



Release Notes for Beam V3.2.1

New/Changed Features in V3.2.1

The development length calculations for prestressing strand now use f_{ps} and f_{se} values taken from the point with maximum applied (service) moment. Previously, V3.2.0 used the maximum of these values wherever they occurred along the length of the member. This change results in slightly longer development lengths and subsequently slightly lower calculated moment capacity at a given point in the development region.

Another small but important change is in the application of the values entered for Design Bearing Length on the User Information page and their relationship to the Simple Span value. See item 656 below for more information.

Bugs Fixed in V3.2.1

- 694 Ultimate moment calculations for short members with non-symmetric debonding are now correct.
- 698 The development length calculation changes described above along with a change to the prestress force calculation in the transfer region were necessary to completely fix this problem. You also may see some difference in the development region of non-symmetric pieces without debonding, more on the left end than the right end.
- 656 The Design Bearing Length entered on the User Info page is applied differently now (from
737 previous versions) for simply supported members. The Beam V3.2.1 uses the Simple Span value as the support-center-to-support-center span and uses 1/2 of the Design Bearing Length value as the face of the support for shear calculations.

In previous versions of Beam, simply supported pieces (i.e both cantilever values at 0.0) used the full value entered for the Design Bearing Length as the face of the support. That is, the value entered for Simple Span was treated as the member length, not the support-center-to-support-center span. However, values for moment were calculated as if the member had point supports at the outside of the bearing, that is, at the very ends of the member.

If you load a problem file from a previous version into Beam V3.2.1, the only difference you'll see in the report is the shear value at the face of the support.

Members with cantilevers have always used 1/2 of the Design Bearing Length on each side of the support point as the face of the support.

- 717 In V3.2.0 and earlier, shear values V_{ci} and V_{cw} were calculated using a prestress steel area value adjusted for development from the ultimate moment calculations. Shear calculations now are done with a working stress value that reflects losses but not development to ultimate. As a result of this change, you will often see an increase in the V_{ci} and V_{cw} values where strand are beyond transfer but still in development.
- 729 The vertical component of prestress force is now included in the calculation of V_{cw} . It worked in

V3.1.1 but was broken in V3.2.0. See 730 below for related info.

- 662 Self weight of the member is now calculated correctly when the p/c flange has thickness changes.
- 638 Step changes still are not handled as nicely as we would like (you must use two values with a 0.01-ft separation but the self weight, applied shear and moment numbers are correct for the entered values.
- 731 The Form Suction and Core Material special loads for stripping conditions are working again. They worked in V3.1.1 but were broken in V3.2.0.
- 725 Overlapping of transfer length from a strand debonded in-span with transfer length from the end of the piece is now correctly reflected in the Final Stress calculations. Previous versions over-estimated the prestress force (and subsequently the stress) near the end.
- 636 Ultimate moment is now reported correctly at positions along the member that correspond to the edge of an opening in top or bottom flanges.
- 739 The Zia-Hsu Alternate Torsion Method now includes "<2>NOTE: Section too small..." in the Summary of...Reinforcement section of the report when appropriate. In V3.2.0, only the Combined Shear and Torsion section noted Section too small.
- 742 For the Zia-Hsu Alternate Torsion Method, the *Sum of X²Y* value entered on the Torsion Design page is now reported under Miscellaneous Torsion Parameters in the Input Data section of the report.
- 635 Fixed the problem with "Vertical Shear" and "Summary of...Reinforcement" which, for some
700 member geometries, prevented the data from being included in the report.
- 734 The Final Stress section now reports cracked sections with the Intelliprint option selected. Previously, only an uncracked section with the highest stresses was reported; cracked sections were ignored in the Intelliprint report.
- 601 If there are rain, snow, wind, or seismic loads specified but no load case includes that load type, a
118 message is displayed now. The problem arises because the loads will still be included in the working loads used for stress, deflection, and bearing calculations but won't be included in factored loads used for ultimate moment and shear calculations.
- 699 Fixed the problem with window location getting corrupted if you closed Beam while it was minimized.
- 710 The listing of section dimensions and properties in the Design Data section of the report have been rearranged to make them easier to read.
- 715 In the Help > Calculation Methods > Initial Stress about mid page, second paragraph under Eq. 3, the max. stress at ends is now correctly given as $6 \sqrt{f'_{ci}}$. It was given as $6 \sqrt{f'_c}$.
- 750 In the Help > Calculation Methods > Combined Torsion and Shear under the Alternate Torsion Design (Zia-Hsu), the typo in Eqn. 15 has been corrected.

