

CSiBridge® 2015 (Version 17.3.0)

Release Notes

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Notice Date: 2015-07-02

This file lists all changes made to CSiBridge since the previous version. **Most changes do not affect most users.** Incidents marked with an asterisk (*) in the first column of the tables below are more significant.

Changes from v17.2.0 (Released 2015-05-20)

Graphics

Enhancements Implemented

| * | Incident | Description |
|---|----------|---|
| | 67726 | An enhancement was made to allow display of curved frame members in extruded views. They were earlier shown unextruded. |

Bridge Modeler

Enhancements Implemented

| * | Incident | Description |
|---|----------|---|
| * | 34849 | The Bridge Modeler has been enhanced to allow the support bearings at bents and abutments to be placed at arbitrary locations rather than only below the girders (webs) of concrete box-girder bridge sections. Previously bearings could only be located at the girders for all bridge sections. Now at each abutment and each bent, or at each bearing line at a double-bearing bent, the bearings for box-girder sections can be specified as Girder-by-Girder or as General, in which latter case the number of bearings, their spacing, and an offset from the reference point can be specified. Individual bearings can be modified to be placed at any offset to allow for nonuniform spacing. |
| * | 70267 | Two enhancements have been made to the Bridge Modeler for assigning the longitudinal position of diaphragms (cross-frames): 1) To better model staggered diaphragms that cross a skewed bent between two girders, the diaphragm can now be located using the distance measured along whichever girder connects to the diaphragm on the down-station side of the bent, i.e., in the span before the bent. Previously the distance was always measured along the first of the two girders, which could only accommodate negative skews. (Staggered diaphragms are those defined between an adjacent pair of girders, and are available for steel I-girder, steel U-girder, and precast-concrete I-girder bridge sections). 2) For steel U-girder sections, the distance for diaphragms that are assigned across the whole bridge section are now measured along the layout line rather than along the individual girder lines. For the "All Spaces" assignment used to locate exterior diaphragm (between the girders), users can specify a bearing orientation. This will force a matching section cut and the U-girder meshing will be aligned with this section cut. For the "All Girder Interiors" assignment used to locate interior diaphragms, no bearing orientation is specified. Instead, the interior diaphragms will be aligned with the existing section cut at that location, whether from a matching "All Spaces" assignment, a user discretization point, or default from the bridge geometry. Because the definition of distance has changed for "All Spaces" and "All Girder Interiors", such assignments will be converted to equivalent staggered diaphragms when opening a model containing steel U-girder bridge sections from previous versions of the software. Staggered exterior and interior diaphragm assignments are not affected by this change, and continue to use the distance measured along the girder lines (see item 1). |

| * | Incident | Description |
|---|----------|--|
| * | 79735 | An enhancement was implemented for the Bridge Modeler where now each bridge bent column is modeled as a single frame object with auto meshing instead of dividing the column into multiple frame objects. The auto-mesh size is based on the maximum segment length for bent columns as specified in the Update Bridge Structural Model form. This value was previously used to set the length of the multiple frame objects in the bent column. The auto-mesh size cannot be smaller than the 1.1 times the half of the bent capbeam depth. The advantage of using a single meshed frame object is that the height will be better handled during frame design of the columns. It is important to note that this enhancement may cause a small change to analysis results and bridge seismic design results compared to previous versions. This is due to a slight difference in the discretization of the column. Small changes in the location of the discretized column joints may cause (1) small differences in the mass distribution, affecting mode shapes, and (2) small changes in the stiffness used to condition frame hinges after yielding when they have zero or negative stiffness. In both cases the difference should be insignificant from an engineering point-of-view. |
| | 80771 | An enhancement was implemented for the bridge modeler to now allow negative distance values to be specified for any of the control points used to define a parametric variation. Previously only the first point was allowed to have a negative distance. Negative distances can be used to specify parametric variations for locations before the starting point of a span when the support is skewed. |

Modeling

Enhancements Implemented

| * | Incident | Description |
|---|----------------|--|
| * | 45987 61923 | An enhancement was implemented to add creep and shrinkage according to CEB FIP-2010, ACI 209R-92, and user-defined curves. |

Loading

Enhancements Implemented

| * | Incident | Description |
|---|----------|---|
| * | 79651 | Mass source from loads has been enhanced to exclude vertical loads from self-equilibrating effects, including: temperature, strain, deformation, target force, pore-pressure, and asolid rotate loads. This also includes the self-equilibrating component of force along the chord (joint-to-joint line) of a cable object under transverse load. Only the net vertical load (global Z) from each object in a selected load pattern is now considered as contributing the mass source. Results may now differ from previous versions for models that use such loads in mass source definitions. However, the effect was usually small for cable objects, and the other types of loads are not commonly used in mass source definitions, so most models will not be affected. |

