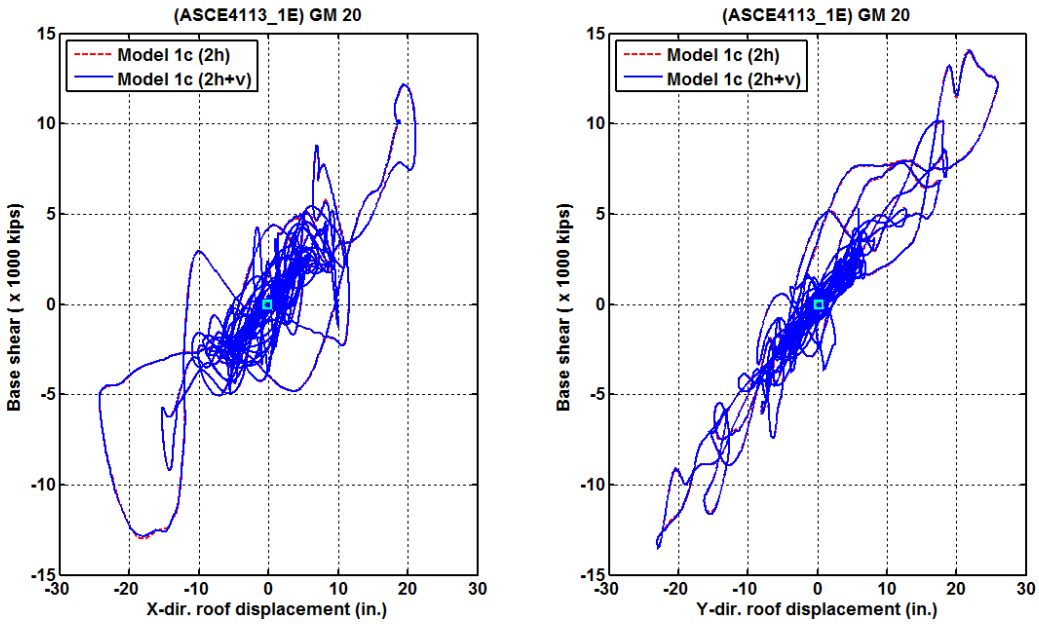

Figure F.20 Base shear versus roof displacement relationships under BSE-1E level ground motion number 20 with and without vertical component motions (Model 1c).

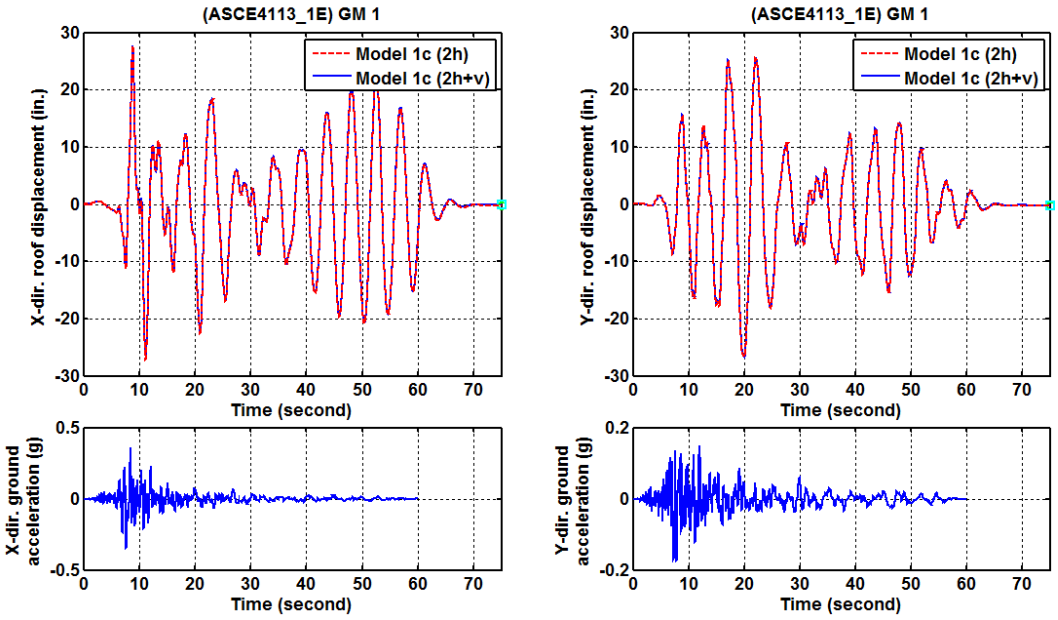

Figure F.21 Roof displacement histories under BSE-1E level ground motion number 1 with and without vertical component motions (Model 1c).

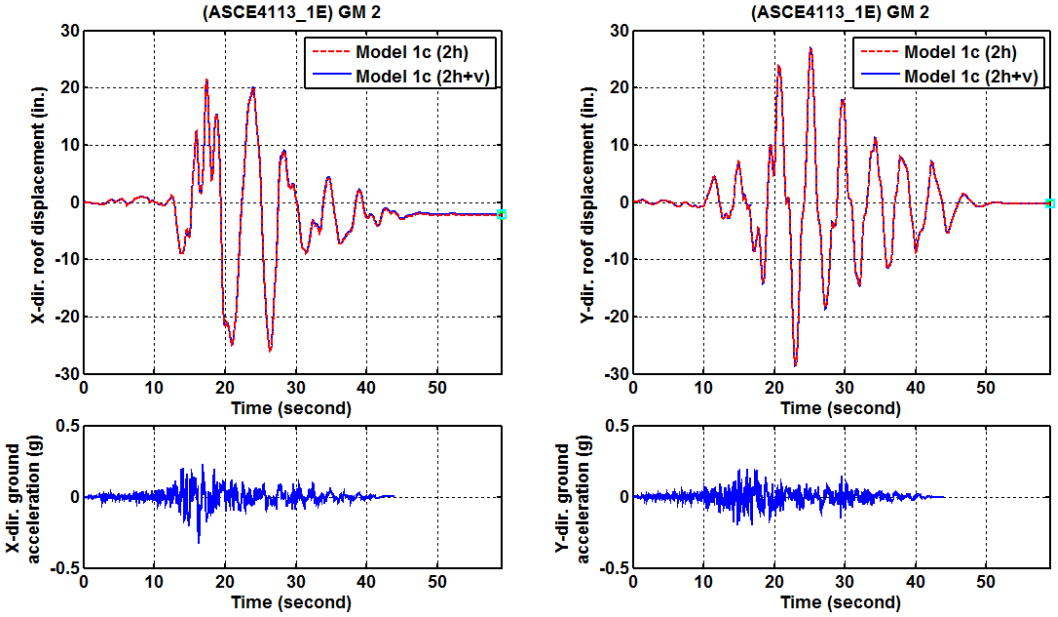

Figure F.22 Roof displacement histories under BSE-1E level ground motion number 2 with and without vertical component motions (Model 1c)

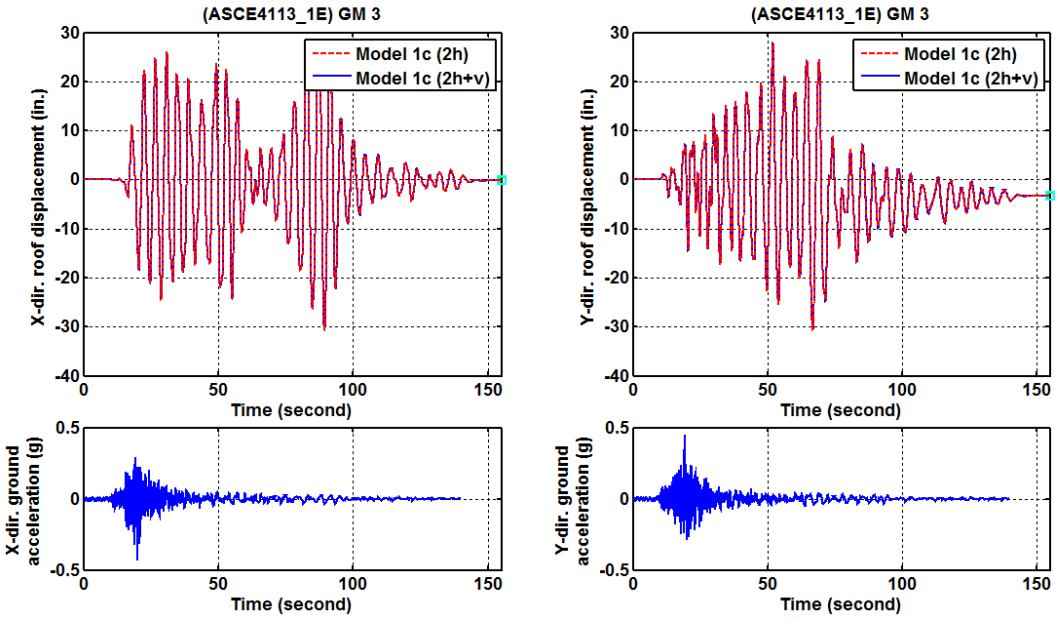

Figure F.23 Roof displacement histories under BSE-1E level ground motion number 3 with and without vertical component motions (Model 1c).

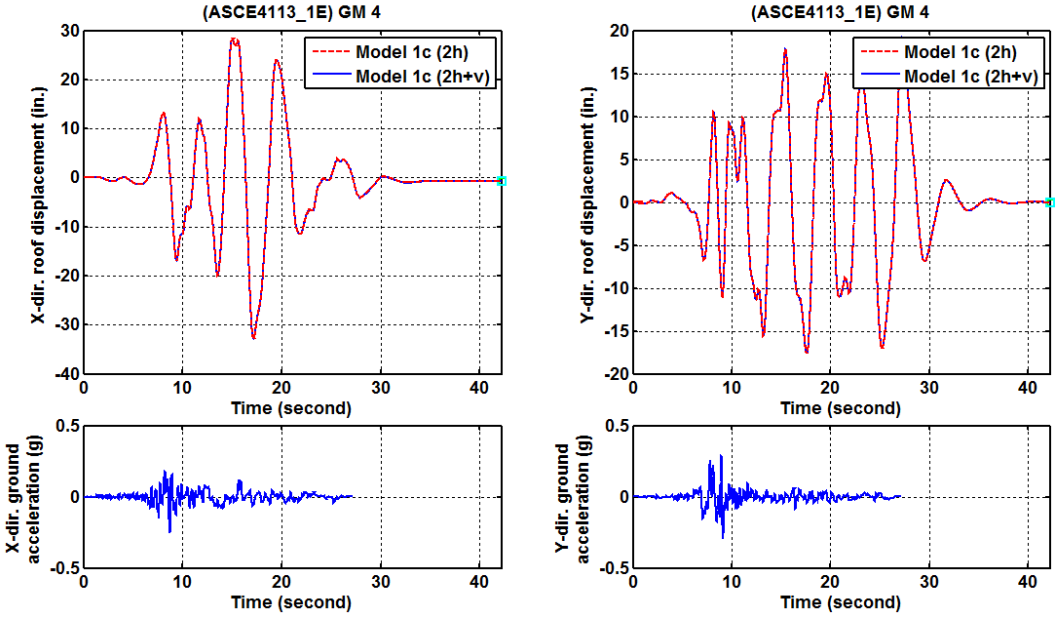

Figure F.24 Roof displacement histories under BSE-1E level ground motion number 4 with and without vertical component motions (Model 1c.

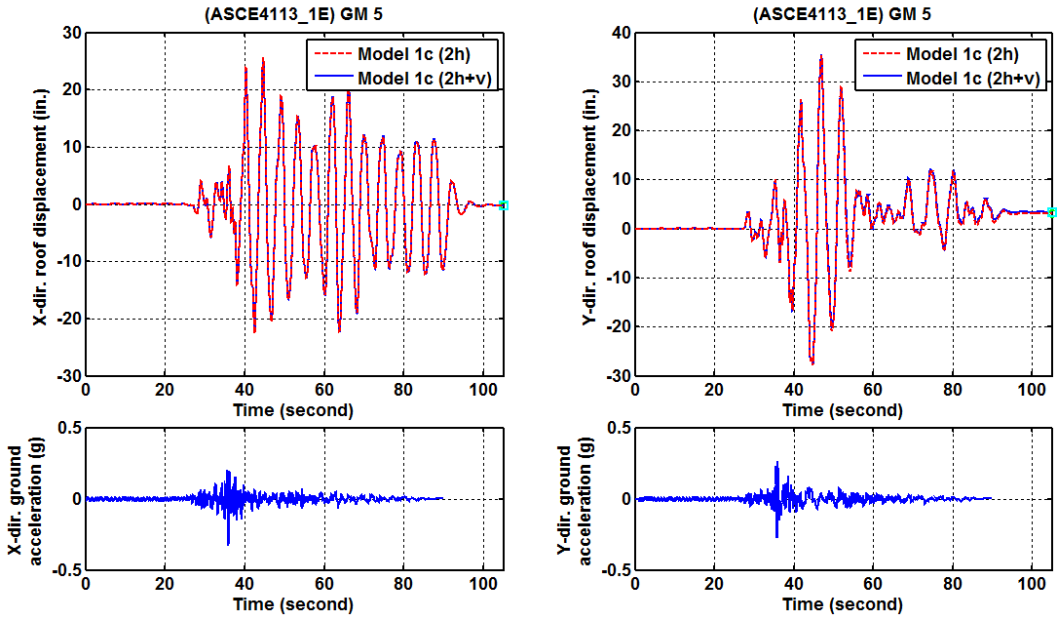

Figure F.25 Roof displacement histories under BSE-1E level ground motion number 5 with and without vertical component motions (Model 1c).

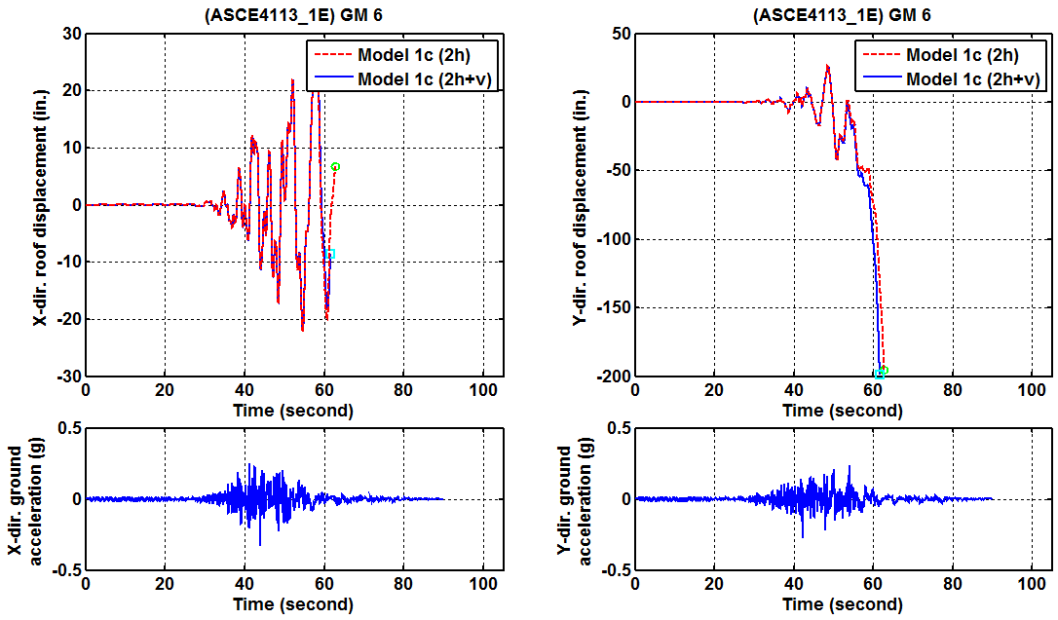

Figure F.26 Roof displacement histories under BSE-1E level ground motion number 6 with and without vertical component motions (Model 1c).

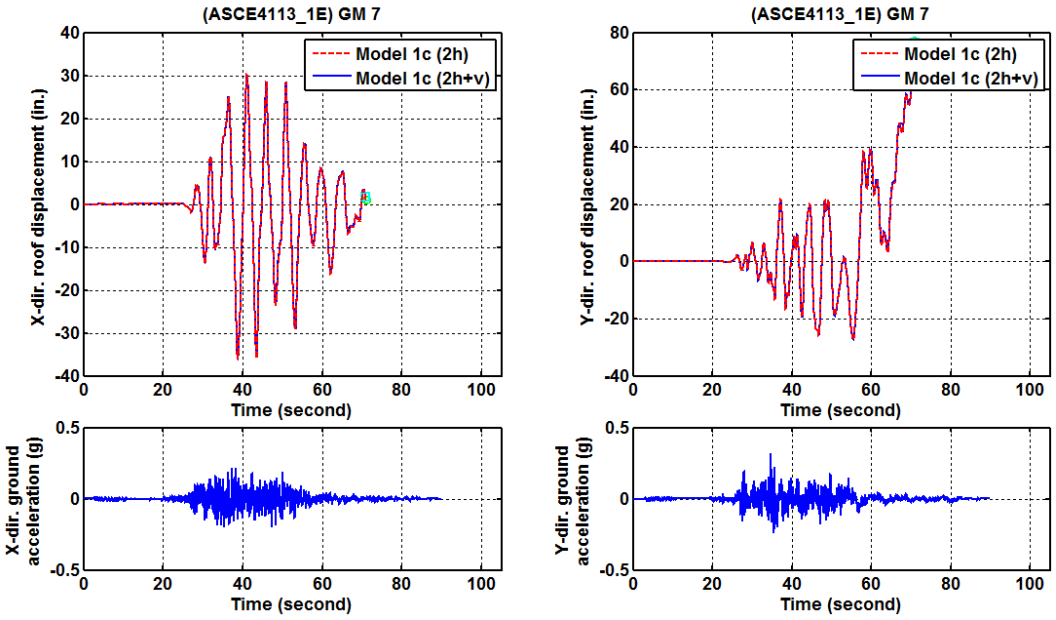

Figure F.27 Roof displacement histories under BSE-1E level ground motion number 7 with and without vertical component motions (Model 1c).

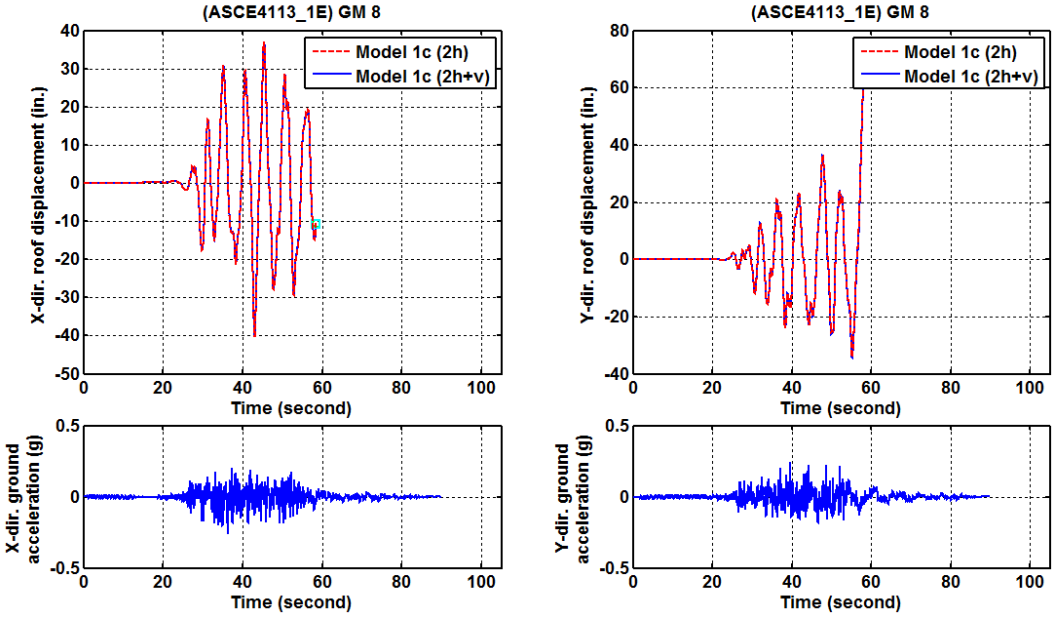

Figure F.28 Roof displacement histories under BSE-1E level ground motion number 8 with and without vertical component motions (Model 1c).

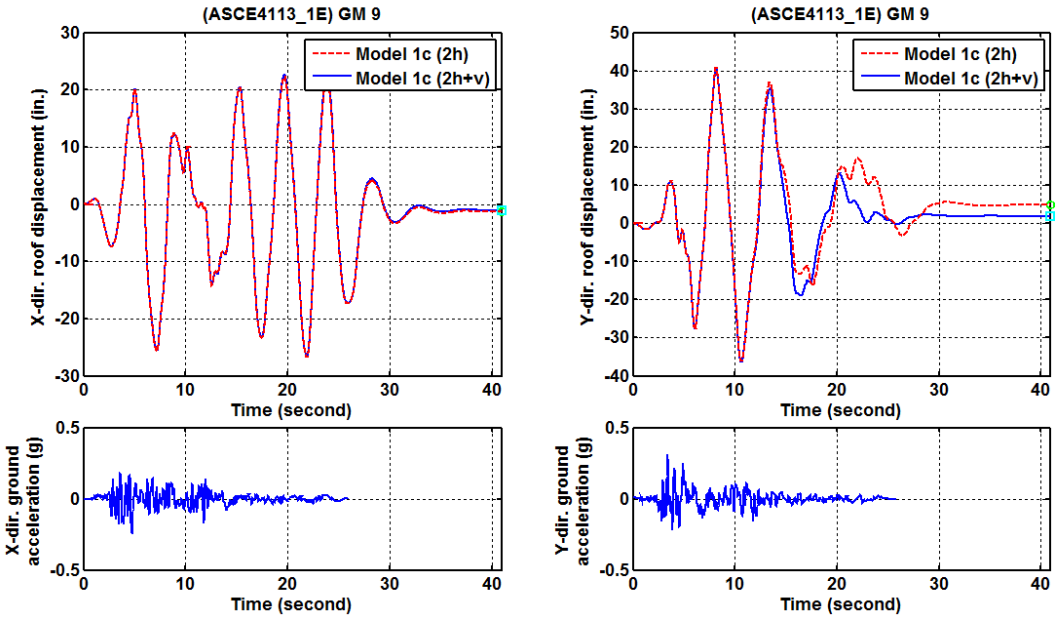

Figure F.29 Roof displacement histories under BSE-1E level ground motion number 9 with and without vertical component motions (Model 1c).

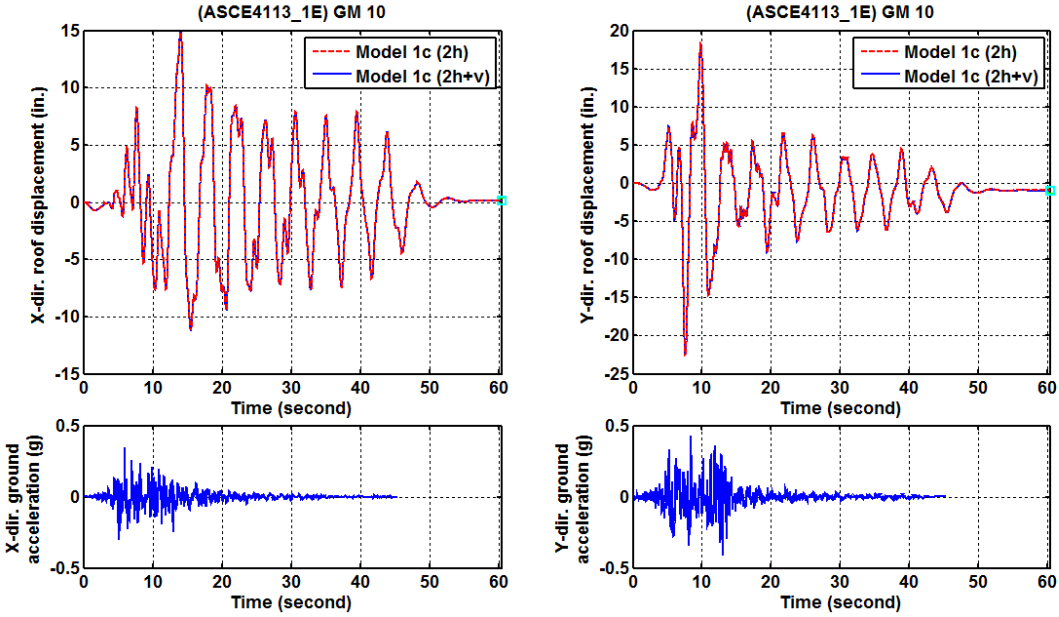

Figure F.30 Roof displacement histories under BSE-1E level ground motion number 10 with and without vertical component motions (Model 1c).