New unresolved issues in V3.2.1

- 664 Cracked section analysis ignores mild steel in the compression region. See Example 4 in the

Help. (This isn't really new. It just wasn't on the list before.)

730 V_{cw} sometimes is wrong when a harp point coincides with a location in the report. The sign on the vertical component of the prestress force is reversed. It's usually obvious that V_{cw} is way out of line compared to the values on either side of it. V_{cw} is seldom the controlling shear value at these points.

New/Changed Features in V3.2.0

The big changes for this release are the addition of an ACI 318-05 option for the code provision which includes

- strength reduction (ϕ) factor interpolation in development per Section 9.3.2.7
- an Alternate Method (Zia-Hsu) option for torsion design per Section 11.6.7.

These changes required extensive re-write of Ultimate Moment, Vertical Shear, Torsion, and Summary sections of the calculations. Extensive testing has been done to assure that results are as consistent as possible with previous versions.

The installer is updated to use MSI, the Microsoft Installer. Because of this, you need to manually uninstall any previous version. A previous version and V3.2.0 can co-exist on a system as long as the previous version license is valid. After removing the previous version with Add or Remove Programs in the Control Panel (or just Programs in Vista) open the Program Files\STI folder and delete the Beam folder (not the Beam V3.2.0 folder).

General Changes

- 608 Updated for use with restricted accounts on Windows Vista and Windows 7. The program now stores configuration information in the user's Application Data folder and uses the Temp folder for calculation files.
- 317 The "Override calculated f'_c, f'_{ci} values" option that was on the Concrete Info page has been removed.
- 544 Full-width openings in flanges are no longer allowed. We realize this will cause some hardship
631 when designing spandrels with pass-throughs. It will return in a future update.

Calculation changes

- 038 The program now handles short pieces of mild steel at the end of a member correctly. Previously,
057 short pieces of mild steel either produced no change in the calculated moment capacity or
106 increased it beyond what was calculated for a full-length piece of mild steel.
179
- 061 Dead load stresses and sustained load stresses no longer are calculated with the elastic regain in
194 the strand stresses. Full live load stresses still contain an elastic regain contribution.
- 515 M_{cr} for Ultimate is now calculated without elastic regain.

- 403 With Rectangular Stress Block selected, ultimate moment for composite section with different unit weight for p/c and topping now uses the ratio of elasticities (which includes a $w^{1.5}$ term) to calculate the compression force in the topping. It was using the ratio $\sqrt{f'_{ctpg}/f'_c}$.
- 268 The robustness of the algorithms for cracked section properties has been improved, though there
326 are still some cases which cause problems. When these algorithms fail, the result is non-
402 convergence in the Final Stresses and under- or over-flow for Deflections.
- 431 The value for the Initial Young's Modulus Modifier entered on the Concrete Info page is now used as expected. In V3.1.1, the initial value was ignored and the final value was used for both initial and final calculations.
- 466 Shear values are now calculated for cantilevers. However, for user-specified additional points near
543 a support, the full value of V_u is reported even if it should be limited to the value at $h/2$.
- 467 The "Second run w/ Live Loads Removed from Cantilever" now works reliably. The second run report is cleaned up; there is less duplication between runs.
- 479 A problem with calculated topping width that occurred when the Parabolic Stress Block option
499 was chosen on the Concrete Info page has been fixed. The problem caused under-estimation of ultimate moment capacity.
- 514 The value for $S_{tc}(tpg)$ in the report and in the calculations has been changed to I_c/y_{tpg} . It previously was this divided by r_{tpg} , the ratio of elasticities for topping and precast. The old value was mistakenly used in several places where the new value was really required. See also 592.
- 516 For '99 code, the over-reinforced strength calculation now includes strand in the compression zone.
- 549 Standard Draping with multiple columns now calculates the correct height for the strand at the hold-down.
- 586 Strand stress-strain curve now uses the E_{ps} entered by the user and, for the PCI Handbook option, follows more closely the curve described in Design Aid 11.2.5. See the Help section on Material Constants for more information on the new stress-strain curve calculation.
- 612 Horizontal Shear now uses Equation 11-13 with the minimum enforced for '02 code (and '05 code). V3.1.1 used Eq. 17.6.1 from the '99 code for all horizontal shear calculations.
- 675 The ϕ factor used in bearing stress calculations for the '02 and newer codes is now the value entered on the Serviceability page for compression. It was hard-coded at 0.7, which is still true for the '99 code.

