Evaluation of ASCE 7-22 Equivalent Lateral Force Procedures: Method 2 versus Method 1

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Abstract

ASCE 7-22 introduced Method 1 for determining the seismic base shear in the Equivalent Lateral Force (ELF) procedure, based directly on multi-period design response spectra, while retaining the traditional method of base shear calculation based on two-period design response spectra as Method 2.

This paper evaluates the commonly held perception that Method 1 generally produces higher seismic base shear demands than Method 2 at short periods. Seismic response coefficients (design base shear divided by seismic weigh) were computed using both methods for 56 locations across the Western United States (WUS) and Central and Eastern United States (CEUS) for Site Classes A, B, C, D, and E. The results demonstrate that neither method is uniformly more conservative. Method 1 produces higher base shear values at very short periods when spectral peaks occur below 0.2 s, a period range not representative of most building structures, whereas Method 2 often yields significantly higher base shear values at intermediate periods. At longer periods, differences diminish, and the two methods typically converge as minimum design base shear requirements of ASCE 7 govern. This study identifies the conditions under which one method may produce larger seismic response coefficients than the other and clarifies the influence of the shape of the multi-period response spectrum on the calculated base shear.

The paper also discusses a proposed change for the 2027 International Building Code®, which is intended to mitigate the effects of short-period spectral spikes present in the ASCE 7-22 multi-period design response spectra at periods below 0.2 s. This code change will effectively result in Method 1 and Method 2 producing identical base shear values up to the period at which the design spectral response acceleration reaches its maximum value and then decreases to S_{DS}.

1. Introduction

The Equivalent Lateral Force (ELF) procedure for calculating seismic base shear has traditionally relied on spectral response accelerations derived from two-period design response spectra. With the adoption of multi-period design response spectra (MPRS) in ASCE 7-22, this approach has been expanded. ASCE 7-22 introduces a new option, Method 1, in which the seismic response coefficient, C_S, and consequently the base shear, V, is calculated directly using the design spectral response acceleration obtained from the multi-period response spectrum.

The traditional approach, which has been used in earlier editions of ASCE 7 and is based on the parameters S_{DS} and S_{D1}, remains permitted in ASCE 7-22 and is referred to as Method 2. While the standard does not restrict the use of either method, there appears to be a perception within a part of the engineering community that the newly introduced Method 1 will generally result in higher seismic base shear values than Method 2. As demonstrated in this paper, this perception is not correct.

The purpose of this paper is to examine the differences between Method 1 and Method 2 and to compare the resulting seismic response coefficient values across a range of site classes, structural periods, and geographic regions. This study identifies conditions under which one method may produce larger seismic response coefficients than the other and clarifies the influence of the shape of the multi-period response spectrum on the calculated base shear.

It is important to note that, although Method 2 is conceptually similar to the approach used in previous editions of ASCE 7, the definitions for S_{DS} and S_{D1} have been revised in ASCE 7-22. As a result, Method 2 calculations performed in accordance with ASCE 7-22 are not directly comparable to those obtained using earlier editions of the standard. This aspect is studied elsewhere (Ghosh and Rudra 2026).

This paper is a follow-up to an earlier paper published in the *Building Safety Journal* (Ghosh and Rudra 2025).

2. Equivalent Lateral Force (ELF) Procedure of ASCE 7-22

Section 12.8 of ASCE 7-22 provides the requirements for performing the Equivalent Lateral Force (ELF) procedure. The primary objective of this section is to calculate the seismic response coefficient, C_s, which is then multiplied by the effective seismic weight, W, to obtain the design seismic base shear, V:

$$V = C_s W \qquad \text{(Equation 12.8-1)}$$

Section 12.8 permits two methods for determining the seismic response coefficient C_s:

- Method 1: In Method 1, C_s is calculated directly from the design spectral response acceleration, S_a, obtained from the multi-period design response spectrum. An additional requirement applies: for periods T less than the period at which S_a reaches its maximum value, the maximum value of S_a from the spectrum must be used.

  The seismic response coefficient is calculated as.

$$C_s = \frac{S_a}{\left(\frac{R}{I_e}\right)}$$

(Equation 12.8-2)

- Method 2: Method 2 was the only procedure available in earlier editions of ASCE 7 and remains permitted in ASCE 7-22. In this method, C_s is calculated based on the values of S_{DS} and S_{D1}, depending on the period of the structure.

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}$$

(Equation 12.8-3)

C_s value calculated from Equation 12.8-3 need not exceed the following:
for $T \leq T_L$

$$C_s = \frac{S_{D1}}{T\left(\frac{R}{I_e}\right)}$$

(Equation 12.8-3)

for $T > T_L$

$$C_s = \frac{S_{D1}T_L}{T^2\left(\frac{R}{I_e}\right)}$$

(Equation 12.8-3)

Section 12.8.1.1 also specifies lower bounds for C_s, that apply to both the methods.

- $C_s = 0.044 S_{DS} I_e \geq 0.01$
- where $S_1 \geq 0.6$, $C_s \geq 0.5 S_1/(R/I_e)$

3. Method 2 vs. Method 1

In this section, the seismic response coefficients, C_s, calculated using Method 1 and Method 2, are compared. A total of 56 locations were considered, including 29 cities in the Western United States (WUS) and 27 cities in the Central and Eastern United States (CEUS). ASCE 7-22 Section 11.9 has made -105-deg longitude the dividing line between WUS and CEUS. Locations east of that longitude are in CEUS. Locations at or west of that longitude are in WUS. For each location, C_s was computed using both methods for Site Classes A, B, C, D, and E.

3.1 Site Class A

The ratio of C_s calculated using Method 2 to that calculated using Method 1 for Site Class A is shown in Figure 1.

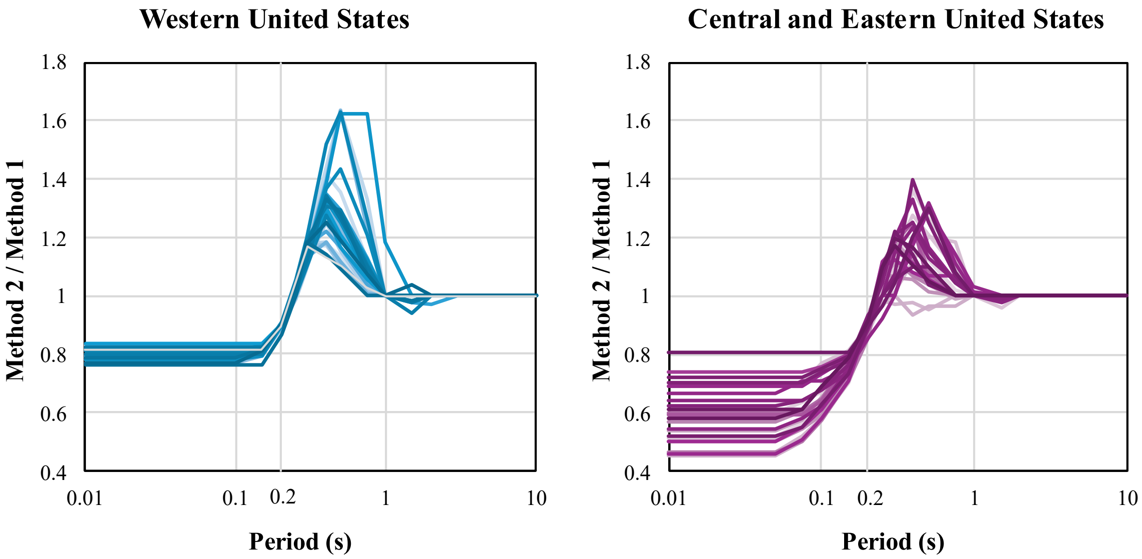


Figure 1. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class A.

From Figure 1, the following observations can be made:

- *Periods less than approximately 0.25 s*:
  For both WUS and CEUS locations, Method 1 produces higher C_s values than Method 2. This occurs because, for Site Class A in both regions, the multi-period design response spectrum reaches its maximum spectral response acceleration at periods shorter than 0.2 s. Figure 2 shows the multi-period design response spectra for representative WUS and CEUS locations for Site Class A.

  As required by Method 1, when the structural period is less than the period at which peak spectral response acceleration occurs, C_s must be calculated using the maximum value of S_a. In contrast, Method 2 relies on S_{DS}, which in ASCE 7-22 is defined as 90% of the maximum spectral response acceleration between periods of 0.2 and 5 s. Consequently, when the spectral peak occurs before 0.2 s, Method 1 yields larger C_s values than Method 2.

