

# PennDOT e-Notification

Bureau of Business Solutions and Services  
Highway/Engineering Applications Division



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## FBLRFD

No. 005  
August 17, 2015

## Release of Version 1.5.0.0

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The Department's Floorbeam Analysis and Rating (FBLRFD) program has been revised as described in the attached "Summary of April 2015 Revisions – Version 1.5.0.0".

The new version has been placed on PENNDOT servers for use by the Districts. Consultants and others, who have a current license agreement for **FBLRFD Version 1.4.0.0**, can obtain the updated version by submitting an Update Request form along with an **update fee of \$500 for private organizations and \$50 for governmental agencies**. Updates for **FBLRFD Version 1.3.0.0 or earlier** will require an **additional fee**. For FBLRFD update fee details, refer to the following link: <http://penndot.engrprograms.com/home/Ordering/FBLRFD.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 note that the software will no longer be provided on a CD. Once payment is received, an e-mail will be sent with download instructions. The new installation will require a License Key that will be provided in the e-mail. A valid e-mail address must be provided on the Update Form in order 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 JUNE 2015 REVISIONS - VERSION 1.5.0.0

Since the release of FBLRFD Version 1.4.0.0 several revision requests and user requested enhancements have been received. This release of FBLRFD Version 1.5.0.0 contains the following revisions and enhancements.

### General Programing Revisions

- 1. The method of calling the engineering program DLL from Engineering Assistant has been changed for compatibility with EngAsst v2.5.0.0 which uses Microsoft's .NET Framework, version 4.5. Because of this, FBLRFD will no longer work with EngAsst v2.4.0.6 or v2.4.0.9 unless the EngAsst "Edit / Run EXE – Command Window" option is selected. FBLRFD will no longer work with EngAsst v2.4.0.0 and earlier (Request 322).*
2. The Department's Continuous Beam Analysis program, CBA Version 3.6.0.5, has been incorporated into the program (Request 306).
3. The program is now compiled with Intel Visual Fortran Composer XE version 2011.9.300 using Visual Studio 2010 (Request 321).
4. An error with reporting the gross section properties at a transition between varying-depth and constant-depth sections have been resolved (Request 326).
5. Analysis points are now placed immediately to the left and right of all bracing locations. The analysis points are then assumed to be in the bracing range on the given side of the analysis location, using the unbraced length on that side, along with the factored effects on that side. Previously, the program would only use one analysis point at a bracing location (Request 366).
6. A error in assigning the ultimate strength of rolled beams has been resolved. With this revision the NET SECTION FRACTURE CHECK calculations will now use the correct ultimate strength value (Request 370).
7. A tolerance has been applied to avoid an issue with the program ignoring a concentrated load placed on a stringer framing into a floorbeam that is at the last support of the stringer (Requests 379, 386).
8. The program now stops execution on the rare occurrence of a floating point error. Previously, on the rare occurrence of a floating point error the program would continue execution, which would result in the program calculating incorrect results and sometimes stopping execution later in the program with a different error (Request 393).

## **Program Input Revisions**

9. 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 stage (Request 327).
10. A new noncomposite dead load, DC1S, has been added to allow the user to distinguish between noncomposite loads associated with the floorbeam/stringer (DC1S) that are not computed by the program (like stiffeners loads) and noncomposite loads that are not associated with the girder itself (DC1). This revision allows the user to more easily break out the components of beam camber (Request 349).
11. The description of the Floorbeam Concentrated Load (FCL) command has been clarified with respect to when bearing stiffener checks are done at concentrated load points (Request 350).
12. A check has been added so that if a user enters 0.0 for the thickness or width of a flange plate for built-up sections, or for the cover plate of a rolled beam, the other dimension must also be entered as 0.0. If only one dimension has been entered as 0.0, the program will stop with an error. Previously, the program would permit one dimension to be 0.0, which could lead to a program crash (Request 351).
13. The lower limit of the shear connector diameter (SCS command) has been increased to 0.75". Diameters less than 0.75" will result in a warning message printed in the program output (Request 356).
14. Loads entered by the user via the Floorbeam Concentrated Load (FCL command) will no longer be mirrored for symmetrical beams if the load coincides with the floorbeam symmetry point (Request 352).
15. The Previous Count Year must be less than the Recent Count Year and the Future Count Year must be greater than the Recent Count Year on the FTL (Fatigue Live) command. This revision was made to prevent the program from crashing (Request 362, 372).
16. The limit on the total number of section holes entered on the SHO command has been increased. The user can now enter up to 40 ranges and each range can have up to 40 holes. If a user enters a value greater than one for "Number of Holes" on the SHO command, they must also enter a value for "Hole Spacing" (Requests 337, 355, 388).

