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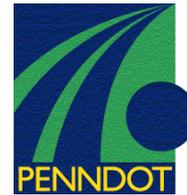
STLRFD No. 002 March 20, 2006	**Release of Version 1.4.0.0**

The Department's LRFD Steel Girder Design and Rating Program (STLRFD) has been revised as described on the attached Summary of February 2006 Revisions – Version 1.4.0.0.

The new program has been placed on PENNDOT servers for use by the Districts. Consultants and others, who have a current license agreement for STLFRD Version 1.3.0.0, can obtain the updated version for a license update fee of $500 for private organizations and $50 for governmental agencies. Updates for STLRFD Version 1.2 will required an update fee of $1,000 for private organizations and $100 for governmental agencies. Updates for STLRFD Version 1.0 and Version 1.1 will required an update fee of $1,500 for private organizations and $100 (not $150) for governmental agencies. The forms for Software Update Request and Request for PennDOT's Engineering Software License can be downloaded from the web site at http://penndot.engrprograms.com.

Please direct any questions concerning the above to:

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Attachment

SUMMARY OF FEBRUARY 2006 REVISIONS–VERSION 1.4.0.0

Since the release of STLRFD Version 1.3.0.1, several error reports and user requested enhancements have been received. This release of STLRFD Version 1.4.0.0 contains the following revisions:

1. A new input item for field splice location (FSL command) has been added and is used to indicate that the analysis point at the splice location will always be treated as noncompact for flexural resistance calculations. (Request 114)

2. Fatigue calculations are now computed only for fatigue details that satisfy the requirement of LRFD Specifications Section 6.6.1.2.1, that is, fatigue details that incur tensile stress under the fatigue load combination, or fatigue details where compressive stress under permanent load is less than twice the fatigue live load stress. (Requests 115, 265)

3. The TK527 vehicle is now included for several live load codes, for rating, analysis and design. (Request 122)

4. The expression showing the calculation of lambda in Section 6.41 of the User's Manual has been updated to match the program. (Request 126)

5. A span-to-depth ratio check (as per DM-4 Section 2.5.2.6.3 and the LRFD Specifications Table 2.5.2.6.3-1) has been added to the design algorithm of the program. If desired, this check can be turned off via the DP2 and DRB commands. (Request 200)

6. The same procedure for calculating the fatigue stress range is now used both for fatigue resistance and estimated remaining fatigue life. (Requests 207, 255, 280)

7. The calculation of the web buckling stress now handles the case where the dead load stress is greater than the calculated stress capacity. (Request 214)

8. The brace point calculation has been modified to avoid rounding errors that could lead to a program crash. (Request 215)

9. If the depth of web in compression at the plastic moment, D_{cp}, is equal to zero and the optional Q formula is to be checked, the program has been modified to stop with an error to avoid a program crash. (Request 218)

10. The analysis point location calculation has been modified to avoid rounding errors that could lead to a program crash. (Request 222)

11. Girder overhang checks have been added in accordance with DM-4 Article 9.7.1.5.1. Any girder overhang greater than 0.5 * girder spacing will result in a chief bridge engineer warning for both analysis and design runs of the program. A girder overhang greater than 0.625 * girder spacing will cause the program to stop with an error for design runs of the program. (Request 225)

12. The program has been modified to run as a Windows dynamic link library (DLL). (Request 228)

13. The Beam Section Properties program, BSP, version 1.5, has been incorporated into the program to compute the section properties. (Request 235)

14. The calculation of shear connector design region length now follows consistent rules for all spans. (Request 243)

15. The fatigue live load results now print correctly when the pedestrian load is entered as 0.0. (Request 250)

16. A check for built-up sections has been added to ensure that the web depth is greater than twice the vertical leg length. (Request 254)

17. Captions have been added to the images used with Engineering Assistant help. (Request 268)

18. The corner of the angle is now only counted once for calculations of moment of inertia and area of the angle when angles are used as transverse stiffeners. (Requests 270 and 271)

19. The program now takes section loss on the web into account for shear capacity and web buckling calculations. (Request 272)

20. If section hole (SHO) commands are not entered in order from left to right along the girder, the program will sort them properly. (Request 277)

21. A negative value for the distance to first hole can now be entered on the SHO command through the Engineering Assistant program. A negative value can now also be entered for the "Distance" parameter on the SLS command. (Request 278)

22. The lower limit of the dynamic load allowance and fatigue dynamic load allowance has been changed to 1.0. (Request 285)

23. The construction load path is now printed on the uncured slab and staged construction output reports. (Request 286)

24. An output report describing economic feasibility checks has been added to advise the user of economic and constructibility checks that may not be satisfied by the girder. (Request 288)

25. The multiple presence adjustment factor (parameter 10 of the CTL command) is only applied to the "lever rule" and "rigid frame" methods of calculating the distribution factors. Note that the use of the multiple presence adjustment factor is no longer allowed by DM-4, so the upper and lower limits of this value have been changed to 1.0 to restrict the use of this factor. (Request 292)

26. The upper limit of concentrated loads has been changed to 30 in the User's Manual to reflect the program's capability. Also, the description of the TST command has been modified to indicate that the parameters of the command cannot be repeated. (Request 294)

