

# CSiBridge® 2015 (Version 17.2.0) Release Notes

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**Notice Date: 2015-05-18**

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 v17.1.0 (Released 2014-10-01)**

### **Bridge Modeler Enhancements Implemented**

*	Incident	Description
*	68905	The precast concrete-U girder bridge section in the Bridge Modeler now permits nonprismatic variation of the concrete-U girder sections themselves, including for superstructure design and rating. Generated models include the spine model, as well as area models of the slab with the girders modeled as frames or as areas. Previously nonprismatic section properties were only available in the Bridge Modeler for steel-I, steel-U, and concrete-I girders.
*	69233	A new type of bridge object has been added to the Bridge Modeler for segmentally-constructed bridges. When defining a segmental bridge object, the user has direct control of the length, number, type, erection method, and naming convention of the segments in each span. The entire bridge object is effectively assembled from specified span-discretization schemes that allow for balanced cantilever or span-by-span construction methods. The tendon layout and definition for segmental bridges follows the industry standard of tendon categorization based on their geometry and sequence of installation. The available categories are: Cantilever, Bottom Span, Top Span, and Continuity. Each category features a specialized input form that facilitates very fast and efficient batch-mode tendon definition and provides immediate plotting of defined tendons and segments in various non-proportional scales for quick checking. In addition, general tendons may be defined as needed. Bridge groups will be automatically created for each segment, and for the support bearings and substructures. Staged-construction schedules and load cases can then be easily created with reference to these bridge groups.
	71422	Minor changes have been made to the behavior of the Bridge Modeler when updating a bridge object: (1) When clearing a linked bridge object, unused section properties, constraints, and other properties that had been previously created automatically for the bridge object are now removed. This simplifies the model. (2) The Undo command is no longer available immediately after updating, clearing, or unlinking a bridge object. This was previously available but should not have been, since it can be inconsistent with user actions. Undo is still available for subsequent user actions, but not for the automatic operations of the Bridge Modeler.
	72679	An enhancement has been implemented for the Bridge Object Data form used to add or modify a bridge object. The form now allows the location of spans along the layout line to be specified using span length as well as by station.
	73289	An enhancement has been implemented to add a solid concrete girder deck section to the Bridge Modeler. This section consists of a concrete slab with integral concrete girders of rectangular or trapezoidal shape. Options for updating the linked bridge model include the spine model and an area model where the slab is modeled with area (shell) objects and the girders are modeled as individual frame objects. A variable depth solid concrete diaphragm is available for this section. Force, stress, and displacement results are available for the entire bridge section and the individual girders.

## Modeling

### *Enhancements Implemented*

<b>*</b>	<b>Incident</b>	<b>Description</b>
	13735	An enhancement was implemented to add a library containing the WSDOT (Washington State Department of Transportation) standard precast I-girder and bulb-tee girder frame section properties.
	39848	An enhancement was implemented to allow the definition of bridge precast concrete I, U, and bulb tee girder frame section properties in XML library files that are read by the software for quickly adding new standard frame sections for these shapes. Users can define their own libraries and either add them to the subfolder .\Libraries\Fram Sections in the installation directory or into subfolder .\Computers and Structures\CSiBridge 2015\Libraries\Fram Sections within their local user folder.
*	47359	An enhancement was implemented to allow modification of the model geometry based on the shape of a buckling or modal case mode. This can be used to simulate imperfections or other scenarios. Once applied, the geometry can be reset to the original.
	73291	An enhancement has been implemented to provide a warning message if a mass source definition includes both element self-mass and at least one load pattern with a self-weight multiplier greater than zero, possibly resulting in double counting of the self-mass.
*	76109	An enhancement has been implemented to now allow mass assigned to null objects to be accounted for during analysis. Previously mass could be assigned to null objects but was not considered during analysis. Old models that had mass assigned to null objects will now have different results for any load cases that account for mass.
	76130	An enhancement was implemented to add a new trapezoidal concrete frame section property. This is similar to the rectangular concrete shape, except that the top and bottom widths may be different. Concrete frame design for these sections is not currently available, as they are intended primarily for use in the new Concrete Solid Girder bridge deck section.
*	76434	An enhancement has been implemented to allow specification of scale factors for the material time-dependent properties controlling creep, shrinkage, and stiffness for concrete; and relaxation for tendons. For creep, shrinkage and relaxation, these factors multiply the calculated strain. For stiffness, the factor multiplies the modulus of elasticity at any given time.

## Section Designer

### *Enhancements Implemented*

<b>*</b>	<b>Incident</b>	<b>Description</b>
	73935 75383	Section Designer has been enhanced to provide more detailed information in the message displayed when an error is encountered while displaying the Concrete Model Form. Such errors are typically due to an invalid specification of a Mander-Confined material that adversely affects the calculation of the stress-strain curve.
	22355	Section Designer has been enhanced to allow prestressed tendon layouts to be drawn directly using the same tools used to draw rebar layout. Previously tendons could only be defined within Caltrans shapes. Selecting a tendon material for the drawn shape allows specification of the tendon force. Available shapes include point, line, rectangular, and circular layouts, as well as the reinforcing included as part of the rectangular, circular, and polygon concrete shapes. The tendon size, material, and prestress force affect the moment-curvature relationship, and hence affects Caltrans frame hinges defined from Section Designer sections. Fiber hinges and non-Caltrans PMM hinges are not affected. The PMM interaction surface used for design is not affected, but treats the tendon as reinforcement without prestress.