Analysis

Enhancements Implemented

| * | Incident | Description |
|---|----------|---|
| * | 79573 | The speed of nonlinear static and nonlinear direct integration time-history analysis has been increased for models containing many linear shell elements. |

Results Display and Output

Enhancements Implemented

| * | Incident | Description |
|---|----------|--|
| | 79856 | An enhancement was implemented to improve the default report contents to include more bridge-specific data and minimize the number of pages in the report. |

Bridge Design Enhancements Implemented

| * Incident | Description |
|------------|---|
| 80492 | Bridge superstructure design for steel I-girder and steel U-girder bridge sections may now optionally be presented in the tables for all load combinations that were considered at each design location, not just the controlling load combination. This new option is available for all steel bridge design codes. |

Frame Design Enhancements Implemented

| * Incident | Description |
|------------|---|
| 68285 | Concrete frame design has been added for AASHTO 2012 6th Edition with 2013 interims and AASHTO 2014 7th Edition with 2015 interims. |

Installation and License Enhancements Implemented

| * Incident | Description |
|------------|--|
| 80321 | All significant installed EXE and DLL files from CSI are now digitally signed to avoid sand-boxing and other interference from anti-virus products. It is important to note that there never was a threat from any of the installed files in any previous release, but a few anti-virus products are overly cautious, which could cause them to prevent the software from running. No results were affected. |

Miscellaneous Enhancements Implemented

| * Incident | Description |
|------------|---|
| 79318 | The version number has been changed to v17.3.0 for a new minor release. |

User Interface Incidents Resolved

| * Incident | Description |
|------------|---|
| 79156 | An incident was resolved in which an abnormal termination would occur when using the Advanced > Edit > More > Divide Solids command. This was a user interface error introduced in v17.2.0. |
| 79293 | An incident has been resolved in the bridge layout line definition in which the station and radius data in the Horizontal Layout Data form were not editable. This was a user interface issue only. |
| 79507 | An incident was resolved in which the forms in the segmental bridge template wizard did not display correctly when using Windows large font settings or on displays with high DPI resolution. |
| 80419 | An incident was resolved in which the list input items on the Lane Data form could not be modified. This was a user interface issue only. |

Bridge Modeler Incidents Resolved

| * Incident | Description |
|------------|--|
| 78994 | An incident was resolved for the Bridge Modeler that addressed several issues affecting how models were generated for steel I-girder bridges with steel girders using the frame section type "Built-up I Section with Cover Plates". 1) When the steel girder was modeled fully as area objects, the girder web depth was sometimes calculated incorrectly. 2) When the steel girder was modeled as mixed, |

| * | Incident | Description |
|---|----------|--|
| | | the cover plates were incorrectly ignored. In particular, the frame section properties used to model the flanges were for the base I-girder flanges without the cover plates. 3) When the steel girder was modeled as frame objects, the girder position (elevation) was incorrectly located using the top of the top cover plate rather than the bottom of the top flange at the junction with the web. 4) The link objects used to connect the girders to the bearings were not connected to the bottom of the girder when the girder section was nonprismatic and the girder webs were modeled as area objects. For all of these issues, analysis results were consistent with the model as generated. Note that this frame section type may be used in bridge models for analysis but is not considered for bridge superstructure design and rating, and hence did not affect those latter results. When opening older version models, please update the linked bridge model in order to correct this issue. |
| * | 79378 | An incident was resolved for the Bridge Modeler where, for a curved bridge with highly skewed supports, the slab area objects were sometimes incorrectly meshed near the supports, creating overlapping areas or holes in the slab near the supports. This was due to an insufficient transition length for adjusting the bridge section-cut skew angle from supports toward the mid span. When this occurred the effect was obvious by looking at the generated model. The length of the transition zone has now been extended to avoid this problem. Results have improved due to the change in the mesh and the change may be significant for highly skewed bridges. When opening older version models, please update the linked bridge model in order to correct this issue. |
| | 79486 | An incident was resolved for the Bridge Modeler where the bearing elevations at the abutments could be located incorrectly when both 1) the bridge section had a non-zero reference-point offset in vertical direction, and 2) the bridge object was updated as a spine model. Results agreed with the model as generated by the Bridge Modeler. When opening older version models, please update the linked bridge model in order to correct this issue. |
| | 79540 | An incident was resolved for the Bridge Modeler where some diaphragms (cross-frames) may not be generated with the expected orientation (bearing angle) as assigned for the limited case where all of the following conditions occur: (1) A steel U-girder bridge section is used that contains more than three U-girders, (2) External cross-frames (not inside the U-girders) are assigned between all girders at the same location using either the "All Spaces" option or individually between each pair of girders using the same distance, and either (3a) The span has skewed supports or (3b) the cross-frames assignments do not use the default bearing orientation. When this occurred, the error was obvious and results were consistent with the model as generated. When opening older version models, please update the linked bridge model in order to correct this issue. |