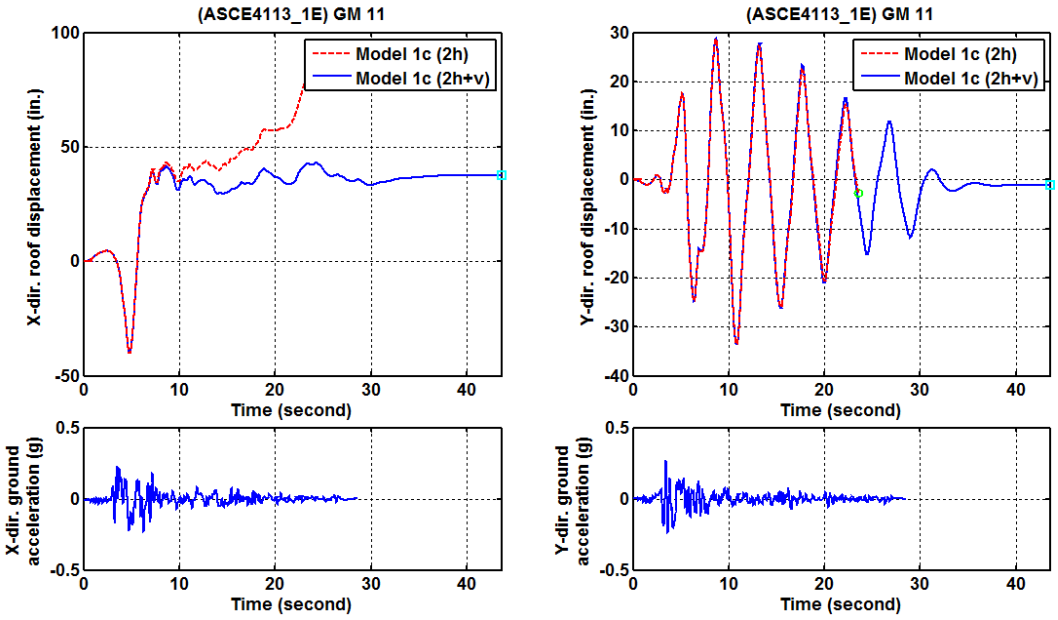

Figure F.31 Roof displacement histories under BSE-1E level ground motion number 11 with and without vertical component motions (Model 1c).

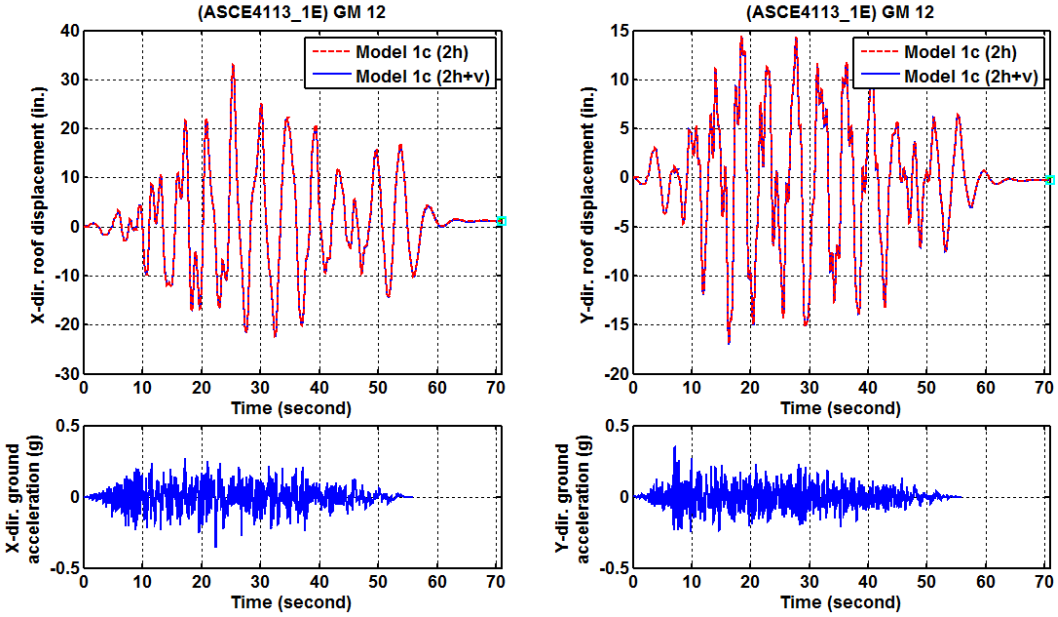

Figure F.32 Roof displacement histories under BSE-1E level ground motion number 12 with and without vertical component motions (Model 1c).

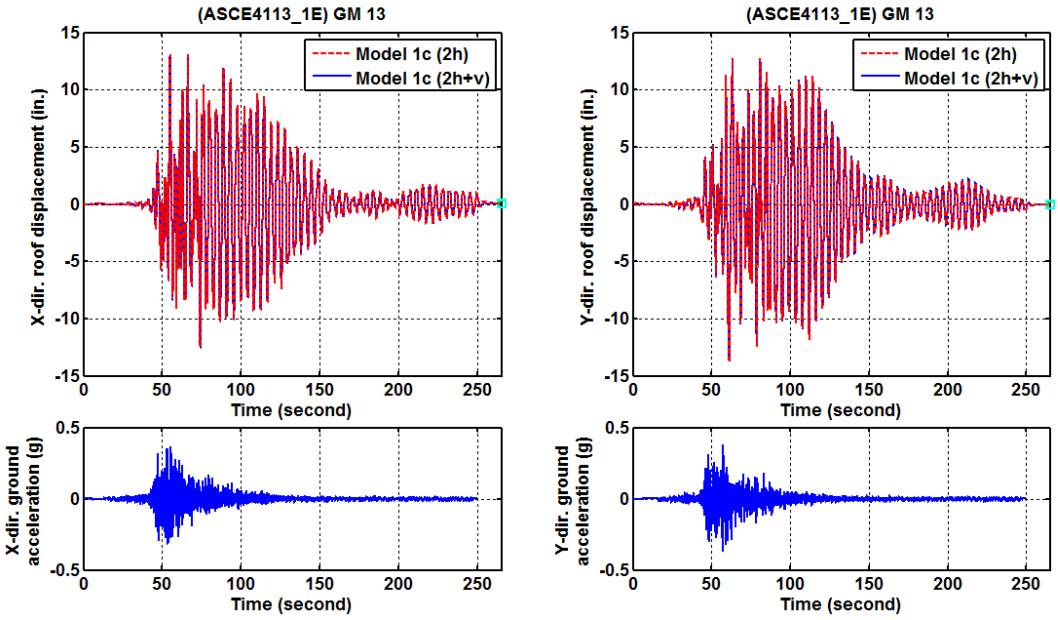

Figure F.33 Roof displacement histories under BSE-1E level ground motion number 13 with and without vertical component motions (Model 1c).

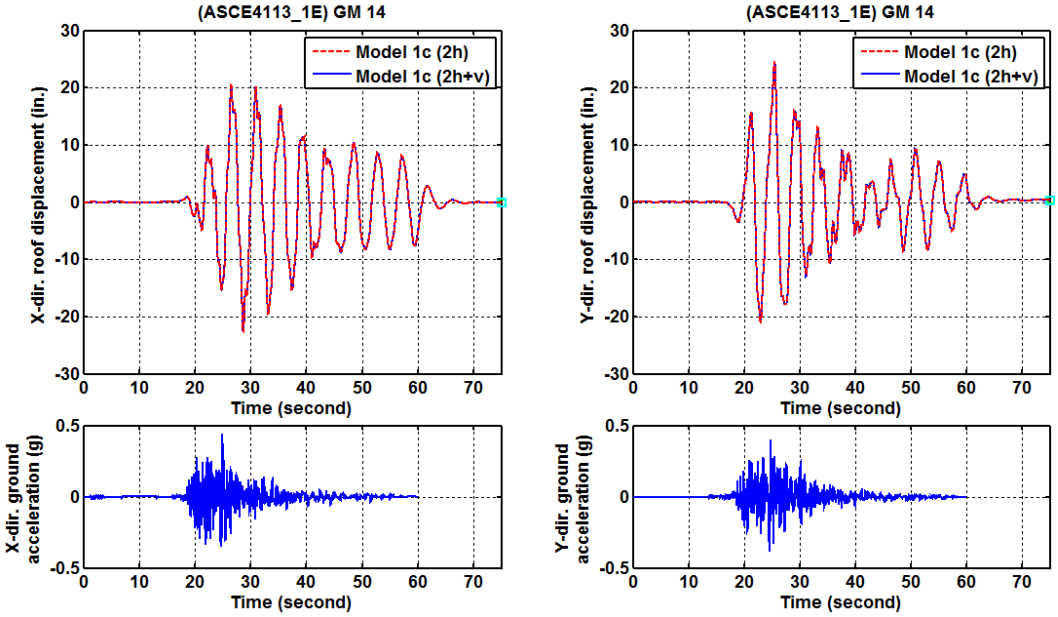

Figure F.34 Roof displacement histories under BSE-1E level ground motion number 14 with and without vertical component motions (Model 1c).

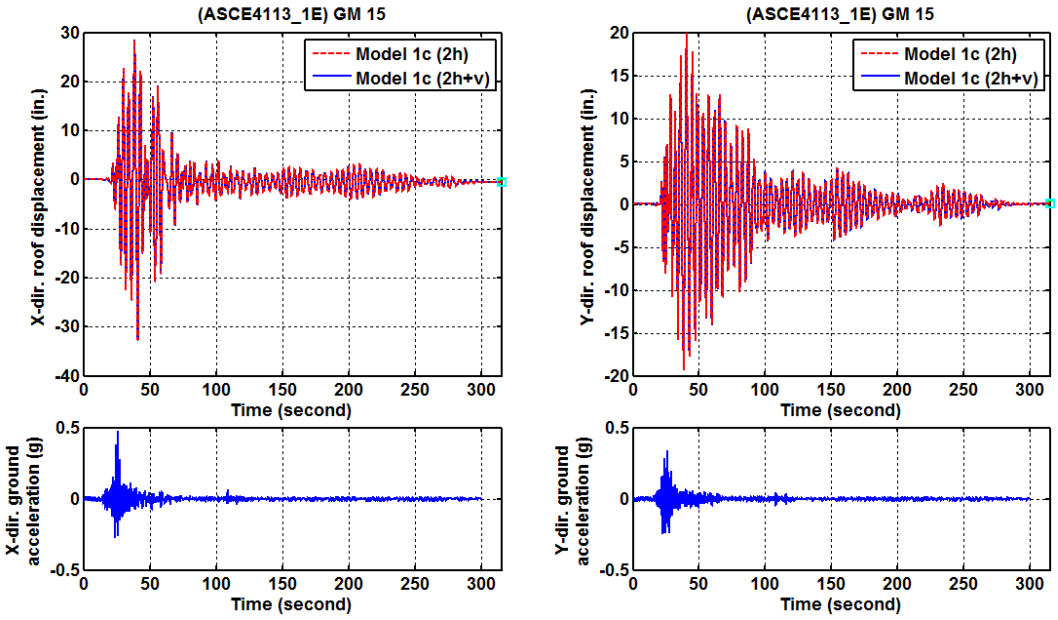

Figure F.35 Roof displacement histories under BSE-1E level ground motion number 15 with and without vertical component motions (Model 1c).

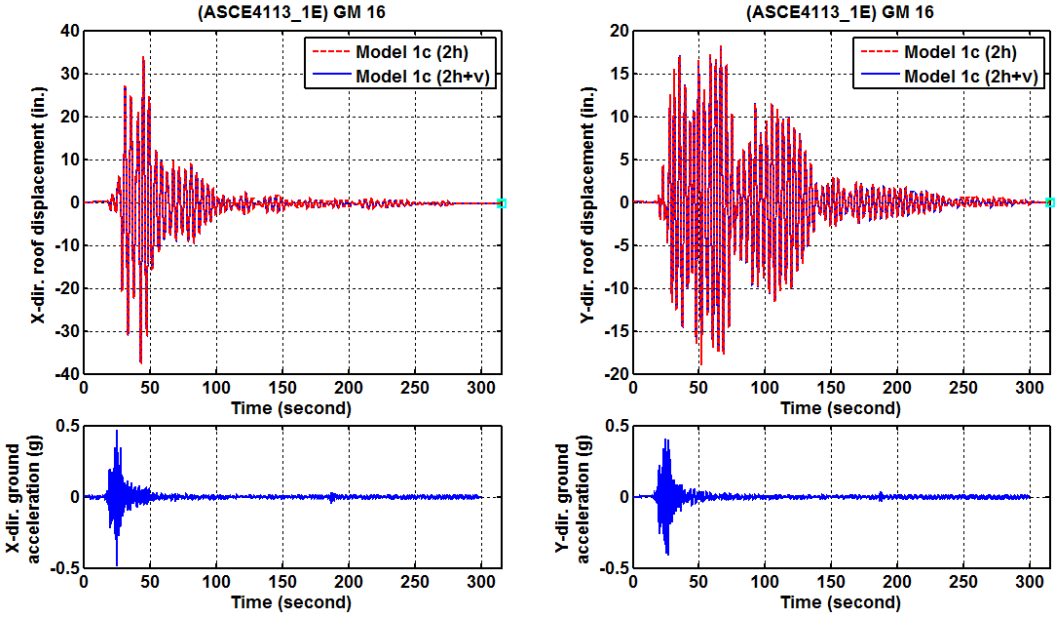

Figure F.36 Roof displacement histories under BSE-1E level ground motion number 16 with and without vertical component motions (Model 1c).

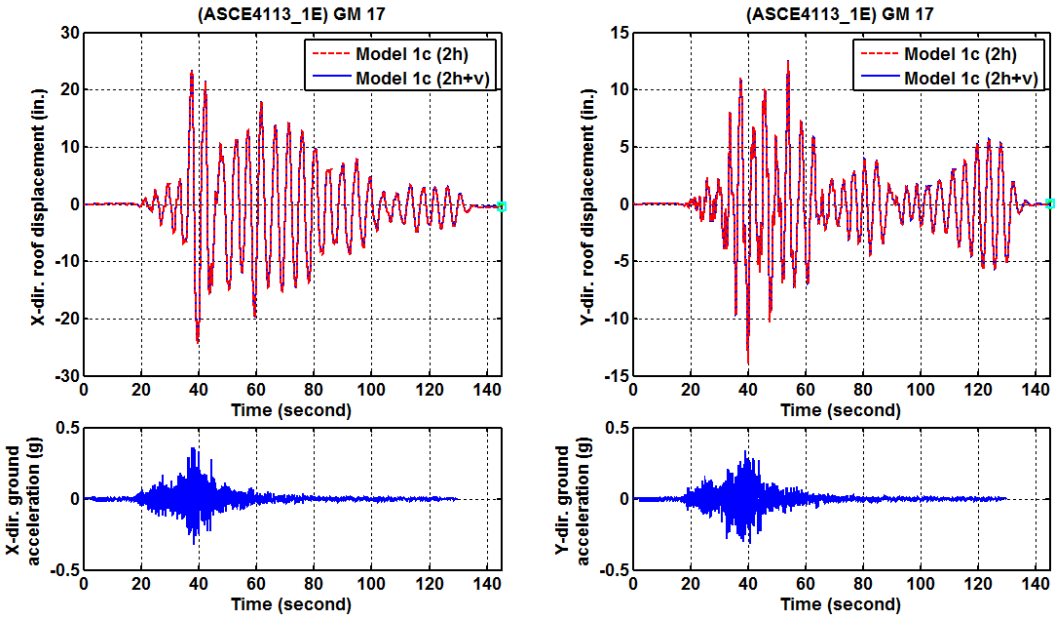

Figure F.37 Roof displacement histories under BSE-1E level ground motion number 17 with and without vertical component motions (Model 1c).

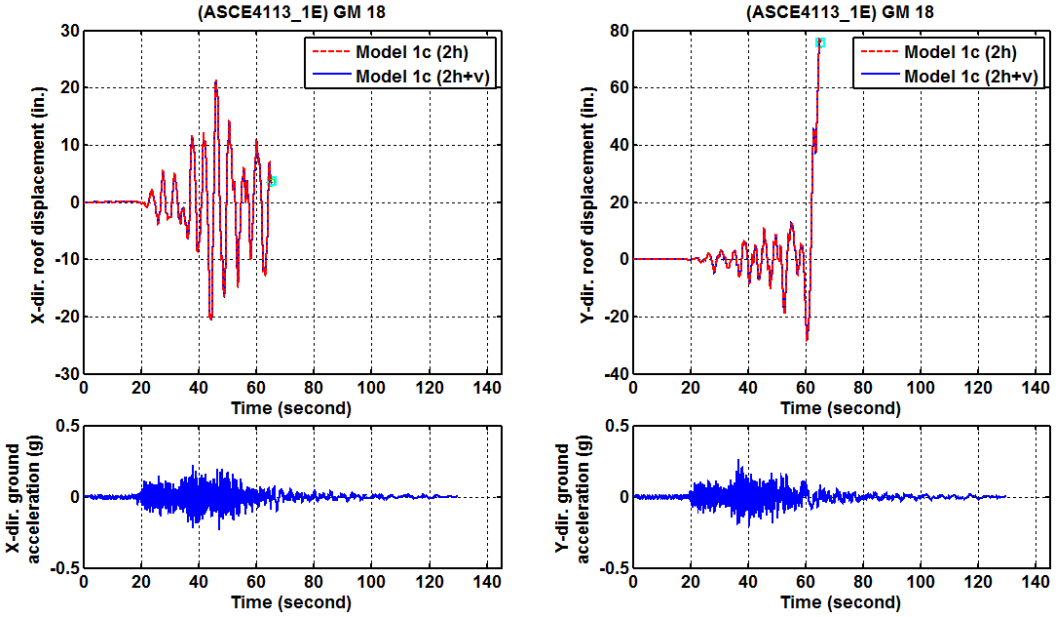

Figure F.38 Roof displacement histories under BSE-1E level ground motion number 18 with and without vertical component motions (Model 1c).

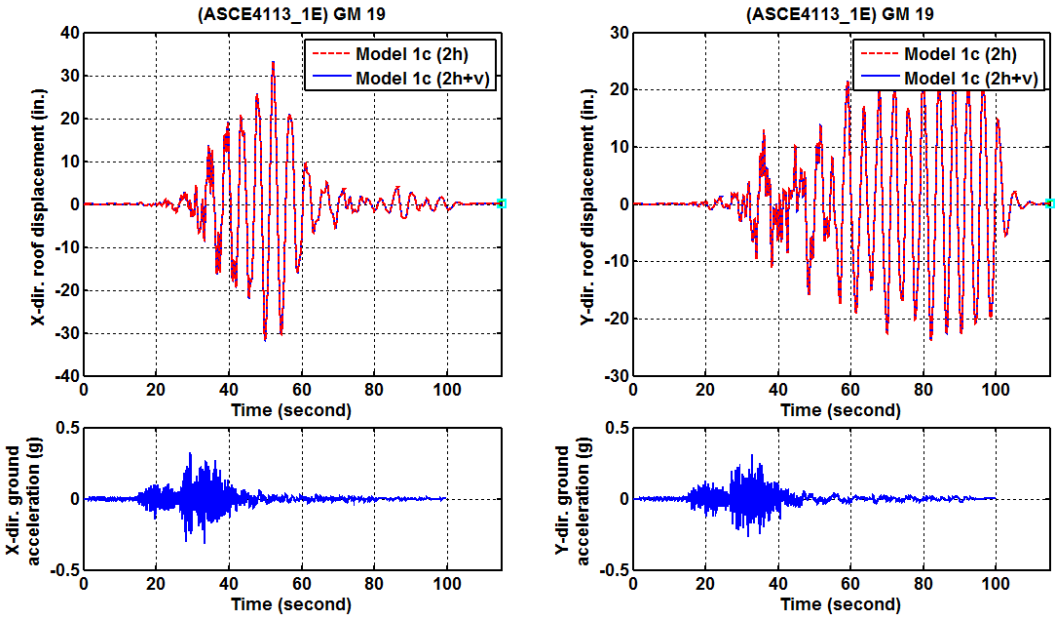

Figure F.39 Roof displacement histories under BSE-1E level ground motion number 19 with and without vertical component motions (Model 1c).

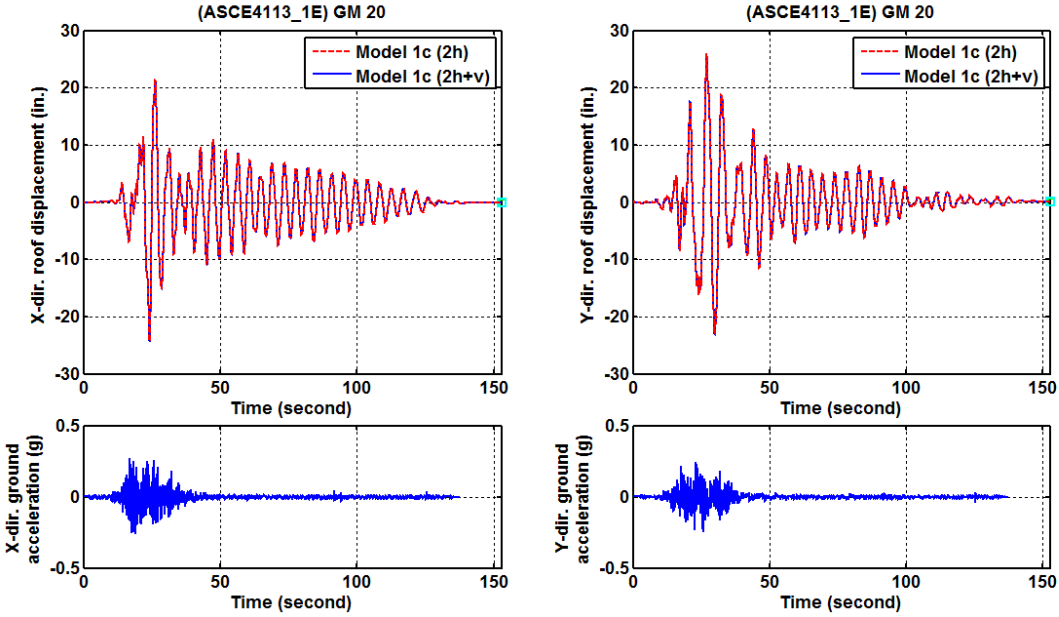

Figure F.40 Roof displacement histories under BSE-1E level ground motion number 20 with and without vertical component motions (Model 1c).

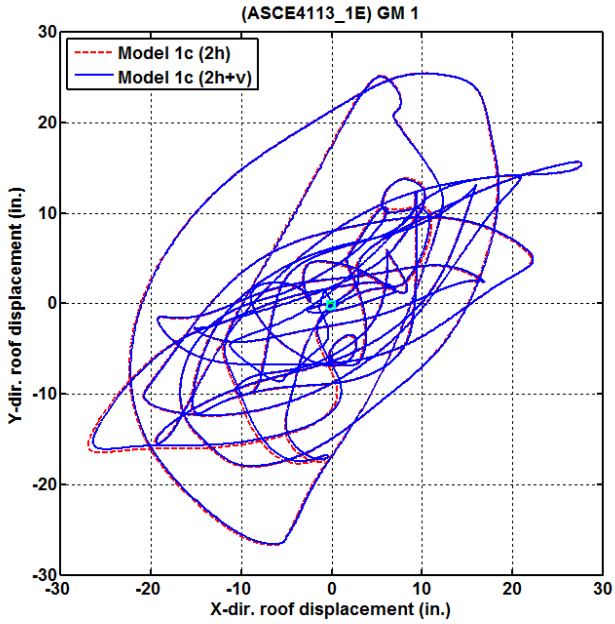

Figure F.41 Roof displacement orbits under BSE-1E level ground motion number 1 with and without vertical component motions (Model 1c).

