



**Note:** Version 10.4.5.0 is a rollup build of several interim versions which were not officially released. Each interim build is described below beginning with the latest. Some changes may have superseded others.

## **Summary of March 2024 Revisions - Version 10.4.5.0 (AASHTO 9<sup>th</sup> Edition - Update)**

Since the creation of LRFD Simon Version 10.4.4.0, several revision requests and user-requested enhancements have been received. This release of LRFD Simon Version 10.4.5.0 (AASHTO 9<sup>th</sup> Edition) contains the following revisions and enhancements. The Version 10.4.5.0 release includes the revisions made in Versions 10.4.1.0 through 10.4.4.0.

### **Input Revisions**

1. The Number of Girders on the General Properties Form must now be entered as a value greater than or equal to two (Revision NSBA143).
2. A check has been added to the input consistency check to ensure that the Bottom Flange Cross-Frame Spacing on the Span Information Form has a value greater than zero (Revision NSBA159).

### **Output Revisions**

1. Stresses, detailed information, and specification checks for deck pours will only be output at sections that are in positive bending and non-composite. Previously, these values would be output at sections in positive and negative bending and at sections where the deck had previously been cast and assumed hardened (Revision NSBA063).
2. Advisories have been added to the program output to indicate that the distribution factors have been calculated by the lever rule because input values are outside the limits of the AASHTO LRFD Specifications for the applicability of the empirical distribution factors (Revision NSBA094).
3. The future wearing surface and utility loads are now combined on the Field Splice Design Information report to match the requested input for these loads in the NSBA Splice spreadsheet (Revision NSBA101).
4. The second-order amplification factor values are now output for the deck pours in the Detailed Information output report (Revision NSBA117).
5. The “WEB, FLANGE, LONGITUDINAL-STIFFENER DESIGN” output report now correctly shows the web ranges with varying depth in the transformed output (Revision NSBA121).
6. A column showing the accumulated effect after all the deck pours have been completed has been added to the output reports for the moments, reactions, and shears (Revision NSBA162).

### **Analysis Revisions**

1. An issue with the calculation of dead effects due to the self-weight of the girder has been resolved. This issue was most pronounced for a symmetrical simple-span girder where symmetrical analysis results were not generated. The issue occurred when the effective cross-section range length was less than the distance between the twentieth points of a span (Revision NSBA161).

### **Specification Related Revisions**

1. The constructability shear requirements (AASHTO LRFD Article 6.10.3.3) and special fatigue requirements for the web (AASHTO LRFD Article 6.10.5.3) are now also considered when designing the transverse web stiffeners (Revision NSBA038).

### **Summary of June 2023 Revisions - Version 10.4.4.0 (AASHTO 9<sup>th</sup> Edition)**

Since the creation of LRFD Simon Version 10.4.3.0, several revision requests and user-requested enhancements have been received. LRFD Simon Version 10.4.4.0 (AASHTO 9<sup>th</sup> Edition) (not released separately - released with Version 10.4.5.0) contains the following revisions and enhancements.

#### **Programming Revisions**

1. The GUI is now compiled with Visual Studio 2019, Version 16.11.13. The engine is now compiled with Visual Studio 2019, Version 16.11.13 and the Intel Fortran Compiler Classic, Version oneAPI 2021.4.0.364 (Revision NSBA160).

## Summary of May 2023 Revisions - Version 10.4.3.0 (AASHTO 9<sup>th</sup> Edition)

Since the creation of LRFD Simon Version 10.4.2.0, several revision requests and user-requested enhancements have been received. LRFD Simon Version 10.4.3.0 (AASHTO 9<sup>th</sup> Edition) (not released separately - released with Version 10.4.5.0) contains the following revisions and enhancements.

### Input Revisions

1. If the “Distribution factor definition” or “Girder location” are changed on the Distribution Factors Form, the user will now be prompted to save the model file before running the girder analysis. Previously, the user would not be prompted and so the analysis would be run with outdated information (Revision NSBA151).