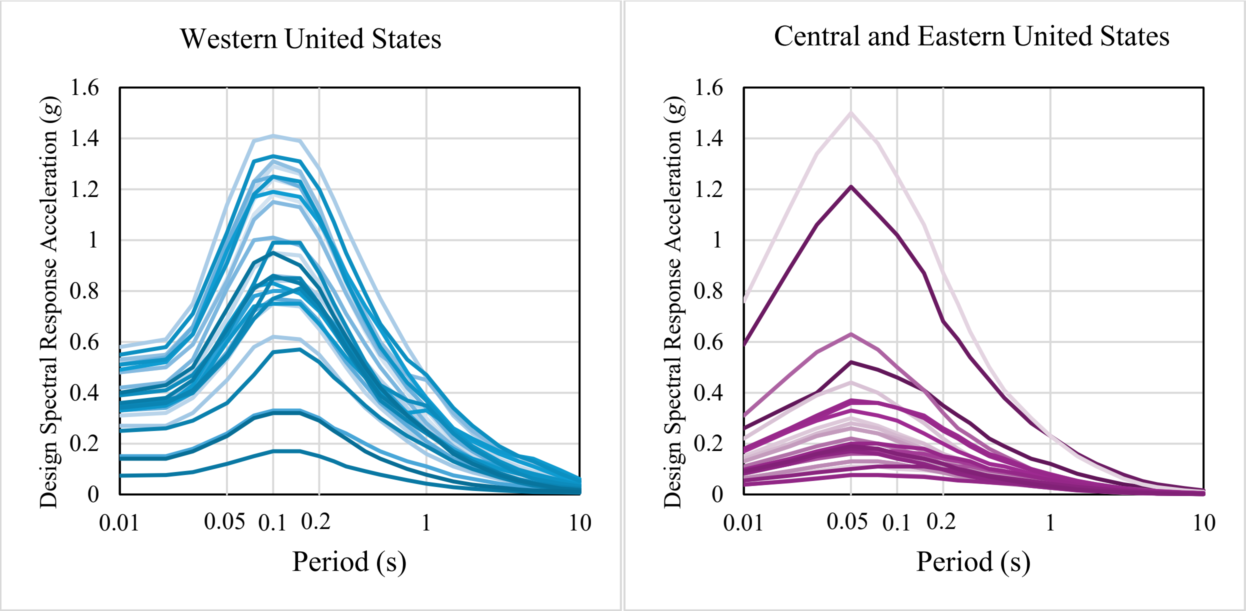


Figure 2. Design multi-period response spectra for selected WUS and CEUS locations for Site Class A. (*period on log-scale for clarity*)

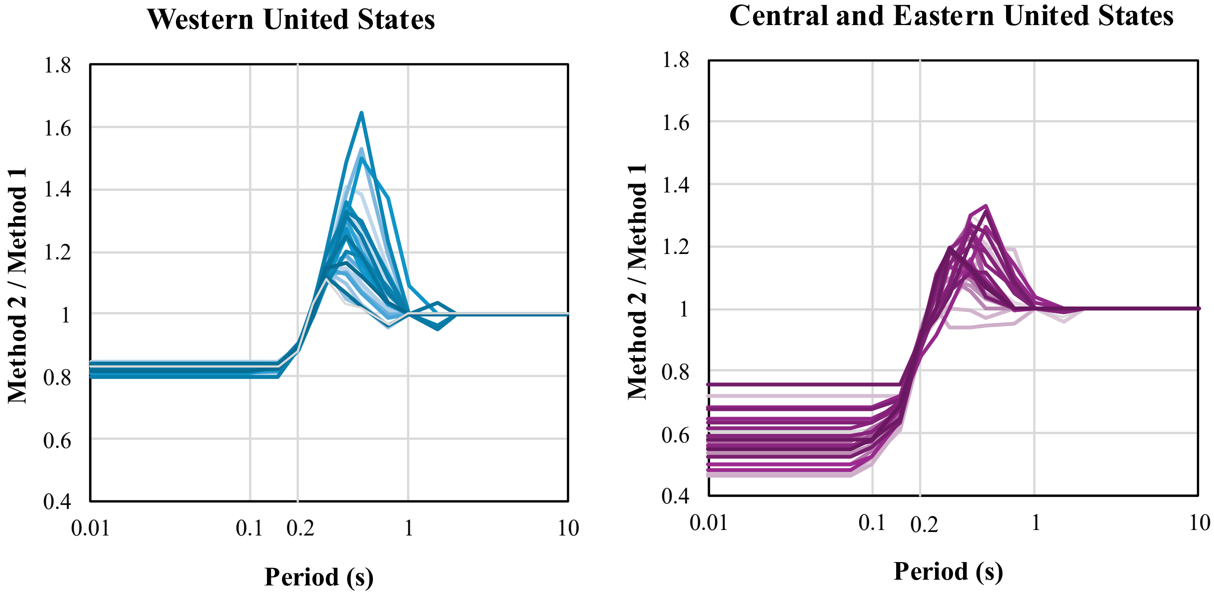
- *At a period of 0.2 s*:
  The C_s value obtained from Method 2 is 90% of the value obtained from Method 1. This is a direct consequence of the ASCE 7-22 definition of S_{DS}. When the peak spectral response acceleration occurs at or before 0.2 s, S_{DS} is equal to 0.9 times the spectral response acceleration at 0.2 s ($S_{0.2}$).

- *Periods from approximately 0.25 s to between 1 and 2 s*:
  In this period range, Method 2 produces higher C_s values than Method 1, with the ratio eventually approaching unity. The difference is particularly pronounced between 0.4 s and 0.5 s, where Method 2 yields C_s values up to approximately 1.6 times as large as Method 1 for WUS locations and 1.4 times as large for CEUS locations.

  This behavior occurs because, within this period range, Method 1 directly reflects the decreasing S_a values from the design multi-period response spectrum, whereas Method 2 is still governed by the constant short-period plateau defined by S_{DS} up to the transition period, $T_s = S_{D1}/S_{DS}$, beyond which the calculation of C_s in Method 2 is governed by S_{D1}. At longer periods, the two methods yield similar results as lower-bound equations for computing C_s, that applies to both the methods, control.

3.2 Site Class B

The ratio of C_s calculated using Method 2 to that calculated using Method 1 for Site Class B is shown in Figure 3.



Western United States

Central and Eastern United States

Figure 3. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class B.

As shown in Figure 3, the trends observed for Site Class B are generally similar to those noted for Site Class A. Again, Method 2 results in significantly higher values of C_s in the period range of approximately 0.4 to 0.6 s.

The multi-period design response spectra for Site Class B for representative WUS and CEUS locations are presented in Figure 4.

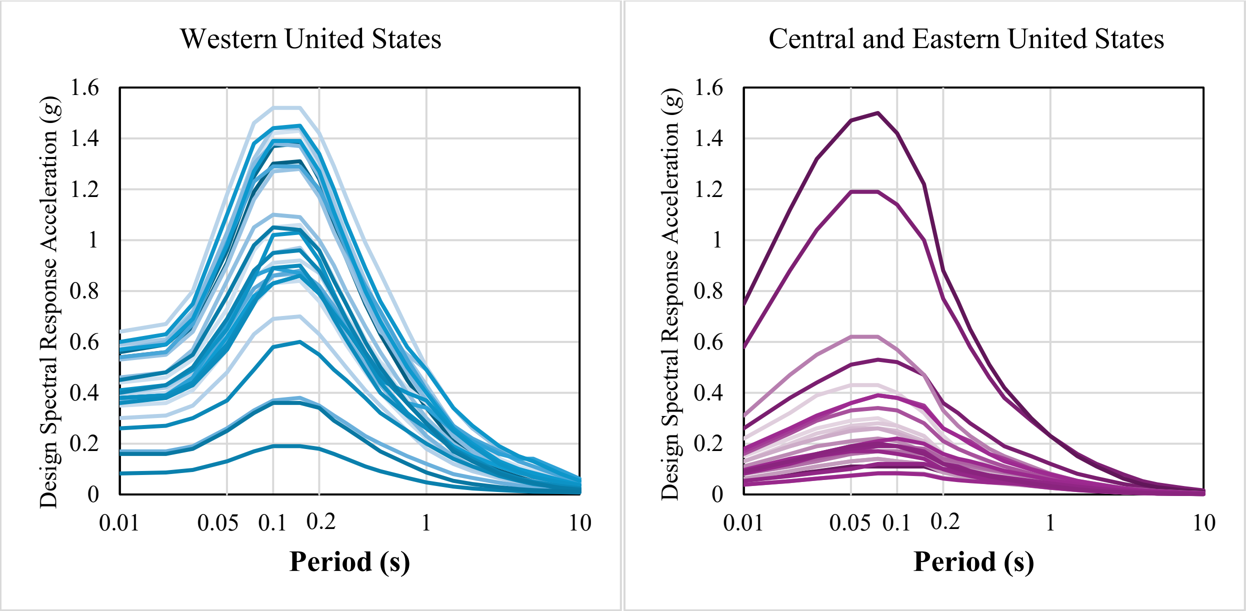


Figure 4. Design multi-period response spectra for selected WUS and CEUS locations for Site Class B. ***(period on log-scale for clarity)***

3.3 Site Class C

The ratio of C_s calculated using Method 2 to that calculated using Method 1 for Site Class C is shown in Figure 5.