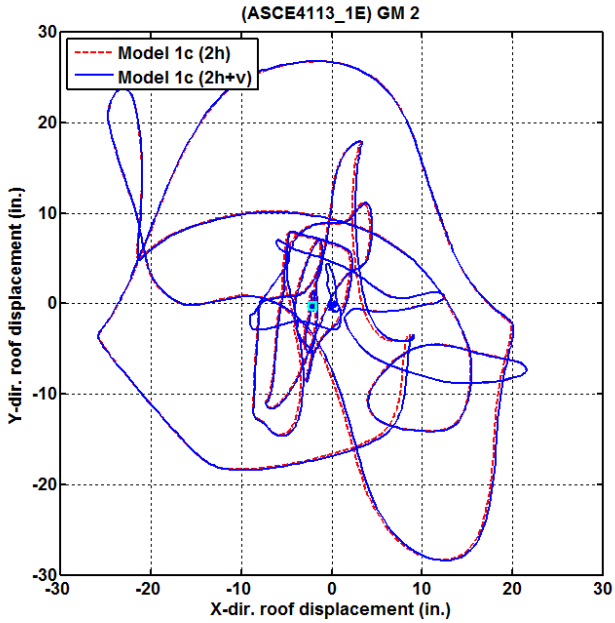

Figure F.42 Roof displacement orbits under BSE-1E level ground motion number 2 with and without vertical component motions (Model 1c).

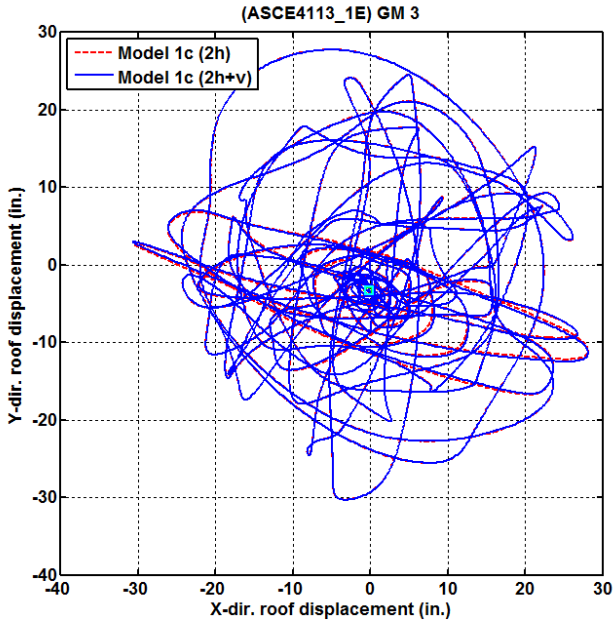

Figure F.43 Roof displacement orbits under BSE-1E level ground motion number 3 with and without vertical component motions (Model 1c).

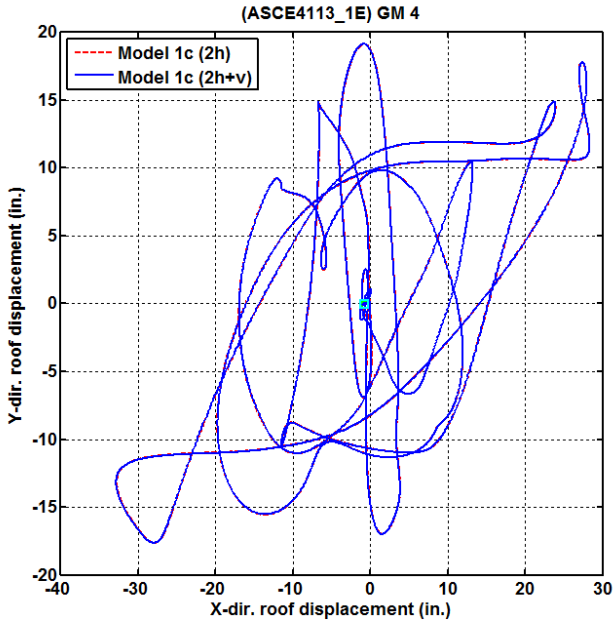

Figure F.44 Roof displacement orbits under BSE-1E level ground motion number 4 with and without vertical component motions (Model 1c).

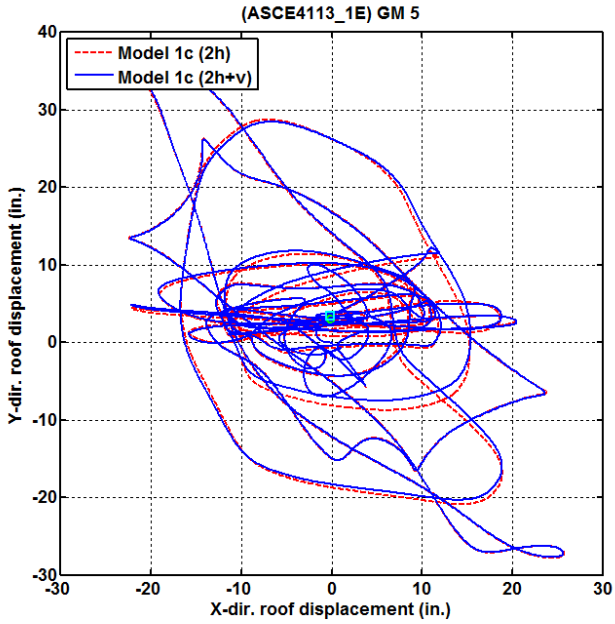

Figure F.45 Roof displacement orbits under BSE-1E level ground motion number 5 with and without vertical component motions (Model 1c).

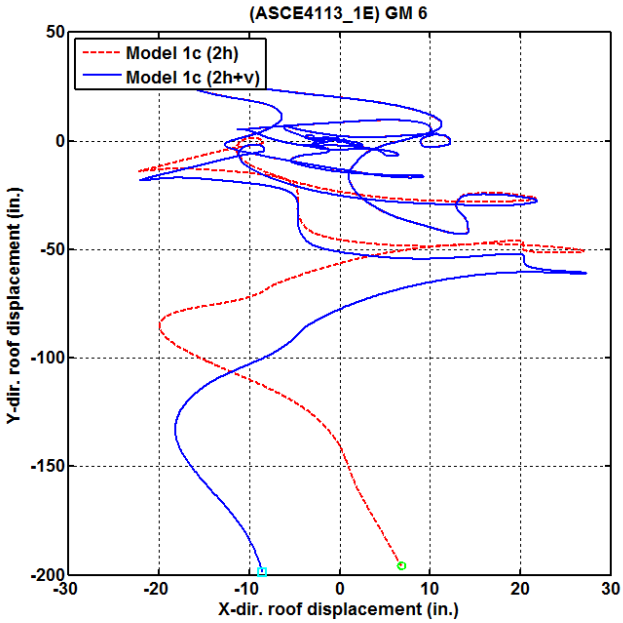

Figure F.46 Roof displacement orbits under BSE-1E level ground motion number 6 with and without vertical component motions (Model 1c).

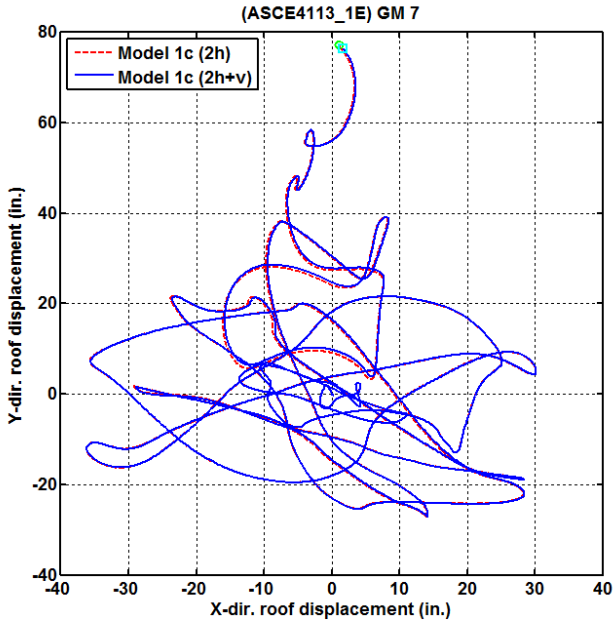

Figure F.47 Roof displacement orbits under BSE-1E level ground motion number 7 with and without vertical component motions (Model 1c).

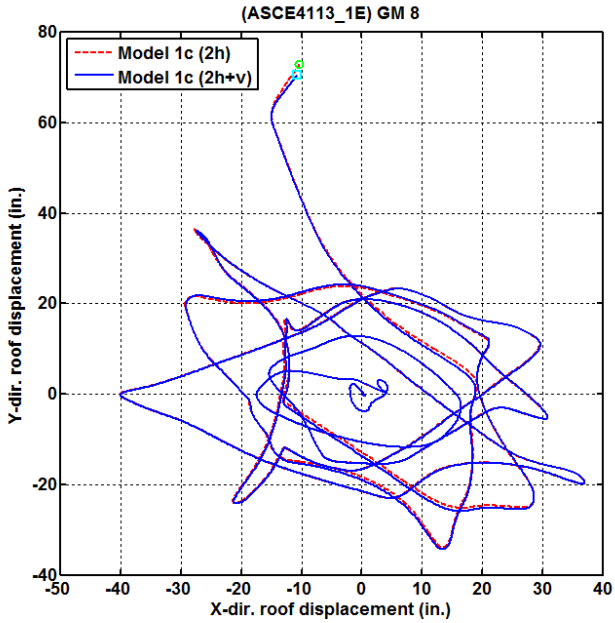

Figure F.48 Roof displacement orbits under BSE-1E level ground motion number 8 with and without vertical component motions (Model 1c).

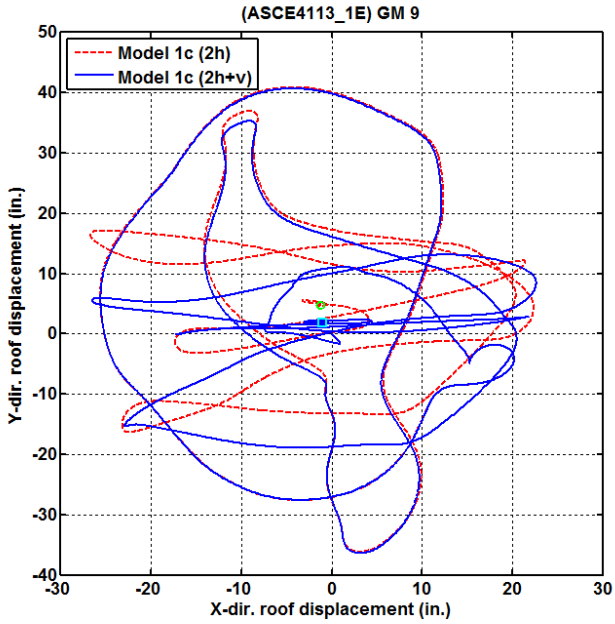

Figure F.49 Roof displacement orbits under BSE-1E level ground motion number 9 with and without vertical component motions (Model 1c).

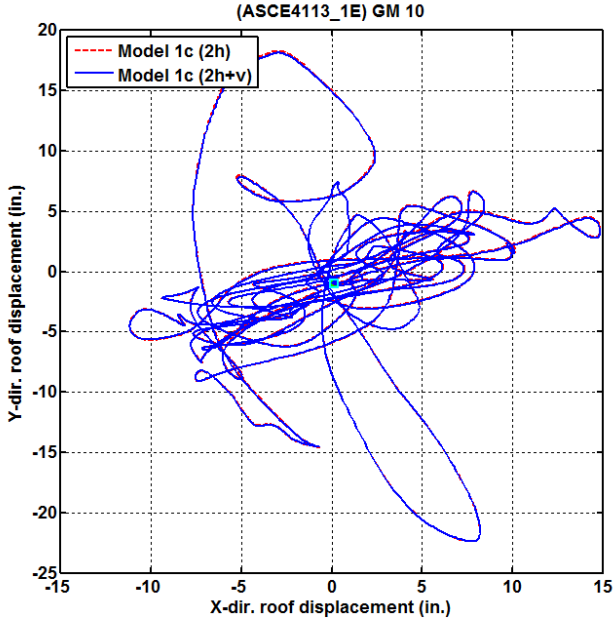

Figure F.50 Roof displacement orbits under BSE-1E level ground motion number 10 with and without vertical component motions (Model 1c).

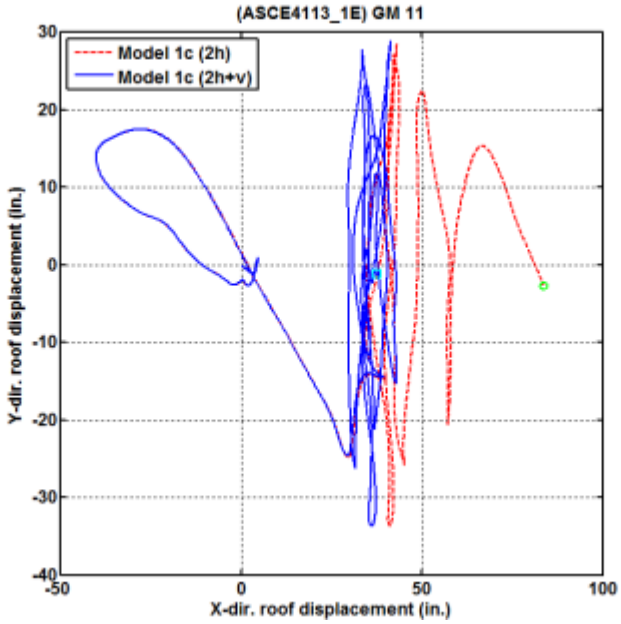

Figure F.51 Roof displacement orbits under BSE-1E level ground motion number 11 with and without vertical component motions (Model 1c).

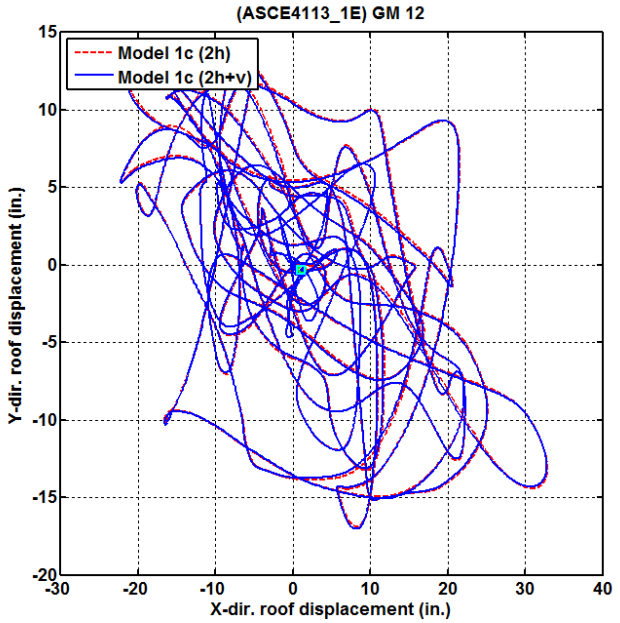

Figure F.52 Roof displacement orbits under BSE-1E level ground motion number 12 with and without vertical component motions (Model 1c).

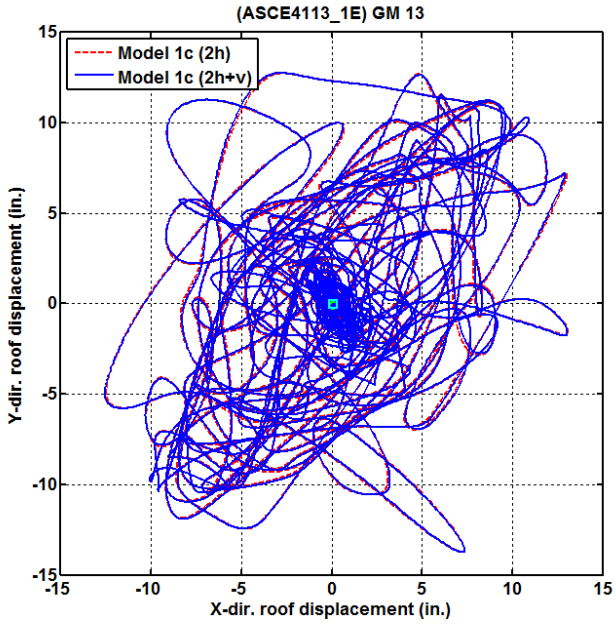

Figure F.53 Roof displacement orbits under BSE-1E level ground motion number 13 with and without vertical component motions (Model 1c).

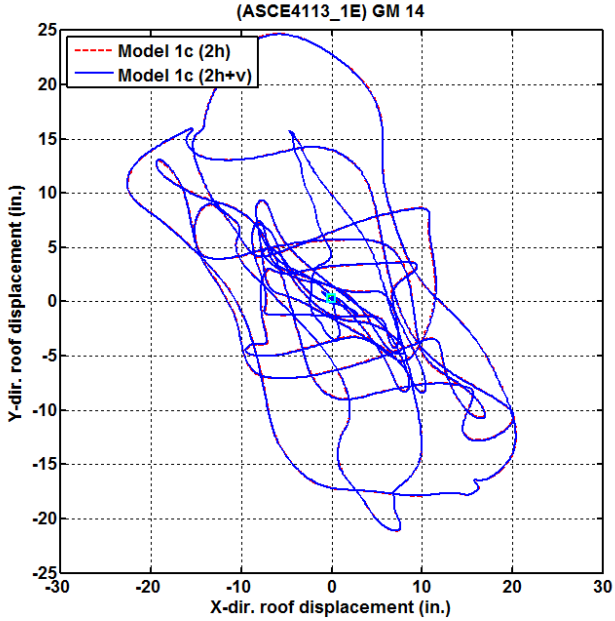

Figure F.54 Roof displacement orbits under BSE-1E level ground motion number 14 with and without vertical component motions (Model 1c).

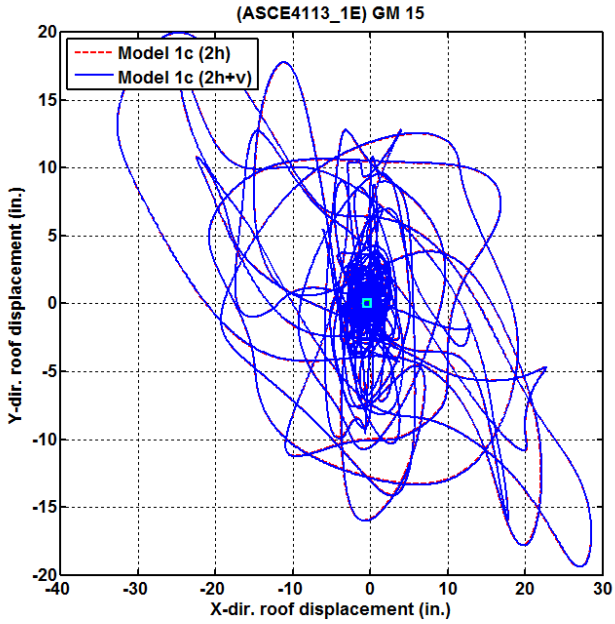

Figure F.55 Roof displacement orbits under BSE-1E level ground motion number 15 with and without vertical component motions (Model 1c).

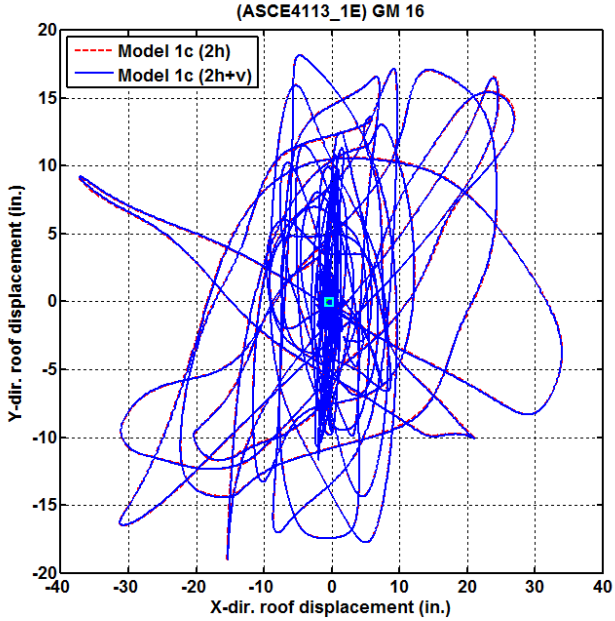

Figure F.56 Roof displacement orbits under BSE-1E level ground motion number 16 with and without vertical component motions (Model 1c).

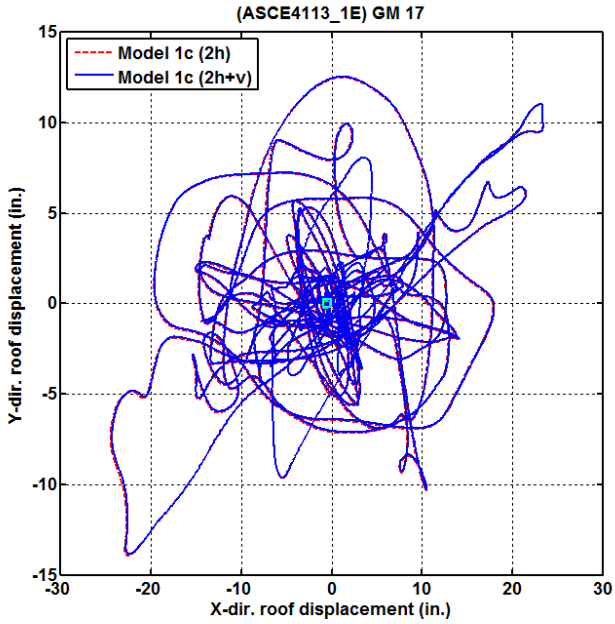

Figure F.57 Roof displacement orbits under BSE-1E level ground motion number 17 with and without vertical component motions (Model 1c).

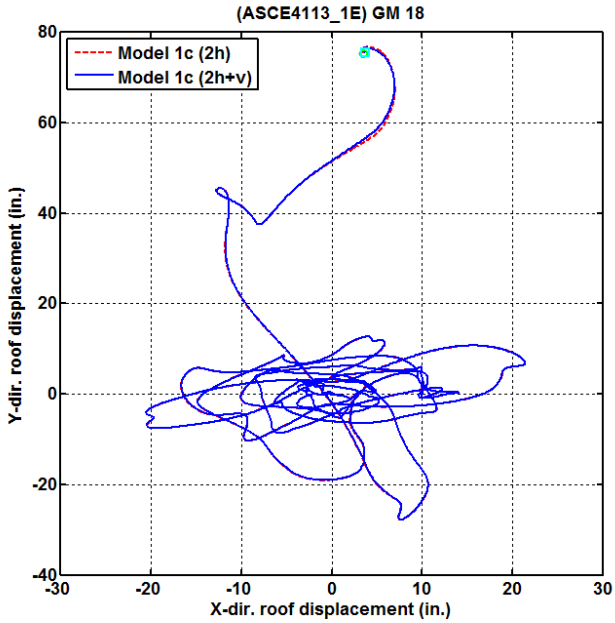

Figure F.58 Roof displacement orbits under BSE-1E level ground motion number 18 with and without vertical component motions (Model 1c).

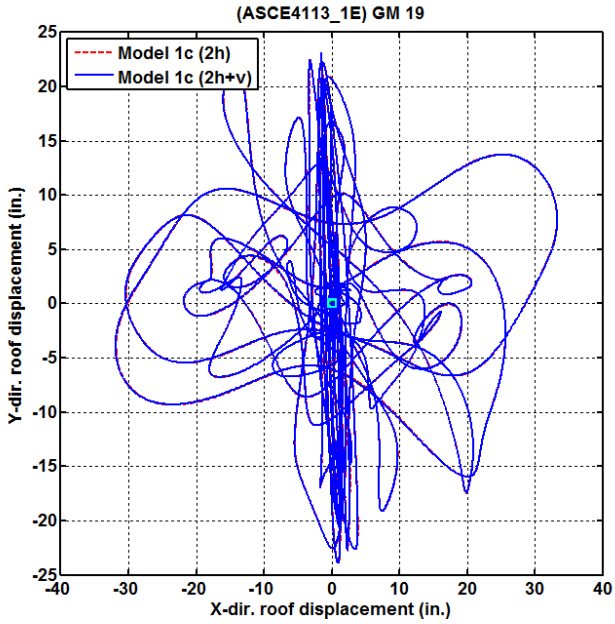

Figure F.59 Roof displacement orbits under BSE-1E level ground motion number 19 with and without vertical component motions (Model 1c).

