

PennDOT e-Notification

Bureau of Business Solutions and Services
Highway/Engineering Applications Division



PSLRFD

No. 011
August 27, 2012

Release of Version 2.6.0.0

The Department's LRFD Prestressed Concrete Girder Design and Rating (PSLRFD) program has been revised as described in the attached "Summary of August 2012 Revisions – Version 2.6.0.0".

The new program has been placed on PennDOT servers for use by the Districts. Consultants and others, who have a current license agreement for **PSLRFD Version 2.5.0.0**, can obtain the updated version by submitting an Update Request form along with the **update fee of \$500 for private organizations and \$50 for governmental agencies**. Updates for **PSLRFD Version 2.4.0.0 or earlier** will require an **additional fee**. For PSLRFD update fee details, refer to the following link: <http://penndot.engrprograms.com/home/Ordering/PSLRFD.htm>. The update fee is waived for federal and state transportation agencies.

The Software Update Request form can be obtained on the PennDOT Engineering Software Support website at <http://penndot.engrprograms.com> by clicking on "Ordering/Updating" and, then on "Update Form".

Please direct any questions concerning the above to:

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Attachment

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 AUGUST 2012 REVISIONS - VERSION 2.6.0.0

Since the release of PSLRFD Version 2.5.0.0 several revision requests and user requested enhancements have been received. This release of PSLRFD Version 2.6.0.0 contains the following revisions and enhancements.

Specification Revisions

1. The PSLRFD program has been updated to the AASHTO LRFD Bridge Design Specifications Fifth Edition 2010 and the 2012 PennDOT Design Manual Part 4.
2. The live load factor for Strength IA Limit State has been revised to use 1.35 rather than the previous value of 1.10 per 2012 DM-4 Table 3.4.1P-2. (Request 468)
3. The modular ratio has been revised to not be limited to a minimum of 6. (Request 475)
4. The minimum prestress reinforcement requirements have been revised to exclude the ends of the beam in the development zone per 2012 DM-4 Article 5.7.3.3.2. (Request 476)
5. The modulus of rupture for calculating the cracking moment has been revised to use a 0.37 factor times the square root of the design concrete strength. The default allowable tension for final stresses with creep and shrinkage uses a 0.24 factor. Previously, a 0.24 factor was used for both calculations. (Request 489)
6. Transfer and Development Lengths of prestressing strands have been updated to AASHTO LRFD 2010 and 2012 DM-4 Article 5.11.4. (Request 488)
7. Violations of the Span-to-Depth Ratio criteria of AASHTO LRFD Article 2.5.2.6.3 now report an information message that the optional ratio has not been met. Previously, a Chief Bridge Engineer warning message was given. (Request 481)
8. Eta factor values other than 1.0 gives a warning message that PennDOT DM-4 requires Eta factors to be taken as 1.0. (Request 496)

Input Revisions

9. The beam concrete structural design strength (f'_c) has been limited to between 5 ksi and 10 ksi as per 2012 DM-4 Article 5.4.2.1. A warning message that justification must be submitted at TS&L stage for approval has been added for design strengths greater than 8 ksi. The default value for f'_c is now 8 ksi on the DES command. The default values for f'_c and f'_{ci} have been removed from the MCS command. The f'_{ci} to f'_c ratio, on the DES command, now has a default value of 0.85. (Request 470)

10. The strand diameter and area upper limits have been revised to allow 0.6" strands as per 2012 DM-4 Article 5.4.4.1. A warning message that justification must be submitted at the TS&L stage for approval has been added for strand diameter and area of 0.6" strands. (Request 446)
11. The lower limit for the yield strength of reinforcement bars has been revised to 40 ksi as per 2012 DM-4 Article 5.4.3.1. Also, a Chief Bridge Engineer warning message has been added when the yield strength equals 40 ksi. (Request 474)
12. The upper limit for the initial concrete strength (f'_{ci}) has been changed to 8.5 ksi per 2012 DM-4 Commentary DC5.9.4.4P. Also, a check of the f'_{c}/f'_{ci} ratio has been added to warn when the following criteria is validated: $1.05 f'_{ci} \leq f'_{c} \leq 1.18 f'_{ci}$ (Request 477)

Output Revisions

13. The average prestressing steel stress is now reported at mid-span rather than at the transfer length from the end of the beam. This change was made to eliminate a difference between a design run and an analysis run for the same beam. (Request 482)
14. Computed Distribution Factor warning messages have been revised to print once for violations of torsional or moment of inertia limits. Previously, violations of the limits for adjacent box beams could result in multiple pages of warning messages. (Request 484)
15. For Design runs, if an unsymmetrical strand rows is discovered, where an odd number of strands are in a row with an even number of available strands, those unsymmetrical strand rows are flagged with a "U" character in the strand output table and a warning is printed at the bottom of the table. The strand table is also added to the Specification Check Warning table at the end of the output report. Currently, Analysis runs provide warnings if unsymmetrical strands rows are entered so no revisions were necessary. (Request 495)

Flexural Resistance Revisions

16. The flexure resistance factor, ϕ , is now based on the net tensile strain in the tension steel per AASHTO Article 5.5.4.2.1 Fifth Edition 2010. (Request 405)
17. The flexural resistance computations have been revised based on 2012 DM-4 Article 5.7 (April 2012). (Request 479)

Prestress Loss Revisions

18. Prestress loss computations are now based on AASHTO Article 5.9.5 Fifth Edition 2010. A new input parameter has been added for the beam concrete age at deck placement to the CTL Command. (Request 486)

19. Creep coefficients for determining restraint moments are now computed using creep equations per AASHTO Article 5.4.2.3.2 Fifth Edition 2010. (Request 471)
20. The top flange width is now removed when computing the Volume to Surface Area (V/S) ratio for the slab per 2012 DM-4 Commentary DC5.4.2.3.2. Also, the V/S ratio has been limited to 6 inches. (Request 472)
21. Shrinkage strain for determining restraint moments are now computed using shrinkage equations per AASHTO Article 5.4.2.3.3 Fifth Edition 2010. (Request 473)

Shear Resistance Revisions

22. Longitudinal strain, ϵ_x , calculations used to determine shear resistance have been updated to use AASHTO Appendix B5 Fifth Edition 2010. (Request 431)
23. The total effective prestressing strand area at debonding cutoff locations has been revised to correctly determine the longitudinal strain used to compute the concrete shear resistance. Previously, before this change was made the concrete shear resistance would drop sharply at debonding cutoff locations which would result in an odd reduction in stirrup spacing. (Request 490)

Fatigue Revisions

24. The Fatigue I Limit State is now used when checking fatigue in prestressing steel per 2012 DM-4 Article 5.5.3.3. An additional final compressive stress check for the Fatigue I combination with one-half of dead load and one-half of prestress load has been made and reported in a new output table. (Request 464)

Debonding Revisions

25. The effects of debonding and transfer length on the eccentricity of the prestress force are now correctly considered when computing stresses, shear capacity, and camber. This change allows analysis of draped strands with normal debonding (non-crack control debonding). For straight strand analysis the debonding location is checked to ensure only crack control debonding has been entered. If non-crack control debonding has been entered an error is reported and the user is required to change the strand type to debonded on the SSI command. (Request 454)

Engineering Assistant Revisions

26. The lower limit for the start span number on the DLD Command now allows 0 to be entered to indicate all spans have the same load and the start distance, end span number and end distance values are ignored. (Request 492)

27. The field help for the Span Number of the SSI Command has been revised to correctly describe the span number. Previously, before this change the help text applied to the Support Number of the SST Command. (Request 493)