Report changes

- 031 The Distributed Loads table no longer displays duplicate lines for Self Weight when flange
614 openings or changes in topping thickness are present.
- 033 The correct value for required precast strength is reported in the Production Info section. Previously, the value entered by the user was reported in this section even if it was determined to be inadequate.

- 035 A note will be included at the Miscellaneous Input Data section when any of the ϕ factors are changed from the default values for the selected code ('99, '02, or '05).
- 062 A fourth load case is available for '02 and '05 code options.
- 066 The Light Weight Modifiers on the Concrete Info page are now labeled "Lambda" to clarify their actual usage in the calculations.
- 281 For a General Section with applied negative moment, M_{cr} is now reported. It was always reported as zero in V3.1.1.
- 328 Standard Draping will report an error (and stop the calculations) if the hold-down or -up height is such that any strand would be pushed out the bottom or top of the piece.
- 530 A warning is included in the report when mild steel Distance from Bottom is such that the steel would be above the precast.
- 352 When strand do not reach full development because the piece is too short or because of debonding, a note is printed in the Ultimate Moment section of the report warning that the reported strength may not be achieved. See the discussion in the Help under CM > Design Moment, Partially Developed Strand.
- 417 The note "Temporary stripping conditions were not checked." is no longer printed if Initial Conditions are NOT included in the report, i.e. the Initial Stresses box is not checked on the Printout Options page.
- 468 When the check of initial stripping conditions determines that the extreme bottom fiber is never in tension during stripping, a note is printed in the Initial Stresses section of the report stating that. Previously, the report was silent and it seems that the request for stripping checks simply was ignored (though the checks were performed).
- 460 When "Loads Applied to Top..." is checked on the User Info page, a note is printed with the loads in the Input Data section of the report.
- 464 The Final Stresses section now reports an error when sustained stresses exceed $12 \cdot \sqrt{f'_c}$ (or whatever multiplier you've specified). The program does not correctly analyze a cracked section when cracking occurs with sustained loads.
- 538 The Horizontal Anchor ... & Bearing Stress section now includes the total torsion which must be resisted at support.
- 582 The notation for torsion equilibrium reaction has been changed to coincide with the notation of the PCI Handbook in Fig. 4.5.1.
- 547 The value for A_{vei} is reported as "Undefined" (Note 3) when the value for M_{max} in ACI Eq. 11-10 is zero.
- 592 The $S_{tc}(tpg)$ value reported with the section dimensions in the Design Data section of the report is now the standard value I_c / y_{tpg} . See also 514.

User Interface changes

- 411 You can now save a new (blank) problem file without changes.
- 235 A CANCEL option was added to the "Do you want to save current problem?" dialog that you get
432 when you (e.g.) click on File > Open while you have unsaved changes.
- 345 When you select the current problem from the File > (list) and have made changes to the input data, if you click [Yes] to the question "Do you want to save the current problem?" you will get a Save As dialog.
- 254 You can now view and print the results for problem files that are accessed using the
410 \\server\share\path syntax. Previous versions crashed when any of the actions that required calculations were requested for files accessed with this path syntax.
- 270 Clearing the hold-down or hold-up info on the Standard Draping page will remove draping from
324 the report even if you forget to change the Holddown Type to "No Holddowns" on the Strand Info page. Entering duplicate information for Standard Draping no longer crashes the program.
- 236 The Help explains the entry requirements for debonding strand better. The confusing little
343 inconsistency with X2 between the entry page and the report is noted. The column headings on
368 the Debonding page now show "...from left end & middle" and "...from right end" for all display resolutions.
- 350 In the Help on the Final Stresses page (CM), the equations for top and bottom stress are now correct.
- 351 In the Help on the Tee Sections page (ED), a note was added to remind you about including the topping weight as non-composite DL on the Distributed Loads page.
- 353 The Help explains the bearing steel calculations better.
- 355 All length dimensions on the Ledge Design page now are entered in inches. Previously some were inches and some were feet which caused confusion.
- 455 A minimum value of 2500 psi has been imposed on f'_c to conform with ACI 318 Section 5.1.1. A warning dialog appears if you try to generate a report with a value below 2500 psi for f'_c . If you continue, a warning is included in the report.
- 509 The Help for calculation of horizontal shear reinforcing now correctly defines V_{nc} as unfactored and D as depth of tensile force.
- 552 The default for the "Loads Applied to Top..." checkbox has been changed to unchecked, the more conservative of the two possibilities.
- 554 The explanations for d_w (was d_s) and h_s (was H_s) have been moved to their proper place on the Help page for Torsion Design. They were on the Ledge Design Help page.
- 575 When entering data on the End Patterns page, the value for the right end (if empty) will automatically be entered to match the value for the left end. You can then enter a different value for the right end if desired. This saves a little typing and possibly eliminates the opportunity to make a error when entering end patterns.