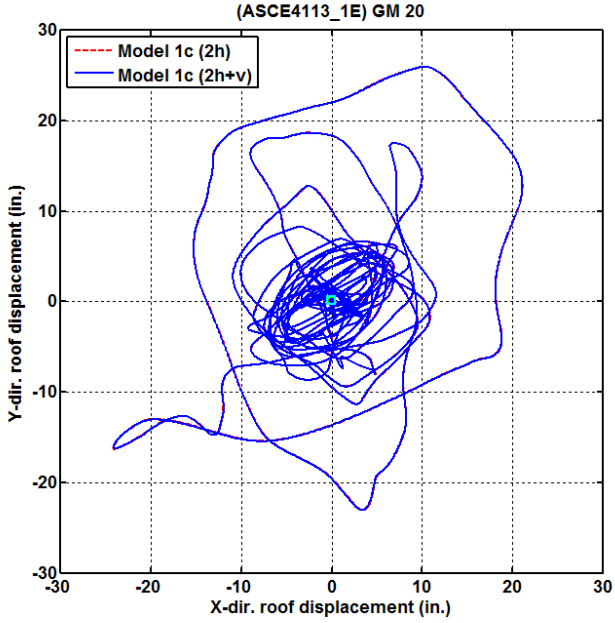

Figure F.60 Roof displacement orbits under BSE-1E level ground motion number 20 with and without vertical component motions (Model 1c).

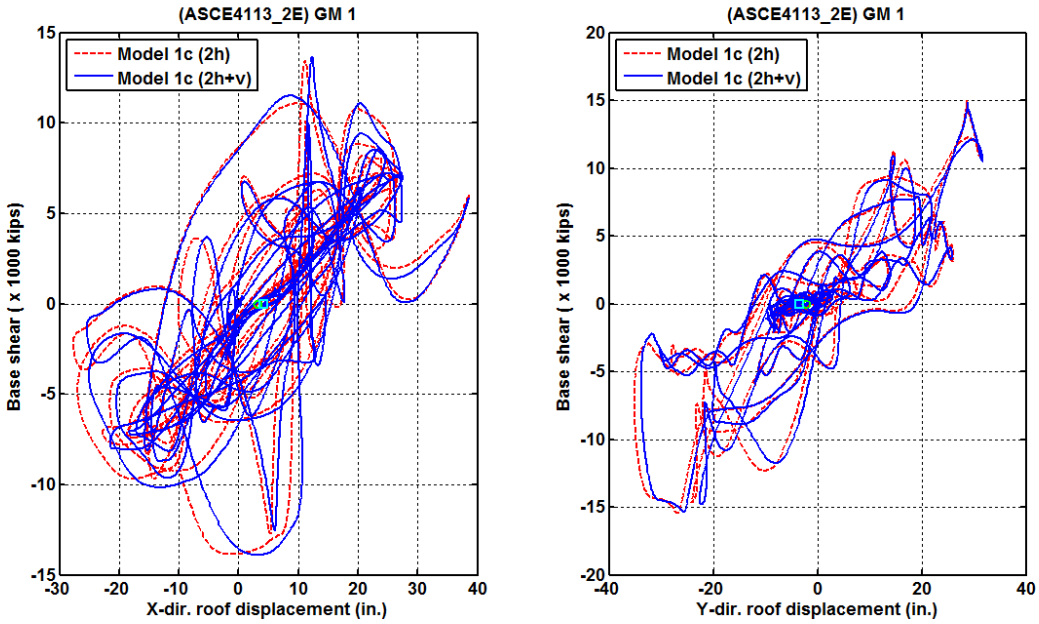

Figure F.61 Base shear versus roof displacement relationships under BSE-2E level ground motion number 1 with and without vertical component motions (Model 1c).

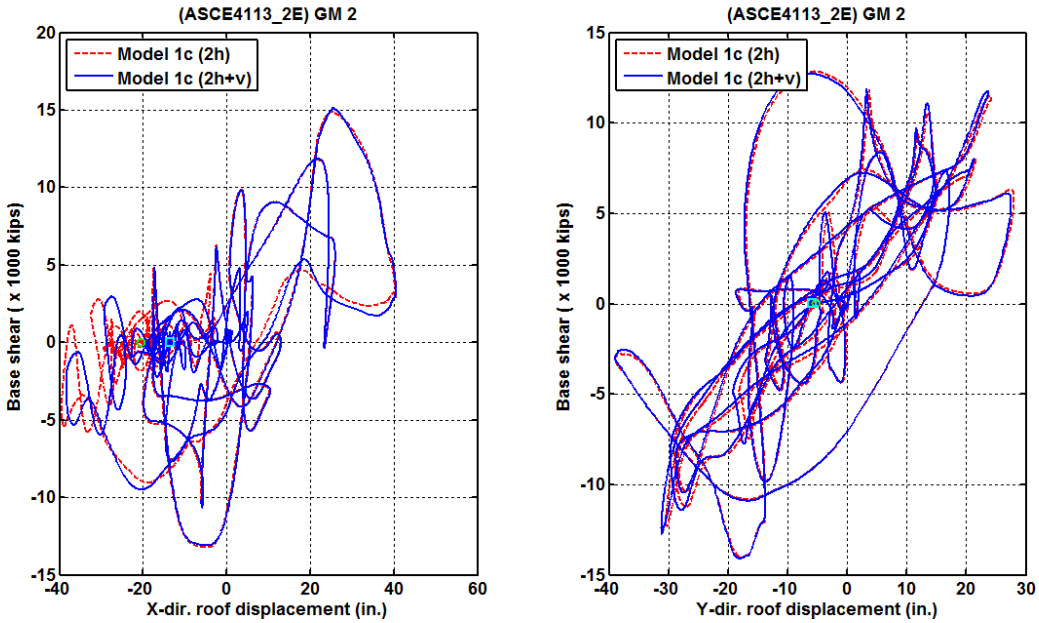

Figure F.62 Base shear versus roof displacement relationships under BSE-2E level ground motion number 2 with and without vertical component motions (Model 1c).

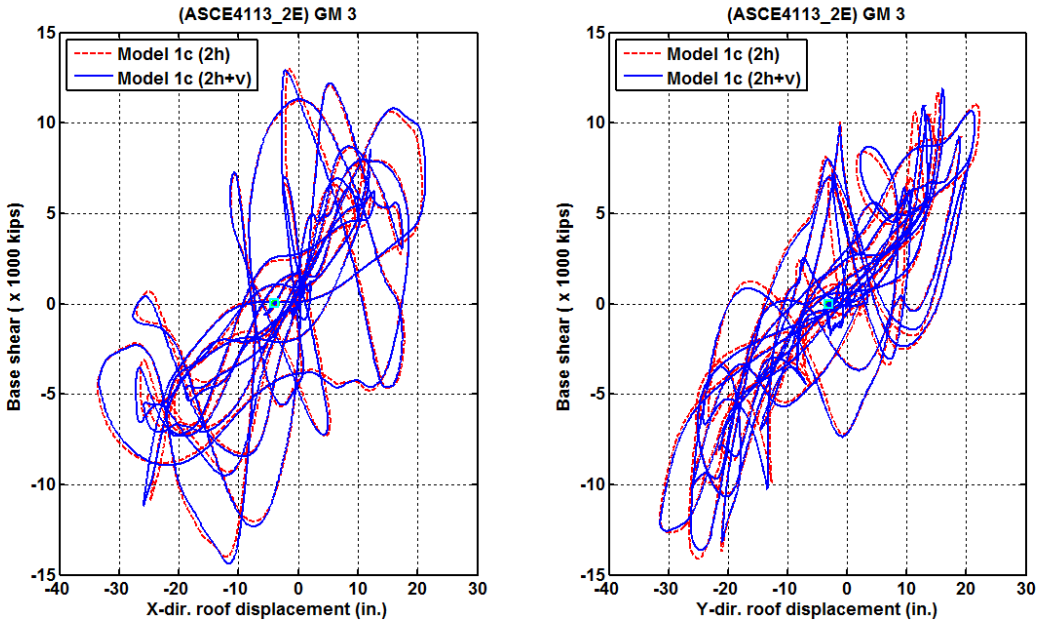

Figure F.63 Base shear versus roof displacement relationships under BSE-2E level ground motion number 3 with and without vertical component motions (Model 1c).

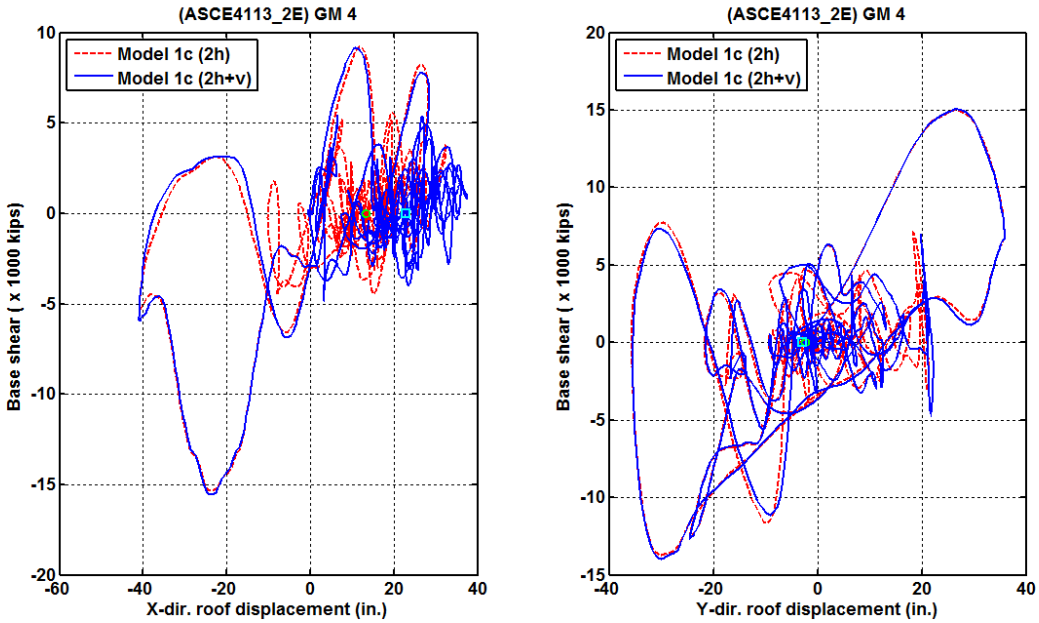

Figure F.64 Base shear versus roof displacement relationships under BSE-2E level ground motion number 4 with and without vertical component motions (Model 1c).

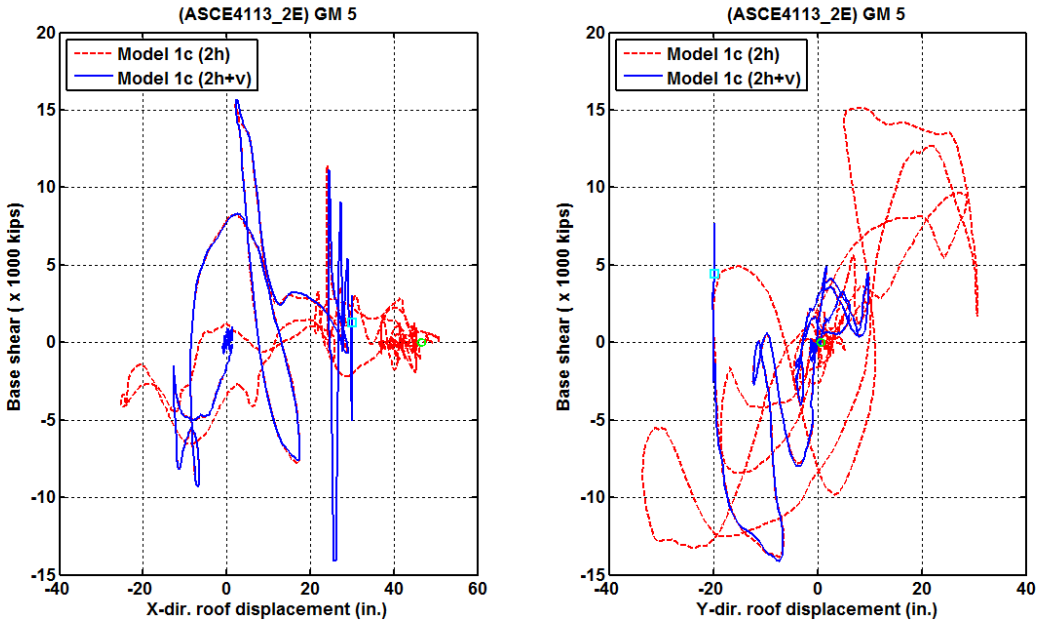

Figure F.65 Base shear versus roof displacement relationships under BSE-2E level ground motion number 5 with and without vertical component motions (Model 1c).

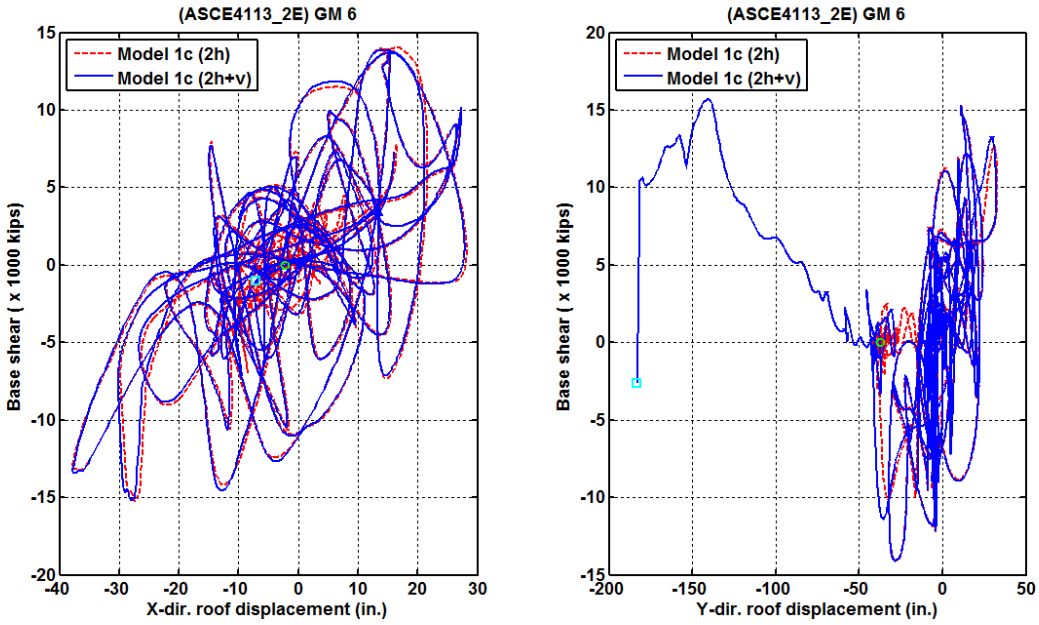

Figure F.66 Base shear versus roof displacement relationships under BSE-2E level ground motion number 6 with and without vertical component motions (Model 1c).

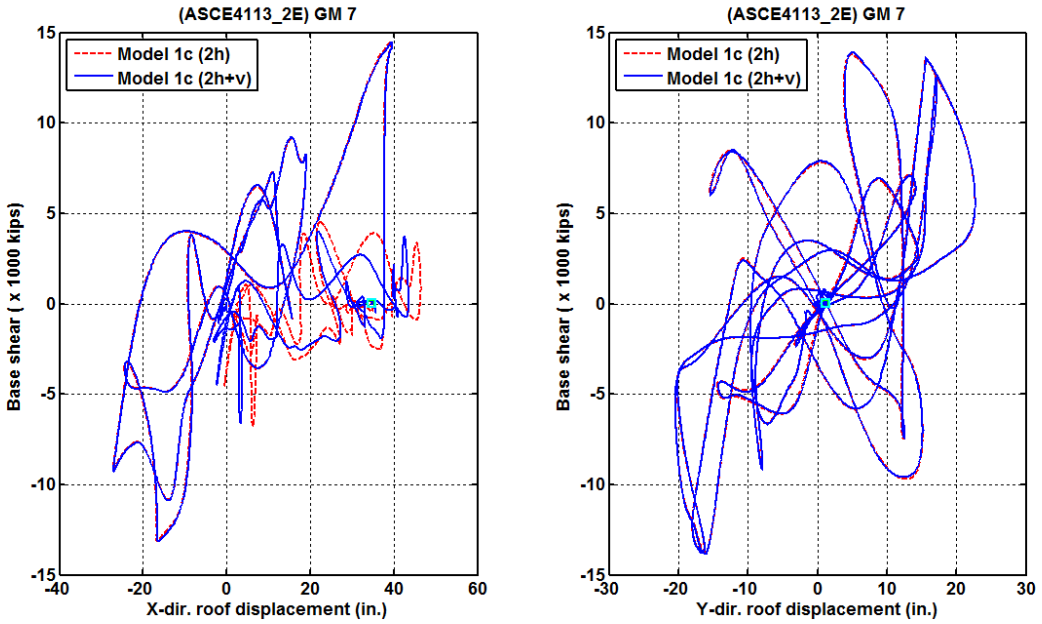

Figure F.67 Base shear versus roof displacement relationships under BSE-2E level ground motion number 7 with and without vertical component motions (Model 1c).

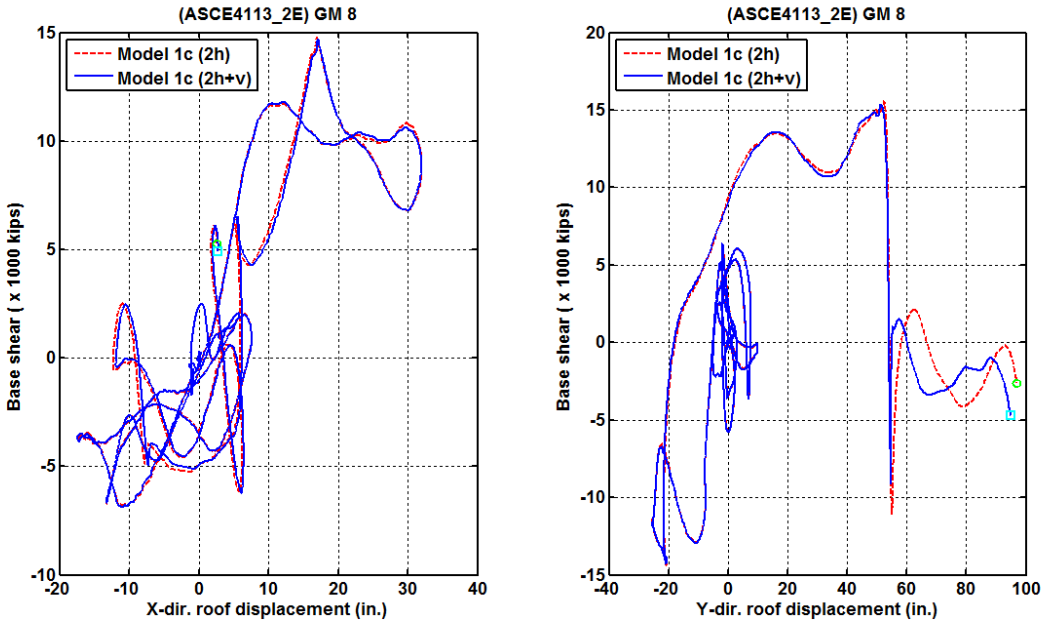

Figure F.68 Base shear versus roof displacement relationships under BSE-2E level ground motion number 8 with and without vertical component motions (Model 1c).

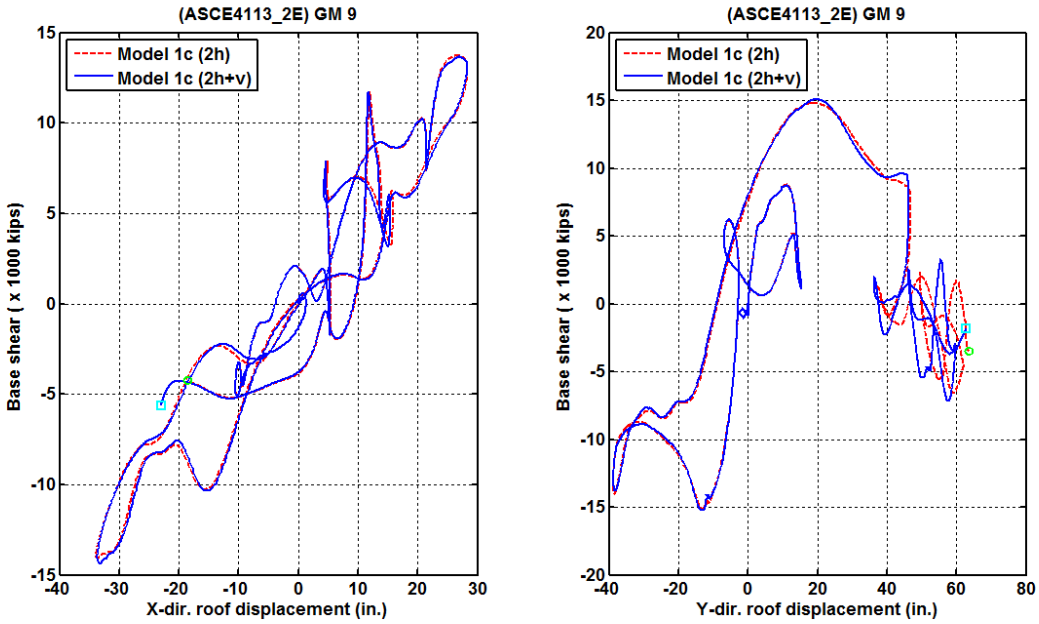

Figure F.69 Base shear versus roof displacement relationships under BSE-2E level ground motion number 9 with and without vertical component motions (Model 1c).

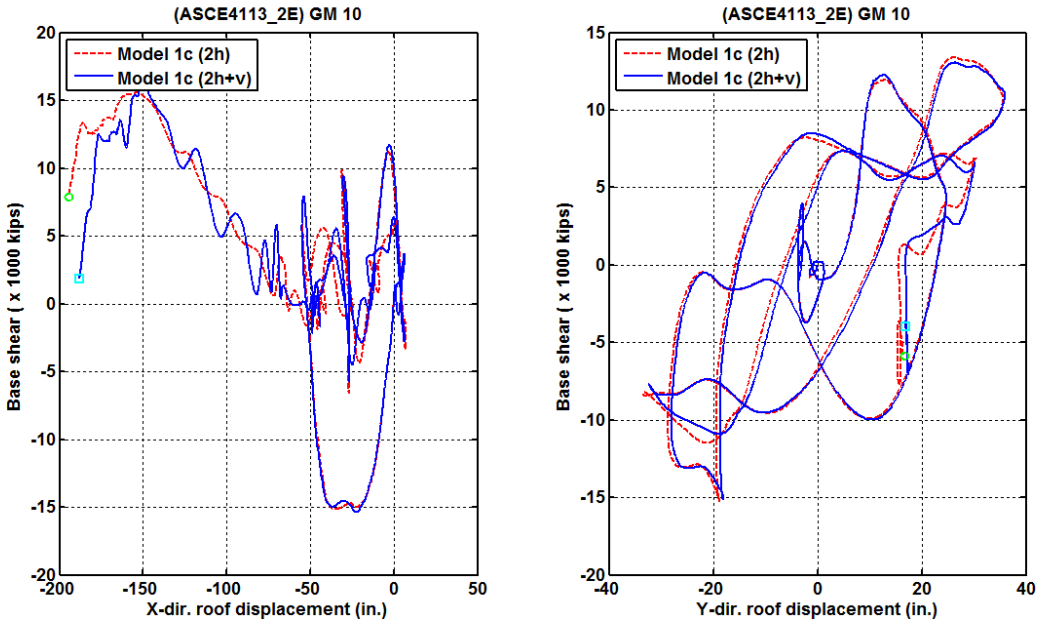

Figure F.70 Base shear versus roof displacement relationships under BSE-2E level ground motion number 10 with and without vertical component motions (Model 1c).

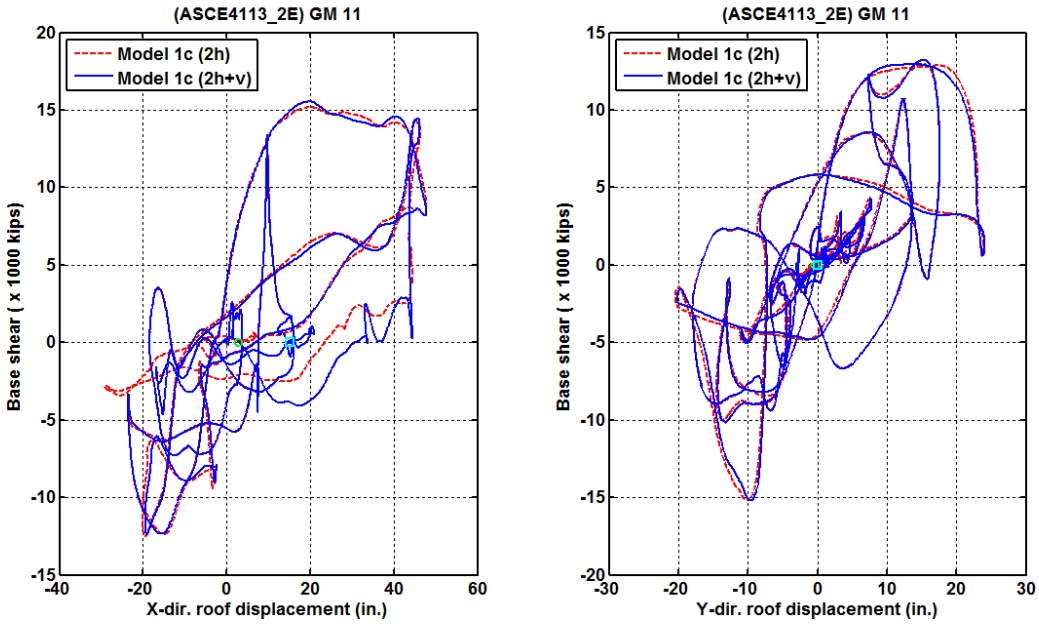

Figure F.71 Base shear versus roof displacement relationships under BSE-2E level ground motion number 11 with and without vertical component motions (Model 1c).