## Loading

### Enhancements Implemented

*	Incident	Description
*	18433	An enhancement has been implemented to allow standard vehicles to be defined in XML files for import into models. All previously available standard vehicles are now available in this XML format using the Import Vehicles command. Users can define their own libraries and either add them to the subfolder .\Libraries\Vehicles in the CSiBridge installation folder or into the subfolder .\Computers and Structures\CSiBridge 2015\Libraries\Vehicles within their local user folder.
*	18434 19077	Horizontal moving loads may now be considered in influence-based moving load cases, including the effect of braking/acceleration loads and centrifugal forces. Horizontal loads are computed as proportional to the vertical loads defined for each vehicle, with factors specified in the vehicle definition for braking/acceleration coefficients, centrifugal coefficients and velocity, overturning effects, and super-elevation effects. The centrifugal radius is specified as part of the lane definitions, and is independent of the geometry of the layout line. Each moving load case may consider any combination of vertical, braking/acceleration, and/or centrifugal loading. Overturning moments due to centrifugal and super-elevation effects are represented as vertical force couples and are limited so as not to cause uplift on the unloaded wheels; for this reason, overturning moments are most conservatively analyzed when combined in the same moving load case with vertical load. In addition, moving load analysis has generally been made more efficient by only running those vehicles on lane influence surfaces actually needed for the load cases being run; previously, all vehicles were always run on all lanes.
*	67707	An enhancement has been made to add automated response-spectrum functions for Argentina, Chile, Colombia, Dominican Republic, Ecuador, Guatemala, Mexico, Peru, and Venezuela.
	72359	An enhancement has been implemented to allow the definition of notional load patterns by specifying a base load pattern and a load ratio.
*	74815	Auto seismic loading and response spectrum function for Eurocode 8-2004 has been updated for Norway National Annex EN 1998-1:2004 NA:2014.

## Analysis

### Enhancements Implemented

*	Incident	Description
	71596 72252	The file-size limit for internal files used for analysis has been increased from its previous 2GB limit. The new limit defaults to 100GB, but this can be changed using the environment variable SAPFIRE_FILESIZE_MB to 1TB or more. This change will not affect most users and most models, since the previous limits were exceeded in very few cases. The new larger size limit applies to NTFS file systems only. FAT32 file systems are still limited to 2GB. Most files used for analysis will have the new larger capacity, although a few files may still exhibit limits for other reasons, such as the number of objects that can be handled. For most practical problems, the amount of disk space and other system resources will control the size of the model and associated analysis files that can be handled.
	76508	Computation of the nonlinear behavior of link elements has been parallelized to increase the speed of analysis for nonlinear static, nonlinear direct-integration time-history, and nonlinear modal time-history (FNA) load cases. This will primarily impact models having a large number of link objects or a large number of link elements generated to represent line or area spring supports. Analysis results may change slightly in sensitive or ill-conditioned models, but should otherwise not be affected.
	76511	The behavior of the isotropic interacting frame hinge has been improved, particularly with respect to the handling of changes in bending ductility due to changes in axial load. In addition, the behavior when the hinge is collapsing due to a drop in the moment capacity has been improved. In certain rare cases, the moment-rotation results would deviate significantly from the backbone curve during such drops, and this has been largely resolved. Note that deviations from the backbone curve are expected when the axial force or M2:M3 ratio changes due to movement around the interaction surface. The affected hinges types are P-M2-M3, P-M2, P-M3, M2-M3, excluding fiber hinges and single degree-of-freedom hinges. For most models, the effect of these changes will be insignificant.

## Results Display and Output Enhancements Implemented

* Incident	Description
13401 25713 62522	Superstructure displacements are now available for plotting and output on the Bridge Object Response Display form using the command Home > Display > Show Bridge Superstructure Forces/Stresses. Displacement results are available for the entire section along the layout line and for individual girders or webs along their individual lines. Displacement components provided include vertical, transverse, and longitudinal translations, plus rotation about the longitudinal axis (torsion). Result locations for the girders and webs depend upon the type of bridge section and how it is modeled. For girders, the torsional rotation is computed as the relative transverse displacement per depth of the girder. Displacement results can be plotted at the section-cut locations where forces and stresses are reported or at the tenth points of each span. Plotted results can be displayed in a table and exported to Excel. In addition, the Bridge Object Response Display form has been enhanced for all result types (forces, stresses, displacements) to show location based on the layout line or individual girder line, and from the start of the bridge object or the start of each span. Previously distance was always measured along the layout line from the start of the bridge object.

