CSiBridge® 2016 (Version 18.2.0)
Release Notes

Notice Date: 2016-08-15

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 v18.1.1 (Released 2016-02-26)

User Interface

Enhancements Implemented

*	Incident	Description
	88053	An enhancement has been implemented to indicate in the Bridge Splice Property form and the associated context-sensitive Help that splices are currently limited to steel I-girder deck sections. There is no change to behavior of the software.
	91021	An enhancement has been implemented to provide an option to toggle whether the Properties of Object floating form is displayed when drawing. This option was previously available in the menu interface under Options and is now available in the ribbon interface under File > Settings > Other Settings.

Graphics

Enhancements Implemented

*	Incident	Description
*	93999	An enhancement has been implemented to allow displaying all loads, within a single load pattern, on all object types, in a single display. The new option is available from the Home tab > Display > More > Show Object Load Assignments > Load Pattern command.

Bridge Modeler

Enhancements Implemented

*	Incident	Description
	78065	The Bridge Modeler has been enhanced for precast concrete I-girder bridges with diaphragms at support locations (bents and abutments) to connect the bottom of the diaphragm to the I-girder in the case where the girders were modeled as frames. The connection is made using a stiff link element between the bottom of the diaphragm and top of the girder, where the frame joint was located. Previously the diaphragm was connected to the girder only at the top. The effect of this change is local to the diaphragm itself. Spine models are not affected. Area models where the I-girder is model as mixed or areas are not affected.
	80617	The Bridge Modeler has been enhanced to provide some informative warning messages during generation of a bridge model from the bridge object when the specified parameters create invalid geometry. Examples include when a straight girder lies partially outside the deck in a highly curve bridge, or when parametric variation reduces certain dimensions to zero or negative.

*	Incident	Description
	83982	The Bridge Modeler has been enhanced to allow control of the orientation for internal diaphragms (cross-frames) in steel U-girder bridge sections at bent support locations. Previously, internal diaphragms for steel U-girders were always generated perpendicular to the girder line at single-bearing bents regardless of the skew angle of the bent. Now an option is provided to generate the internal diaphragm along the bent skew or perpendicular to the girder line. The default is now along the bent skew, although the original behavior will be retained for older models when opened in the new version unless changed by the user. Note that internal diaphragms for steel U-girders are always aligned along the skew at double-bearing bents and at abutments.
*	89789	The Bridge Modeler has been enhanced to allow definition of bents without cap-beams for use with concrete box-girder bridges. Previously all bents required a cap-beam. Support bearings are located at the top of each column defining the bent and connect directly to the superstructure.
	90844	An enhancement has been implemented to add typical Chinese tendon strands to the Tendon Area Calculator used for defining tendons for bridge objects (command Bridge > Bridge Objects > Prestress Tendons).
	92861	An enhancement has been implemented to the frame object submesh to now divide the object based on the clear length instead of the full length. The clear length is equal to the full length minus any rigid end offsets. This protects rigid end offsets from being overwritten when they are longer than the meshed end elements containing them. This may change the location of output stations of old models such that frame analysis and design results are changed. Previous version results were accurate based on the previously used output stations.
	94465	Calculation of bridge section properties has been made more efficient by eliminating the re-calculation of the torsional constant for identical section geometry at different section cuts. This can speed up the time it takes to create the analysis model for certain bridge objects. The torsional constant is calculated numerically for best accuracy, and this can take time for complex bridge sections containing narrow dimensions, such as for composite steel girder sections.