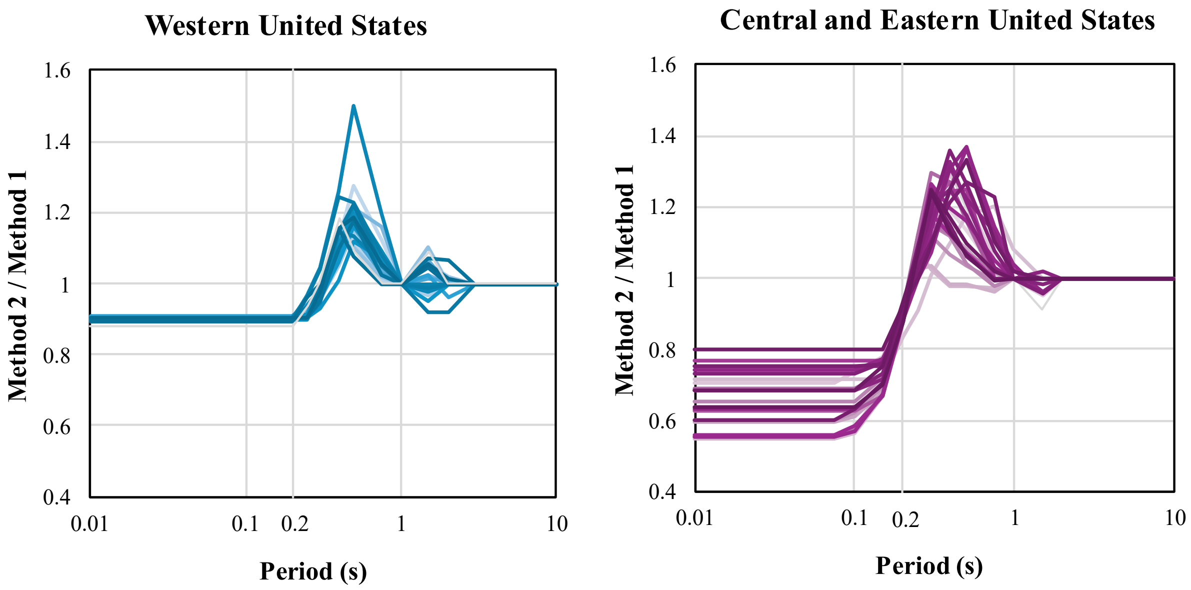


Figure 5. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class C.

The trends in the C_s ratios for CEUS locations are similar to those observed for Site Classes A and B. However, slight differences are observed for WUS locations. The primary difference for the WUS is that, for periods less than 0.2 s, the C_s values computed using Method 2 are 0.9 times those computed using Method 1.

This behavior occurs because, for WUS locations on Site Class C, the peak design spectral response acceleration occurs at approximately 0.2 s. As a result, under Method 1, C_s for periods shorter than 0.2 s is calculated using the peak spectral response acceleration, which occurs near 0.2 s. Under Method 2, C_s is calculated using S_{DS}, which is 90% of the maximum spectral response acceleration between 0.2 s and 5 s.

As in the case of Site Classes A and B, Method 2 produces substantially larger values of C_s than Method 1 for periods between approximately 0.4 and 0.6 s.

The multi-period design response spectra for Site Class C for representative WUS and CEUS locations are presented in Figure 6.

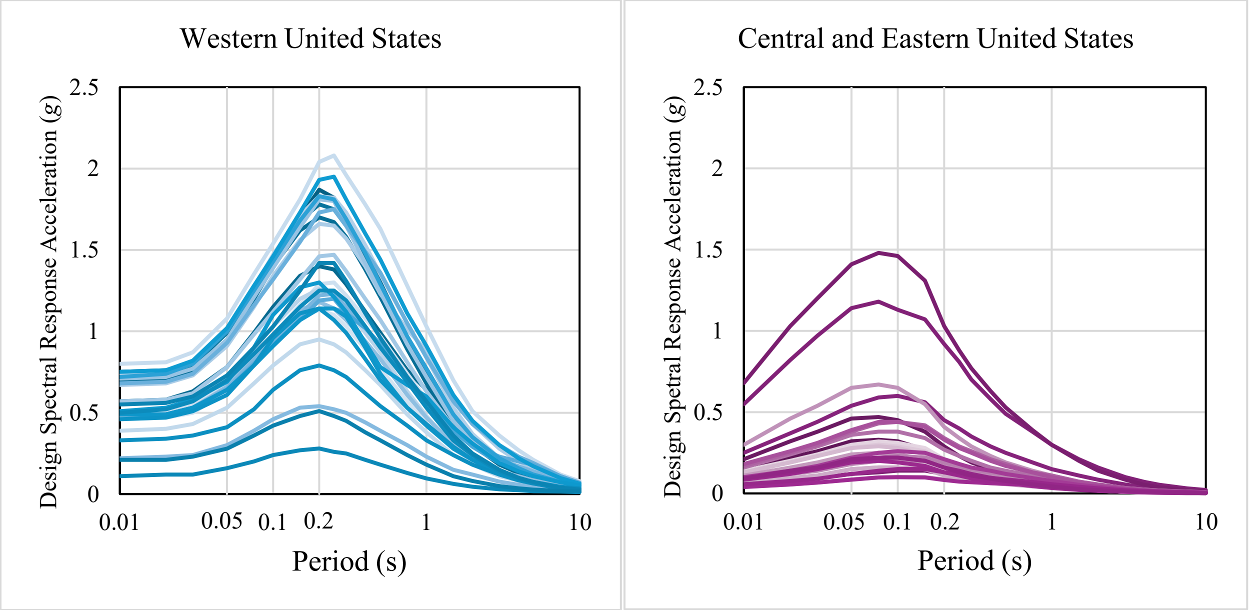


Figure 6. Design multi-period response spectra for selected WUS and CEUS locations for Site Class C. ***(period on log-scale for clarity)***

3.4 Site Class D

The ratio of C_s calculated using Method 2 to that calculated using Method 1 for Site Class D is shown in Figure 7.

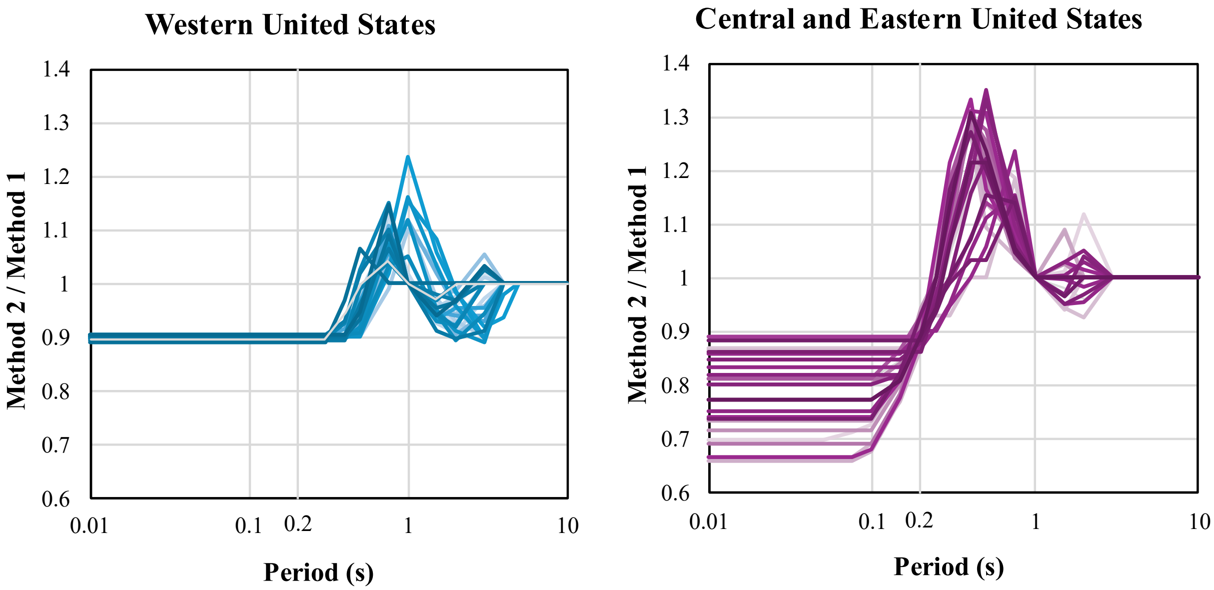


Figure 7. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class D.