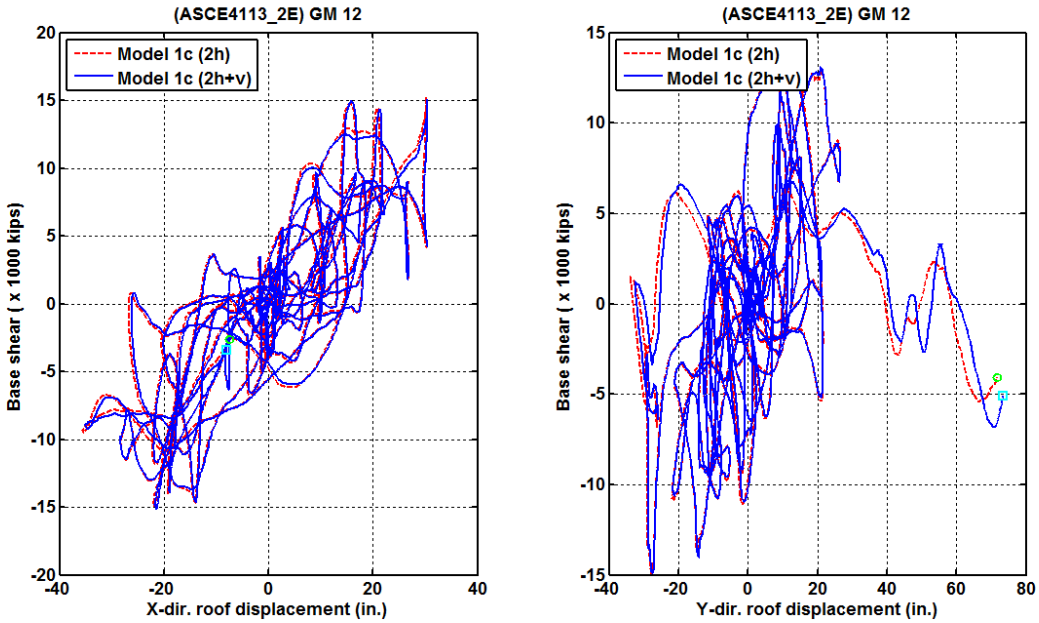

Figure F.72 Base shear versus roof displacement relationships under BSE-2E level ground motion number 12 with and without vertical component motions (Model 1c).

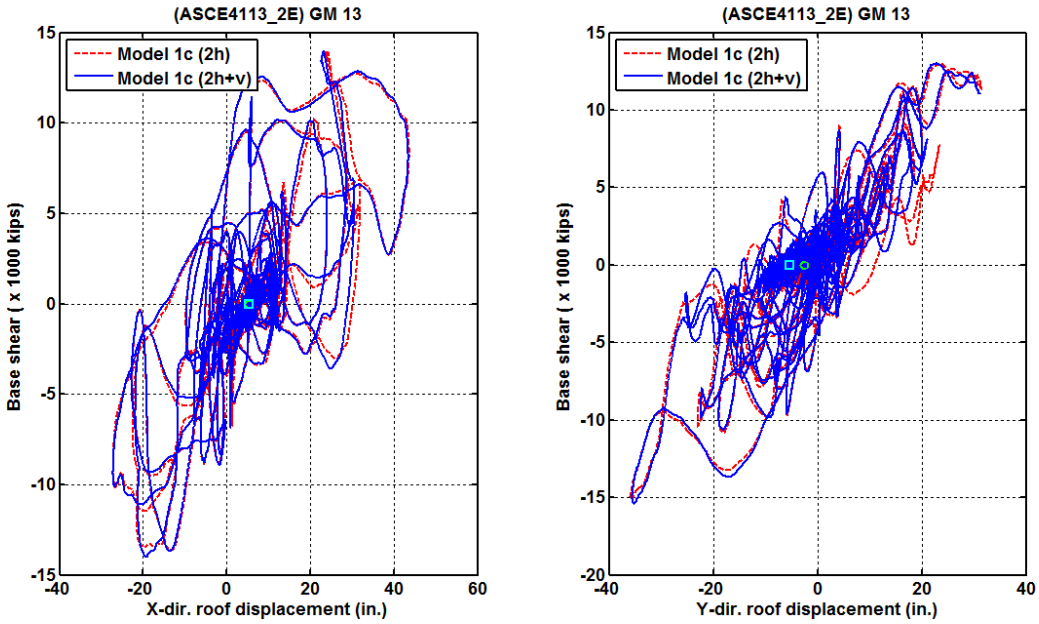

Figure F.73 Base shear versus roof displacement relationships under BSE-2E level ground motion number 13 with and without vertical component motions (Model 1c).

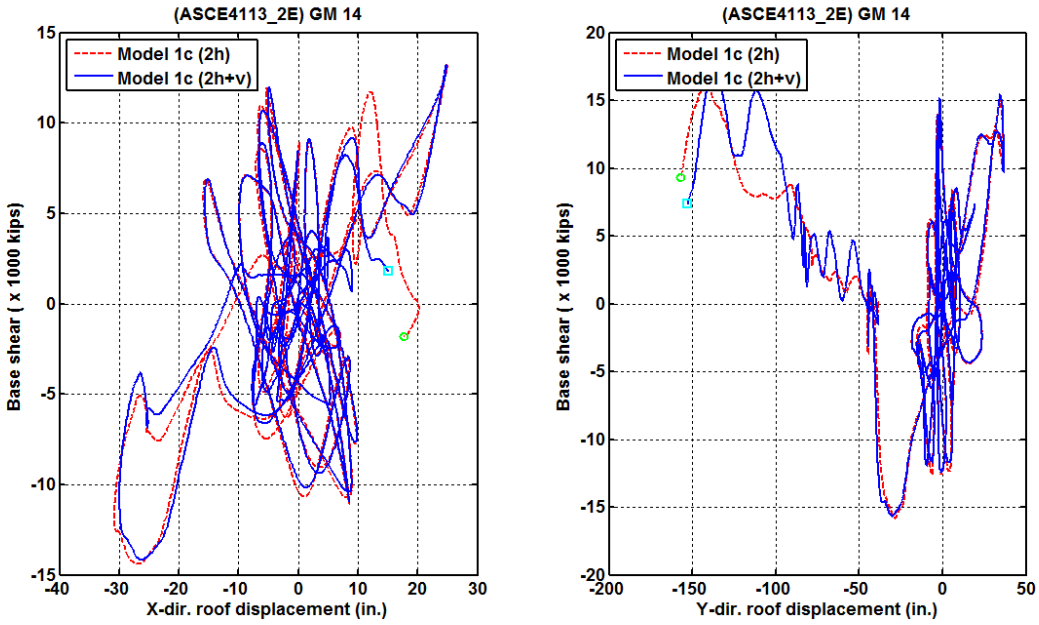

Figure F.74 Base shear versus roof displacement relationships under BSE-2E level ground motion number 14 with and without vertical component motions (Model 1c).

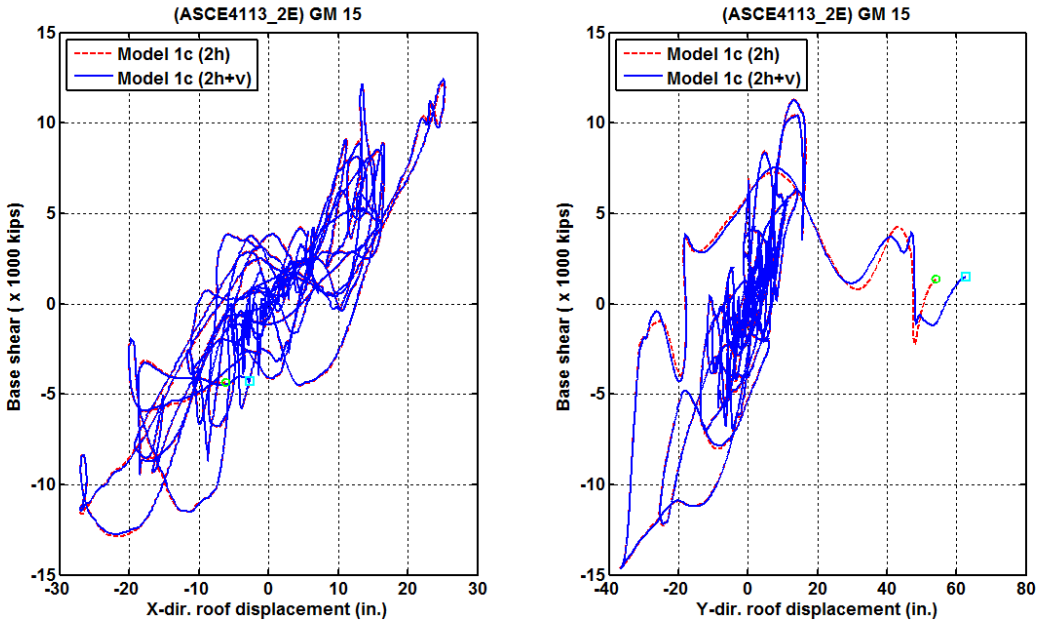

Figure F.75 Base shear versus roof displacement relationships under BSE-2E level ground motion number 15 with and without vertical component motions (Model 1c).

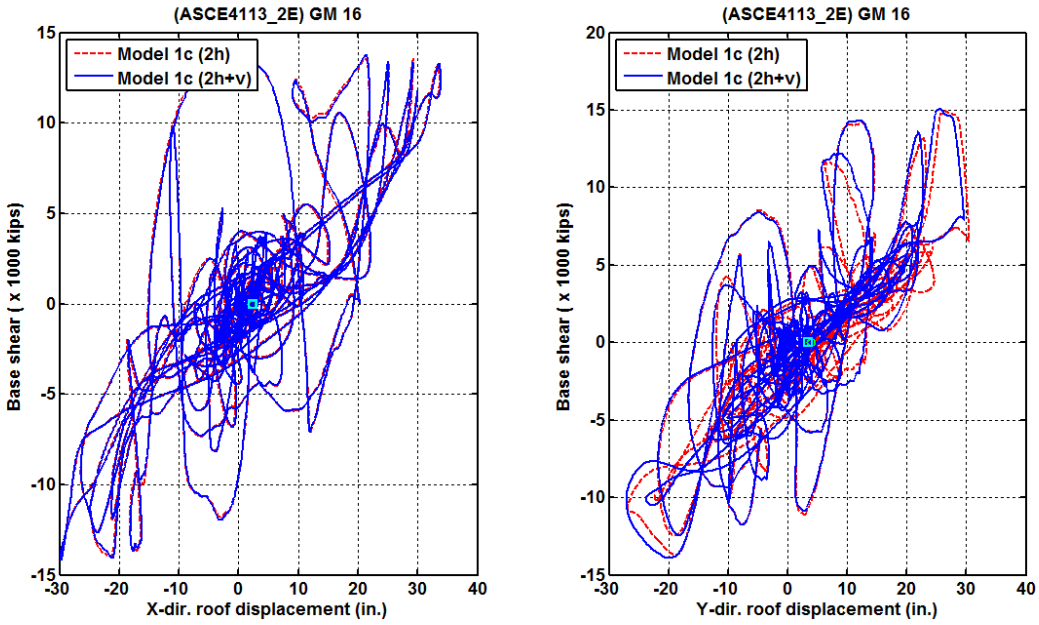

Figure F.76 Base shear versus roof displacement relationships under BSE-2E level ground motion number 16 with and without vertical component motions (Model 1c).

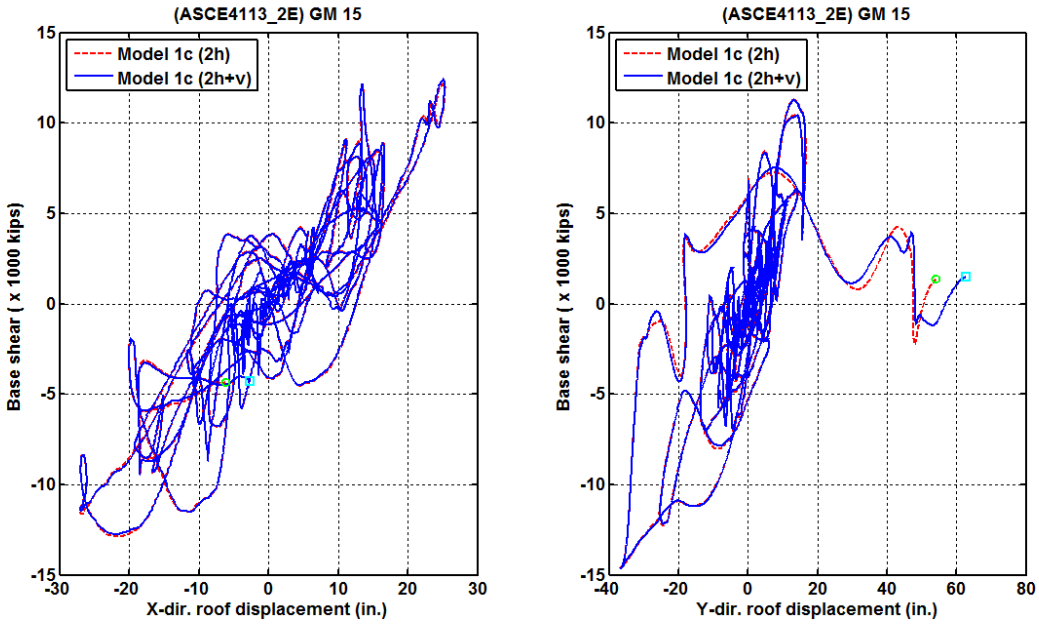

Figure F.77 Base shear versus roof displacement relationships under BSE-2E level ground motion number 15 with and without vertical component motions (Model 1c).

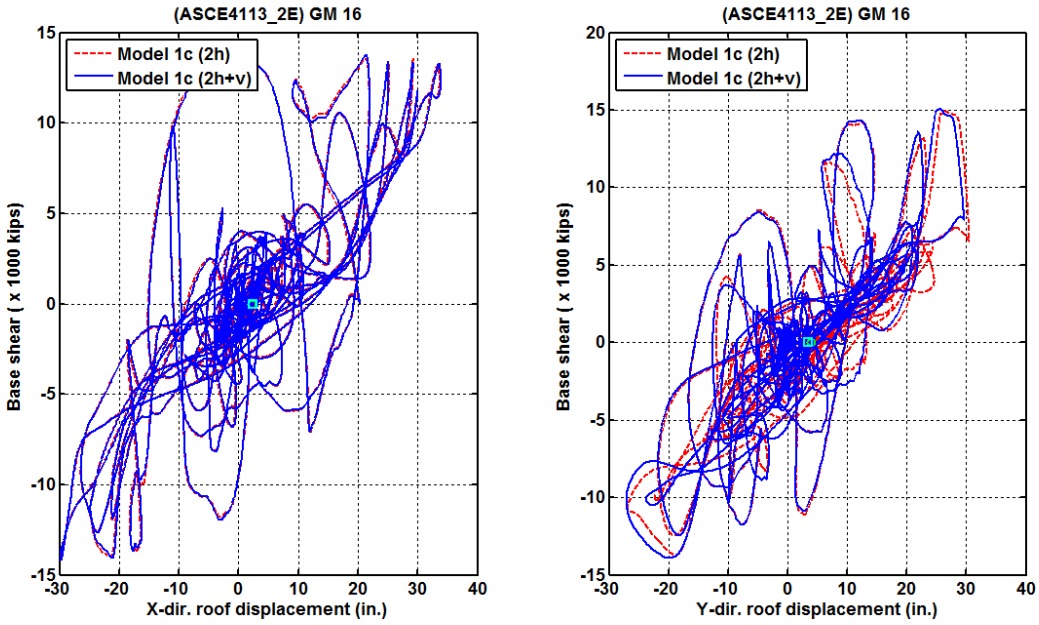

Figure F.78 Base shear versus roof displacement relationships under BSE-2E level ground motion number 16 with and without vertical component motions (Model 1c)

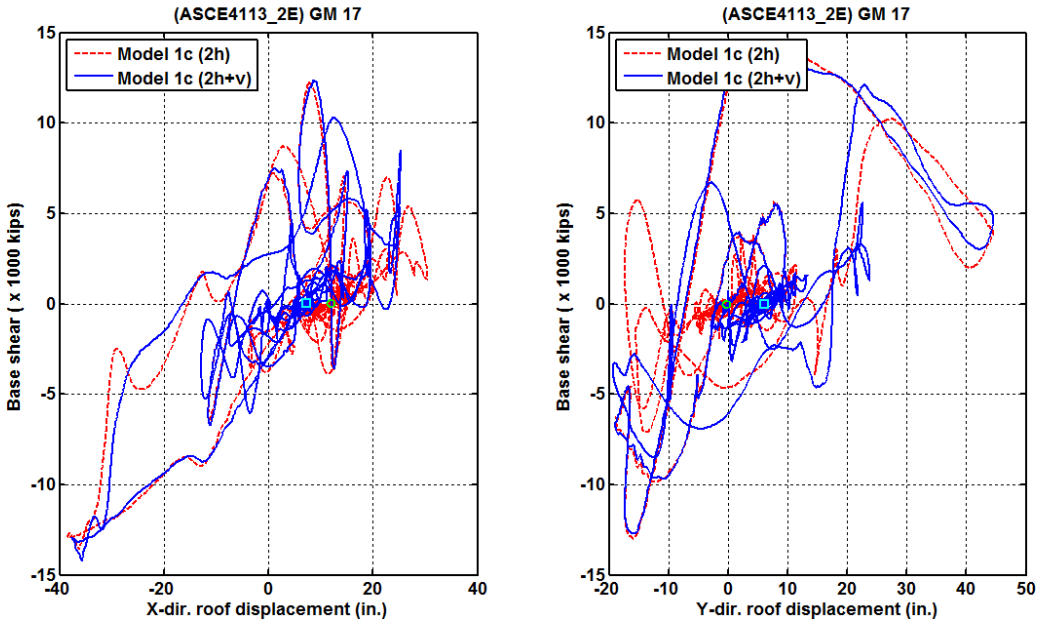

Figure F.79 Base shear versus roof displacement relationships under BSE-2E level ground motion number 17 with and without vertical component motions (Model 1c).

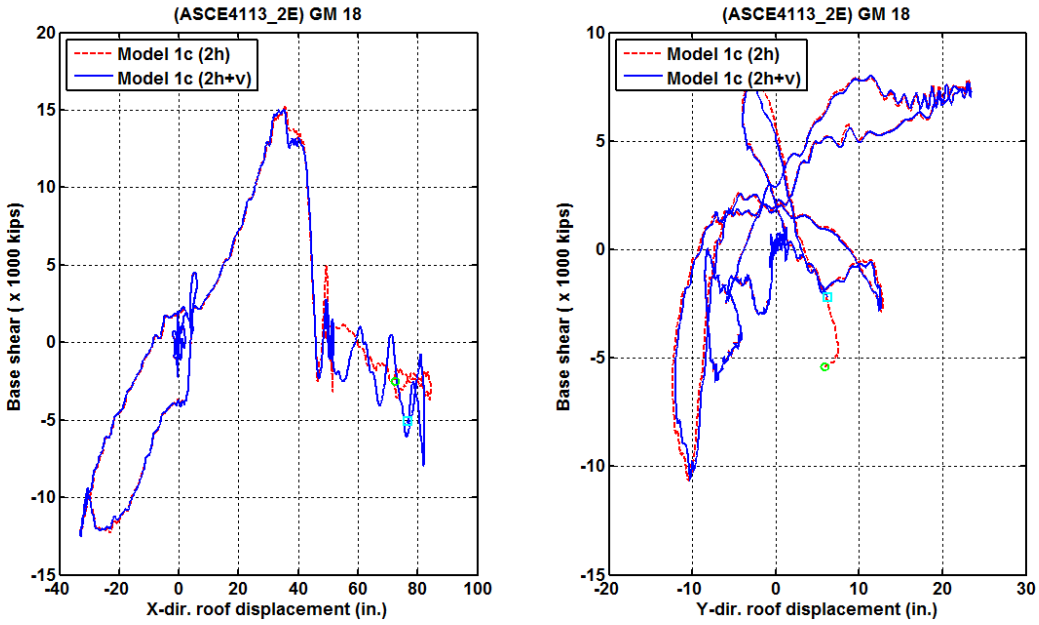

Figure F.80 Base shear versus roof displacement relationships under BSE-2E level ground motion number 18 with and without vertical component motions (Model 1c).

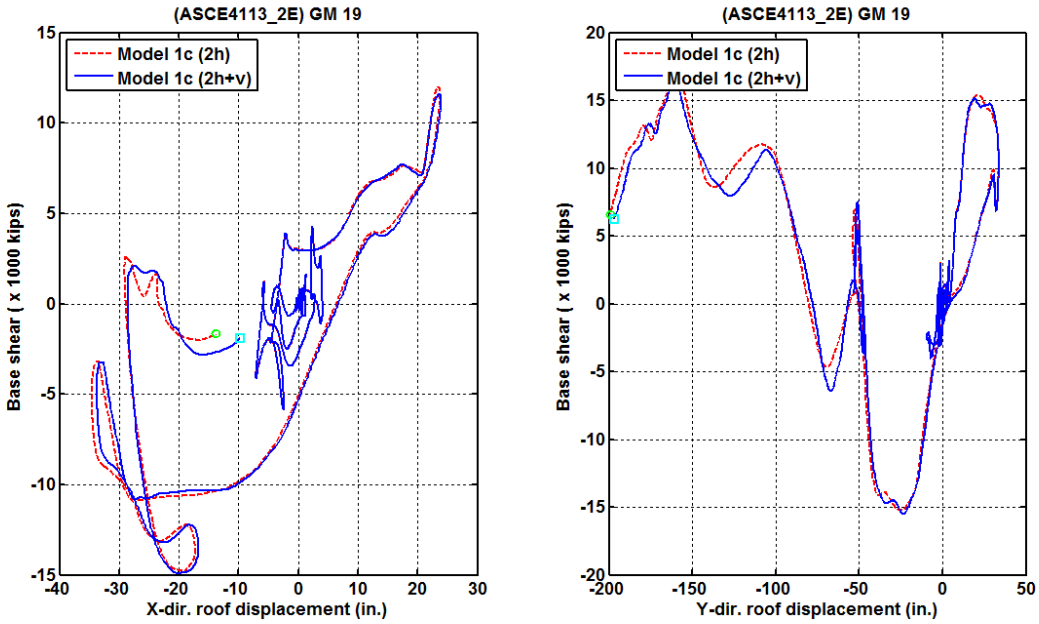

Figure F.81 Base shear versus roof displacement relationships under BSE-2E level ground motion number 19 with and without vertical component motions (Model 1c).