Modeling

Enhancements Implemented

*	Incident	Description
	82049	A new Property Modifier assignment has been added for the link objects used to specify a scale factor multiplying the stiffness, damping, and force/moment response of the object. The scale factor applies equally to all six degrees of freedom, as well as the mass and weight. This allows the same link property to be used for multiple link objects that may, for example, represent different size tributary regions supported by the link objects.
*	90364	An enhancement was implemented that allows model settings, such as material properties, frame sections, load patterns, design preferences, and other definitions, to be saved and later used when starting a new model. Each collection of settings is named and stored in the installation folder or the user settings folder, so that appropriate settings can be chosen for different projects.
	91114	An enhancement has been implemented adding a new "Expected Concrete Compressive Strength" to the concrete material property definition. This value is similar to the effective yield strength for steel materials. This new value is used in the stress strain curves and concrete hinge definitions. Creep and shrinkage analysis and concrete design still use the specified or characteristic compressive strength previously available.
	93648	The axial force points used to generate Caltrans P-M2-M3, P-M2, and P-M3 hinges have been changed to provide more accurate interpolation near zero axial force. Previously the interaction surface was discretized uniformly in the axial (P) direction on both the tension and compression added to the bridge seismic design preferences to allow specification of the number of axial and angular discretization points for automatically generated Caltrans hinges. This specification already exists for Caltrans hinges assigned by the user.

Loading

Enhancements Implemented

*	Incident	Description
*	90961	An enhancement was implemented to update the Chinese vehicle library by adding the following: (1.) CJJ 011-2011 vehicles, (2.) Special live-load vehicle according to TB 10002.1, (3.) JTG D60-2015 vehicles.
*	90967	An enhancement has been implemented to update the Chinese response spectrum function definition from JTG/T B02-01-2008 to the newer JTG B02-2013. Old models with a JTG/T B02-01-2008 response spectrum function defined will be updated to the new JTG B02-2013 response spectrum.
	91068	An enhancement has been implemented to update the Chinese bridge load combinations to the latest code with the following changes: (1.) Basic combinations are now referred to as Fundamental combinations , (2.) Combinations of short-term action effects are now referred to as Frequent combinations , (3.) Combinations of long-term action effects are now referred to as Quasi-permanent combinations, (4.) The combination coefficient, psi_c, of variable actions is now 0.75 for fundamental combinations.
*	91458	An enhancement has been implemented to add the Chinese CJJ 166-2011 response spectrum function.
*	88108	An enhancement has been implemented to add the Russian SP 14.13330.2014 response spectrum function.

Analysis

Enhancements Implemented

*	Incident	Description
	90244	An enhancement has been implemented to reduce the number of events generated by a layered shell element. Event-to-event stepping can be used by nonlinear static and nonlinear direct-integration time-history load cases to help control stepping and convergence. The use of events for the layered shell element was introduced in version 18.1.0. For models with significant and localized nonlinearity, using events can improve the rate of convergence and speed-up the analysis. For models with widely distributed nonlinearity, a large number of events may be generated and this can actually slow down the analysis compared to not using events. This enhancement will reduce the number of events generated by a single layered shell element when many integration points are defined over the thickness of the layered shell section. Additionally, the event behavior for directional layered shell materials was altered to remove certain types of events. While the number of events generated by a single element has been reduced, models with a large number of shell elements and distributed widely distributed nonlinearity may still run better without event-to-event stepping. Minor changes in results from versions 18.1.0 and 18.1.1 may occur due to this enhancement for models containing layered shell elements and run using events, but the differences should be within the convergence tolerance for well-conditioned models.
	91738	Internal improvements have been made to the force equilibrium and deformation compatibility between frame hinges and their parent frame elements. This mostly affects fiber hinges and PMM hinges while dropping load. The effect is generally small, but can be helpful for the new event-to-event strategies that have been added for nonlinear direct integration time history load cases. In addition, multiple hinges in a single frame element will tend to perform better than previously, lessening the need to assign frame hinge overwrites that auto-subdivide the frame object at the hinges. This reduces the size of the analysis model and tends to increase the speed of the analysis. Results for models with these hinges may differ from previous versions, although the difference will generally be within the convergence tolerance for the load case. Models with P-delta may be more significantly affected, particularly for those few cases where the deformations of the hinge and the parent frame element were not fully compatible. For unstable and numerically sensitive models, larger differences may be observed.

