
PRESTRESSED CONCRETE SOFTWARE PRACTICE POINTERS

The following information was compiled by the ASCE-INDOT Structures Committee to raise awareness regarding bridge design software idiosyncrasies and bridge detailing practices. The list is not all inclusive and intended only as a useful tool for designers. Some information may no longer be applicable as new versions of software are released. Indiana Design Manual (IDM) and AASHTO LRFD Bridge Design Specifications (LRFD) references have been added for convenience to identify how the software affects design requirements. Where no reference is given the information is a preferred common practice or corrections to computer program glitches.

Please send comments, questions and suggestions to BridgeDesignOffice@indot.IN.gov.

CONSPAN

1. Toggle "Exclude Non-Composite Moments from Mu". IDM 406-12.05
2. Toggle "Exclude Beam and Slab Contribution from Vu". IDM 406-12.05
3. When designing multi-span bridges, ensure that the Double Truck and Double Tandem Live Loads are selected in the live load window. Conspan has been known to accidentally remove these during multiple runs. LRFD 3.6.1.3
4. Distribution Factors must be manually changed for Dead Loads due to barrier railing, curbs, sidewalks, or other attachments to meet the criteria in IDM 403-2.06. These can be changed under the "Analysis Factors" tab.
5. When Importance is set to 1.05 and "Non-composite moment effects are EXCLUDED from Mu" is toggled, the Mu-req'd in the "Reinforced Design" does not compute correctly. If "INCLUDED" is used and/or importance = 1.0, the numbers are correct, but the combination of the two causes unconservative results. The solution can be to run with Eta = 1.00 and then scale up the steel required by 5%.
6. Adjust the design importance factors under the "analysis factors" tab per Indiana Design Manual Guidelines. IDM 403-1.02
7. Under the "project design parameters tab", alter the relative humidity from 75% to 70% per INDOT guidelines. IDM 406-4.02(01)
8. Adjust deflection multipliers within the "project design parameters" tab. Conspan defaults the at erection deflection multipliers to 1.85. Per Indiana guidelines, these should be adjusted to 1.75 unless more accurate methods are utilized. IDM 406-12.04(03)

9. Under the “project design parameters tab”, check the box titled “check at lifting point”. Due to the large amount of strand that can sometimes be placed in certain beam types, beams can fail due to concentrated stresses and the lifting points. This will provide an additional check for stresses at the lifting points allowing the designer to adjust mild reinforcement within the beam to compensate for this.
10. Under the “project design parameters tab”, check the box for horizontal shear auto designed for intentionally roughened surface. IDM 406-7.03
11. Verify that Conspan is applying the correct resistance factor correctly for semi-lightweight and lightweight concrete in the $V_u/f'c$ computation used to determine the max stirrup spacing for vertical shear and horizontal shear. IDM 406-5.04
12. Have had difficulties matching the values for d_v and a . This tracks through the rest of the results.
13. Have had difficulties matching the values for longitudinal reinforcing.
14. Trouble reproducing Conspans f_p , c & a results for ultimate moment.
15. Designer should not input thickness greater than the minimum since CONSPAN will use for composite section properties, but input additional as a non-composite load on precast.
16. Include additional concrete due to residual camber and vertical curve correction as a trapezoidal precast DC load. These can be adjusted along the length of the beam to account for additional concrete dead load associated with differences between beam camber and the profile grade.
17. Conspan outputs Bursting or Anchorage Zone Steel in Prestressed Beams as one value. Designers need to make sure they are looking at the top of beam and bottom of beam separately when they are draping strands.
18. Flared beam analysis - After entering all the geometric data, if you go back and change any information in the “Layout” dialogue (like deck widths & offsets or abutment widths & offsets), then the beam analysis goes haywire. As a temporary solution, you just need to wipeout and reenter all the beam data in the “Cross Section” dialogue after you’ve made all changes to the “Layout”. (Version 11.00.01.05)
19. Deck thickness should be entered as the structural thickness (typically 7.5”). Sacrificial thickness (typically 1/2”) should be added as a non-composite dead load. IDM 404-2.01
20. Beams are typically supported at their bearing locations within the yard. The designer should consider having their release span and bearing to bearing span match within the program.
21. When the designer has finished generating their strand pattern, if the design stresses pass, but you still receive a “NG” under release stresses, this is due to the beam failing

at the lifting points. The designer can view these stresses in the report under “positive envelope stresses”. The second table reports the stresses at the lifting point. The designer can add additional mild steel or increase the allowable release strength improve this. IDM 406-5.01