## Bridge Design Enhancements Implemented

* Incident	Description
69749 73155	Bridge design of steel-girder superstructure sections has been enhanced by adding the calculation of the negative plastic moment capacity for steel I- and U-girder sections where the plastic neutral axis (PNA) falls into bottom flange. Previously those sections were flagged as not valid, and no design results were provided. This enhancement affects all design and rating requests for steel I- and U-girder sections for all design codes.
73676	An enhancement has been implemented for the bridge design and rating progress form to show additional status details for the requests being run.
* 76388	An enhancement has been implemented adding bridge superstructure design according to AASHTO LRFD 2014 (7th Edition), including the 2015 interim revisions as an option. This also affects bridge rating when used as the underlying resistance code.
* 76389	Bridge superstructure rating for the AASHTO code has been revised to account for the 2014 and 2015 interim revisions. The name of the rating code, as referenced in the Bridge Rating Preferences form and documentation, has been changed from "AASHTO Rating 2011" to "AASHTO Rating 2010", and a new option has been added to select the interim revision: "No Interims", "2011 Interims", ..., "2015 Interims". The choice of the interim appears in the output and reports, but actually has no effect on the results as the changes in the code do not affect the superstructure rating requests as implemented in CSiBridge. In addition, two new options have been added to the Bridge Rating Preferences to select the AASHTO design code and corresponding interim revisions to be used for resistance calculations. These too will be reported in the output and reports. Changes in these codes and interims may have an effect upon the results. No change was made for superstructure rating using the "AASHTO LRFD 2007" code.
77525	A tolerance value has been added to the AASHTO LRFD criteria for the determination of stiffened versus unstiffened web panels. The web panel is now classified as stiffened when the stiffener spacing $d_0$ satisfies $d_0 \leq 3D + Tol$ (AASHTO LRFD 6.10.9.1 without longitudinal stiffeners) or $d_0 \leq 1.5D + Tol$ (AASHTO LRFD 6.10.9.1 with longitudinal stiffeners), where $D$ is the web height and $Tol$ is the Auto Merge Tolerance specified in the model settings (command File > Settings > Tolerances). This change allows web panels to be considered as stiffened that previously were intended to exactly satisfy the limiting case but failed due to numerical round-off.

## Frame Design

### ***Enhancements Implemented***

<b>*</b>	<b>Incident</b>	<b>Description</b>
	40516	An enhancement has been implemented, adding steel frame design according to AISC ASD-89 and AISC ASD-01.
*	75246	An enhancement has been implemented, adding concrete frame design according to the ACI 318-14 code.
*	75247	An enhancement has been implemented, adding steel frame design according to the new Canadian CSA S16-14 code.
*	75248	An enhancement has been implemented, adding concrete frame design according to the new Canadian CSA A23.3-14 code.

## Data Files

### ***Enhancements Implemented***

<b>*</b>	<b>Incident</b>	<b>Description</b>
	73403	The definition of schedules created by the Construction Scheduler is now incorporated in the model file (.BDB). Previously this data was stored in a separate file (.BCS). Construction schedules are now also available in the database tables for display and editing, and for export and import to text, Excel, and Access files.

## Application Programming Interface

### ***Enhancements Implemented***

<b>*</b>	<b>Incident</b>	<b>Description</b>
	75813	New functions have been added to the CSI API (Application Programming Interface) to set and retrieve the GUID (Globally Unique Identifier) for point-object force loads, cable-object distributed loads, and frame object concentrated or distributed loads. A separate GUID applies for each individual load assignment to an object. The GUID is now automatically created whenever any of these load types is assigned to an object, whether by using the API, graphical user interface, or database tables. In addition, GUIDs are now automatically generated for each new object when created.

## Documentation

### ***Enhancements Implemented***

<b>*</b>	<b>Incident</b>	<b>Description</b>
	73336 76108	An enhancement has been implemented, updating the API documentation to include Visual C++, Python, MATLAB, and Fortran examples.

## Miscellaneous

### ***Enhancements Implemented***

<b>*</b>	<b>Incident</b>	<b>Description</b>
	71128 71493 71599	The check for updates feature has been modified to be less intrusive. Now when an update is available a small icon will appear in the upper right corner of the main window to indicate this. Clicking on the icon will take the user to a website providing details on how to obtain the update. The Help > Check for Updates command remains.
	71221	The version number has been changed to v17.2.0 for a new minor release. CSiBridge v17 is known as CSiBridge 2015.

**User Interface  
Incidents Resolved**

*	Incident	Description
	71092	An incident has been resolved that addressed several unreported "Abnormal Termination" errors that could occur when working with the graphical user interface. When these errors occurred, the model could be saved before the software terminated to prevent loss of data. Results were not affected.
	71555	An incident was resolved in which an abnormal termination would sometimes occur when trying to edit mixed bridge group types.
	71754	An incident was resolved for three minor usability items: (1) When using the menu instead of the ribbon, no recent models were shown on the File menu . (2) When using the menu, the advanced menu option was not saved between sessions. (3) The unit settings were not saved between sessions.
	72067	An incident was resolved in which an abnormal condition could occur when clicking the 'Export To Excel' button on the 'Bridge Object Response Display' form. This was a user interface issue only and did not affect results.
	72110	An incident was resolved in which an abnormal condition could occur when modifying or deleting existing vehicles. This was a user interface issue only and did not affect results.
	72477 72868	An incident was resolved in which an input field validation message on the Bridge Section Data form was unable to be closed in order to correct the input data. This was a user interface issue only.
	72633	An incident was resolved in which an abnormal condition would occur when using the ribbon button to copy a lane that was defined based on frames. This was a user interface issue only and did not affect results.
	73195	An incident was resolved correcting two items related to using the menu interface instead of the ribbon interface. (1) After switching to the advanced menus, the option was not maintained the next time the software was run. (2) A window title was not displayed to identify what was displayed in the window. Both items were user interface issues only and did not affect results.
	73198	An incident was resolved in which an abnormal condition could occur when manipulating data on the 'Define Parabolic Tendon Vertical Layout by Points' form. This was a user interface issue only and did not affect results.
	73394	An incident was resolved where the plot on the 'Length Effects for Axle or Uniform Loads' forms was blank. This was a user interface issue only and did not affect results.
	73649	An incident was resolved in which an abnormal termination could occur when modifying bridge groups. This was a user interface issue only and did not affect results.
	73773	An incident was resolved in which an abnormal termination error could occur for certain models when changing to extruded view. This was a user interface issue only and did not affect results.
	74054	An incident was resolved where it was not possible to add or modify vehicle classes in the graphical user interface. Vehicle classes could be added or modified using the interactive database editor. The automatic vehicle classes created for each individual vehicle were not affected. No results were affected.
	74164	An incident was resolved in the Define Bridge Section Data form for advanced box girder sections in which setting the option to specify a radius for calculation of some of the fillet data would auto-calculate the fillet values, but still let the user input values in the fillet fields. The user input values would revert to the auto-calculated values and therefore the results matched the model definition. The fields are now locked from user input when applicable.
	74369	An incident was resolved where the distance values in the Lane Loading Points form were always shown in the model database units instead of the specified display units.
	74689	An incident was resolved in which the traditional menu item (not the ribbon) Display > Show Superstructure Forces/Stresses was enabled when there were no bridge objects in the model.
	74793	An incident was resolved for the Load Case Data - Nonlinear Static Staged Construction form in which a long name in the Data For Stage section of the form would result in a horizontal scrollbar obscuring part of the input data. This was a user interface issue only and did not affect results.