**Modeling
Incidents Resolved**

| * | Incident | Description |
|---|----------|---|
| | 78600 | An incident was resolved where in some cases items overwritten or deleted in the interactive database were not deleted in the model. |
| | 79765 | An incident was resolved in which the software could terminate with an "Abnormal Termination" error message in two cases while using the construction scheduler. 1) When modifying the row height using the Options > Change Row Height toolbar command. 2) When setting an invalid predecessor value for certain tasks. No results were affected by these errors. |
| | 80438 | An incident was resolved where changing the units on the New Model form would result in certain other forms performing incorrect unit conversions if they were opened and the OK button clicked. The affected forms were Vehicle Data - Vertical Loading, Vehicle Data - Horizontal Loading, Time Dependent Properties, and Modify Undeformed Geometry. This issue only affected v17.2.0. |

**Section Designer
Incidents Resolved**

| * | Incident | Description |
|---|----------|-------------|
|---|----------|-------------|

| * Incident | Description |
|------------|---|
| 80155 | An incident was resolved in Section Designer in which an unexpected error message would occur when trying to view the report form by clicking the "View or Print" button in the material stress-strain curve form and the "Details..." button in the section moment curvature curve form. |
| * 80679 | An incident was resolved for Section Designer where the moment-curvature relationship could not be calculated for sections that contained an opening. This would cause an error message to be displayed when trying to plot the moment-curvature relationship within Section Designer, and would also affect the generation of Caltrans hinge properties for such a section. In addition, the automated calculation of the cracked-section properties for bent columns as implemented in the bridge seismic design could produce incorrect results that may affect the demand and capacity results. Only version 17.2.0 was affected by this error, and only Section Designer sections with openings. |

Analysis Incidents Resolved

| * Incident | Description |
|------------------|--|
| 53987 | An incident was resolved where force-controlled axial hinges with strength loss did not always lose strength at the specified limit force, but would instead continue to exhibit strength after the limit is exceeded. When this occurred the error was obvious. This incident was resolved with version 17.2.0 but was inadvertently omitted from the Release Notes. |
| * 71544 | An incident was resolved where the behavior of kinematic hysteresis model could exhibit strength loss more rapidly than expected from the specified stress-strain or force-deformation curve. This did not affect the behavior for strain or deformation levels where the stress or force was increasing, only strain or deformation levels where the stress or force value was decreasing, beyond the maximum stress or force value. Kinematic hysteresis can be specified in multi-linear plastic link properties, single-degree-of-freedom (non-interacting) frame hinge properties, and in material stress-strain curves affecting frame fiber hinges and nonlinear behavior in layered shells. Any link, frame, or shell object using one of these properties could be affected by this error if strength loss is expected in a given nonlinear load case. This error affected version 16.1.0 to 17.1.1. This incident was resolved in version 17.2.0 but inadvertently omitted from the Release Notes. |
| 74604 | An incident was resolved where the analysis was unable to run using the advanced or multi-threaded solvers on certain machines that use an AMD CPU chip branded as APU (accelerated processing unit). Such machines are not commonly used for engineering purposes. When this occurred, results were not available. If the analysis was run in the GUI process (typical for smaller models), a message was shown and the software was closed. If the analysis was run as a separate process (typical for larger problems), only the analysis was terminated and the user could continue working with the model. This error did not affect analyses run using the standard solver. Setting the environment variable MKL_DEBUG_CPU_TYPE = 2 using the Windows Control Panel before starting the software could be used to avoid this error, but this is no longer required with the new version. |
| * 77488 | An incident was resolved where link elements of type "Damper - Exponential" could add negative stiffness to the structure in a nonlinear modal time-history (FNA) load case if it was based on mode shapes from a modal case that was used the stiffness from the end of a nonlinear static or nonlinear direct-integration time-history load case. This included modes calculated using the Preset P-delta option "Iterative - Based on Loads". When this occurred, the effect was generally obvious, and was more pronounced for larger stiffness values used in the damper property. This affected versions 17.0.0 to v17.2.0. |
| * 77550 80054 | An incident was resolved where the results of linear direct-integration time history analysis with stiffness-proportional damping could become unstable for models with spring supports. When this occurred the error was obvious because the displacement, force and stress results would diverge and become unrealistically large. Models without spring supports were not affected. This error affected version 17.0.0 to 17.2.0. |

| * | Incident | Description |
|---|-------------------------|---|
| | 79933 79986 80751 | An incident was resolved where the analysis could not be run due to errors while creating the analysis model in certain cases where multiple bridge objects were present in the model and connected together or overlapping. This error typically occurred when creating the influence loads at the common locations and could be avoided by changing the lane definitions to use a specified group (such as "ALL") for the loaded objects rather than using the "Program Determined" option. When the error occurred, no results were available. This error affected v17.2.0 only. |