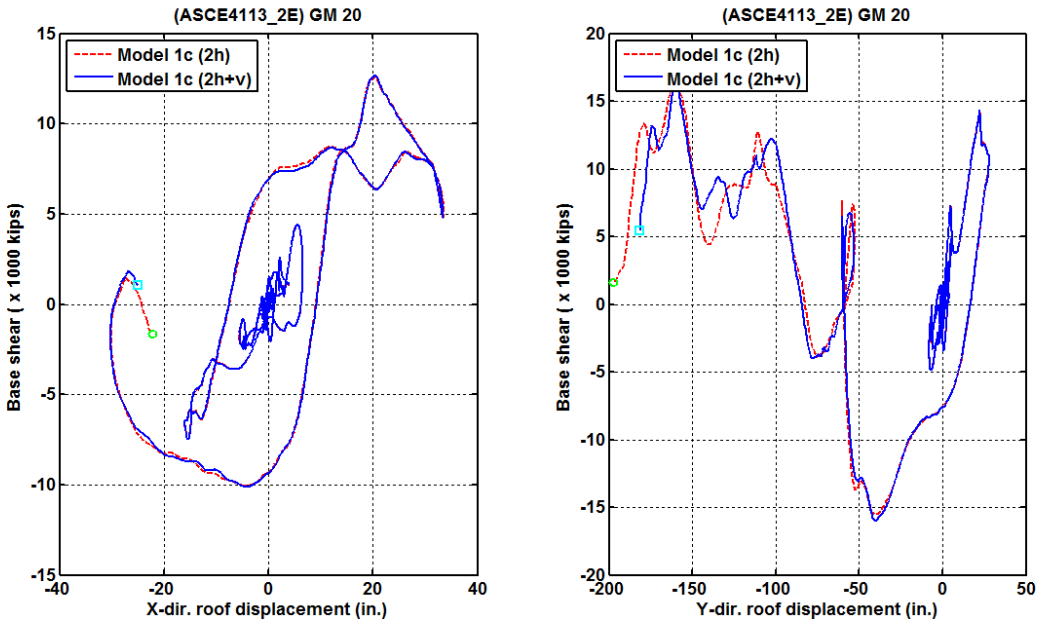

Figure F.82 Base shear versus roof displacement relationships under BSE-2E level ground motion number 20 with and without vertical component motions (Model 1c).

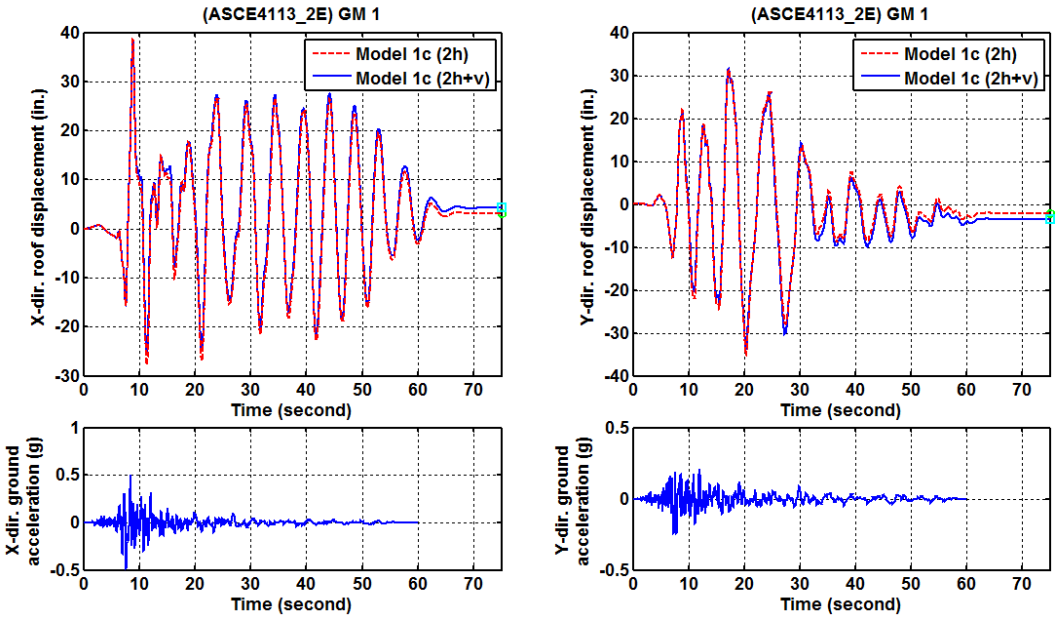

Figure F.83 Roof displacement histories under BSE-2E level ground motion number 1 with and without vertical component motions (Model 1c).

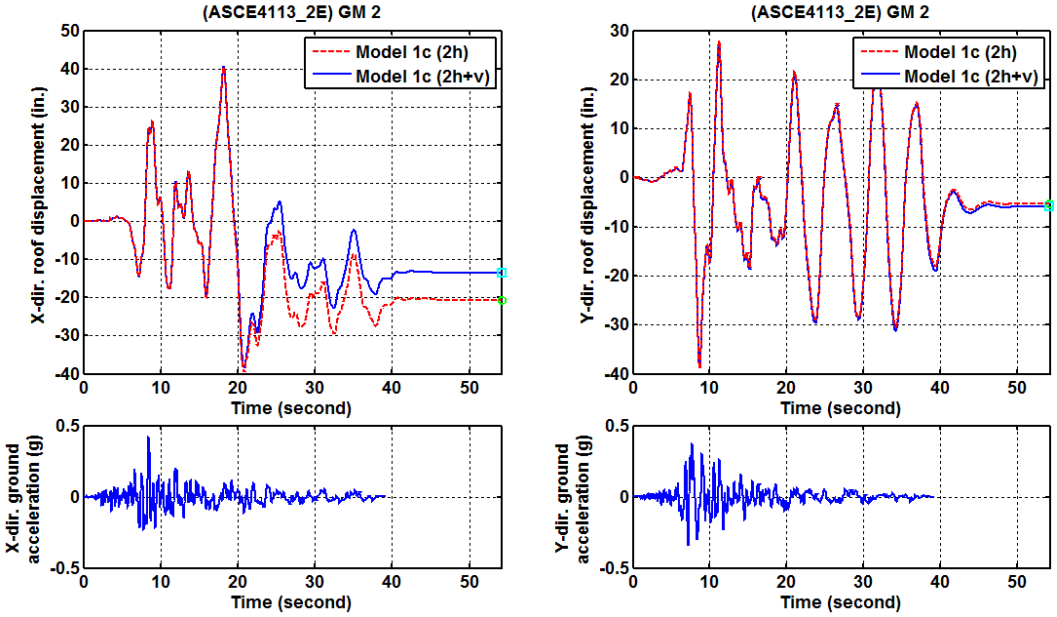

Figure F.84 Roof displacement histories under BSE-2E level ground motion number 2 with and without vertical component motions (Model 1c).

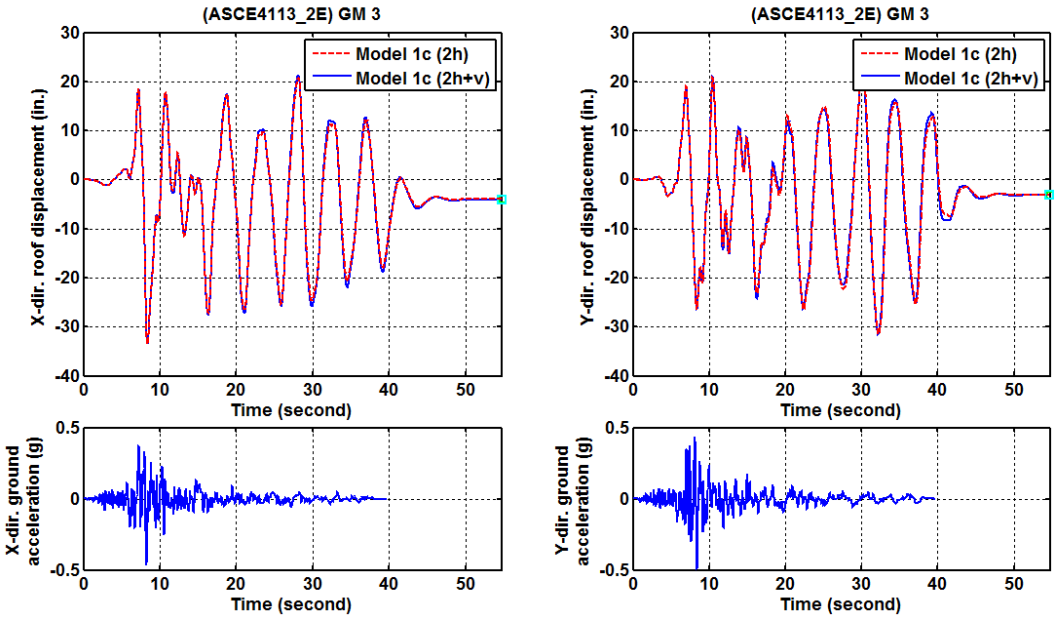

Figure F.85 Roof displacement histories under BSE-2E level ground motion number 3 with and without vertical component motions (Model 1c).

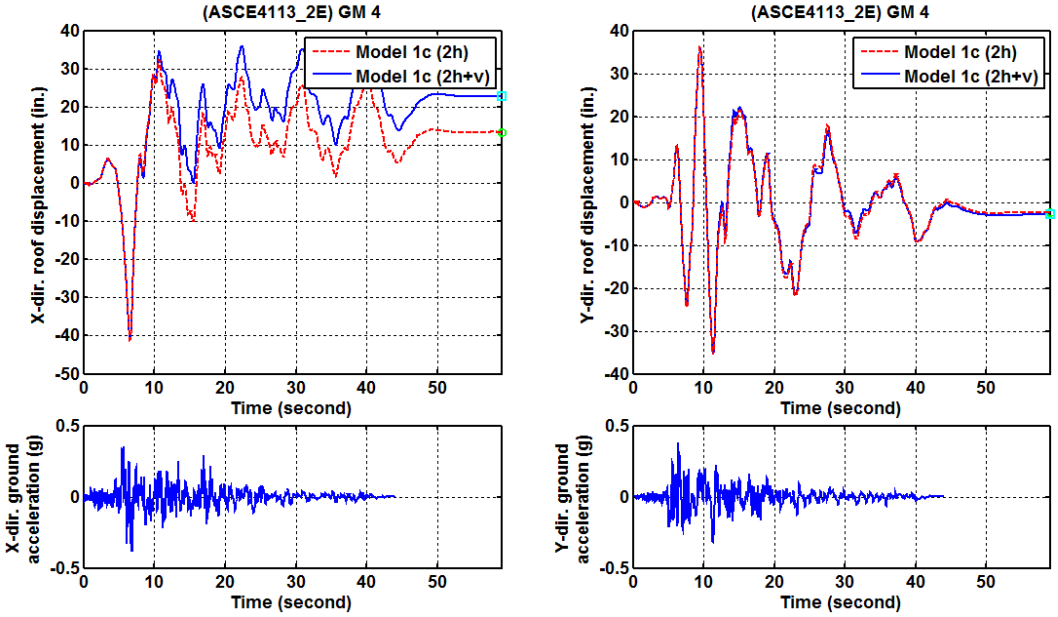

Figure F.86 Roof displacement histories under BSE-2E level ground motion number 4 with and without vertical component motions (Model 1c).

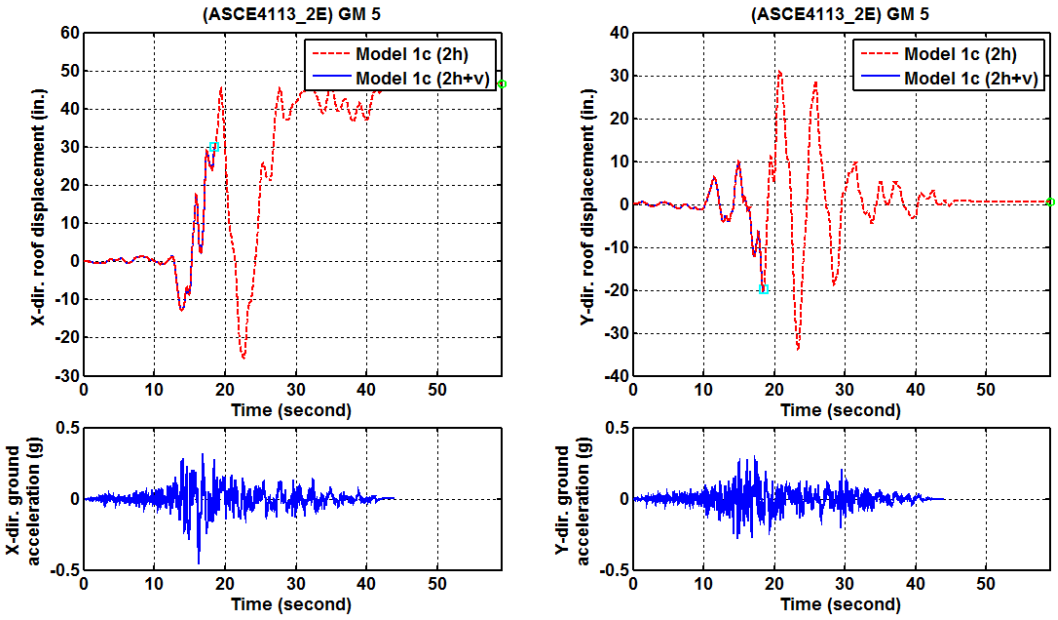

Figure F.87 Roof displacement histories under BSE-2E level ground motion number 5 with and without vertical component motions (Model 1c).

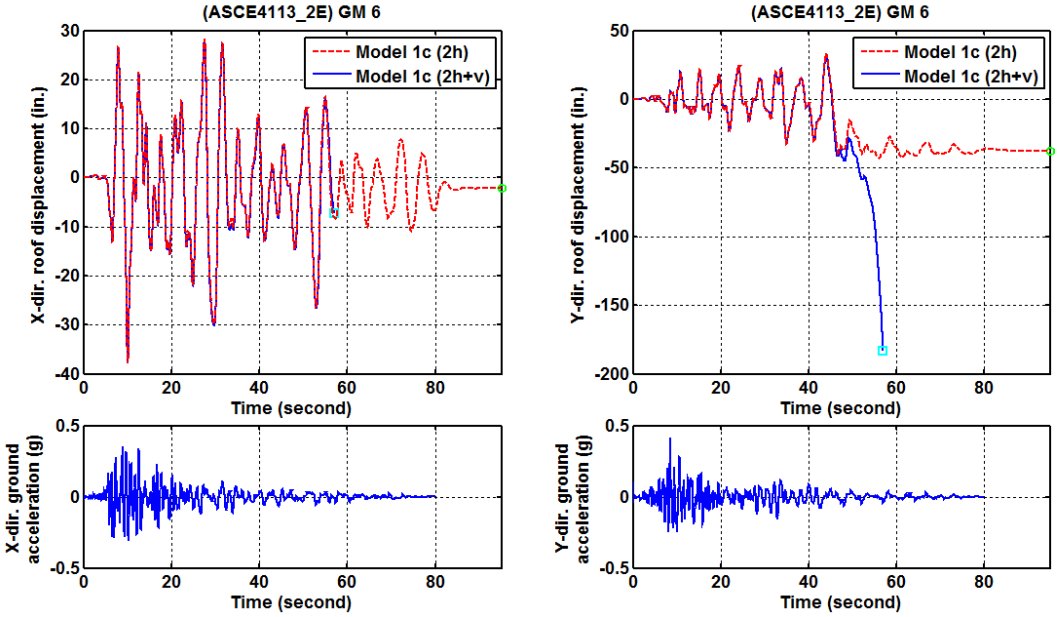

Figure F.88 Roof displacement histories under BSE-2E level ground motion number 6 with and without vertical component motions (Model 1c).

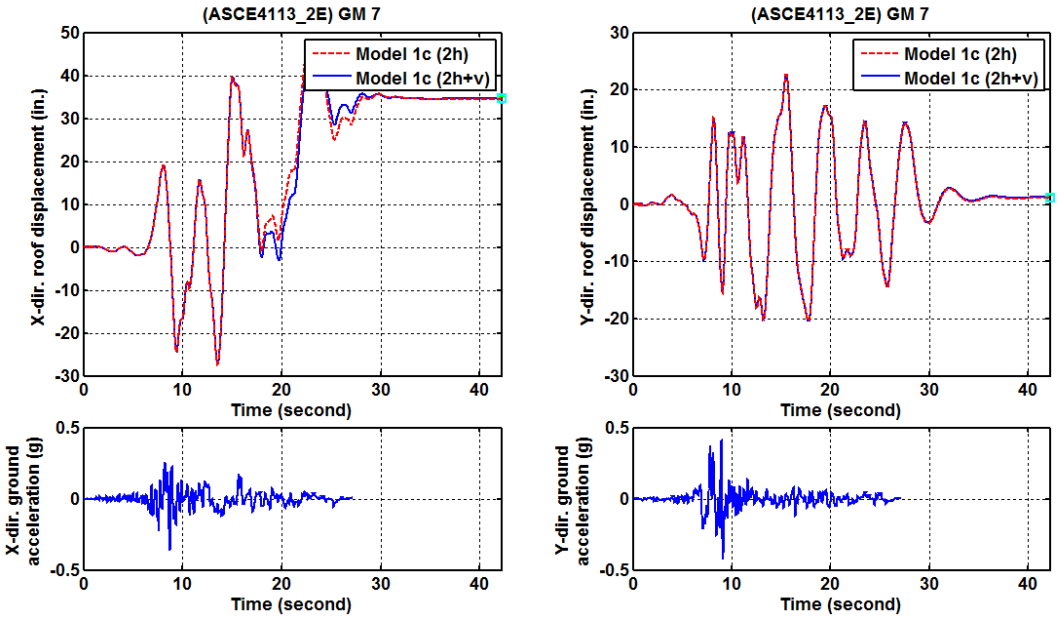

Figure F.89 Roof displacement histories under BSE-2E level ground motion number 7 with and without vertical component motions (Model 1c).

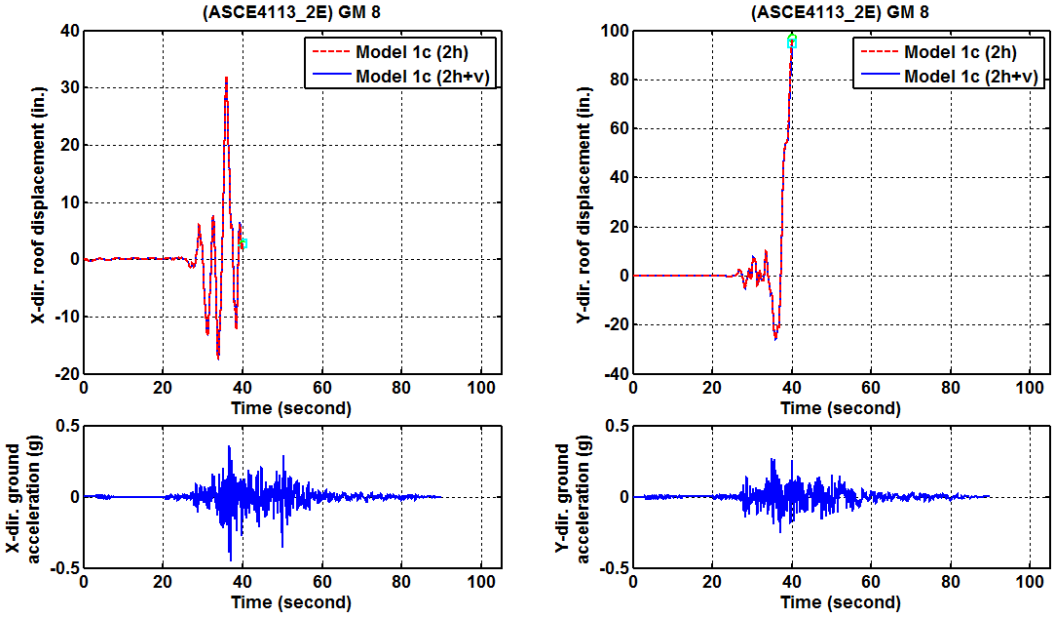

Figure F.90 Roof displacement histories under BSE-2E level ground motion number 8 with and without vertical component motions (Model 1c).

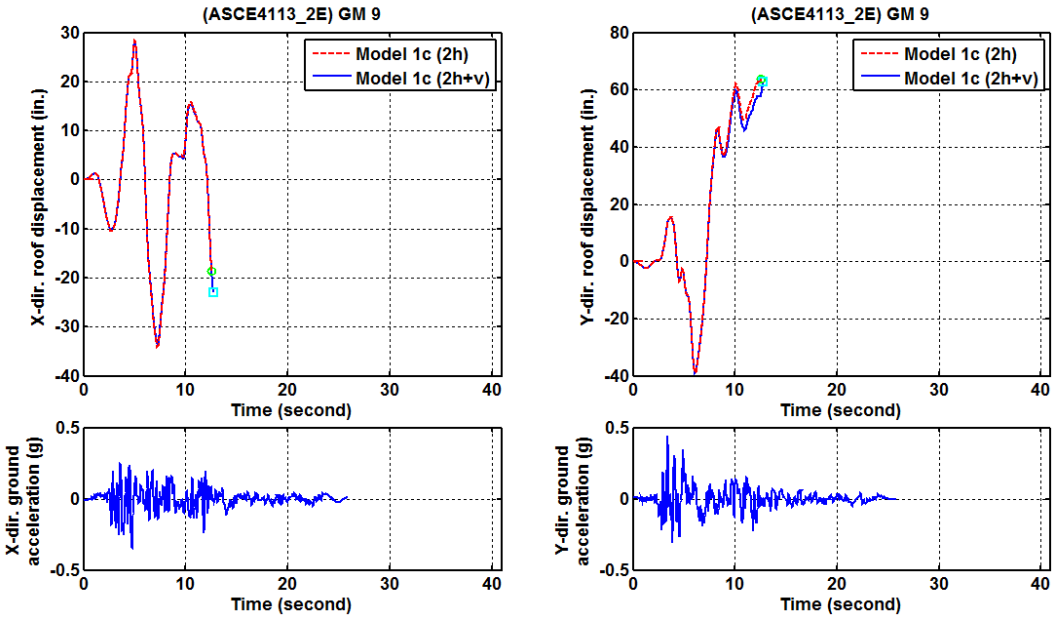

Figure F.91 Roof displacement histories under BSE-2E level ground motion number 9 with and without vertical component motions (Model 1c).

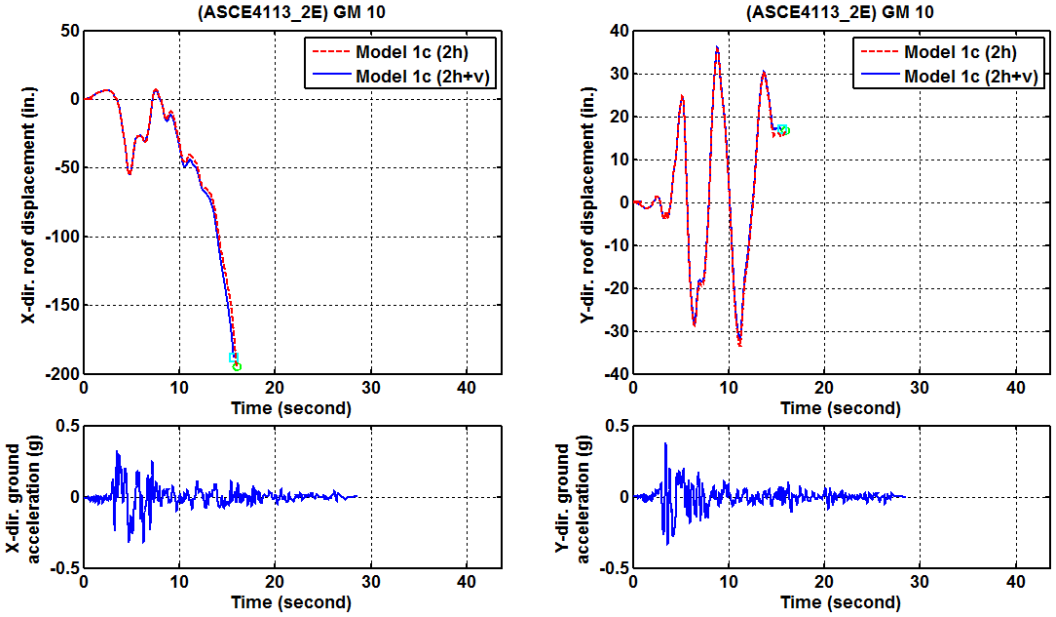

Figure F.92 Roof displacement histories under BSE-2E level ground motion number 10 with and without vertical component motions (Model 1c).