For Site Class D, the behavior for WUS locations differs from that observed for Site Classes A through C. In these locations, the peak design spectral response acceleration occurs at a significantly longer period, approximately 0.4 s (see Figure 8). For periods shorter than 0.4 s, the C_s values computed using Method 2 are 0.9 times those computed using Method 1. This occurs because S_{DS}, which governs the Method 2 calculation at short periods, is defined in ASCE 7-22 as 90% of the maximum spectral response acceleration obtained from the multi-period design response spectrum over periods ranging from 0.2 s to 5.0 s.

Method 2 results in higher C_s values than Method 1 for periods in the range of approximately 0.75 to 1.0 s. At longer periods (approximately 1.0 to 3.0 s), Method 2 produces up to 10% lower C_s values than Method 1. This behavior is resulting from how S_{D1} (which governs the Method 2 calculation at longer periods) is defined in ASCE 7-22.

Beyond the transition period, $T_s = S_{D1}/S_{DS}$, the calculation of C_s in Method 2 is governed by S_{D1}. For Site Class D, S_{D1} is defined as 90% of the maximum value of TS_a over periods ranging from 1.0 to 5.0 s, but not less than 100% of the design spectral response acceleration at 1.0 s. Therefore, Method 1 produces higher C_s values—by as much as 10%—for periods shorter than the period at which TS_a attains its maximum value. At longer periods, Method 2 produces increasing C_s values, but not higher than those given by Method 1, until the lower-bound provisions become controlling, at which point the results from the two methods converge.

The trends observed for CEUS locations at periods up to 1.0 s are similar to those noted for Site Classes A, B, and C. As in the case of WUS locations between 1.0 and 3.0 s, Method 2 yields slightly lower C_s values than Method 1.

The multi-period design response spectra for Site Class D for representative WUS and CEUS locations are presented in Figure 8.

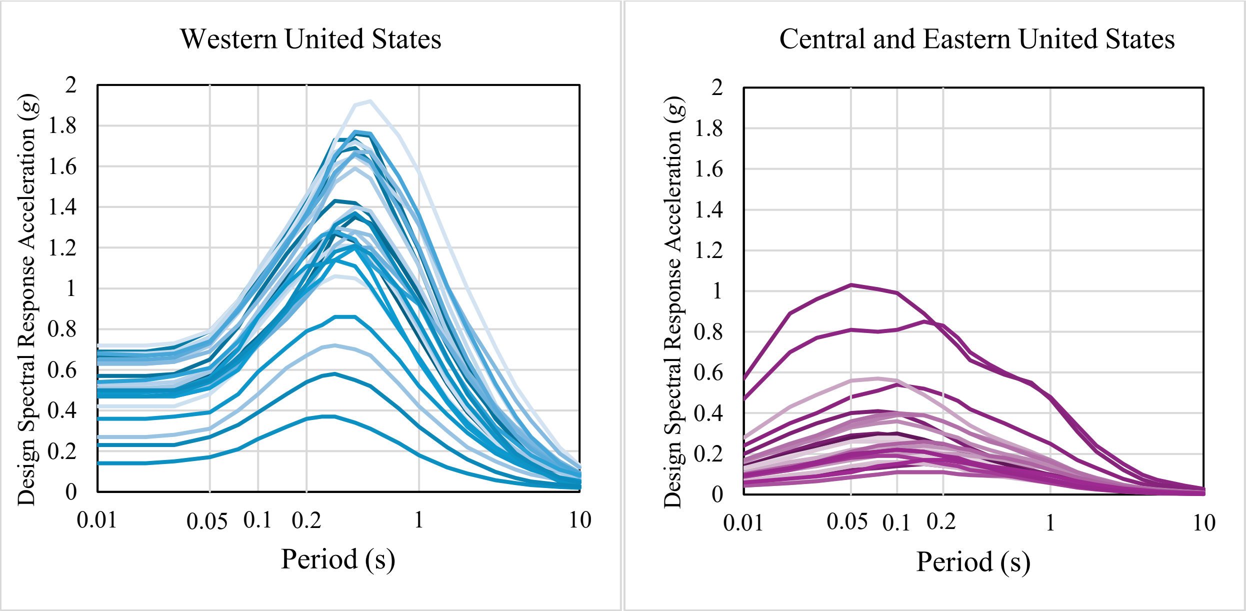


Figure 8. Design multi-period response spectra for selected WUS and CEUS locations for Site Class D. ***(period on log-scale for clarity)***

3.5 Site Class E

The ratio of C_s calculated using Method 2 to that calculated using Method 1 for Site Class E is shown in Figure 9.

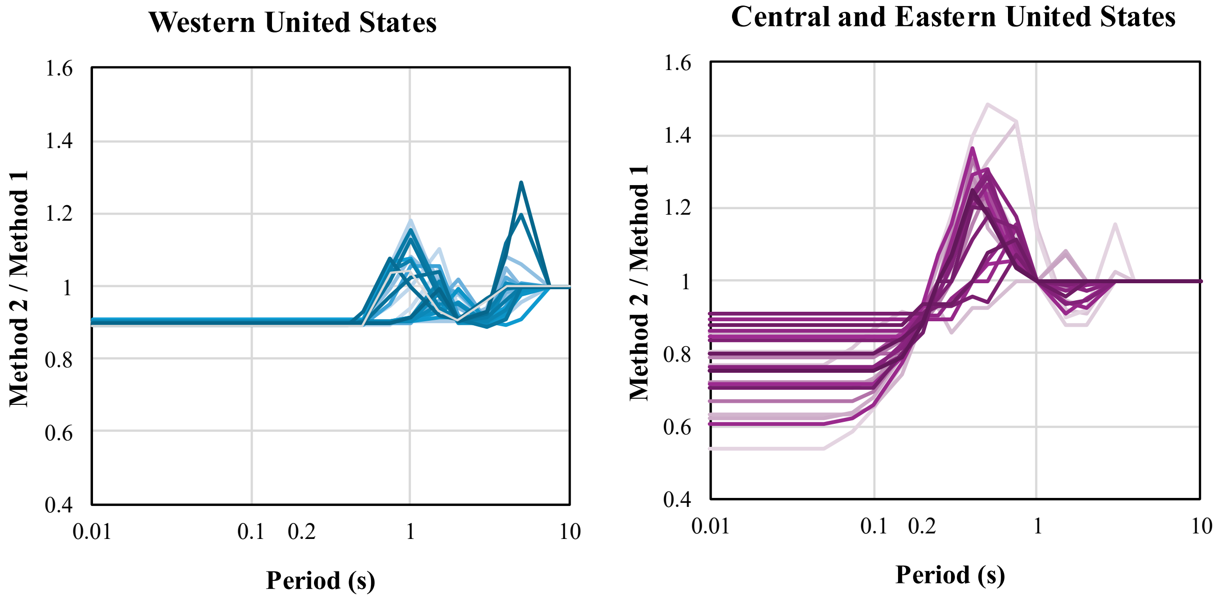


Figure 9. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class E.

For Site Class E, the behavior observed for WUS locations is notably more complex than for other site classes. This is primarily due to the significant variability in the shape of the multi-period design response spectra among different WUS locations. For these sites, the maximum design spectral response acceleration occurs over a broad period range, approximately between 0.4 s and 1.0 s. As a result, trends similar to those identified for Site Class D at longer periods are also evident here, but they are more pronounced.

For CEUS locations, the trends remain largely consistent with those observed for other site classes. The maximum design spectral response acceleration continues to occur at periods well below 0.2 s, leading to method-to-method comparisons that closely resemble those for Site Classes A through D.

The multi-period design response spectra for Site Class E for representative WUS and CEUS locations are presented in Figure 10.

