

# PennDOT e-Notification

Bureau of Solutions Management  
Highway Applications Division



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## STLRFD

No. 014  
June 24, 2019

## Release of Version 2.5.0.0

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The Department's LRFD Steel Girder Design and Rating (STLRFD) program has been revised as described in the attached "Summary of March 2019 Revisions – Version 2.5.0.0".

The new version has been placed on PennDOT servers for use by the Districts. Consultants and others, who have a current license agreement for **STLRFD Version 2.4.0.0**, can obtain the updated version by submitting an [Update Request Form](#) along with the **update fee of \$500 for private organizations or \$50 for governmental agencies**. Updates for **STLRFD Version 2.3.0.0 or earlier** will require an **additional fee**. For update fee details, refer to the [STLRFD Fee Schedule](#). The update fee is waived for federal and state transportation agencies.

Once payment is received, an e-mail will be sent with download instructions. A valid e-mail address must be provided on the Update Request Form to receive the download instructions.

Please direct any questions concerning the above to:

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Attachment

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Archived copies of all previously distributed e-Notifications can be obtained from the PennDOT LRFD and Engineering Programs website at <http://penndot.engrprograms.com/home> and clicking on "e-Notification" and then "Mailing List Archives."

## SUMMARY OF MARCH 2019 REVISIONS - VERSION 2.5.0.0

Since the release of STLRFD Version 2.4.0.0 several revision requests and user requested enhancements have been received. This release of STLRFD Version 2.5.0.0 contains the following revisions and enhancements.

### Programming Revisions

1. The program has been revised to allow all characters in input or output file names except for the characters listed as unacceptable by Windows, \ / : \* ? " < > | (Request 636).
2. The version of PennDOT's Beam Section Properties (BSP) program used by STLRFD has been updated to BSP version 2.0.2.0 (Request 642).
3. The calculation of  $k$ , the bend buckling coefficient for webs with longitudinal stiffeners, no longer uses a toleranced comparison when checking if  $d_s/D_c$  is less than 0.4, because the tolerance comparison caused the comparison to incorrectly fail when  $d_s/D_c$  was close to 0.4 (Request 772).
4. STLRFD has been revised to use Visual Studio 2017 and Intel Parallel Studio XE 2017 Fortran Update 5 for compilation and linking (Request 773).
5. A change was made in the program compilation process to place MOD files in the appropriate Debug or Release folders so that the proper version of the MOD file is used when the program is compiled (Request 792).

### Specification Related Revisions

6. When calculating the proportions of the user input lateral stress to distribute to each component of the total lateral stress at an abutment, the program will now use the strong-axis bending stresses at an adjacent analysis point to determine the proportions. Previously, the program would report a total lateral stress of zero because there are no bending stresses at the abutments (Request 620).
7. The "Global Displacement Amplification in Narrow I-Girder Bridge Units" check from the AASHTO LRFD Specifications, 8th Edition, Section 6.10.3.4.2 has been added to STLRFD for two and three girder systems for all deck pours and the uncured slab condition. See the GLOBAL DISPLACEMENT AMPLIFICATION CHECK output reports (Requests 647 and 806).
8. If both flanges of a section are in tension, the program will now report 0.0 in as the depth of web in compression (Request 694).
9. Documentation has been added to Chapter 2 describing the limit states that are used by default when special live load is entered, and the program has been revised to include the ML-80 live load with the Strength-V limit state when analysis live load code C is used (Request 740).

10. Three vehicles specified as part of the FAST Act (EV2, EV3, and SU6TV) have been added as a live load option to the program (Analysis Live Load Code H) (Request 748).
11. A new permit design vehicle, PA2016-13, has been added to several live load options for the program (Design Live Load Code F, Analysis Live Load Codes I, J, and K) (Request 749).
12. The program now reports two limit states for construction, Construction-I and Construction-II, to correctly capture the different load factors for construction loads with and without wind. Construction-I does not include effects due to wind, while Construction-II does include wind effects (Request 755).
13. When there is only a single lane of traffic on the bridge, STLRFD will now only use the single lane shear distribution factor. Previously, the program would use the maximum of the single and multiple lane shear distribution factors when calculating live load shear effects (Request 761).
14. An error that caused a designed plate girder to have a rating factor less than 1.0 has been resolved. The program was considering a section at midspan to be noncompact during design (incorrect), but compact during final analysis (correct), which led to a smaller rating factor during final analysis (Request 794).
15. Moment of inertia failures on the TRANSVERSE STIFFENERS CHECK output report will now properly cause the report title to appear on the SPECIFICATION CHECK FAILURES report at the end of the output file (Request 797).
16. The pedestrian load will now be counted as an additional design lane when determining the multiple presence factor for the deflection distribution factors with sidewalks (Request 805).

