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Bureau of Information Systems
Application Development Division

BAR7

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Release of Version 7.10

The Department's Bridge Analysis and Rating Program (BAR7) has been revised as described on the attached Summary of April 2003 Revisions – Version 7.10. The User's Manual has also been revised and it is now available in Adobe Acrobat PDF format.

Consultants and others, who have a current license agreement for BAR7 Version 7.9, can obtain the updated version for a license update fee of \$50. 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>.

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SUMMARY OF APRIL 2003 REVISIONS - VERSION 7.10

BAR7 Version 7.10 contains the following revisions.

1. Increase the number of truss panels allowed from 60 to 99.
2. Increase the size of some of the output fields to avoid printing *****.
3. Correct an error where 2.375 was being printed as the default input value of UNIT WEIGHT DECK CONC.
4. Add a new bridge type "CPL" to analyze precast slab type bridges.
5. Add an input error edit check to flag an error if the moment distribution factor is not entered when the CONT code for stringer span lengths is "C".
6. Correct an error in the calculation of the plastic moment capacity for a built up section. When the plastic neutral axis falls in the vertical part of the bottom angles, the portion of the web above the neutral axis had the wrong sign. Hence, the Mu was being calculated incorrectly.
7. Print the value of DP/D' in the detailed output (OUTPUT code is "A").
8. Print a message in the detailed output (OUTPUT code is "A") if the section is not compact because $F_y > 50$ ksi for a positive moment composite section.
9. Print a message in the detailed output (OUTPUT code is "A") if the section is not compact because it does not have a constant web depth.
10. Print a message in the detailed output (OUTPUT code is "A") if the section is not compact because B'/T is greater than the maximum allowable B'/T .
11. Correct an error in the calculation of distance to consider allowable steel stresses in bent up bars for a concrete structure. The depth that was entered in inches needed to be converted to feet.
12. Correct an error so that the appropriate sign (+ or -) is applied to the Overload Moment Strength on the output.
13. Add an input error edit check to flag an error if no angle data is entered when the steel member type is "B".

14. Correct an error so that a decimal point can be explicitly entered for the axle distance of a special live load.
15. Increase the space between the output fields C BOT and S TOP when printing section properties.
16. Modify the uplift warning message to indicate the live load that produced the uplift.
17. Since the effective slab width may be based on the span length, print the effective slab width and thickness for each span of composite member properties.
18. Correct an error so that Flexural Stresses - Slab are printed for composite stringers.
19. Add a new input item for Integral Wearing Surface at the end of the Concrete Member Properties data. The default value is 0.5 inches.
20. Correct an error in the detailed output (OUTPUT code is "A"). When printing the Area, M of I and C Bot properties for LL+I, check for + or - LL moment and print properties accordingly.
21. Print a message in the detailed output (OUTPUT code is "A") if the section is not compact because DP/D' is greater than 5 for a positive moment composite section.
22. Print a message in the detailed output (OUTPUT code is "A") if the section is not compact because $2DCP/TW$ is greater than the allowable maximum.
23. Print a message in the detailed output (OUTPUT code is "A") if the section is not compact because $2DCP/TW + 9.35(B'/T)$ is greater than the allowable maximum.
24. Print a message in the detailed output (OUTPUT code is "A") if the section is not compact because LB/R_Y is greater than the allowable maximum.
25. Print a message in the detailed output (OUTPUT code is "A") if the section has a possible web-buckling problem because the web thickness check fails (D/TW is greater than the allowable maximum).
26. Print a message in the detailed output (OUTPUT code is "A") if the section is unbraced non-compact because the unbraced length is greater than the allowable spacing of lateral bracing in the compression flange.
27. Print a message in the detailed output (OUTPUT code is "A") if the section has a possible flange-buckling problem because it does not meet the compression flange projection requirement.

28. Check for web buckling based on whether the section is unstiffened, transversely stiffened or longitudinally stiffened.
29. Do not allow a longitudinally stiffened section to be compact as per the 2000 Interims of AASHTO Standard Specifications.
30. Do not allow a built up section to be compact because of holes in the tension flange as per the 2000 Interims of AASHTO Standard Specifications.
31. Print a message in the detailed output (OUTPUT code is "A") if the section is not compact because of either of the above two items.
32. Correct an error for Bridge Type "EIB", shored versus unshored construction. For shored construction, use DL2 properties for DL1 stresses and rating calculations, but do not use DL2 depth to compute shear rating.
33. When calculating the ratings for each of the four cases:
 - (a) Maximum positive moment & simultaneous shear
 - (b) Maximum negative moment & simultaneous shear
 - (c) Maximum positive shear & simultaneous moment
 - (d) Maximum negative shear & simultaneous momentDo not consider the ratings from cases (a) and (b) when determining the controlling shear ratings and do not consider the ratings from cases (c) and (d) when determining the controlling moment ratings.
34. Add an input error edit check to flag an error if the Deck Width is less than the Roadway Width.
35. Add an input error edit check to flag an error if the sum of truss panel widths for each span does not equal the span length.
36. Allow a combination of panel type 7 followed by panel type 8 if the appropriate vertical member is not present and the truss is internally determinate. Add checks for VERTICAL POST = 'N' based on whether the truss is a deck truss or a thru truss and print an error if the truss is internally indeterminate.
37. Correct an error so that dead loads are not redistributed to the wrong panel joints when panel type 7 follows panel type 8 or panel 8 follows panel 7 and there is a vertical missing between panels.
38. Add a check and print an error message when an invalid (negative) square root argument occurs because the combined stress formula has inappropriate input values for calculating the allowable compression in an eccentrically loaded truss member.
39. Add a check to allow multiple negative stringer locations when computing main girder effective slab width.