27. The input line length limit has been increased to 512 characters. (Request 295)

28. The rating tonnage of SI special live load vehicles is now computed using the correct conversion factors. (Request 298)

29. The longitudinal stiffness (Kg) is now printed in the section property output tables for negative flexure. (Request 303)

30. The example input files have been modified to eliminate all input warnings. (Request 304)

31. The gross section properties now print correctly for a plate girder with section loss on a straight-line web depth variation. (Request 305)

32. An example has been added to Chapter 6 to demonstrate how the DP1 command "Weight/Mass Savings" input parameter is used by the program. (Request 306)

33. The upper limit of $b_t < 0.48 * t_p * sqrt(E/ F_y)$ has been removed from the transverse stiffener specification check calculations. (Request 309)

34. An error with reporting the gross section properties at a transition between varying-depth and constant-depth sections has been resolved. (Request 310)

35. CBA Version 3.5.0.7 has been incorporated into the program. (Request 312)

36. A new bracing command, CBR, has been added to allow the user to designate continuous bracing of the top flange for beams that are noncomposite in the final state. (Request 313)

37. The program has been modified to avoid crashes when checking if section holes are actually located on the steel section. (Request 314)

38. BSP Version 1.5.0.1 has been incorporated into the program. (Request 315)

39. When the only code check advisory on the "Web to Flange Weld Design: Weld Capacity" output report is that the designed weld size is less than the minimum, the title of the output report will now appear under "SPECIFICATION CHECK WARNINGS". (Request 316)

40. The scale tolerance has been removed from the rating tonnages computed by the program for the TK527, ML80 and special live load vehicles. (Request 318)

41. Trapezoidal loads on symmetrical girders are now mirrored properly. (Request 319)

42. The section numbering of Chapter 6 has been corrected to properly correspond with the section numbers in Chapter 5. (Request 320)

The following is a list of reported problems, user requests and clarifications that will be addressed in a later version of STLRFD:

1. User request for an abbreviated output option. (Requests 033/036/190)

2. Apply a different load factor to wind on superstructure for the construction limit state. (Request 047)

3. Investigate how to calculate the effective span length for use in effective flange width calculations when an interior span is entirely in negative bending. (Request 069)

4. Make the program compatible with APRAS system. (Request 093)

5. Investigate how and where the program uses the "Bracing Type" parameter specified in the CDF command. (Request 098)

6. Investigate for a specific input file why the allowable compression flange capacity at the pier is less than that at midspan despite the larger plates. (Request 103)

7. Investigate to determine if the program considers a section over the pier as noncomposite if the reinforcement over the pier is entered as zero. (Request 104)

8. Investigate how the program should handle hybrid girders where the web strength is greater than the flange strength. (Request 117)

9. Allow the user to specify minimum load factors for the miscellaneous loads MC1 and MC2. (Request 127)

10. Increase the maximum number of allowable points to 60 on UDA command for camber computations. (Request 137)

11. Report flexural capacity in terms of stress at all points including sections where the flexural capacity is moment-governed for use with the splice program (SPLRFD). (Request 138)

12. Investigate to determine why sometimes asterisks are printed in the STLRFD Rating Factor output. (Request 146)

13. Incorporate Articles and Equations that have been changed in the 1998 LRFD Specifications and 2000 DM-4. See Table 2.7-1 for a full list of changes that need to be incorporated. (Requests 157 to 159, 161 to 174, 178 to 187)

14. Remove the computed deflection distribution factor from the output if the user does not enter a deflection distribution factor. (Request 177)

15. Incorporate the web crippling check for rolled beams for the provision of bearing stiffeners. (Request 195)

16. Investigate how the web compression failure for construction stages is computed. (Request 196)

17. Investigate why specification checks change when a user-defined analysis point is introduced in a varying-depth section. (Request 231)

18. Investigate why specification checks are nonsymmetrical for a symmetrical, varying depth section. (Request 232)

19. Select rolled beams shallower than 18" for rolled beam design runs. (Request 236)

20. Clarify description of deflection distribution factors in User's Manual. (Request 239)

21. Allow complex geometry for varying depth sections (different adjacent parabolic sections). (Requests 240/327)

22. Investigate the application of the multiple presence factor when sidewalks are present. (Request 247)

23. Program crashes for a case where there are no dead load points of contraflexure in the end spans. (Request 293)

24. Report service limit state flexural capacities in terms of stress. (Request 296)

25. Program crashes with section loss in a varying-depth range. (Request 299/323)

26. Modify the program to compute section properties at the midpoint of each girder range to avoid problems at transitions. (Requests 321/322)

27. Add capability to specify multiple shear connector design regions with a different number of connectors per row in each region. (Request 324)

28. Modify the program to use the concurrent shear and moment from the same vehicle when analyzing a live load envelope of multiple vehicles (design live load cases D and E). (Request 325)

29. Program crashes when a transverse stiffener spacing of 0.0 is entered. (Request 326)

30. Change the upper limit on the span length (SPL) command to be a warning or Chief Bridge Engineer warning. (Request 328)

31. Increase the number of special live load axles allowed to 64. (Request 332)

32. Very large negative rating factors are calculated near hinges. (Request 333)

33. Show a specification check failure if the overhang on an exterior beam is greater than the beam depth. (Request 334)