### **Program Output Revisions**

17. The program has been revised to inform the user that section holes defined on the web are not considered when calculating section properties or any specification check calculations. This has been the case with the program, but the program now informs the user when they enter section holes that the program is not considering them (Request 689).
18. Output reports that are turned off by the user, but have errors or warnings on them will now have an asterisk (\*) after the name of the report on the SPECIFICATION CHECK WARNINGS or SPECIFICATION CHECK FAILURES reports at the end of the program output. In addition, output reports with required Chief or District Bridge Engineer approvals are also indicated on the SPECIFICATION CHECK WARNINGS and FAILURES output reports (Request 698).
19. The BRIDGE LOAD RATINGS output reports now include the governing section resistance corresponding to the governing rating reported for each live load vehicle (Request 745).

20. The program output has been revised so that information about lateral capacity and deck reinforcement does not print when the FLANGE LATERAL CAPACITY and the MINIMUM NEGATIVE FLEXURE CONCRETE DECK REINFORCEMENT output reports have been turned off (Requests 754, 759).
21. In the output reports providing SPLRFD program input, the stress capacity reported will now be the smallest stress capacity at the adjacent section, regardless of whether it causes the smallest rating factor or not. Previously in some situations, the program would report a larger stress capacity that corresponded to the lowest rating factor (Request 756).
22. An error where the reported DC1 moment in the SPLRFD INPUT INFORMATION report did not include the effects due to the concrete slab has been addressed. Previously, if the moment due to the slab was opposite in sign to the other DC1 effects, the slab moment would not be included (Request 757).
23. For limit states where rating factors are not calculated (Strength-III, Strength-IV, and Strength-V) the LATERAL TORSIONAL BUCKLING output reports will now report the combination resulting in the largest resistance / factored effect ratio as governing (Request 758).
24. The MINIMUM NEGATIVE FLEXURE CONCRETE DECK REINFORCEMENT output report has been revised to always print analysis points where a specification check warning has occurred for CTL / OUTPUT POINTS options 1 or 3. Previously only analysis points with a specification check failure would print for options 1 or 3 if the failure occurs at an analysis point not requested. In addition, an error was fixed where the title of the report was appearing for all live loads, not just the live load causing the specification check warning (Request 763).
25. An error has been fixed that caused the page headings to occasionally not include the current live load (Request 764).
26. The program will now correctly analyze a bearing stiffener specified at the symmetry point of a girder with an even number of spans. An internal location assignment would previously prevent the program from printing the bearing stiffener properties for a bearing stiffener at the symmetry point (Request 765).
27. In the formatted Input Echo, the display of HAUNCH DEPTH on the DESIGN - PLATE GIRDER output report has been revised so that the user-input value is no longer divided by 12 before printing (Request 769).
28. A note has been added to the reaction summary output to remind the user that the dead load reactions at the abutments do not include any loads past the centerline of bearing (Request 774).
29. An error in calculating the total DC2 and FWS stresses for the Strength-IP limit state on the UNFACTORED FLEXURAL STRESSES output report has been fixed. Previously the FWS stress in the top flange, and the DC2 and FWS stresses in the bottom flange were double-counting some stresses and omitting others (Request 787).
30. STLRFD now produces output that will, in conjunction with the Engineering Assistant, version 2.6.0.0 and above, allow the user to view graphs of unfactored dead and live load effects (Request 791).

31. A reaction summary report has been added to assist with the design of steel sole plates. This report includes factored as well as unfactored reactions to be used with sole plates (Request 809).

### **Program Input Revisions**

32. STLRFD will now design bearing stiffeners and the size of the web-to-stiffener weld. Use the Bearing Stiffener Design (BSD) command to enter the design parameters (Request 588).