* Incident	Description
75269	An incident was resolved in which the Add button on the Vehicle Class Data form was not enabled, preventing adding of new vehicle classes through the form. Built-in vehicle classes were not affected. Vehicle classes could be added through the interactive database editor. This was a user interface issue and did not affect results.
75998	An incident was resolved for the Bridge Modeler where entering invalid data in the Bridge Bent Column Data form (command Components > Substructure - Bents) could generate an error message that could not be closed, such that the user was unable to go back to the form to correct the data. This required the software to be terminated and restarted.
76494	An incident was resolved in which the Bridge Lane Data form would increase in size when opening it multiple times. This was a GUI issue only when using large fonts and did not affect results.
77511	An incident was resolved where the load case tree may not display correctly when more than one staged construction case starts from a single staged construction case.
78904	An incident was resolved in which the Vehicle form could grow in size when opened repetitively. This was rare and typically occurred when using large font Windows settings. This was a user interface issue only.

### Graphics Incidents Resolved

* Incident	Description
59395	An incident was resolved in which the 'Offset' view type would sometimes show offsets where they were not applied. This was a graphical issue only and did not affect results.
73594	An incident was resolved where the Offset view option (command Home > View > Set Display Options > View Type > Offset) was drawing frame objects at the center of the section bounding box rather than at the centroid (neutral axis) of the frame section. This was incorrect for unsymmetrical sections such as channels, angles, T-sections, and some Section Designer sections. This was a display issue only and no results were affected. The extruded view option was drawn correctly.
74495	An incident was resolved in which the bent columns were sometimes not correctly displayed in extruded view as a result of incorrect nonprismatic bent column sections as described and resolved in Incident #74427.

### Bridge Modeler Incidents Resolved

* Incident	Description
69751	An incident was resolved for the Bridge Modeler where the bent bearings may be generated incorrectly at the beginning of the span for a steel U-girder bridge model when two internal cross-diaphragms, in the same or different girders, were assigned near a bridge section cut location in that span. When this occurred the error was obvious and the results agreed with the model as generated.
71365	An incident was resolved for the Bridge Modeler where the software would terminate with an Abnormal Termination error message when assigning to a bridge object a Steel U-Girder deck section having only a single girder. When this occurred, no results were available.
71404	An incident was resolved for the Bridge Modeler where bridge groups that are defined in terms of a station or distance range could include objects outside of the specified range. This was most likely to occur in larger models. When this occurred, the effect was obvious by looking at the objects selected using the generated groups, and results agreed with the model as generated. This error affected versions 17.0.0 to 17.1.1.
73515	An incident was resolved for the Bridge Modeler in which the feature to copy a tendon to all girders (command Bridge > Bridge Objects > Prestress Tendons) did not always work when a parametric variation was assigned to the second or subsequent span, and the distance for the parametric variation was specified to be measured from the beginning of the span. When this occurred the effect was obvious and results agreed with the model as generated.
73915	An incident was resolved for the Bridge Modeler where defining a composite bridge deck section with zero overhang length and an overhang thickness greater than the slab thickness would cause a