- 582 The notation for torsion equilibrium reaction has been changed to coincide with the notation of the PCI Handbook in Fig. 4.5.1. This is reflected in the labels on the Torsion Design page and the Help for Entering Data and Calculation Methods.
- 583 Beam now uses the folder designated in by the environment variable APPDATA for the configuration files Beam.ini and Beam.hst. The folder designated by the environmental variable TEMP is used for temporary intermediate files.
- 587 The Help now gives a more detailed explanation of the strand stress-strain curves used by Beam. See the Material Constants page of the Calculation Methods.
- 624 The dimensions for General Section are explained better in the Entering Data section of the Help.

Unresolved Issues

- 013 If you define an opening for a beam type then change to general section, you will get a message "can't have openings in g-sect" when you try to generate a report.
- 052 The transfer length for strand should be calculated following equation 12-2 of ACI 318-02. Currently the program uses 50 strand diameters for the transfer length.
- 047 Help needs to be improved for hollowcore. See 176 below.
- 176 Hollowcore example from James to be included in the Help. See 047 above. He uses an I-section for hollowcore; not sure we want to endorse that.
- 065 Truncated output for symmetrical members not working (with added points). Truncation doesn't work at all in Vertical Shear.
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- 085 Requirement for hanger steel for ledge beam with unbalanced loads seems high. See also 117.
- 117 Hanger steel calcs don't match what she gets from the equations in the Help.
- 086 New info on strand development to be incorporated.
- 119 Add service load multipliers for stresses and deflections.
- 145
- 121 In some cases, shear A_{vmin} shows note 1 when stress is 55%.
- 146 When an application hits a dead end during calculations, it should pass a flag back to the UI so the user can be notified instead of having to look for a "WARNING>>>" in the output.
- 151 Wants M_u reported in ft-kips.
- 163 Final deflections with 100% sustained live load: why aren't the two numbers the same?
- 207 Wants chamfers for double tee sections.

- 209 For beam sections, only the dimensions that apply for the section type should be active. For example, a rectangular beam shouldn't have top and bottom flange dimensions.
- 234 Need a check for effective flange width, ACI sect 8.10 ('05).
- 469 Calculate shear using strength for p/c and topping.
- 322 Report strand losses at transfer length and at critical section(s).
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- 535 Warning depends on printout options. That is, when a section of the report is unchecked on the Printout Options page, some warnings that would normally appear for those calculations are not displayed.
- 296 Break out wind and seismic loads for deflections and only include load types that are entered.
646
- 312 Program should indicate when self weight is calculated from section properties and when it is entered by the user.
- 346 Special Moving Loads should be disabled when the member has a cantilever.
- 532 Remove the curve in strand development calculation; i.e. use the linear segments as shown in current PCI Handbook.
- 557 f_{pc} factor for V_{cw} is calculated differently from PCA notes.
- 574 Should flag Loads Applied to Top for L- or IT-beam types.
- 637 Skip A_{wv} , A_{wl} when there is no torsion.
- 648 A_{vmin} for p/c pieces (strand dia, area = 0.001) is calculated with the prestress equation (ACI Eq 11-14).
- 263 Print shape factor for bearing pad.
- 309 Maximum load envelope does not consider negative (uplift) loads when they fall into different load cases.
- 310 Add a button to the Toolbar that activates the context sensitive Help.
- 313 All values that the user can leave at zero so the program will use defaults or calculate a value should be identified on the input pages with something.
- 560 Add a button to locate warnings in View Results so the user doesn't have to search for them.

331 Allow holes and taper in flat slabs modeled as an R-beam.
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