*	Incident	Description
*	93002	The speed of moving load analysis has been increased for calculating the vehicle response for frame objects and joint reactions. The effect will be most pronounced for those frames having many output stations.
	93037	The "Hinge Unloading Method" parameter has been removed from nonlinear static and nonlinear staged-construction load case definitions. This parameter only applied to isotropic hinges, and using a non-default value was rarely useful in recent versions of the software. Now the default value "Unload Entire Structure" will always be used. Models opened in the new version that previously used a different setting may be affected, but this will not be common.
*	90374	A pure event-to-event stepping solution strategy has been implemented as an option for nonlinear direct-integration time-history load cases. This is in addition to the iterative event-to-event stepping strategy already available for nonlinear static load cases and nonlinear direct-integration time-history load cases. Time steps will be automatically subdivided where changes occur in the stiffness of nonlinear elements. In contrast to the iterative method, more events will typically be generated, but iteration for equilibrium will not be performed under the assumption that the deviation from linearity will be small between events. Instead, any equilibrium errors are carried forward to the next time step and applied as a corrective load. This is similar to the method used in Perform-3D. This method may not be appropriate in cases with a large degree of geometric nonlinearity. Pure event-to-event stepping can be more efficient than iterative methods for small to medium sized models, but may not be so for large models with many nonlinear elements. Pure event-to-event stepping can also be helpful for models where convergence cannot be achieved with iterative methods, although the results should be reviewed for equilibrium.
	91429	Internal changes have been to increase the speed of nonlinear static and direct-integration time-history analyses, including the use of parallelization of certain element processes. The effect on run-time will be problem-dependent. Results may differ from previous versions due to the change in the order of numerical operations, but the differences are expected to be within the convergence tolerance of the analysis. Larger differences may occur for some very sensitive or poorly conditioned models.
	93756	The multi-threaded equation solver has been changed to provide more consistently repeatable results when the same model is run more than once on the same machine. This change typically only affects very sensitive or ill-conditioned models, which could produce slightly different answers when re-run on the same machine. Previously the multi-threaded solver dynamically changed the number of threads used based on machine conditions, which could change the order of numerical operations and potentially affect sensitive results. Now the number of threads used defaults to the number of physical cores on the machine, and can be changed with the environment variables SAPFIRE_NUM_THREADS or SAPFIRE_NUM_THREADS_SOLVE. Furthermore, the order of operations now is fixed for the same number of threads on a given machine, leading to more consistently reproducible results. Sensitive models may still show differences between different machines with different processors and/or different numbers of cores available. This change will have little effect on most models, with the most significant effects being on long nonlinear time history load cases for sensitive models.

Bridge Design

Enhancements Implemented

*	Incident	Description
	90743	For bridge superstructure design of steel I-girder bridges using the AASHTO LRFD code (all versions and iterims), the design request of type "Steel I Comp Strength" has been changed so that the ductility requirement check per AASHTO Eq. 6.10.7.3-1 is now only applied to sections experiencing positive moment demands. Sections that do not experience positive moment demands are no longer verified for the Eq. 6.10.7.3-1. Previously sections subjected to only negative moment demand that did not pass Eq. 6.10.7.3-1 were not checked further and no demand/capacity ratio was computed. Now the demand/capacity ratio will be computed for such sections, provided all other requirements are met. The previous behavior was over-conservative.

*	Incident	Description
*	91113	An enhancement has been implemented to improve the following aspects of the Chinese bridge seismic design according to JTG/T B02-01-2008. (1.) The seismic design request parameter Seismic Design Category has been changed to Substructure Category and the corresponding options are now Displacement Capacity Formula (Single Column Pier) and Pushover Analysis (Dual Column Pier or Others). (2.) A JTG/T concrete hinge model has been implemented. (3.) The bent failure criteria and hinge limit state are implemented per the JTG/T requirement.
	92134	A new parameter "Is bridge curved?" has been added to the AASHTO LRFD Steel-I Comp Service and Steel-U Comp Service superstructure design request that apply to steel I- and U-girder bridge sections. This ensures the correct applicability of concrete stress compression limit in positive moment regions. Previously these service checks were not taking into account if the bridge was curved and was always applying the clause 6.10.1.1.1d concrete compression limit 0.6*f'c for compact composite sections when the design request parameter "Shored construction?" was set to "Yes". When this clause was not necessary, the design could be conservative.
*	93853	Bridge live-load modeling and superstructure design and rating have been enhanced for the AASHTO code to incorporate the following requirements for the Pennsylvania Department of Transportation (PennDOT) Design Manual, Part 4, April 2015 Edition (DM-4): (1.) New vehicles have been added per DM-4 Sections 3.6.1.2 and 3.6.1.3, (2.) A new load pattern type "Live Load Deflection" has been added for use with vehicles that are intended to check deflections per DM-4 Section 3.6.1.3.2, (3.) An option has been added when generating default bridge load combinations for the AASHTO code to consider the provisions of DM-4 Table 3.4.1.1P-1 for steel-girder bridges and Table 3.4.1.1P-2 for prestressed concrete-girder bridges, (4.) An option has been added to the superstructure design and rating preferences for the AASHTO code (all versions and iterims) to consider the provisions of DM-4 (a) Section 4.6.2.2 regarding live-load distribution factors, (b) Section 6.10.1.9.3P regarding web bend-buckling nominal flexural resistance, and (c) Section 6.10.9.3.3 regarding end panels. Items (b) and (c) do not consider the effect of longitudinal stiffeners.