*	Incident	Description
		warning message "Steel Girder with Composite Slab - Invalid thickness of composite slab." to be generated when running superstructure design or rating requests and displayed in the corresponding status table. When this occurred, affected design results were not available. In addition, plotted and tabulated superstructure stress results for the exterior slab and composite girder adjacent to this overhang could be reported as zero. No other results were affected. This situation was not common, and when it occurred, the error was limited and obvious.
	74246	An incident was resolved for the Bridge Modeler where an error message was sometimes generated when defining bridge groups that stated that a distance specified exceeded the span length, when in fact it did not. This was due to a tolerance check and could be avoided by setting the distance to a slightly smaller value. The tolerances have been adjusted to correct this problem. Results were not affected.
	74427	An incident was resolved for the Bridge Modeler where a nonprismatic frame section assigned to the bent column may not have the lengths of the variable segments properly distributed along the height of the column. The various length should be apportioned along the clear length from the bottom of the column to the bottom of the bent cap, but were instead being calculated as if distributed along the length from the bottom of the column to a point within the bent cap. When this occurred, analysis could be affected, although the effect was generally small.
	75437	An incident was resolved for the Bridge Modeler that affected the generation of seismic hinges in the bent columns for automated Bridge Seismic Design: When the "Concrete Hinge Type" option in the Bridge Seismic Design Preferences form was set to "Auto: From Bent", and the "Seismic Hinge Data" property on the Bridge Bent Column Data form was set to "None" for the top and/or bottom hinge in any of the columns, no hinges would be generated for any of the subsequent columns in any bent using that bent property. Results agreed with the model as generated.
	75523	An incident was resolved for the Bridge Modeler where the superstructure continuity conditions at the support bents could be incorrectly generated when the bridge object was updated as a spine model. When the two end joints of the spine-model frame objects for the two adjacent spans did not share the same location at the bent, then either (1) continuity was being enforced with a body constraint at double-bearing bents even when discontinuity was specified, or (2) continuity was not being enforced with a body constraint at single-bearing bents even when continuity was specified. When this error occurred, the effect was obvious from the deformed shape and superstructure force and moment plots. This did not affect bridge objects updated as area or solid objects. The common case of spine models where the end joints of the adjacent spans were at the same location was not affected.
	75878	An incident was resolved where in certain rare instances of tendons modeled as loads on frame sections with non-prismatic section properties, the loading could be incorrect. When this occurred the effect was obvious.
	76378	An incident was resolved for the Bridge Modeler affecting steel I-girder bridge models with the girder webs modeled as area objects and having either skewed supports or a curved layout line where certain area and frame objects associated with cross frames (diaphragms) could be removed from the generated model when cross-frames were assigned at the same location to the left side and right side of an interior girder and both cross-frames included a "both-sides" type of connection plate. The affected area and frame objects would be present when the linked model was first updated from the bridge object, but could then be removed after the model was saved or the database tables were opened. When this occurred, the effect was obvious, and results agreed with the model as visible. This error was not common.
*	76694	An incident was resolved for Bridge Modeler where the wrong steel material property could be used in the model created for steel I and U girder bridge sections when (1) A girder was assigned with a non-prismatic section, (2) The girder was modeled as shell or mixed type, (3) The nonprismatic segment boundary location was not at a bridge section-cut location, and (4) The section material was different before and after the segment boundary. When all four conditions were true, the girder section material would be the same before and after the nonprismatic segment boundary instead of being different. This normally had no effect on the analysis results because the modulus of elasticity is generally the same for all steel materials. However, design results could be affected if the yield strengths were different between the two materials.

* Incident	Description
77653	An incident was resolved for the Bridge Modeler where rebar could be added into the wrong span when using the Bridge Girders Reinforcement Layout form (command Bridge > Bridge Objects > Girder Rebar) when the name of one span was contained in the name of another span. For example, rebar added to span "Span23" would instead be added into "Span2". When this occurred, the design results agreed with the model as generated, which could be seen from the design results tables or revisiting the Bridge Girders Reinforcement Layout form.

## Modeling

### Incidents Resolved

* Incident	Description
70305	An incident was resolved where Caltrans-type frame hinges could not be assigned to frame members using Section Designer sections defined as Caltrans shapes having tendons but no mild reinforcing steel. This is now possible provided that the specified tendon tension is within realistic limits for the concrete and tendon materials in the section.
72093	An incident was resolved where the Quick Start form for the horizontal layout of circular bridge tendons was not creating the correct tendon layout. Results agreed with the model as generated.
77406	An incident was resolved in which opening the construction scheduler would change the notional size for frame elements from Auto to User.

## Section Designer

### Incidents Resolved

* Incident	Description
* 71170	An incident was resolved in Section Designer where the section properties were calculated incorrectly if the Section Designer section (1) Contained a structural shape assigned with a concrete material, and (2) the Reinforcing for this shape was set to "Yes", and (3) the Rotation Angle for this shape was not zero. The section properties were being transformed twice for the nonzero angle in the case. Structural shape without reinforcing were not affected.

## Analysis

### Incidents Resolved

* Incident	Description
47913	An incident was resolved where the shell response (resultants and stresses) could be all-zero for a moving-load cases that used the stiffness from the end of a staged-construction load case. This was not common. When this did occur, the error was obvious.
* 61372	An incident was resolved where a torsional release applied to the end of a frame object with a section property having shear-center eccentricity (e.g., a channel section) did not result in zero torsion where expected, and in some cases could cause an unexpected shear force V2. When this occurred, the error was obvious from the torsion and shear reported in the frame object. Load patterns used in a mass-source specification that caused large shear in an affected member could also cause errors in the calculated mass if the member was short and the shear error was large. Otherwise, the practical effect on structural response was generally insignificant outside the member itself. Now when torsional and/or shear releases are specified in a frame member, shear-torsion coupling is ignored for that member.
* 70951	An incident was resolved where the convergence behavior of the triple-pendulum isolator (link property) was poor for circumferential behavior. This could cause time-history load cases with independent loading in two directions to run slowly or to not converge, in which case results were not available. Radial behavior (along a fixed shear direction in the U2-U3 plane of the isolator) was not strongly affected. The overall convergence behavior of the triple-pendulum isolator has been made more efficient, and some small difference in results may be expected even for radial behavior.