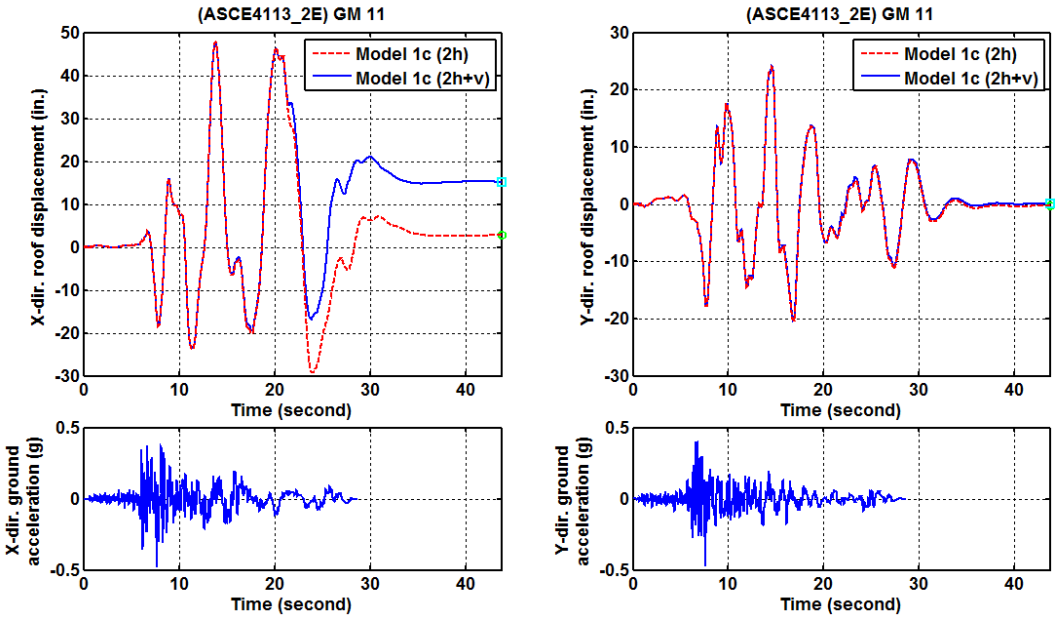

Figure F.93 Roof displacement histories under BSE-2E level ground motion number 11 with and without vertical component motions (Model 1c).

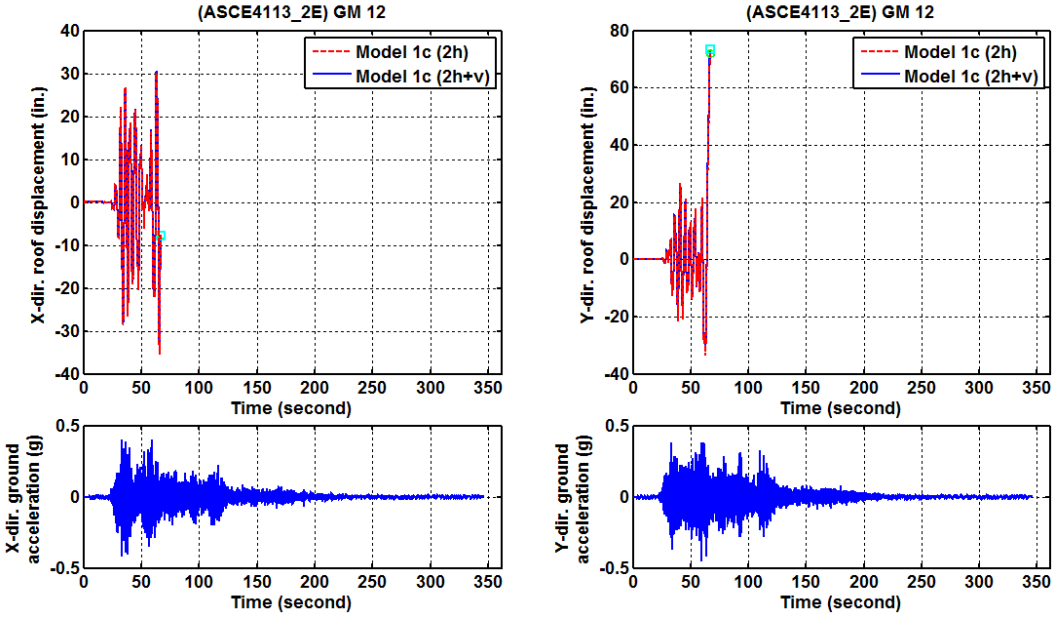

Figure F.94 Roof displacement histories under BSE-2E level ground motion number 12 with and without vertical component motions (Model 1c).

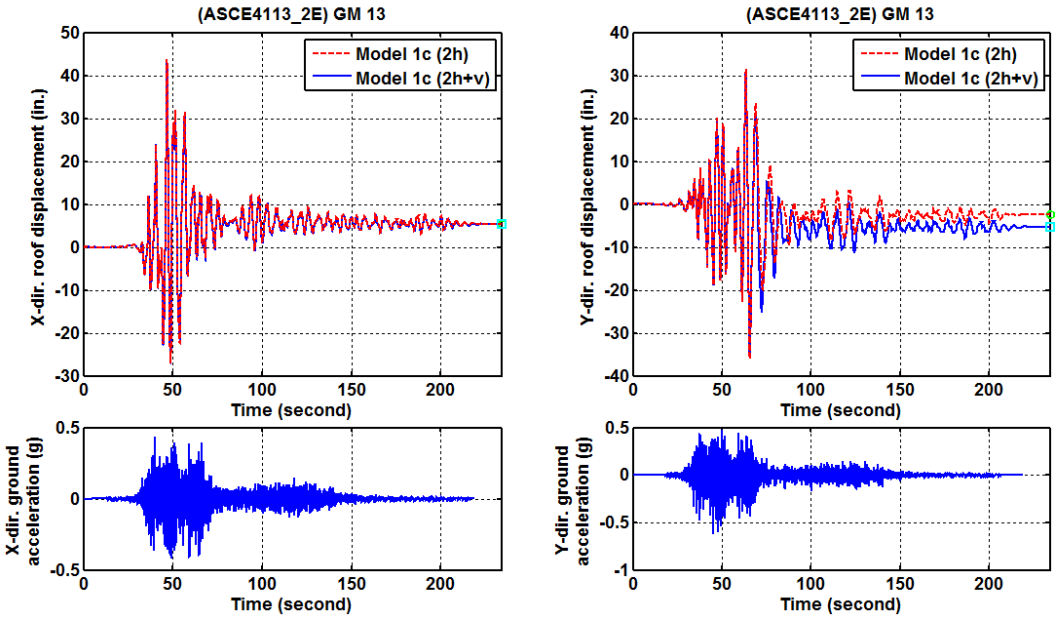

Figure F.95 Roof displacement histories under BSE-2E level ground motion number 13 with and without vertical component motions (Model 1c).

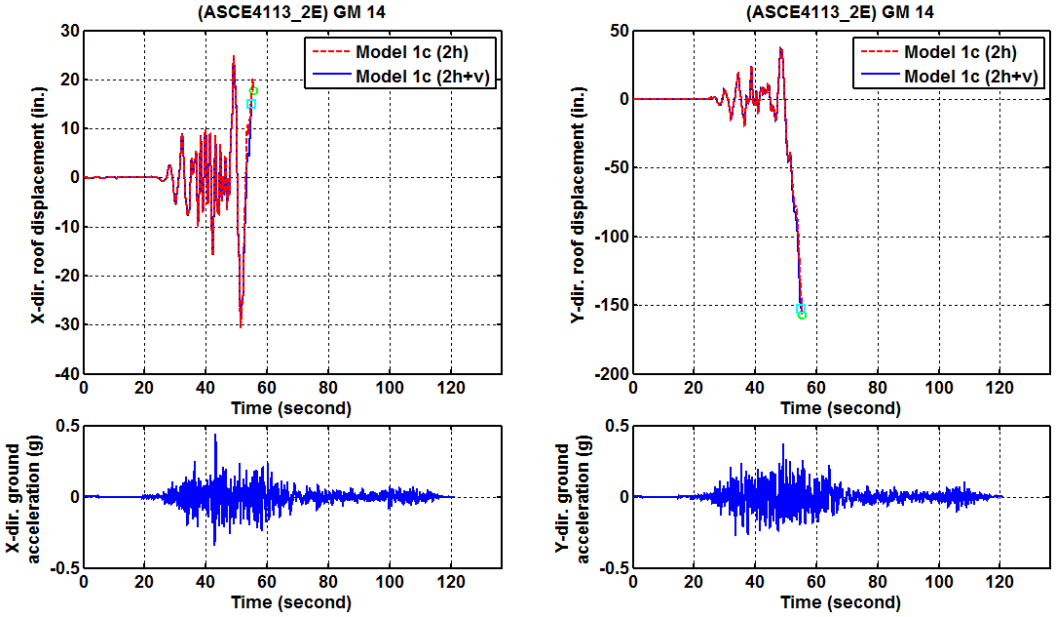

Figure F.96 Roof displacement histories under BSE-2E level ground motion number 14 with and without vertical component motions (Model 1c).

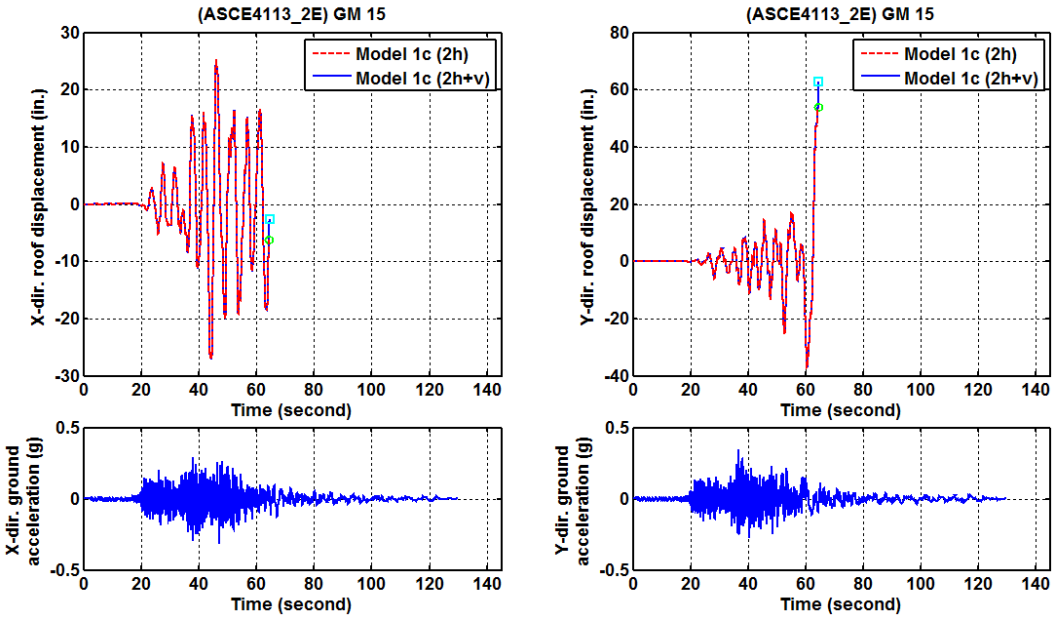

Figure F.97 Roof displacement histories under BSE-2E level ground motion number 15 with and without vertical component motions (Model 1c).

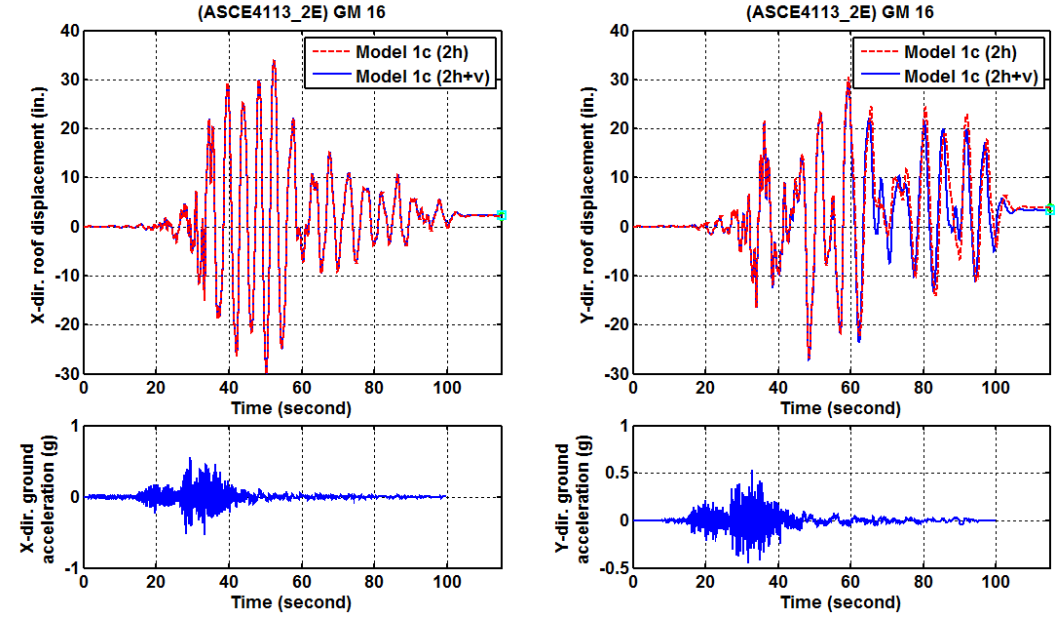

Figure F.98 Roof displacement histories under BSE-2E level ground motion number 16 with and without vertical component motions (Model 1c).

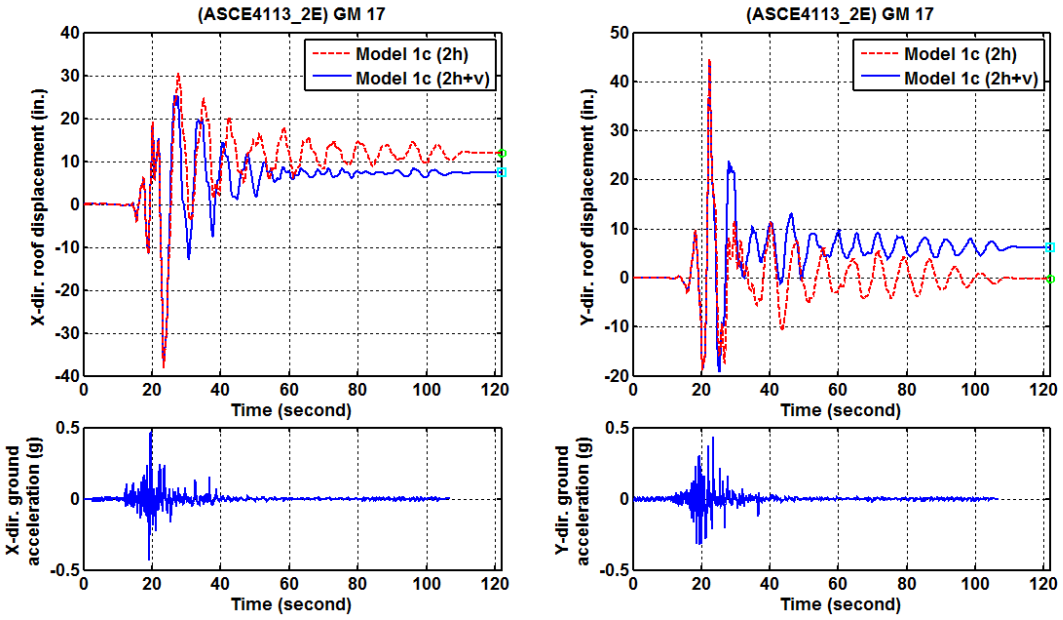

Figure F.99 Roof displacement histories under BSE-2E level ground motion number 17 with and without vertical component motions (Model 1c).

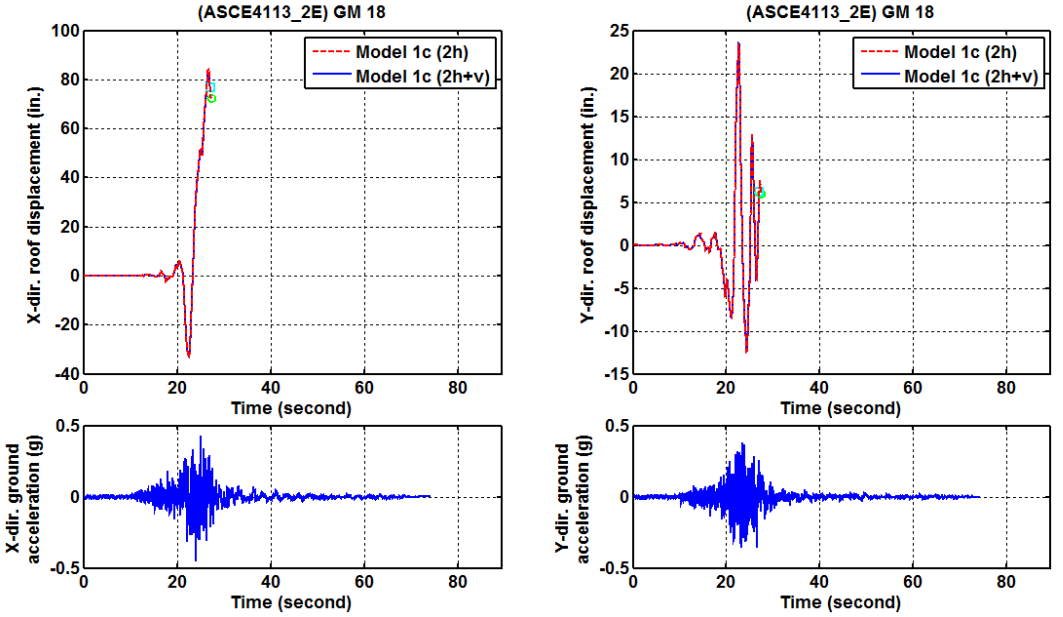

Figure F.100 Roof displacement histories under BSE-2E level ground motion number 18 with and without vertical component motions (Model 1c).

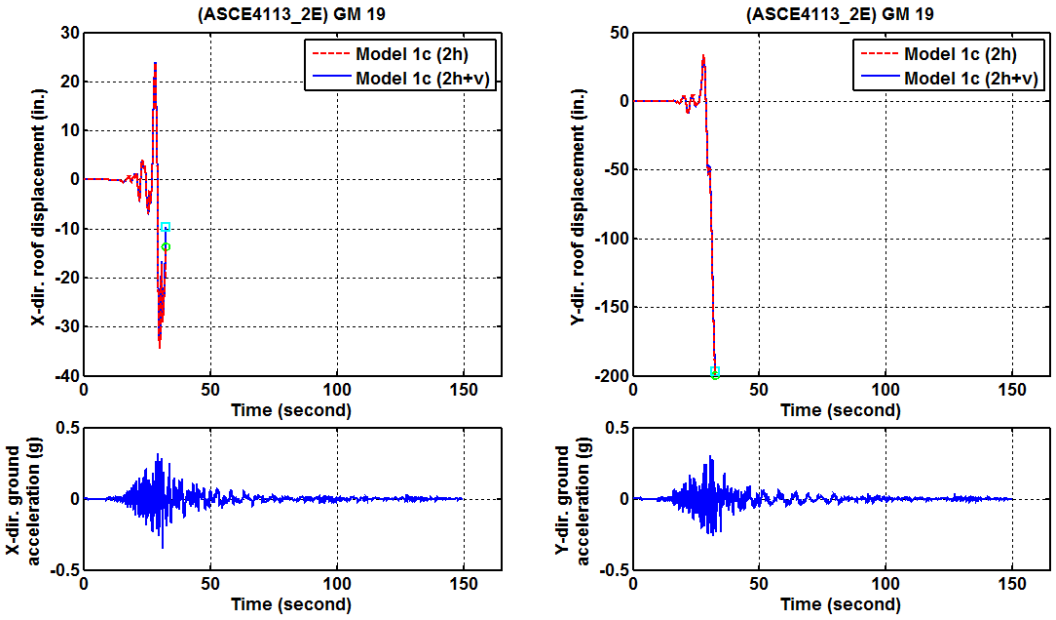

Figure F.101 Roof displacement histories under BSE-2E level ground motion number 19 with and without vertical component motions (Model 1c).

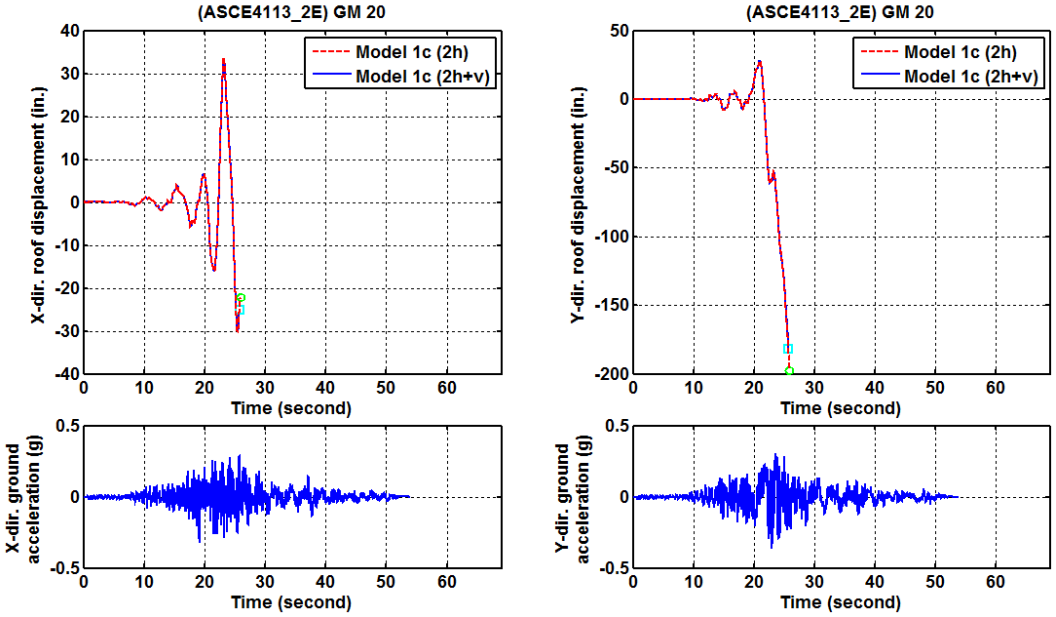

Figure F.102 Roof displacement histories under BSE-2E level ground motion number 20 with and without vertical component motions (Model 1c).

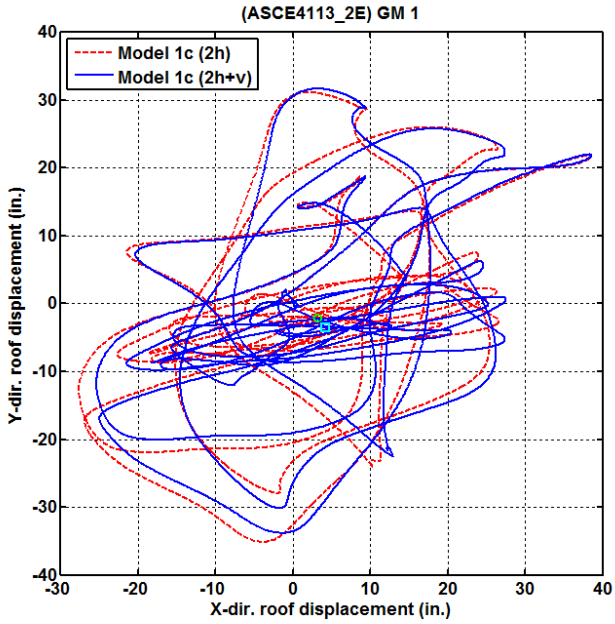

Figure F.103 Roof displacement orbits under BSE-2E level ground motion number 1 with and without vertical component motions (Model 1c).

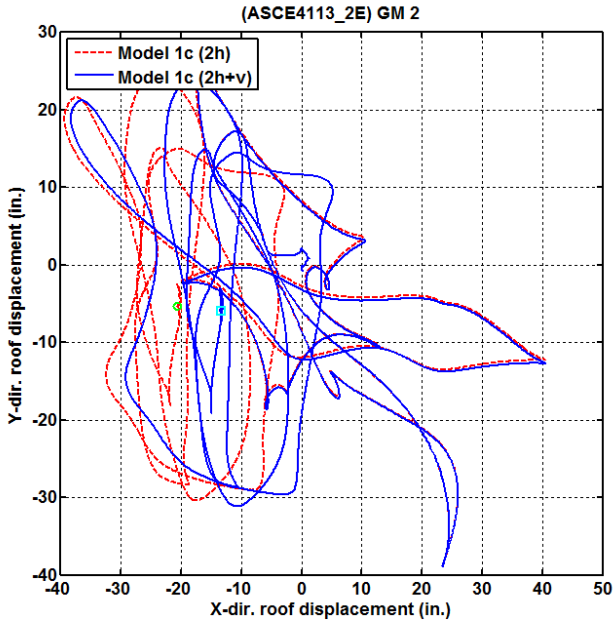

Figure F.104 Roof displacement orbits under BSE-2E level ground motion number 2 with and without vertical component motions (Model 1c).