33. STLRFD will no longer assume brace points at 25 feet if no BRP commands are entered. The user must now always enter at least one BRP command. **NOTE: This change may require revisions to input files created for earlier versions of STLRFD** (Request 598).

34. The upper limits for year values on the FTL command have been increased from 2100 to 2200 (Request 684).

35. The upper limits for the number of trucks on the FGV command have all been increased to 300,000 to allow values that match actual PennDOT loadometer survey data ranges (Request 685).

36. A parameter has been added to the CTL command to allow the user to choose to disregard LRFD Specifications Section 6, Appendix A calculations for flexural capacity (Request 692).

37. A parameter has been added to the GEO command to allow the user to specify if the girder is in a kinked or horizontally curved bridge for the purposes of the compactness checks in the LRFD Specifications Section 6.10.6.2.2 and 6.10.6.2.3 (Request 693).

38. For input parameters that are no longer used by STLRFD, the program will generate an input warning if the user enters the value, stating that the parameter is no longer used. The documentation of the parameter in Chapter 5 has also been revised to make clear that the parameter is no longer needed or used (Request 696).

39. The BRACING TYPE parameter on the CDF command is no longer used by the program and should not be entered (Request 750).

40. Default values for the steel tensile strength on the MAT, DRB, and DP1 commands have been removed, except for the default of 58 ksi when 36 ksi is specified for the steel yield strength. **NOTE: Input files where no steel tensile strength has been entered and a steel yield strength other than 36 ksi has been entered will need to be revised to enter an steel tensile strength** (Request 751).

41. The REDUNDANT LOAD PATH parameter on the CTL command is no longer used by the program and should not be entered by users (Request 767).

42. The lower limit for the BRACE SPACING parameter on the BRP command has been changed from 0 feet to 1 foot to avoid a crash during input processing (Request 770).

43. An input parameter, AUTOMATIC BRACE POINTS AT SUPPORTS, has been added to the CTL command to allow the user to choose whether the program automatically adds brace points at supports (abutments and piers). Previously, the program would always add brace points at abutment and piers regardless of whether the BRP command defined the brace points or not (Request 796).
44. A program error was fixed that caused the program to occasionally not properly check if holes defined on the SHO command were located within the flange. The program will now stop if a hole is not located within the flange (Request 798).
45. Input value limits and default values for design runs of the program have been added to parameters four through seven of the the FSL (Field Splice Location) command. Previously, leaving these values blank could cause the program to crash (Request 806).
46. The CONSTRUCTION WIND PRESSURE parameter on the WPD and WUD commands now defaults to 0.005 ksf, and will trigger a District Bridge Engineering warning if the user enters anything other than 0.005 ksf (Request 807).

#### **Program Documentation Revisions**

47. The STLRFD User's Manual cover page has been revised to use the current PennDOT logo and fonts (Request 646).
48. All references to ADTT (average daily truck traffic) related to the Fatigue Life (FTL) command have been revised to read ADTTsl (average daily truck traffic, single lane) (Request 677).
49. The detailed description of the FGV (Fatigue Gross Vehicle) command in Chapter 6 of the STLRFD User's Manual has been revised to give more detailed information on how to input the parameters of the command (Request 680).
50. Many input commands have been revised to accurately describe how to enter multiple instances of the commands in the Engineering Assistant (EngAsst) program, and in some instances the configuration files for EngAsst have been revised to limit or change how many times a given command can be entered (Requests 683, 786).
51. The list of assumptions and limitations in Chapter 2 has been revised to remove DM-4 and LRFD Specification references. Also, the deck serviceability limitation has been removed because the deck serviceability check is now included in the MINIMUM NEGATIVE FLEXURE CONCRETE DECK REINFORCEMENT program output (Request 746).
52. Chapter 4 of the User Manual has been revised to state the proper name for the folder containing the STLRFD installation location on the Windows start menu (Request 747).

53. For plate or built-up sections that start with a varying-depth web, Chapter 5 of the User Manual has been revised to inform the user that the first defined cross section must have a constant-depth web in order to set the web depth at support number one. This range can be very short, but it must be at the start of the girder (Request 762).
54. The contact information and revision request forms in Chapter 9 of the User's Manual have been revised (Request 804).