* Incident	Description
71962	An incident was resolved where the results for the triple-pendulum isolator could be incorrect when recovered after running a nonlinear load case. The results of a nonlinear load case starting from zero initial conditions were not affected except for the triple pendulum isolators themselves: the results for the joints and all other elements were correct. However, the results for any nonlinear case continuing from a previous nonlinear case could be affected by the incorrect results for the triple pendulum isolators from the previous nonlinear case.
73432	An incident has been resolved where the shear factors "factV2" and "factV3" in the formulas used to calculate shear stresses S12 and S13 for the circular frame section at the points 2, 3, 6 and 7 (angles 315, 225, 45 and 135 degrees, respectively) should have been $R^2 / 6$ instead of $R^2 / (3*\sqrt{2})$ . The computed results agreed with the formulas as documented in the technical note "Frame Stress Calculation". In addition, the shear factors "factV2" and "factV3" in the formulas for S12 and S13 for the pipe frame section at the same location have been enhanced to use an exact analytical solution without the thin-walled assumption. Only analysis results are affected by these changes. Design results are not affected.
73557	An incident was resolved where the analysis would terminate with an error message on certain 64-bit Windows 8.1 machines when using the 64-bit solver with the Advanced or Multi-Threaded options. When this error occurred, no results were available.
76889	An incident was resolved where the results for moving load cases were presented without correspondence for area (shell, plane, and asolid) and solid objects, even when correspondence was requested for the analysis. The results presented were always the maximum and minimum values for each force or stress component, and hence were conservative. Results for joint displacements and reactions, frame forces, and link forces and deformations were not affected by this incident.
78935	An incident was resolved where an exception could occur and the analysis terminated when running a moving load case for cable objects while using the 64-bit solver. When this occurred, results were unavailable. Results were otherwise unaffected. Models that did not contain cable objects or that were set not to consider moving load on cable objects were not affected. This error did not occur when using the 32-bit solver, such as when running the analysis in the GUI process (as set using the command Analysis > Analysis Options > Solver Options).

## Bridge Design Incidents Resolved

* Incident	Description
70741	An incident was resolved for bridge seismic design where the pushover load cases for design requests of seismic design category D could fail to converge if any bents were defined in the bridge modeler without any columns. In such a case, the bent having no columns and all subsequent bents would use the wrong generalized displacement for loading control, and no results would be obtained. Results for the previous bents were unaffected. Now pushover load cases are not created for bents having no columns.
71931	An incident was resolved for bridge superstructure design using the Eurocode-3 code where the software could terminate unexpectedly while performing either the "Steel I Composite Bridge Constructability - NonStaged" or the "Steel I Composite Bridge Constructability - Staged" design checks. When this occurred, no results were available.
72294	An incident was resolved for bridge superstructure design and rating where a design or rating request for a steel I-girder bridge would fail to run with an error message if the bridge section included a nonprismatic frame section that was defined to contain both a regular steel I-section and a hybrid I-section and if the location of the section transition between these two types of I-girders matched a bridge section cut location. When this occurred, results for the design or rating request were not available. Replacing the regular I-girder sections with equivalent hybrid I-girders in such a case enabled the request to run.
73244	An incident was resolved for bridge superstructure design and rating using the AASHTO LRFD 2007 and 2012 design codes where the effective shear depth was not correctly calculated for shear-type design and rating checks. In particular, the depth $d_e$ (as defined in equation AASHTO LRFD 5.8.2.9-2) was being calculated using $f_y = 0$ , where $f_y$ is the yield stress of the longitudinal rebar.