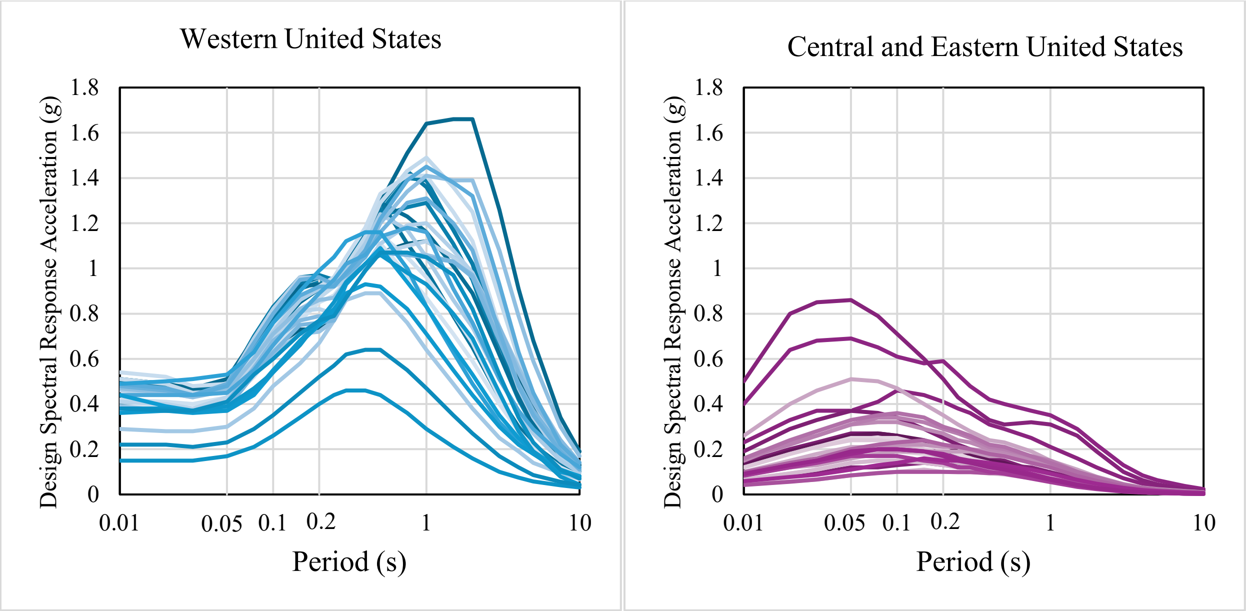


Figure 10. Design multi-period response spectra for selected WUS and CEUS locations for Site Class E. ***(period on log-scale for clarity)***

4. Overall Conclusions

From the preceding discussion, it is evident that whether Method 1 or Method 2 results in a higher design base shear depends primarily on the shape of the design multi-period response spectrum (MPRS) and, in particular, on the period at which the maximum design spectral response acceleration occurs.

If the design MPRS peaks at a period less than 0.2 s, the following behavior is observed:

- For periods less than 0.2 s, Method 1 produces significantly higher base shear values than Method 2. This occurs because Method 1 requires the use of the maximum spectral response acceleration, while Method 2 is governed by S_{DS}, which is defined as 0.9 times the spectral response acceleration at 0.2 s ($S_{0.2}$).
- For periods just beyond 0.2 s, Method 2 begins to produce higher base shear values than Method 1, because S_{DS} remains constant while the spectral acceleration S_a from the MPRS continues to decrease.
- Method 2 continues to produce larger values up to the transition period, $T_s = S_{D1}/S_{DS}$, beyond which the relative magnitude of base shear from the two methods depends on the values of S_{D1} and the long-period shape of the MPRS, as discussed in earlier sections.

Table 1 summarizes the typical periods at which the maximum spectral response acceleration occurs in the ASCE 7-22 design MPRS. As shown, except for WUS locations where Site Class is D or E, the design MPRS peaks at or before 0.2 s for all site classes and regions.

Table 1. Typical periods at which the maximum spectral response acceleration occurs in the multi-period design response spectra of ASCE 7-22.

Region	Site Class				
	A	B	C	D	E
WUS	0.1 s	0.15 s	0.2 s	0.4 s	0.4 to 1 s
CEUS	0.05 s	0.075 s	0.075 s	0.1 to 0.15 s	0.075 to 0.1 s

If the design MPRS peaks at a period greater than 0.2 s:

- For periods less than the peak period, Method 2 produces base shear values that are approximately 90% of those computed using Method 1, again reflecting the definition for S_{DS} as 90% of the peak spectral response acceleration.
- Shortly after the peak period, Method 2 begins to produce higher base shear values than Method 1, until the long-period behavior begins to be governed by the definition for S_{D1}.

In both the cases, at sufficiently long periods, when the lower-bound base shear provisions control, the results from both methods converge.

As noted earlier, the definition of S_{DS} has changed in ASCE 7-22 from the spectral response acceleration at 0.2 s ($S_{0.2}$) used in earlier editions of ASCE 7 to 90% of the maximum spectral response acceleration over periods ranging from 0.2 to 5.0 s. Consequently, for multi-period response spectra in which the peak spectral response acceleration occurs at or before 0.2 s, the revised definition of S_{DS} results in a value equal to 0.9 $S_{0.2}$.

4.1 Period Ranges Where Method 1 or Method 2 Produces Larger Base Shears

Table 2 summarizes the typical period ranges over which the base shear calculated using Method 1 or Method 2 is larger for each site class and seismic region.

Table 2. Typical periods where base shear calculated using Method 1 (M1) or Method (M2) is larger for WUS and CEUS locations for each Site Class.

Region	Site Class									
	A		B		C		D		E	
	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
WUS	0 to 0.2 s	0.25 to 1.5 s	0 to 0.2 s	0.25 to 1.5 s	0 to 0.3 s	0.4 to 2.0 s	0 to 0.5 s 2.0 to 3.0 s	0.75 to 1.5 s	M2 is higher for periods from 0.75 to 1.5 s in some locations, and 4.0 to 5.0 s in others.	
	Equal after 1.5 s		Equal after 1.5 s		Equal after 2.0 s		Equal after 3.0 s		Equal after 5.0 s	
CEUS	0 to 0.2 s	0.25 to 1.5 s	0 to 0.2 s	0.25 to 1.5 s	0 to 0.2 s	0.25 to 1.5 s	0 to 0.2 s	0.25 to 2.0 s	0 to 0.2 s	0.25 to 2.0 s
	Equal after 1.5 s		Equal after 1.5 s		Equal after 1.5 s		Equal after 2.0 s		Equal after 2.0 s	

Typical 4- to 10-story buildings have fundamental periods in the range of approximately 0.4 to 1.0 s. From Table 2, it is evident that:

- Such buildings located in WUS regions on Site Classes D and E are more likely to experience higher base shear values when Method 1 is used. For buildings on other site classes in the WUS, Method 2 generally produces larger base shears in this period range.
- In the CEUS, buildings in the 0.4 s to 1.0 s period range will consistently experience higher base shear values when Method 2 is used, regardless of site class.

5. Case Study for Salt Lake City

The Utah State Legislature, through its Construction Code Amendments titled H.B. 65, adopted the following amendment (Section 15A-3-107) to the 2024 International Building Code (IBC) addressing the ASCE 7-22 Section 12.8.1 requirements for the Equivalent Lateral Force (ELF) procedure:

(5)A new IBC, Section 1613.1.2, is added as follows:

"**1613.1.2 Equivalent Lateral Forces (ELF) Procedure**.

In ASCE 7 Section 12.8.1.1 the first paragraph is deleted and replaced with the following:

Where the design special [should be spectral] acceleration parameter Sa determined in accordance with either Section 11.4.5.1 or Chapter 21 is available, ~~either Method 1 or Method 2 is permitted~~ Method 1 shall be used to determine the seismic response coefficient, Cs. Where Exception 2 of Section 11.4.5 applies, Method 1 shall not be used. The lower bound for the seismic response coefficient, Cs, provided in Eq.12.8-6 or12.8-7 shall be applicable for both Method 1 and Method 2."

This amendment effectively restricts the use of Method 2 for calculating design base shear using the ELF procedure. The apparent reason for this amendment was the perception that, for short-period buildings, Method 2 can result in lower seismic demands than Method 1. As demonstrated in detail in this paper, this perception is not entirely correct. In fact, depending on the site class, region, and shape of the multi-period response spectrum, Method 2 can result in higher base shear values over a wide range of structural periods. The specific findings for Salt Lake City are presented later in this section.

Another factor that may have contributed to this restriction is a common misunderstanding of the language in ASCE 7-22 Section 11.4.5.1, wherein it is frequently assumed that the two-period design response spectrum is permitted only when the multi-period response spectrum is not available. This interpretation is incorrect. ASCE 7-22 continues to permit the use of the two-period spectrum in ELF calculations, even when the multi-period spectrum is available. A detailed clarification of this issue has been published by the International Code Council (ICC) in the Building Safety Journal:

🔗 *Is Continued Use of the Two-Period Design Spectrum in the Equivalent Lateral Force Procedure of Seismic Design Permitted by ASCE 7-22?*

To examine this issue in detail, the design multi-period response spectra (MPRS) for Salt Lake City were evaluated. Figure 11 presents the design multi-period response spectra for Site Classes A, B, C, D, and E for Salt Lake City.