Bridge Design Incidents Resolved

| * | Incident | Description |
|---|----------|---|
| | 79991 | An incident was resolved for the superstructure design and rating of steel I-girder bridges where, for certain cases, the presence of a diaphragm (cross-brace) could be ignored when calculating the unbraced length. This could occur when a parametric variation was applied to a bridge span and the diaphragm was located at one of the control points used to define the parametric variation. Only diaphragms across the full width of the section ("All Spaces") were affected, not staggered diaphragms. When this error occurred, the unbraced length could be overestimated. The actual length used was reported in the bridge design tables and could also be seen during optimization using the commands Design/Rating > Superstructure Design > Optimize and Design/Rating > Load Rating > Optimize. All steel I-girder design requests and rating requests for all codes were affected. This error was not common. The effect of this error was over-conservative. When opening older version models, please update the linked bridge model in order to correct this issue. |
| * | 80115 | An incident was resolved for bridge superstructure design and rating using the AASHTO LRFD codes where the value of Mn for composite steel I-girder or U-girder positive flexure was calculated as per LRFD Eqn. 6.10.7.1.2-3, and when this was greater than Mp, then Mn was being reported as Mp. This has been corrected so that now Mn is based on either Eqn. 6.10.7.1.2-1 or 6.10.7.1.2-2, but will be no greater than 6.10.7.1.2-3. In doing this, when 6.10.7.1.2-2 controls, then Mn will be less than Mp. This affected all versions of the AASHTO LRFD code for the Steel I-girder Strength design request, the Steel U-girder Strength design request, and the Steel I-girder Composite Strength rating request. Separately, the Superstructure Design Manual has been updated for the AASHTO LRFD codes to clarify the following points: 1) the modular ratio "n" is calculated as a real number rather than an integer, as some engineers do. 2) In checking ductility per Eqn. 6.10.7.3, the depth of the haunch is neglected, as permitted per the commentary. 3) In calculating Mp for positive moment, the contribution of the rebar in the deck is neglected, as permitted by the commentary. These three items were changes to the documentation only, and no results were affected. When opening older version models, please update the linked bridge model in order to correct this issue. |
| | 80347 | An incident was resolved where some bridge seismic design requests could fail to run when multiple requests were run at the same time. When this occurred, error messages were generated for the failed design requests and no results were available for those requests. The design requests that did complete and provided results were unaffected by this error. Running the bridge seismic design requests one-at-a-time avoided this error. This error was not common. |
| * | 80482 | An incident was resolved for bridge superstructure design and rating for steel I-girder and steel U-girder bridge sections using the AASHTO LRFD code where the calculation for the ratio "C" of the shear-buckling resistance to the shear yield strength was always using the value of "k" from AASHTO LRFD Eqn. 6.10.9.3.2-7 for unstiffened panels. The procedure has been revised such that k = 5 is used for unstiffened panels and k is evaluated per Eqn. 6.10.9.3.2-7 for stiffened panels. Design and rating results were consistent with the value of "C" used as reported in the design results. This error affected all versions of the AASHTO LRFD code for the following design requests: Steel I Strength, Steel I Web Fatigue, Steel I Constructability, Steel U Strength, Steel U Web Fatigue, Steel U Constructability; and the following rating requests: Steel I Strength Composite, Steel I Strength Non-Composite. |

Database Tables
Incidents Resolved

| * | Incident | Description |
|----------|-----------------|---|
| | 79129 | An incident was resolved where in some cases items overwritten or deleted in the interactive database were not deleted in the model. |
| | 80017 | An incident was resolved in which an error was generated in certain models when using the interactive database to modify the Joint Spring Assignments 2 - Coupled table data. |

Data Files
Incidents Resolved

| * | Incident | Description |
|----------|-----------------|--|
| * | 79803 | An incident was resolved that addressed two issues importing a bridge model from a database file (.b2k or .\$br file text file, Excel or Access files): 1) When importing the "Frame Loads - Temperature" table in a model containing bridge objects with bridge temperature loads acting on generated frame objects may have been assigned to the wrong load pattern, and frame temperature loads directly assigned (not as part of a bridge object) may have been deleted. 2) For bridge superstructure design preferences when using the AASHTO LRFD 2014, the "Interims" value was not imported, and the value was set to the default "No Interims". For both issues, results agreed with the model as imported. |

Documentation
Incidents Resolved

| * | Incident | Description |
|----------|-----------------|---|
| | 78601 | An incident was resolved in which the AASHTO 2007 concrete frame design manual incorrectly documented the calculation of magnified moments according to AASHTO Eq. 4.5.3.2.2b-1. This was a documentation error only and did not affect the design results. |