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		The affected design and rating types are the Multicell Concrete Box Shear and the Precast Composite Shear for concrete I- and U-girders. The computed shear depth was reported in the design tables.
	73859	An incident was resolved for Bridge Design Optimization where an error message "Error in applying modified beam plate sizes to analysis model" could be generated when trying to perform the operation Save as a New Model after making changes to stiffeners and/or plate sizes and then recalculating the resistance. This only occurred for bridge sections defined using rolled steel I-sections, rather than using hybrid steel I-sections. All Steel I Composite design and rating requests were affected for all codes. Results that were already calculated were correct and were not affected.
	74007	An incident was resolved where the unbraced length, L <sub>b</sub> , calculated for steel girder superstructures was incorrect where some span segments were defined with no supports (abutment or bent). The bridge design and rating requests assumed that the flange without composite slab was laterally braced at each end of every span segment. This resulted in evaluation of incorrect L <sub>b</sub> values in situations where there were no supports at one or both ends of a span segment. This affected all design and rating requests for steel I-girder and steel U-girder bridge sections for all design codes. Most bridge models were not affected, only those using span segments to change bridge sections between supports. Models using nonprismatic frame sections to model varying steel girders were not affected. For models that were affected, it is necessary to update the linked bridge model in the new version to correct this problem. Models created in the new version will not be affected.
	74884	An incident was resolved for bridge superstructure design and rating optimization of steel girder composite bridge sections where web panels with closely spaced diaphragms were being classified as unstiffened. This affected the Steel I-girder and U-girder Composite bridge sections, and affected the following design and rating requests for all codes: Steel I and U Comp Strength, Web Fatigue, and Constructability. When this occurred, the error was obvious from the reported classification.
*	74888	An incident was resolved for the Bridge Rating of steel-I-girder bridge sections using the AASHTO codes where the user-specified system factor Phi <sub>S</sub> was being applied to both flexure and shear at the strength limit state, whereas per Section 6.A.4.2.4 of "The Manual for Bridge Evaluation" a constant value of Phi <sub>S</sub> = 1.0 is to be applied when checking for shear in this case. The affected rating request type was AASHTO (2007 and 2011) Steel I Comp Strength. In addition, the names of the rating parameters "Flexure Phi <sub>C</sub> " and "Flexure Phi <sub>S</sub> " in the Superstructure Rating Request Parameters forms for all AASHTO steel I-girder rating requests have been changed for clarity to "Condition Phi" and "System Phi", respectively.
*	74531 75250	An incident was resolved for automated bridge seismic design under Seismic Design Category D (SDC = D) where the calculated concrete column hinge length was not correct in certain cases, depending upon the value of the relative height (RH) specified for the point of contraflexure. The hinge length is based primarily on the effective height (Heff) of the column, which is measured from the point of maximum moment to the point of contraflexure, but not exceeding the physical clear height (H) of the column. The point of contraflexure is specified by the user in the range $-1 \leq RH \leq 2$ , where RH = 0 is the bottom of the column, and RH = 1 is the top of the physical column. Previously the effective height was being calculated as $Heff =  RH  * H$ , subject to $Heff \leq H$ , and used for both the top and bottom hinges. This could lead to excessively small hinge lengths when RH was near zero, and invalid hinge lengths when RH = 0, such that the hinge would be omitted from the analysis model. In addition, the two hinge lengths should not necessarily be the same. This has been corrected as follows: For the bottom hinge, $Heff =  RH  * H$ , subject to $H/2 \leq Heff \leq H$ ; for the top hinge, $Heff =  RH - 1  * H$ , subject to $H/2 \leq Heff \leq H$ . Models where the value of RH was specified to be -1, 1/2, or 2, or approximately so, were not affected by this error. All other models should be rechecked with the new version as the ductility capacity could have been over- or under-estimated. Note that the hinge length actually assumed was provided in the definition of the generated hinges. The effect of this error was moderated by the fact that the hinge length also depends upon rebar diameter, not only Heff. Designs for SDC = B and SDC = C were not affected. Steel columns were not affected.
*	76762	An incident was resolved for the bridge design Steel Optimization procedure where the "As Designed Results" for a Design or Rating Request could be incorrect due to units conversion. This error only occurred when, prior to opening the Optimization form, the model units were set to be

* Incident	Description
	different from the units that were in effect when the Design/Rating check was originally run. This caused an erroneous evaluation of steel material properties (fy and E) in inconsistent units for the "As Designed" resistance calculation. The original "As Analyzed" results were not affected and were correctly calculated. Re-running the Design/Rating Request with the changes made in the Optimization form generated the correct results. This error affected all Design/Rating check types all that are supported for Steel Optimization (commands Design/Rating > Superstructure Design > Optimize or Design/Rating > Load Rating > Optimize).
77394	An incident was resolved where the condition and system factors were not being correctly applied in certain circumstances when using the AASHTO MBE rating equation (MBE eq. 6A.4.2.1-1). In particular, the factors were incorrectly assumed as equal to one (1.0) for ultimate flexural rating in cases where the rating was controlled by positive flexural capacity. In cases where the rating was controlled by negative flexural capacity the correct values of the condition and system factors were being applied. This affected the AASHTO rating requests of types Precast Composite Flexure and Multicell Box Flexure.
77537	An incident was resolved where the automatic load combinations generated for bridge design per the AASHTO LRFD 2007, 2012 and Caltrans codes used a factor of 1.0 instead of 0.5 on temperature-gradient loads when live load was also included in the combination. When this error occurred the generated load combinations were readily visible and editable by the user, and results agreed with the load combinations as generated. Now temperature-gradient loads use a factor of 1.0 when live-load is not included and 0.5 when live load is included, as specified by these codes.

### Frame Design Incidents Resolved

* Incident	Description
71163	An incident was resolved for frame design where attempting to right-click on a frame member while viewing design results saved from a previous CSiBridge session would cause an abnormal termination error. No results were affected or lost. Running the design, even for a single member, in the same session would prevent this problem. Only version 17.1.1 was affected.
73670	An incident has been resolved in the database tables for the steel frame design code AASHTO 2007 in which the phi parameters in the tables did not reflect the actual phi factors used in the program and the phi factors input in the preferences form. Minor updates in the other database tables have also been made to reflect the variable names. These were reporting problems only. Actual calculations and results were correct.
75026	An incident has been resolved where the message for shear failure when using concrete frame design using the AASHTO 2007 code was not clear. This happened when flexural capacity could not be calculated for shear design purposes. The results were correct.