### Output Revisions

1. The yield and ultimate strength of the bottom flanges at a bolted field splice in the Field Splice Design Information output reports will now be output correctly when these strengths are different on each side of the field splice (Revision NSBA154).
2. Incorrect information regarding the deck pours in spans that have fewer deck pours than a previous span will no longer appear in the program output. Deck-pour information for design cycles after cycle one will now appear in the program output (Revisions NSBA157 and NSBA158).

### Analysis Revisions

1. The stiffness properties used for the girder analysis will now be calculated using the actual girder section transitions, rather than approximating the stiffness at the twentieth points of each span. This will result in small changes in the deflections for simple spans, and in the moments, shears, and deflections for simple and continuous spans (Revision NSBA152).
2. The criteria for choosing the weaker side at a splice has been revised to check if the flange yield strength changes between sides, and if it does, the program will choose the side that has the smaller product of the flange yield strength and flange area as the weaker side. The program first checks the bottom flange, then if none of the bottom flange checks result in the determination of the weaker side, the top flange is checked. Refer to Article 5.3.3 of the Guide to see all of the checks used to determine the weaker side, and the order in which they are evaluated (Revision NSBA153).

### Specification Related Revisions

1. The program will now check the initial width and thickness of a transverse stiffener plate to ensure that it satisfies the requirement that the width be less than or equal to 16 times the stiffener plate thickness (Revision NSBA156).

## **Summary of March 2023 Revisions - Version 10.4.2.0 (AASHTO 9<sup>th</sup> Edition)**

Since the creation of LRFD Simon Version 10.4.1.0, several revision requests and user-requested enhancements have been received. LRFD Simon Version 10.4.2.0 (AASHTO 9<sup>th</sup> Edition) (not released separately - released with Version 10.4.5.0) contains the following revisions and enhancements.

### **Input Revisions**

1. A consistency check has been added to the GUI to warn the user that no spans up to and including the center span of a symmetrical beam are allowed to be designated as symmetrical on the Span Information Form (Revision NSBA114).

### **Specification Related Revisions**

1. The program has been revised to set the hybrid factor,  $R_h$ , equal to 1.0 when the factored compressive stress in the flanges for construction and deck pour checks does not exceed the specified minimum yield stress of the web. The program has also been revised to use the steel-only section when calculating the yield moment for construction and deck pour conditions (Revision NSBA090).

## Summary of December 2022 Revisions - Version 10.4.1.0 (AASHTO 9<sup>th</sup> Edition)

Since the release of LRFD Simon Version 10.4.0.0, several revision requests and user-requested enhancements have been received. LRFD Simon Version 10.4.1.0 (AASHTO 9<sup>th</sup> Edition) (not released separately - released with Version 10.4.5.0) contains the following revisions and enhancements.

### Output Revisions

1. Deck pour input and output information now appears in the program output (Revision NSBA055).

### Specification Related Revisions

1. Errors in the lateral torsional buckling (LTB) calculations for top flanges with lateral effects have been resolved. Previously, performance ratios greater than one were occasionally output for LTB calculations at individual locations, even though the overall performance ratio was reported to be less than one (Revisions NSBA145 and NSBA148).
2. When computing moment and shear distribution factors, the program will now continue to use the AASHTO LRFD Specification equations if the span length is greater than 240 feet or if the longitudinal stiffness factor,  $K_g$ , is greater than 7,000,000 in.<sup>4</sup>. Previously, the program would use the lever rule if either of those limits of applicability were exceeded (Revision NSBA147).
3. When computing the distribution factors for an exterior girder, if the lever rule is used to calculate the governing distribution factor for the interior girder, that value is ignored, and the exterior girder distribution factors are calculated as the maximum of the factors determined using the lever rule (using the girder spacing and deck overhang for the exterior girder) and the rigid cross-section equation (Revision NSBA149).
4. The fatigue check for a Category C' (welded) or Category B (bolted) detail at the inside surface of the flanges will again result in a section redesign (in LRFD Design mode) when such details are located at defined cross-frame locations when the performance ratio is greater than the defined maximum performance ratio. For such details at locations other than at defined cross-frame locations, a warning will continue to appear in the program output when the performance ratio is greater than the upper limit (Revision NSBA150).