Scale factor in RSA

How is the response-spectrum scale specified?

Answer: The value for each force-related design parameter of interest, including story drifts, support forces, and individual member forces for each mode of response, shall be computed using the properties of each mode and the response spectra defined in either ASCE 7-05 Section 11.4.5 or 21.2 divided by the quantity R / I. The value for displacement and drift quantities shall be multiplied by the quantity C_d / I (ASCE 7-05, Section 12.9.2).

Therefore, the response-spectrum scale factor is $I\ g\ /\ R$, where g is acceleration due to gravity (386.4 in/sec^2 for kip-in and 9.81 m/sec^2 for kN-m). After analysis, users should review the base shear due to all modes, reported in the Response Spectrum Base Reaction Table. If the dynamic base shear reported is more than 85% of the static base shear, no further action is required. However, if dynamic base shear is less than 85% of the static base shear, then the scale factor should be adjusted such that the response-spectrum base shear matches 85% of the static base shear. In this case, the new scale factor would be ($I\ g\ /\ R$) * (0.85 * static base shear / response-spectrum base shear). Analysis should then be rerun with this scale factor specified in the response-spectrum case.

References

- American Society of Civil Engineers. *ASCE 7-05, Minimum Design Loads for Buildings and Other Structures*. Reston, VA: ASCE Publications, 2006. Print.