Results Display & Output

Enhancements Implemented

*	Incident	Description
	68702	Correspondence can now be explicitly requested for the Analysis Results tables "Bridge Object Forces" and "Bridge Object Girder Forces". Corresponding results were previously available by selecting correspondence for load combos using command Display > Show Tables > Modify/Show Options > "Multi-valued Response Combos", but this required at least one load combination to be defined for this option to be available. Now this option has been renamed "Combos and Bridge Moving Loads" and is also available whenever moving load results are present for a bridge object.
	88036	A minor change has been made to how the certain stresses are plotted in the Bridge Object Response Display form (command Home > Display > Show Bridge Superstructure Forces/Stresses). When plotting the "Longitudinal Stress - Top and Bottom - (S11)" for the left, center or right of the entire bridge section of a spine model and choosing the Multivalued Options: (1.) Envelope Max will plot the most positive values each for the top and bottom points, (2.) Envelope Min will plot the most negative values each for the top and bottom points, and (3.) Envelope Max/Min will plot the most positive value of the two points and the most negative value of the two points. Previously all three options plotted the top stress with the largest absolute value and the bottom stress with the largest absolute value. The new options provide more information, but do not change the correctness of the values plotted.

Database Tables

Enhancements Implemented

*	Incident	Description
	86988	An enhancement has been implemented to issue a message if trying to export database tables to Microsoft Excel or Microsoft Access and the respective program is not detected on the computer.

Miscellaneous

Enhancements Implemented

*	Incident	Description
	88996	The version number has been changed to v18.2.0 for a new intermediate update. CSiBridge v18 is known as CSiBridge 2016.

User Interface and Display

Incidents Resolved

*	Incident	Description
	88643	An incident was resolved where the label for the Vertical Mouse Pointer Location on the "Pushover Curve" form could have been incorrect.
	90385	An incident was resolved in which the tooltip on the Assign Bridge Temperature Loads form would flicker and become very large. This was a user interface issue only.
	90896	An incident was resolved in which certain text input fields on some of the forms did not accept the CTRL+V key combination for pasting text into the textbox. This was a user interface issue only.
	90859	An incident was resolved on the Vehicle Data - Vertical Loading form in which the floating axle loads width types were not correctly shown in the form when reviewing the loads of an existing vehicle. The values used for analysis were visible in the database tables. This was a user interface issue only and did not affect results.
	91154	An incident was resolved in which pressing F1 while in the construction scheduler opened a generic help topic instead of the topic specific to the construction scheduler.

Graphics

Incidents Resolved

*	Incident	Description
	92459	An incident was resolved where the numerical values were sometimes not shown when displaying bridge loads assigned to a bridge object using the command Home > Display > Show Bridge Loads. This was a display issue only and no results were affected.