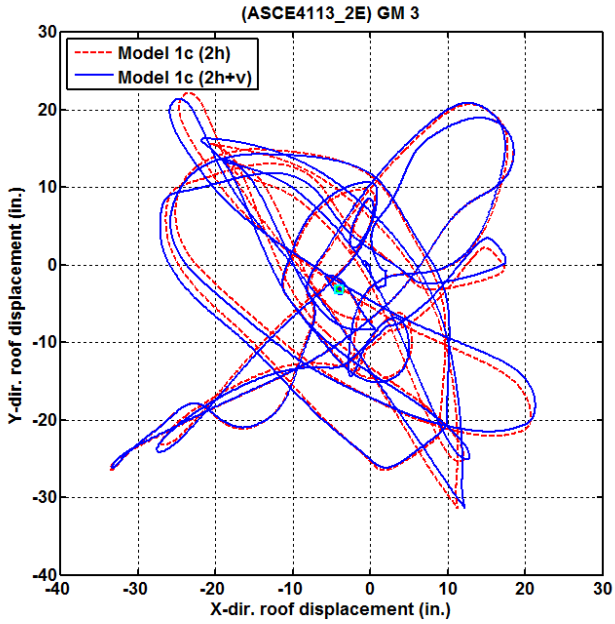

Figure F.105 Roof displacement orbits under BSE-2E level ground motion number 3 with and without vertical component motions (Model 1c).

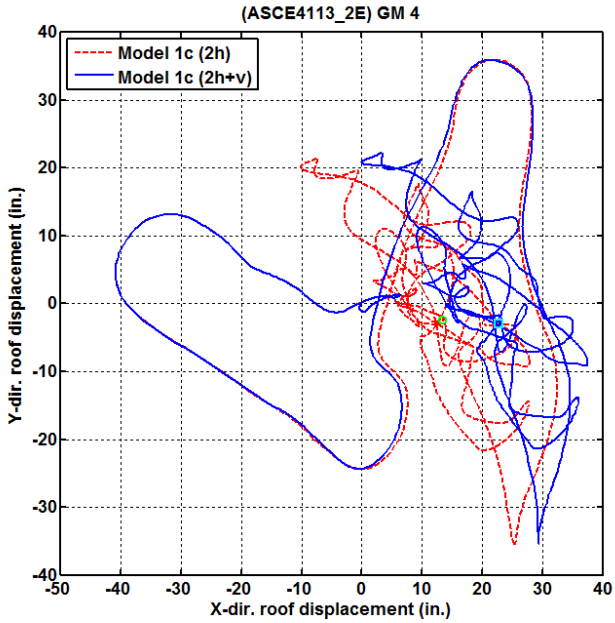

Figure F.106 Roof displacement orbits under BSE-2E level ground motion number 4 with and without vertical component motions (Model 1c).

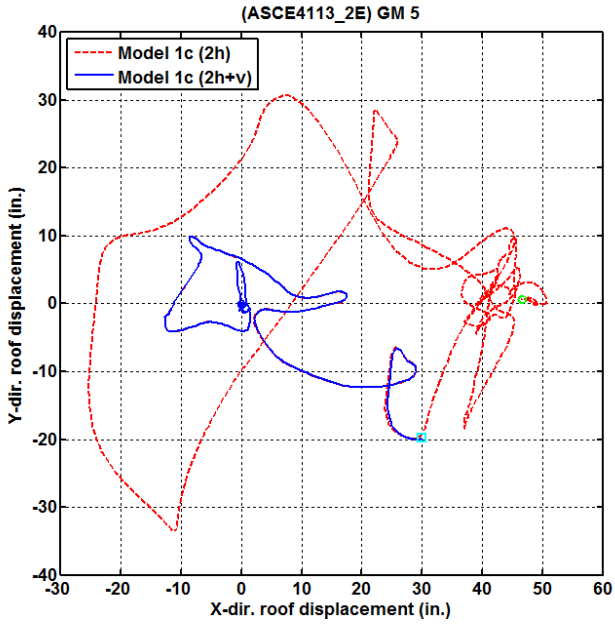

Figure F.107 Roof displacement orbits under BSE-2E level ground motion number 5 with and without vertical component motions (Model 1c).

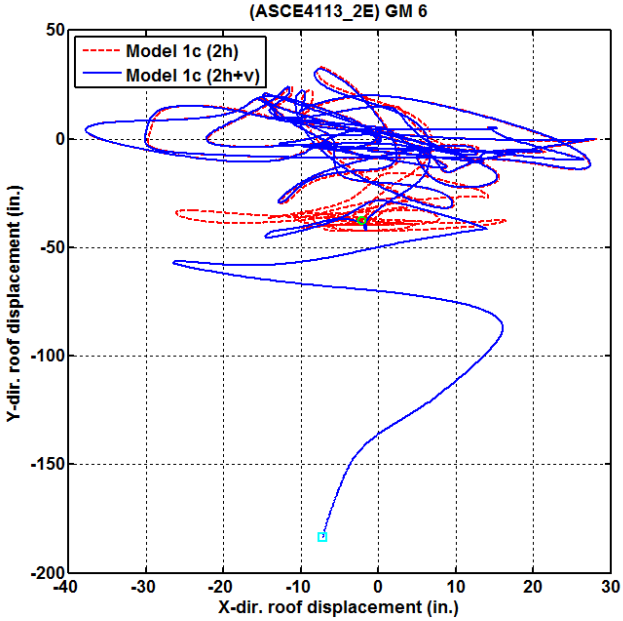

Figure F.108 Roof displacement orbits under BSE-2E level ground motion number 6 with and without vertical component motions (Model 1c).

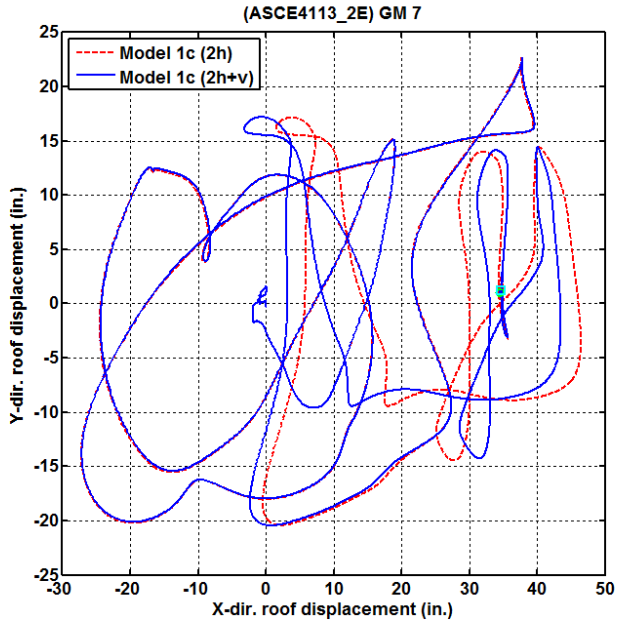

Figure F.109 Roof displacement orbits under BSE-2E level ground motion number 7 with and without vertical component motions (Model 1c).

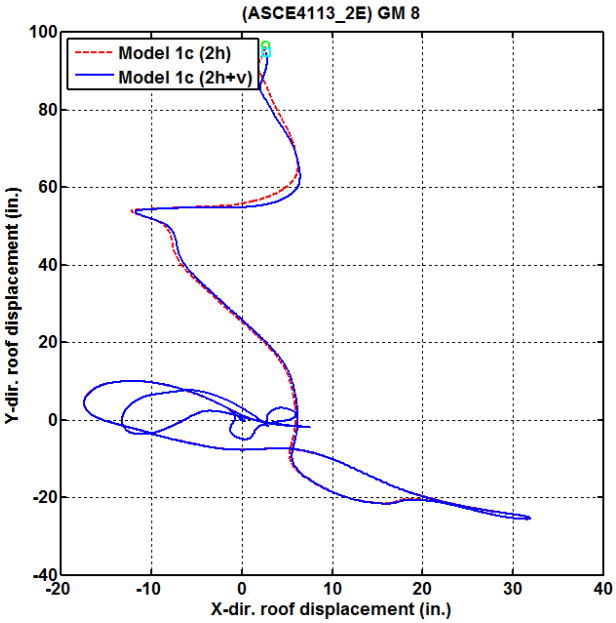

Figure F.110 Roof displacement orbits under BSE-2E level ground motion number 8 with and without vertical component motions (Model 1c).

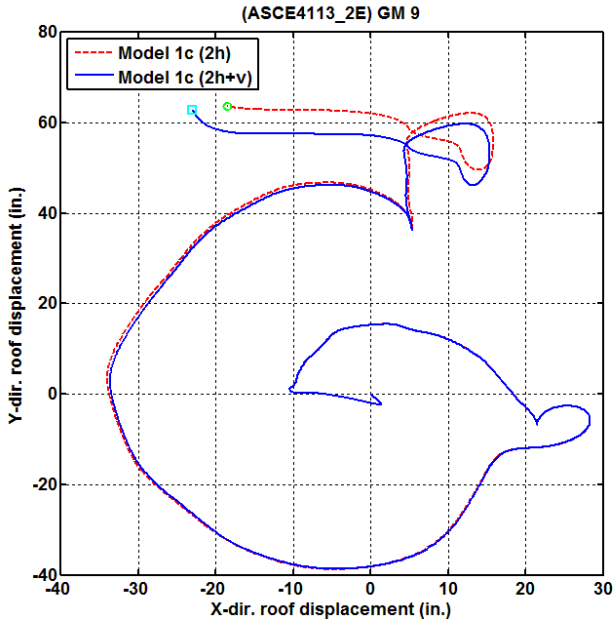

Figure F.111 Roof displacement orbits under BSE-2E level ground motion number 9 with and without vertical component motions (Model 1c).

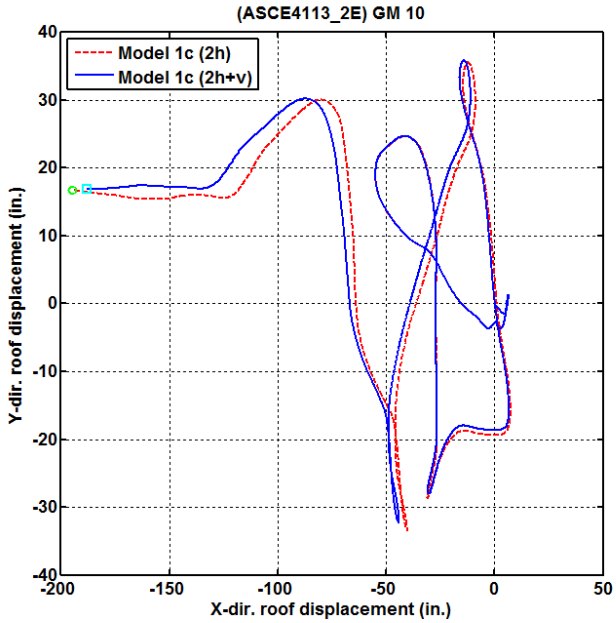

Figure F.112 Roof displacement orbits under BSE-2E level ground motion number 10 with and without vertical component motions (Model 1c).

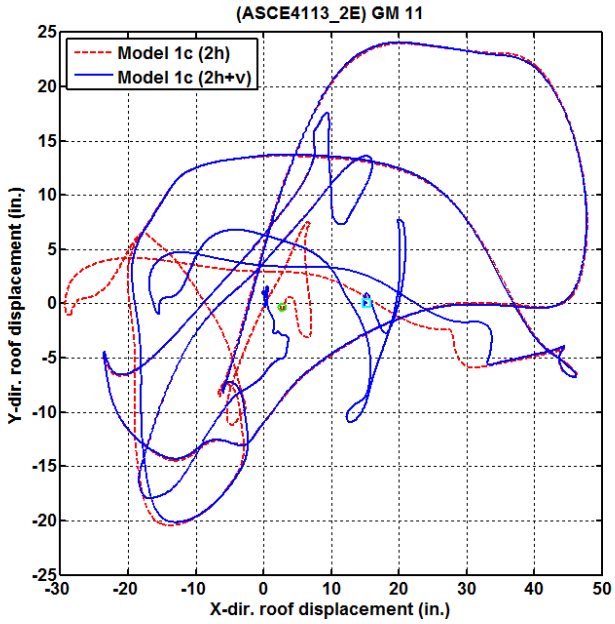

Figure F.113 Roof displacement orbits under BSE-2E level ground motion number 11 with and without vertical component motions (Model 1c).

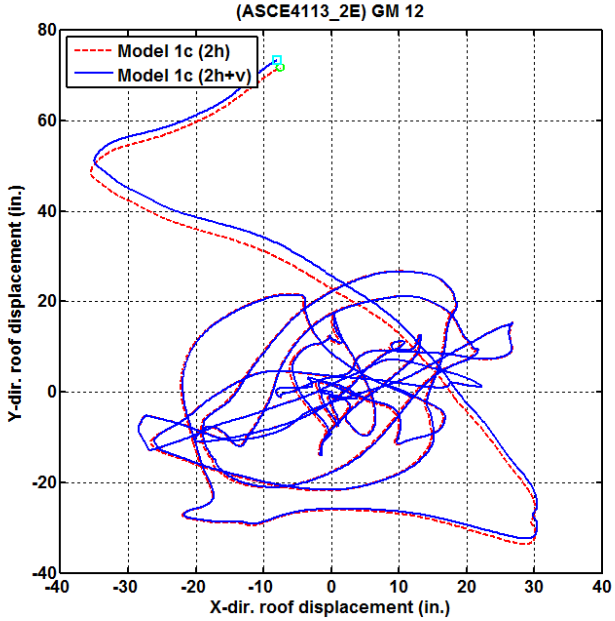

Figure F.114 Roof displacement orbits under BSE-2E level ground motion number 12 with and without vertical component motions (Model 1c).

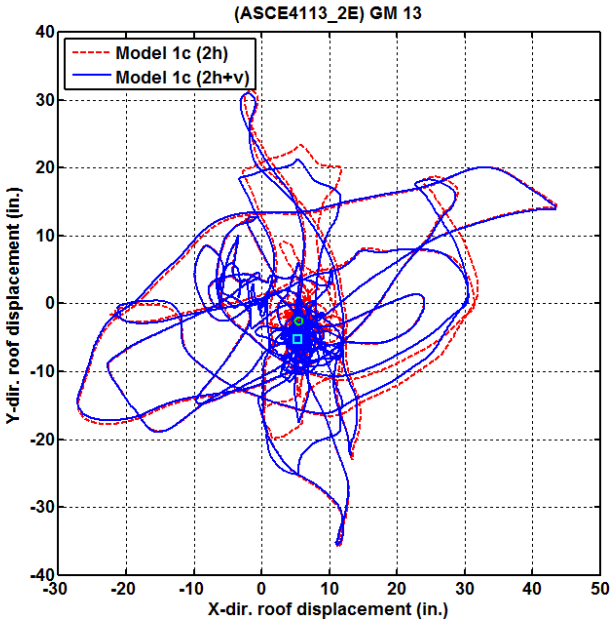

Figure F.115 Roof displacement orbits under BSE-2E level ground motion number 13 with and without vertical component motions (Model 1c).

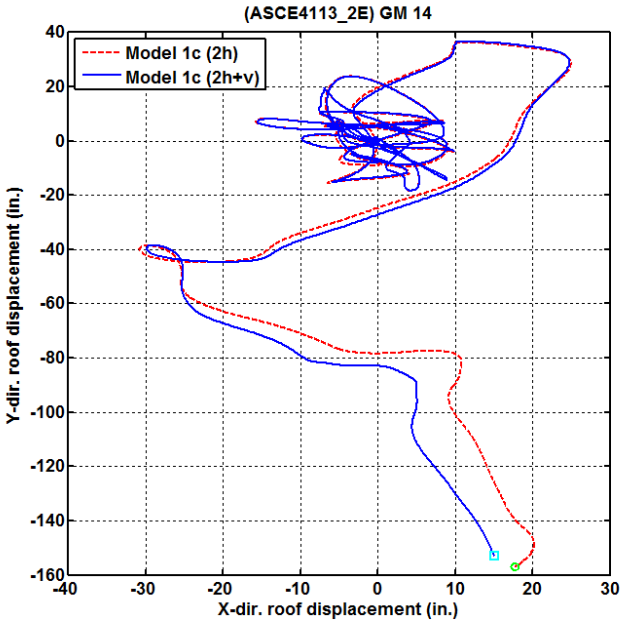

Figure F.116 Roof displacement orbits under BSE-2E level ground motion number 14 with and without vertical component motions (Model 1c).

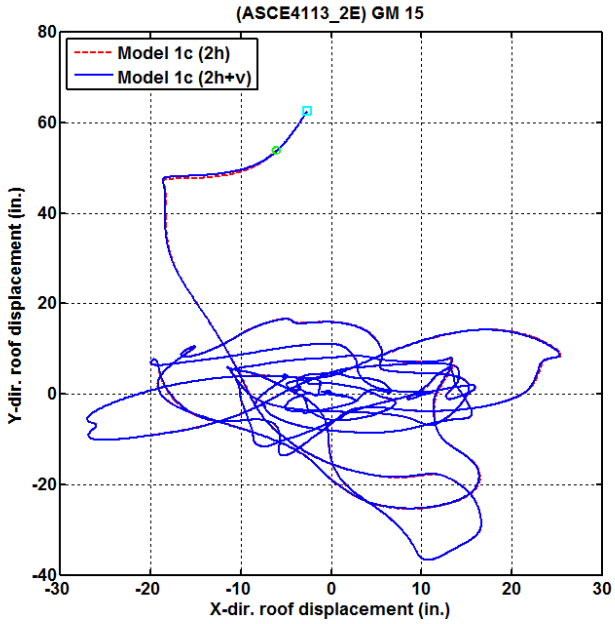

Figure F.117 Roof displacement orbits under BSE-2E level ground motion number 15 with and without vertical component motions (Model 1c).

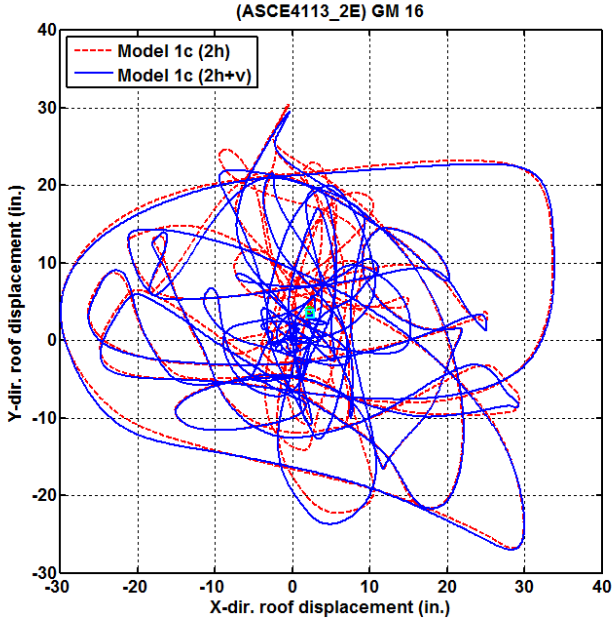

Figure F.118 Roof displacement orbits under BSE-2E level ground motion number 16 with and without vertical component motions (Model 1c).

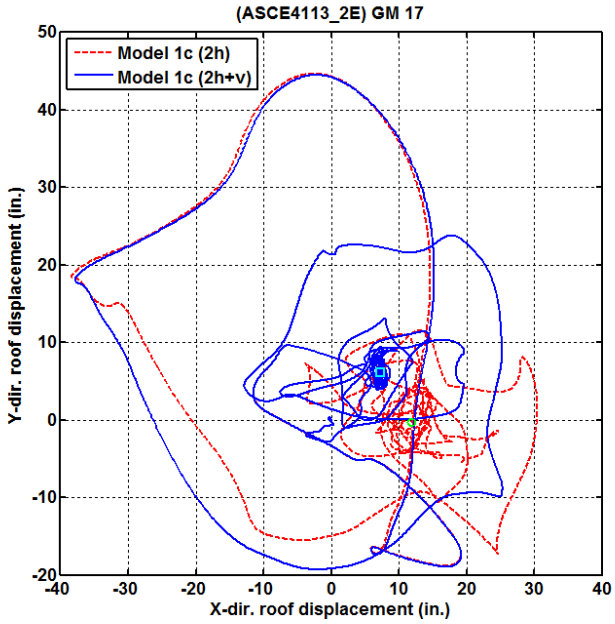

Figure F.119 Roof displacement orbits under BSE-2E level ground motion number 17 with and without vertical component motions (Model 1c).

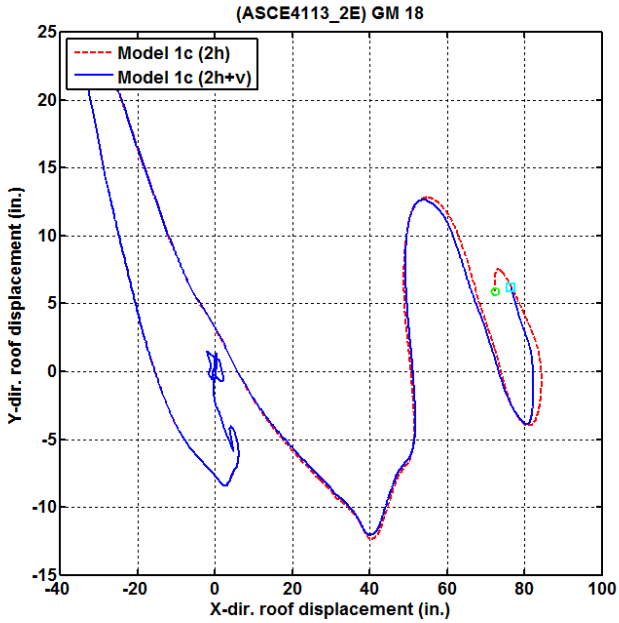

Figure F.120 Roof displacement orbits under BSE-2E level ground motion number 18 with and without vertical component motions (Model 1c).

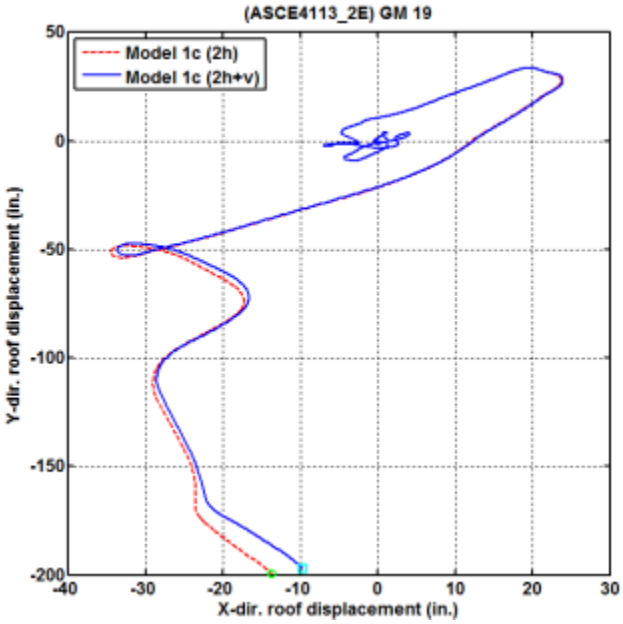

Figure F.121 Roof displacement orbits under BSE-2E level ground motion number 19 with and without vertical component motions (Model 1c).

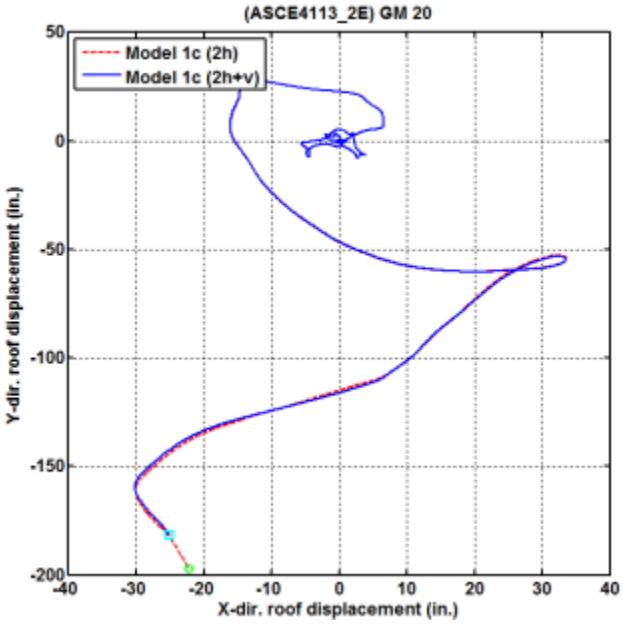

Figure F.122 Roof displacement orbits under BSE-2E level ground motion number 20 with and without vertical component motions (Model 1c).