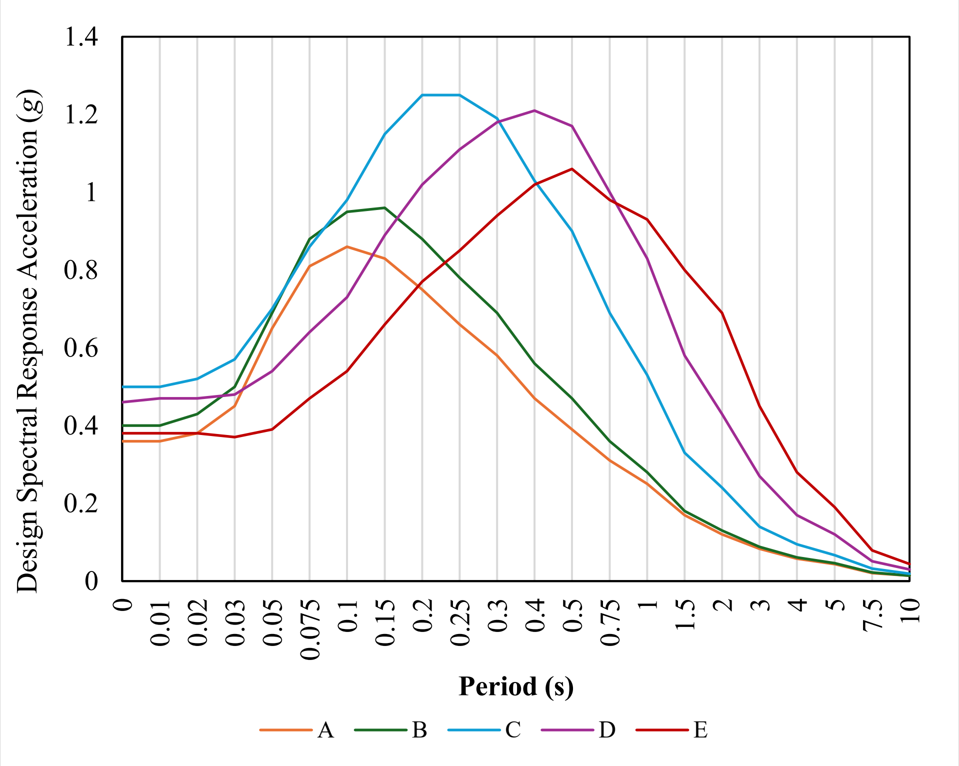


Figure 11. Design multi-period spectra for Salk Lake City

Figure 12 compares the seismic base shear calculated using Method 1 and Method 2 for the Equivalent Lateral Force (ELF) procedure. The following observations can be made:

- Site Classes A and B: Method 2 produces higher base shear values in the period range of approximately 0.25 to 1.0 s, beyond which both methods yield similar results.
- Site Class C: Method 2 results in higher base shear values over a broader period range, approximately 0.35 to 3.0 s.

- Site Class D: Method 1 produces base shear values that are up to 10% higher than those from Method 2 for periods up to approximately 4.0 s, after which the difference between the two methods diminishes.
- Site Class E: Similar to Site Class D, Method 1 produces base shear values that are up to 10% higher for periods up to approximately 4.0 s. At longer periods, approximately 3.5 to 5.0 s, Method 2 begins to produce higher base shear values than Method 1.

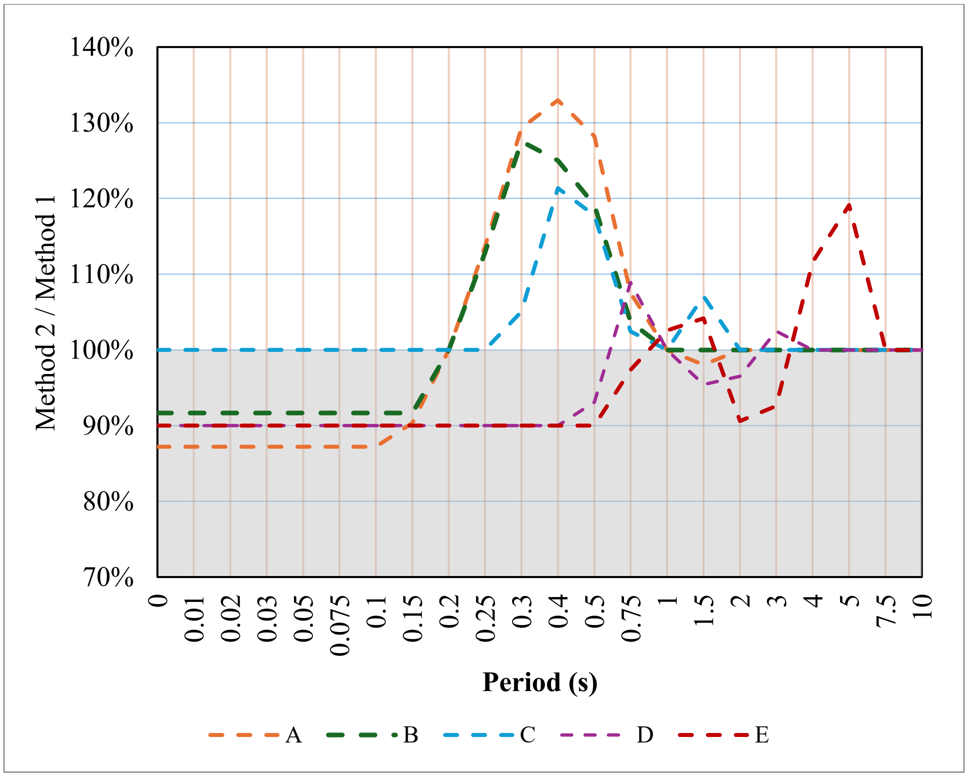


Figure 12. Method 2 vs Method 1 for Salt Lake City

These results clearly demonstrate that it is not always true that Method 2 leads to lower seismic demands at short periods. In ASCE 7-22, the period range used to define S_{DS} spans from 0.2 to 5.0 s, which encompasses a wide range of structural periods. While Method 2 may result in base shear values that are up to 10% lower than Method 1 over certain period ranges, it can also produce base shear values that are as much as 30% higher than those obtained using Method 1, depending on site class and the shape of the design multi-period response spectrum.

Unlike other amendments adopted by the Utah State Legislature, many of which are scheduled to take effect on July 1, 2026, no specific effective date has been identified for Amendment 15A-3-107 to the 2024 IBC, containing the change in the ELF procedure. Instead, the legislation states only that this amendment becomes effective upon the Governor's approval.

6. Proposed 2027 IBC Modification to the Multi-Period Design Response Spectrum of ASCE 7-22

At Central and Eastern United States (CEUS) locations, the multi-period design response spectrum results in a spike in spectral response acceleration at periods between 0.05 and 0.1 as shown in Table 1. A similar, though less pronounced, spike occurs at periods shorter than 0.2 s at WUS locations on Site Classes A, B, and C. To avoid excessively conservative designs resulting from those spikes, a code change was submitted and is expected to be approved for inclusion in the 2027 IBC (see Code Change S101-25 in the Monograph “2025 GROUP B PROPOSED CHANGES TO THE I-CODES”)]. The proposal modifies ASCE 7-22 equivalent lateral force (ELF) design provisions, giving specific design directions in response to the short-period spikes. Two rules are provided.

1. It is not intended that design be based on the S_a spike. It is instead permitted that S_a be capped at S_{DS} for short periods for ELF analysis.
2. The minimum spectral response acceleration, S_a, at very short periods is not to be less than S_{DS} for purposes of ELF analysis.

The two rules above effectively result in Method 1 and Method 2 producing identical base shear values up to the period at which the design spectral response acceleration reaches its maximum value and subsequently decreases to S_{DS}. Figures 13 and 14 illustrate these rules for cases: a) when the peak design response acceleration occurs before 0.2 s and b) when the peak design response acceleration occurs after 0.2 s.

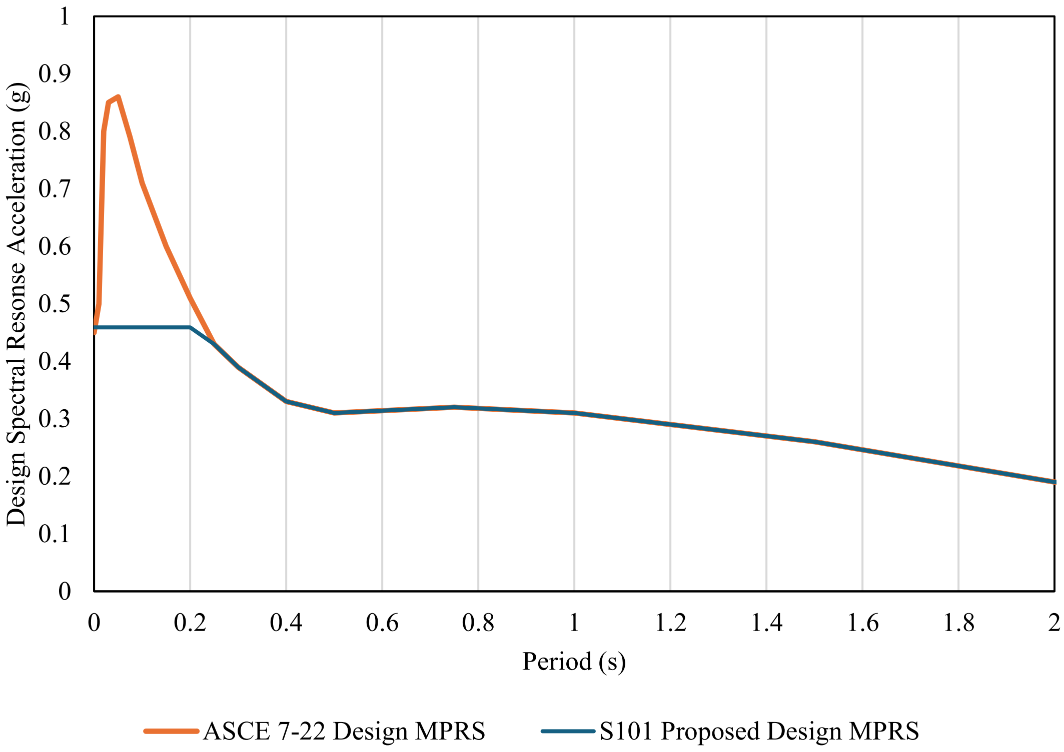


Figure 13. Current and proposed design multi-period response spectra for use in the ELF Procedure for Charleston, Site Class E, with peak design response acceleration occurring before 0.2 s (at 0.05 s).