Bridge Modeler
Incidents Resolved

*	Incident	Description
	88426	An incident was resolved for the Bridge Modeler when the software could become nonresponsive when generating a bridge model for a steel I-girder or U-girder bridge object having parametric variations with very large changes in dimension over very short distances. This could result in poor or illegal shapes for some of the generated elements. Previously this caused the nonresponsive behavior, and no results were available. Now the model will be generated, but with any illegal elements omitted. While such a model may not be desirable, it can be reviewed and corrected. It is recommended to create more gradual transitions when using parametric variations, and to review the generated model for adequacy.
	89736	An incident was resolved for the Bridge Modeler where the girder splices were not able to be assigned to the right exterior girder. This option only applies to steel I-girder bridge sections. Design results agreed with the model as generated by the Bridge Modeler. Analysis results are not affected by splice assignments.
	89757	An incident was resolved for the Bridge Modeler where bridge support bearings were located incorrectly for certain concrete box girder bridge sections using the General type of bearing assignment (not girder-by-girder). In particular, the offset distance from the reference line was not correctly calculated. Affected concrete box girder sections were (1.) Ext. Girders Sloped, (2.) Ext. Girders Sloped Max, (3.) AASHTO - PCI - ASBI, and (4.) Advanced. No other bridge sections were affected. When this error occurred, the error was obvious by looking at the generated model, and results agreed with the model as generated.
	90430	An incident was resolved for the Bridge Modeler that corrected two issues affecting steel U-girder bridge objects with skewed supports and modeled as area objects: (1.) The area objects representing the steel U-girders near a highly skewed support could be generated incorrectly. This could cause internal or external diaphragms to not be oriented normal to the girders near the support, and/or could cause some area object representing the girders to protrude beyond the end of the bridge at skewed abutments. (2.) When a single bearing was assigned to each girder at the support location, the fixed link object generated to connect the bearing and girder bottom might not properly connect to the girder bottom if the support was skewed. For each of these issues, the error was obvious by looking at the generated model, and results agreed with the model as generated. Affected models can be corrected by the following steps: (a.) Open the model in the new release of CSiBridge. (b.) For each affected bridge object, use the command Bridge > Update > Clear All from Linked Model. (c.) Save the model file. (d.) Reopen the model file. (e.) For each affected bridge object, use the command Bridge > Update > Update Linked Model. Note that custom modifications made to the previously generated model may need to be redone after this process.
	90801	An incident was resolved for the Bridge Modeler where the Support Name could not be changed in the Bridge Object Bent Assignments form (command Bridge > Bridge Objects > Supports > Bents). The name would appear to be changed, but would be reset and/or generate an error message whenever the "Bent Is At the End of This Span" was changed or the OK button was clicked. The name could be changed using the interactive database editor. No results were affected. This name is only used for identification.
	91043	An incident was resolved for the Bridge Modeler that addressed two issues affecting the assignment of support bearings to steel U-girders when a bent property was used at the abutments: (1.) At the Start abutment, a single support bearing was always generated for each U-girder even when two bearings per girder was specified for all girders or in the bearing overwrites, and (2.) At the End abutment, the number of bearings per U-girder specified in the bearing overwrites was ignored, and the number of bearing specified for all girders was always being used. In both cases, the error was obvious by looking at the model, and results agreed with the model as