## **Program Output Revisions**

17. For symmetrical floorbeams; only a single analysis point will now print at the symmetrical point; live load results will now be symmetric; stringer dead loads can no longer be entered on stringers past the symmetry point, and results for analysis location past they symmetry point will no longer print (Requests 311, 342).
18. A new rating table has been added to the program after the OVERALL RATING SUMMARY table that will report rating information in a table similar to DM-4 Part A Table 1.8.3-1 (Requests 320, 397).

19. The formatted Input table that is printed to the output file for the FGV command has been revised to prevent formatting errors (Request 334).
20. The HL-93 Loading Code 3 legend description displayed in the program output has been corrected to be "TANDEM PAIR + LANE GOVERNS". Previously, HL93 Loading Code 3 displayed "90% TANDEM PAIR + LANE GOVERNS" which was inconsistent with the CBA program (Request 338).
21. A warning has been added to the program output when the user enters negative distributed dead loads to indicate that negative values indicate an upward sense to the loads. A similar advisory has been added to the program User's Manual (Request 339).
22. Output reports now print all analysis points that contain a warning or failure regardless of the user input for parameter 19 ("OUTPUT POINTS") on the CTL command (Request 346).
23. The HL-93 LL ANALYSIS reports and all of the OVERALL REACTIONS output reports for HL-93 have been modified to now print Loading Code 4 legend description as "90% (TRUCK PAIR + LANE) GOVERNS". Previously, Loading Code 4 legend printed as "90% TRUCK PAIR + LANE GOVERNS" (Request 354).
24. For rolled beams, the WEB CONCENTRATED LOAD CHECK output report now shows the required bearing length,  $N_{req}$ , resulting in web local yielding and web crippling resistances that are greater than the maximum factored load (Requests 361, 384).
25. The intermediate values previously printing on the MOMENT FLEXURAL CAPACITY output report have been moved to a new output report, INTERMEDIATE VALUES FOR MOMENT FLEXURAL CAPACITY, and the depth of web in compression ( $D_c$ ), and yield moments for the top and bottom flanges ( $M_{yt}$ ,  $M_{yb}$ ) have been added to the output report (Requests 368, 385).
26. A Chief Bridge Engineer warning will now appear in the program output for girders that have varying-depth webs where the only varying-depth range is the last range along the girder. The warning was already properly printing for girders with other ranges of varying depth (Request 371).
27. If a fatigue analysis point is placed at an analysis point that produces result immediately to the left and right of the analysis point, the fatigue results will now be calculated on both sides of the fatigue analysis point (Request 381).
28. The code checks on the WEB CONCENTRATED LOAD CHECK output report have been modified so that only code check A will result in a specification check failure (and have the name of the output report show up on the SPECIFICATION CHECK FAILURES output report at the end of the program output). All other code checks for this output report are informational, and are now treated as specification check warnings (Request 382).
29. A new output table named "UNFACTORED FLEXURAL STRESSES" has been added to show the individual unfactored flexural stresses that make up the total factored stress reported by the program (Requests 383, 389).

30. The page layout of the output file has been enhanced to allow for more characters per page width and more lines per page in the PDF output file. The new layout has 102 characters per page width and 83 lines per page (Request 392).

### **User's Manual Revisions**

31. Additional information has been added to the User Manual Chapter 7 description of the Bearing Stiffener Check output report to clarify when concentrated load locations are included in this output report (Request 352).

32. The User's Manual has been revised to state that; the shear connector height entered on the SCS and SCC command is only compared to the effective deck thickness; a warning is printed if the connector height exceeds the effective deck thickness; and that no other specification checks are done with the shear connector height input value (Request 357).

33. The User's Manual has been revised to remove a reference to section holes in Section 7.4.2 and 7.4.3 which cover net section properties as the FBLRFD program does not consider section holes when computing net section properties (Request 358).

### **Specification Checking Revisions**

34. The calculation of the stress in the compression flange at the midpoint of an unbraced length is now calculated by straight-line interpolation of the values at the two nearest analysis points, rather than taking the average of the two values (Requests 378, 399).

35. The determination of  $f_{mid}/f_2 > 1.0$  in the calculation of the moment gradient factor,  $C_b$ , is now done correctly and the calculated value of  $C_b$  has been included in a new output report INTERMEDIATE VALUES FOR STRESS FLEXURAL CAPACITY CALCULATIONS. This new output report includes values that were previously included on the STRESS FLEXURAL CAPACITY output report (Request 380).