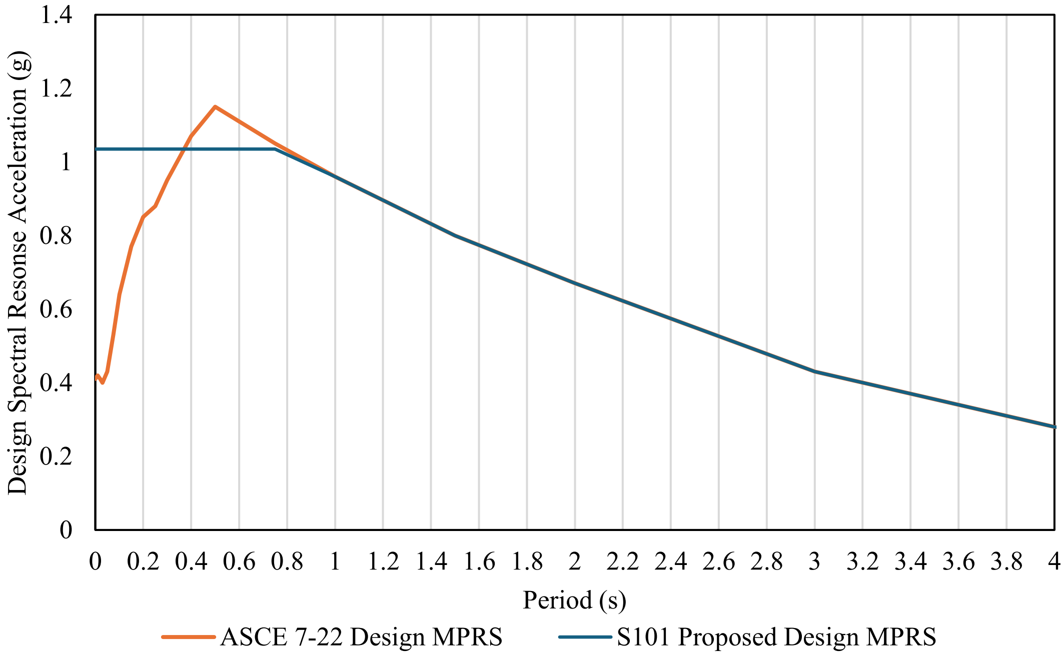


Figure 14. Current and proposed design multi-period response spectra for use in the ELF Procedure for San Diego, Site Class E, with peak design response acceleration occurring after 0.2 s (at 0.5 s).

Figures 15 through 19 show how the Method 2/Method 1 ratios would be impacted for Site Classes A, B, C, D, and E, respectively, when Code Change 101 is implemented.

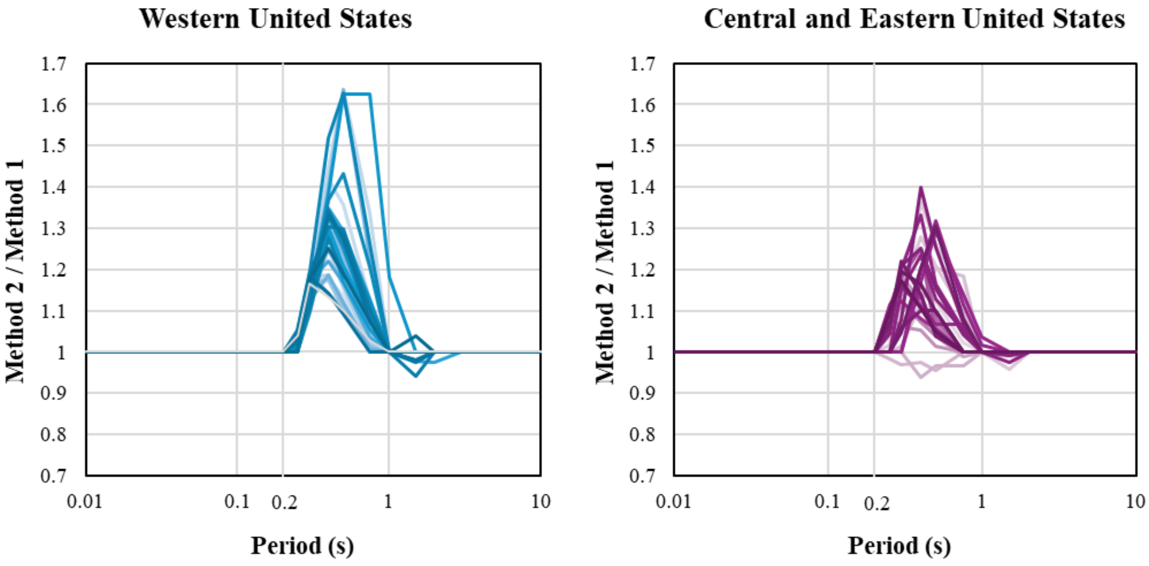


Figure 15. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class A with Proposal S101 implemented.

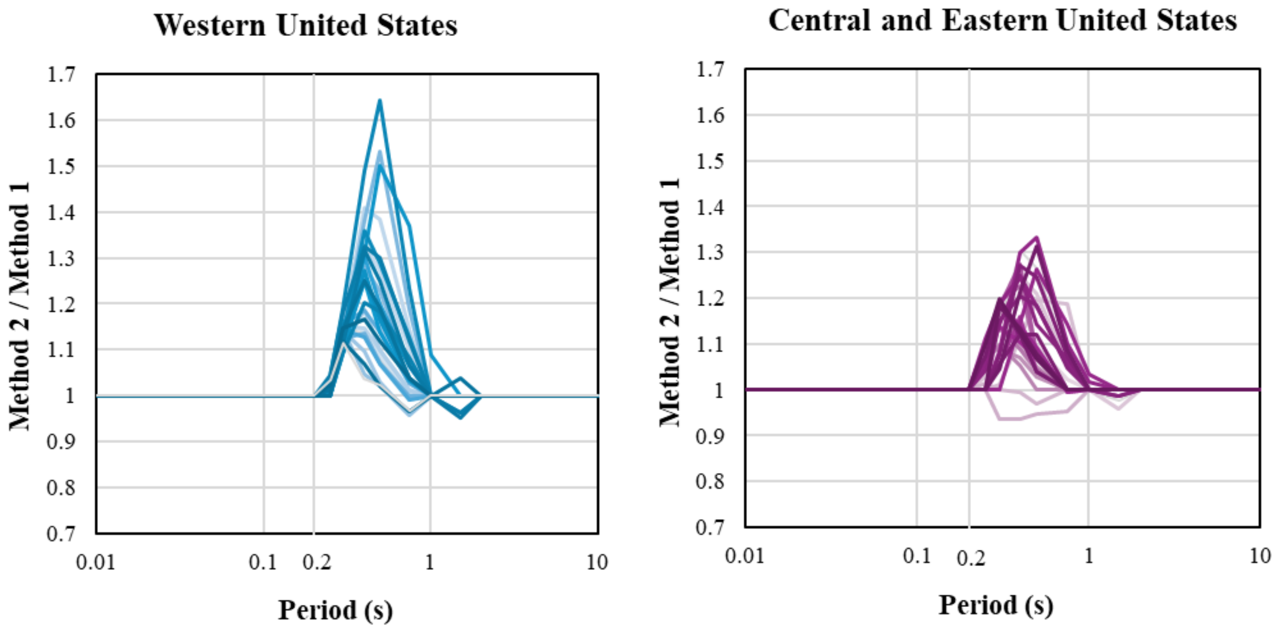


Figure 16. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class B with Proposal S101 implemented.