40. Recompile the program using the latest version of Compaq Visual Fortran.
41. Do not check for uplift on stringers of a GFS type bridge.
42. Revise the User's Manual to reflect that output values for the design fatigue stress range (FSRD) and the effective fatigue stress range (FSRE) do not contain the PA Traffic Factor (PTF).
43. The allowable compression in an eccentrically loaded truss member using the combined stress formula is based on factor of safety equal to 2.12 for IR and 1.70 for OR. Previously it was based on $0.55 F_y$ for IR and $0.75 F_y$ for OR.
44. Correct shear strength calculation for end panels of transversely stiffened girders. Do not include post-buckling resistance due to tension-field action (Use AASHTO equation 10-119 instead of AASHTO equation 10-114).
45. Correct shear strength calculation for interior panels of transversely stiffened hybrid girders. Do not include post-buckling resistance due to tension-field action (Use AASHTO equation 10-149 instead of AASHTO equation 10-113).
46. Use the Safe Load Capacity (SLC) ratings if they exist for an APRAS/ABAS job.
47. Add a new live load posting vehicle TK527.
48. Add an input error edit check to flag an error if the accumulative sum of truss panel widths does not fall within 1/2" of the accumulative span lengths for each span.
49. Add an input error edit check to flag an error if the truss "HINGE AT" joint designation on the Bridge Cross Section and Loading data is not at a support.
50. Provide an error message if a negative stringer location is entered when the OVERHANG is zero.
51. Compute the allowable tension in truss members that have moment of inertia equal to zero and only skip the calculation of allowable compression.
52. Add an input error message to flag when brace points or stiffeners are entered for a stringer.
53. Correct calculations to use appropriate stringer section properties based on stringer span. This is because the effective slab width may now be different between spans.

54. Add a check for an unexpected end-of-file and print out an informative error message.
55. Change ML80 & TK527 loadings as per PUB 238, page IP 03-2. Also use this same methodology for special live loads that have 3% INCR. The axle weights for the ML80 and TK527 loadings shown in Figure 2.4.1 Standard Live Loadings include the 3% scale tolerance allowed by the vehicle code. When calculating the gross vehicle weight of these vehicles for determining the ratings in tons, the 3% tolerance is removed.
56. Correct the calculation of moment of inertia for a composite section when the neutral axis is above the bottom of the slab. The area of concrete below the neutral axis should be neglected.
57. For bridge type GGF, correct the calculation of the effective slab width for the critical girder by using the same method used to calculate the effective slab width for a critical stringer.
58. Correct a problem where erratic results (very large ratings or *****) were being printed for certain special loads.
59. Correct a problem where Type FSS with floorbeam overhang causes BAR7 to crash or go into a loop.
60. Allow more than 5 spans for a continuous truss. Limit is 15 spans, same as for girders.
61. Add new bridge Type TTT to analyze a truss only with no floorbeams or stringers.
62. Rearrange the output of the input default values into the order in which they are entered.
63. Use 1983 AASHTO 3.23.4.3 to calculate the moment distribution factor for Type CPL instead of 1996 AASHTO 3.23.4.3.
64. Add a Note to the output stating that the program does not check stiffener spacings against the AASHTO/DM4 minimum stiffener spacing criteria.
65. Use the clear depth instead of the total depth to calculate the area of the web when computing shear stresses.
66. Add an input check and print an error when stringer/girder locations are unsymmetrical about the center of floorbeam span.
67. Correct the calculation for the weight of floorbeams that have overhangs. The length of the overhang was incorrectly included in the length of the first positive range.

68. Allow comment lines to be included in a separate special live load input file.

69. The User's Manual has been revised for the above revisions. In addition, the manual's format was changed and the manual is available in Adobe Acrobat PDF format.

The following is a list of reported errors, user requests and clarifications from BAR7 Version 7.9 that have not been addressed in Version 7.10.

1. Incorporate CBA and BSP libraries to be used as engines in BAR7.
2. Add new input items to make use of BSP library to allow for non-standard beam sections (deteriorated or patched).
3. Add new input items to make use of CBA library to allow for user supplied or non-uniform dead loads. This will provide capability to analyze counterweights to prevent uplift as well as point loads.
4. Provide analysis for a special live load in one lane and a specified "other" vehicle(s) in remaining lane(s), where "other" vehicle(s) are defined through the LIVE LOAD field on the Project Identification.
5. Add two new codes to the LIVE LOAD field on the Project Identification as follows: I - consider HS20 and ML80 loadings and J - consider HS25, IML and ML80 loadings.
6. Add new input items for single lane distribution factor and multi-lane distribution factors, moment and shear.
7. Add a third option to LANES input for user to define a median barrier.
8. Allow different gage distances for multiple special live loads and recalculate distribution factors for each load.
9. Check provisions of AASHTO Equation (10-119) when rating unsymmetrical stiffened girders.
10. Correct calculation of estimated fatigue life HS20 TRK STRESS for positive and negative live load plus impact moments. The program should use the distribution factor for one lane instead of the multi-lane moment distribution factor entered by the user.
11. Provide the capability to handle the situation where the deck is overhanging the girder with no cantilever or bracket on the floorbeam.

12. Allow a cantilever floorbeam to be non-continuous, i.e., partial or no moment passed thru at the support.
13. Incorporate new equation for C_b (AASHTO 10.48.4.1) for discretely supported compression flange of a floorbeam, stringer or girder.