### Results Display and Output Incidents Resolved

* Incident	Description
71250	An incident was resolved where concrete frame design results were not fully available after reopening a model in a new CSiBridge session. Design results could be displayed graphically on the model window, but attempting to right-click on a member for detailed results would produce an abnormal termination error. Similarly, tabular results were not available in the situation. Running the design, even for a single member, after reopening the model would enable the display and output of the correct design results for all members. Result values were not affected by this error, which affected only version 17.0.0 to v17.1.1.
72007	An incident was resolved where the bridge seismic design report could not be generated in the case where the response-spectrum curve used for a bridge seismic design request was of type user-defined. Results were not affected, and the results from the bridge seismic design could be viewed graphically and in tabular format.
73135	An incident was resolved in which discontinuities could occur in the girder response plots when the

* Incident	Description
	section changed from variable depth to constant depth.
73378	An incident was resolved where the hinge status (LS, IO, CP) shown in the table "Frame Hinge States" could be incorrect for load combinations and for load cases when enveloping results were requested. This could also affect the plotted hinge status for enveloped results. The hinge status was correct for individual steps of a load case. The hinge state (A, B, C, D, E) was not affected.
* 73600	An incident was resolved where the frame stress plots (command Display > Show Frame/Cable/Tendon Force Diagrams) could be incorrect when consecutive frame objects were assigned a nonprismatic frame section property with the advanced setting, i.e., the length of the frame object was less than the full length of the nonprismatic section variation. This could also affect the stresses reported in the table "Element Stresses - Frames". This did not affect frame objects that contained the entire length of the nonprismatic variation (the most common case), even though the object could be meshed into multiple frame elements for analysis. No other results were affected (such as frame forces and moments, displacements, and reactions).
76702	An incident was resolved affecting the bridge response display (command Home > Show Bridge Superstructure Forces/Stresses) for prestressed concrete U-girder sections where the longitudinal stress reported at the top left of the beams (U-girders) was actually the stress at a distance D5 below the top left corner of the beam for the case where the U-girder frame section was defined such that the exterior edge of the two webs were not smooth (i.e., D4, D5 and B6 were not zero). The stresses at all other locations were being reported correctly. This error could affect design results. The significance depended upon the size of the dimension D5.
77622	An incident was resolved where an Abnormal Termination error occurred when the influence line for a frame object was requested in tabular format in the Show Influence Line/Surface form. This error did not occur for other object types. No results were affected.
77736	An incident was resolved where correspondence results were not available for the tables "Bridge Object Forces" and "Bridge Object Girder Forces", even when the table "Output Options" for Multi-Valued Response Combos was set to "Correspondence". Instead, the correct maximum and minimum values were presented with all corresponding values set to zero. This also affected the same results when obtained using the API (Application Programming Interface). This error was introduced in v17.0.0.

## Database Tables Incidents Resolved

* Incident	Description
70888	An incident was resolved for the Bridge Modeler where an error occurred when importing the database table "Bridge DesReqSuper 01 - General" or "Bridge RateReqSuper 01 - General" into an existing file. When this occurred, the software became unresponsive and results were not available.
74197	An incident was resolved where using the interactive database editor to modify the area object thickness overwrites for area objects with more than four points could cause an error. In some cases, the interactive database could become unresponsive when applying the changes to the model. In other cases the changes would be accepted but the analysis would not run, giving an error message instead. In both situations, results were not available. Exporting the table, modifying it, and re-importing the table as an addition to the model did work correctly, as well as modifying the area thickness overwrites using the menu assignment command.
74474	An incident was resolved for the Frame Section Properties 01 - General database table in which the total mass and weight columns were not being populated for joist and nonprismatic sections. This was only an issue with the presentation of the data and did not affect results.
* 74549 76561	An incident was resolved where the section cut forces reported in the database table "Section Cut Forces - Design" may have been reported incorrectly for some section cuts if the following two conditions occurred: (1) Results were displayed for more than one load case at the same time, and (2) The load cases requested contained response spectrum cases. If both of these conditions occurred the response spectrum case results could be from one of the other selected load cases.
76009	An incident was resolved in which the construction scheduler data could become corrupted after making changes using the interactive database.

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76147	An incident was resolved where exporting database files (Text, Excel, Access) was quite slow when an alternate language file, CSiLanguageResource.xml, was present in the installation folder. This also made saving the model file slow, since the *.2k text file is written as a database file. No results were affected in any case.

## Data Files

### Incidents Resolved

* Incident	Description
74394	An incident was resolved in which the table "Tendon Section Definitions" would not be exported completely for a model where the number of the tendon section properties was greater than the number of the frame section properties. This affected the export to text, Excel, and Access files, including the .2k text file. Without the complete tendon section data, the model could not be imported correctly, resulting in error messages during import. Results for the exported model were unaffected. Results for the imported model were consistent with the model as imported.
76061	An incident was resolved where importing a database file using the add to existing model option could cause existing bridge layout lines to be reset to default values.
77422	An incident was resolved where an error message was generated when importing an exported CSiBridge database table file (.b2k or .\$br text, Excel, or Access) that contained more than 20 bridge design requests, whether of types superstructure design, rating, and/or seismic design. When this occurred, the model could not be imported. Deleting some of the design requests from the database table file enabled it to be imported.

## Documentation

### Incidents Resolved

* Incident	Description
72257	An incident was resolved in the context sensitive help (F1) for the topic 'Vehicle Data Form', in which a typo existed for specifying the scale factor units for HA and HB vehicles. This was a documentation error only.
73357	An incident was resolved in the context sensitive help topic 'Bridge Rating Request Superstructure Form' in which the Rating Type bullet point mentioned stress checks which currently are not available for rating.
76409	The documentation for creating plugins was clarified to reflect updates to the CSiBridge API. The cSapPlugin interface has been replaced with cPluginCallback.
76415	An incident was resolved to correct the Analysis Reference Manual, Figure 18 equation for the calculation of the shear area of thin walled circular tube sections. The previously documented equation was not what the software was using.

## Application Programming Interface

### Incidents Resolved

* Incident	Description
73602	An incident was resolved where the API command SapModel.File.OpenFile could not open *.2k files.