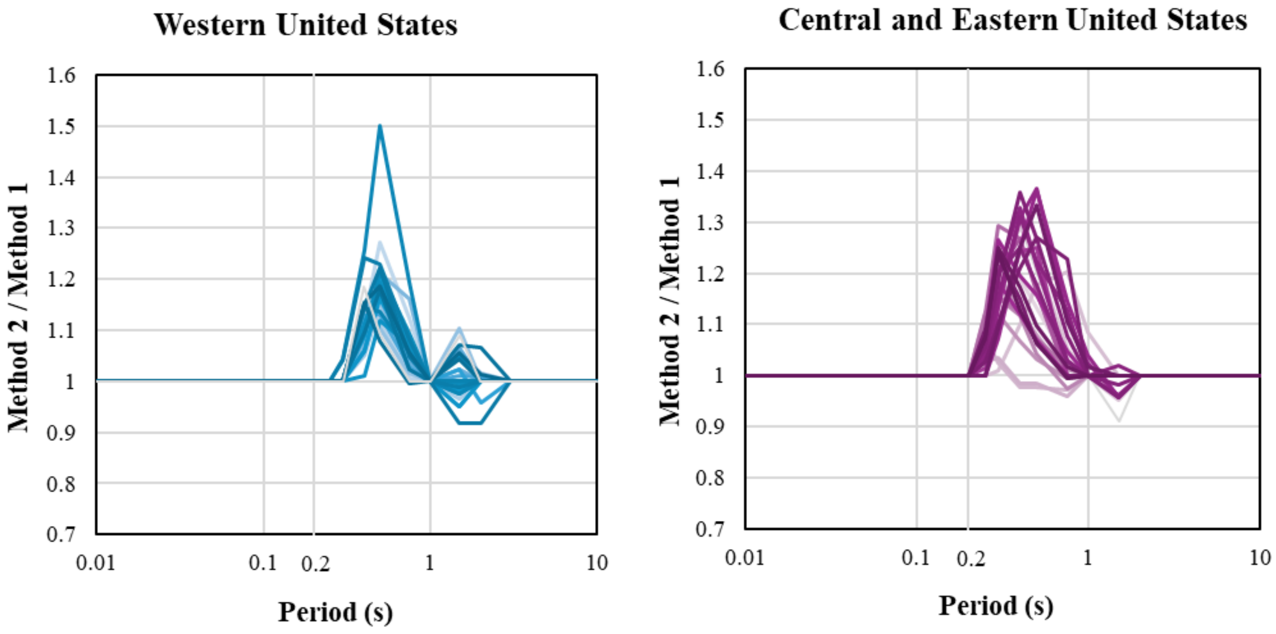


Figure 17. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class C with Proposal S101 implemented.

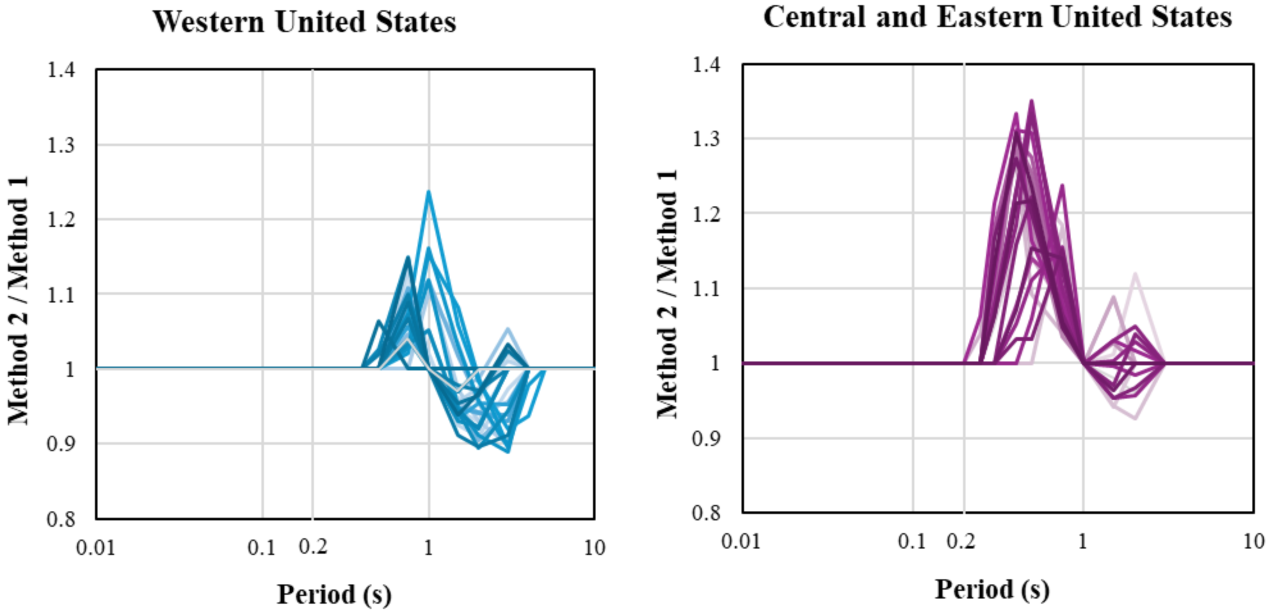


Figure 18. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class D with Proposal S101 implemented.

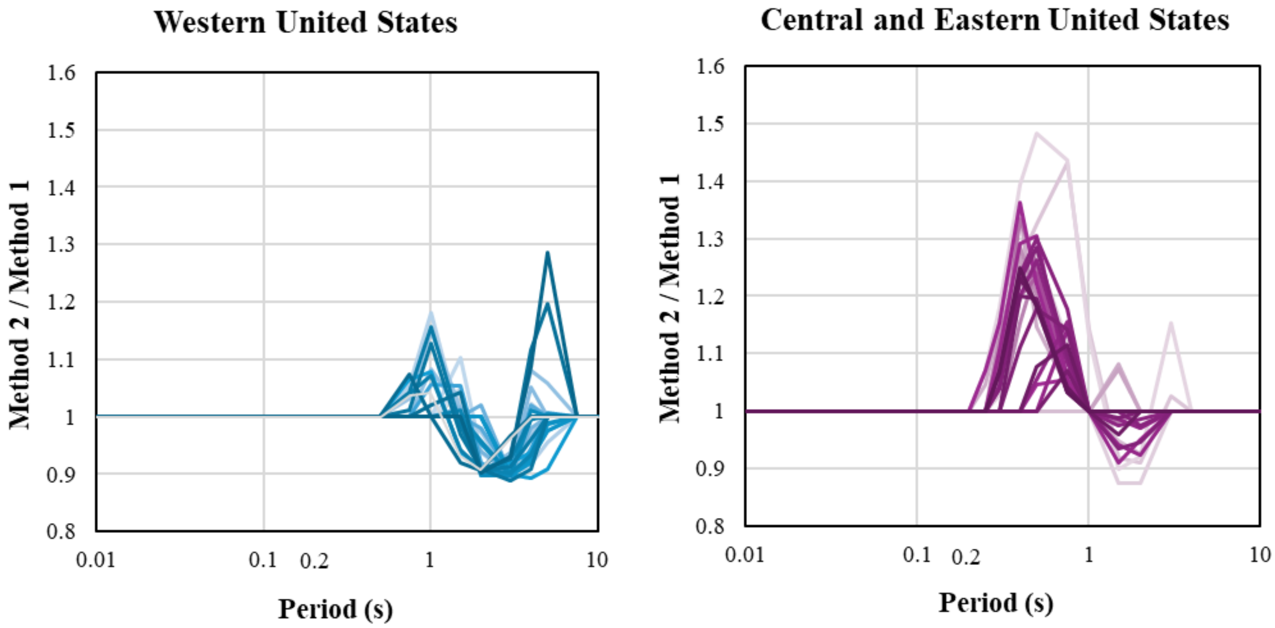


Figure 19. Ratio of C_s value computed using Method 2 to that computed using Method 1 for Site Class E with Proposal S101 implemented.

7. Concluding Remarks

This paper presents an informed and comprehensive comparison of ELF Method 1 and Method 2, which may assist engineers in making technically sound decisions in choosing one method over the other. The paper is strictly informative. No opinions are expressed, except for the note of caution below.

When a code or standard permits two different methods for the same calculation, the expectation would normally be that both methods would produce approximately the same result, or, alternatively, that one method would clearly be more conservative than the other. That is clearly not the case here. Over much of the practical structural period range, Method 1 yields lower, often substantially lower, design forces then Method 2. So, the normal tendency on the part of the engineer would be to choose Method 1, rather than Method 2. However, a note of caution may be in order here. The soil modification of ground motion in Method 1 is highly period-dependent. Two things are important about that. First, period is seldom precisely estimated when the ELF procedure is used, because it is difficult to do so. Second, the period increases as a structure accumulates damage while going through an earthquake. Both of these factors ought to be considered by the engineer in choosing Method 1 over Method 2.