*	Incident	Description
		generated. The common case where abutment properties were used at the abutments was not affected, only the case where bent properties were used at the ends.
	91356	An incident was resolved for the Bridge Modeler where the two adjacent spans would be incorrectly constrained together at a double-bearing (discontinuous) bent when the bridge object was updated as a spine model if either of the spans had a non-zero transverse offset at the bent. This could result in an unexpected negative superstructure moment at the bent. This error did not affect bridge objects updated as area or solid models. When this error occurred, results agreed with the constrained model as generated.
	91850	An incident was resolved for the Bridge Modeler where the bridge model could be generated incorrectly in certain cases when (1) The layout line was kinked, i.e., had an angle change between two segments, and either (2a) A skewed bent support was located near the kink, or (2b) A skewed bent support was located at the kink and parametric variation was applied to any transverse dimensions. When this error occurred, transverse dimensions of the generated model could be incorrect, although the error was consistent and easily observable. Results agreed with the model as generated. This error was not common. It was introduced in version 18.0.0.
	91891	An incident was resolved for the Bridge Modeler where the geometry of the generated bridge model could be incorrect at abutments having extremely large skew angles, particularly along curved layout lines. This was not common. When it did occur, the error was obvious and results agreed with the model as generated. This error could affect area and solid models, but not spine models.
	92019	An incident was resolved for the Bridge Modeler where steel I- and U-girder models may not be correctly generated for multi-span bridge objects with skewed span-transition (bent-support) locations under either of the following two conditions: (1.) The layout line also transitions from a straight line to a curved line at the skewed span-transition location, or (2.) The specified superelevation is not constant at the skewed span-transition location. When either of these conditions occurred, the generated model was visibly not as expected, and results agreed with the model as generated.
	92076	An incident was resolved for the Bridge Modeler that addressed two issues affecting bridge objects with precast concrete U-girder bridge sections where any of the concrete U-girders themselves were nonprismatic: (1.) The bridge object could not be updated as a spine model if any diaphragms were assigned to the bridge object. When this occurred, no results were available. (2.) When updated as an area-object model, the thickness of the girder webs and bottom flange were not being created correctly for the nonprismatic sections. When this occurred, results agreed with the model as generated. Neither of these errors affected bridge objects having only prismatic concrete U-girder sections, regardless of whether or not the bridge section had any parametric variations.
	92289	An incident was resolved for the Bridge Modeler that addressed two issues with user-defined bridge sections: (1.) If temperature load had been assigned to a bridge object with a user-defined bridge section for which any of the polygon points were defined with a non-zero radius, then the bridge object could not be updated as a linked model. When this occurred, no results were available. (2.) If parametric variations were assigned to some of the polygon point coordinates in the user-defined section such that the net number of polygon points in the section, after removing duplicate (coincident) points, was different at two adjacent bridge section cuts, then the extruded view of the spine model could not be displayed between those two section cuts. This was a display issue only and no results were affected.
	92839	An incident was resolved for the Bridge Modeler where bridge objects using the concrete box girder section could not be updated as a spine model under the condition where parametric variations were assigned to the horizontal fillet at the top of the exterior girder and/or to the corresponding overhang length such that at some locations along a span these two dimensions were equal but not at other locations. When this occurred, the analysis could not be run and no results were available. This error was not common, and it only affected bridge objects updated as spine models, not as area or solid models.

*	Incident	Description
	93501	An incident was resolved for the Bridge Modeler where a support bearing at a bent or abutment could be incorrectly located in the following case: (1.) The bearing assignment type was "General" rather than "Girder-by-Girder" ("General" is available for concrete box girders only), and (2.) A bearing overwrite was assigned to that bearing, and (3.) The bearing overwrite option "Bearing Offset from Section Ref. Point" was not checked. In this case, the bearing was always located at the section reference point rather than at the expected uniformly spaced bearing location. When this occurred, results agreed with the model as generated from the bridge object.
	93809	An incident was resolved for the Bridge Modeler where a generated model might not have been fully continuous at an internal bent support where the superstructure was specified as continuous if the following three conditions applied: (1.) The bridge layout line was not straight horizontally and vertically in one span adjacent to the bent, (2.) The bridge layout line was straight in the other span adjacent to the bent, and (3.) The super-elevation was not zero at the bent. When this occurred, results agreed with the model as generated. Models that exhibit this problem in an older version will need to have their bridge objects updated in the new version to correct it.
	93856	An incident was resolved for the Bridge Modeler where any support bearing assignments to bents and abutments that were specified by the user would be reset to default values for a bridge object containing a user-defined bridge section that was attempted to be updated as an area or solid model. A bridge object with user-defined bridge sections can only be updated as a spine model, and a warning message is issued when attempting to create an area or solid model. The bridge object definition should not have been changed in this case, and this has been corrected. When this error occurred, results agreed with the model as generated.

Modeling
Incidents Resolved

*	Incident	Description
	91075	An incident was resolved where the time variation of stiffness was incorrectly applied for “User” type time-dependent properties (command Define > Materials > Time-Dependent Properties > Modify/Show Stiffness Curve). Rather than using the values of the Stiffness Multiplier specified by the user, the square-roots of these values were being used instead. The value of modulus actually being used in analysis could be seen using the Show Plot button available while defining the time-dependent properties.
	91317	An incident was resolved in which an abnormal condition could occur when trying to delete hinge properties for certain models.

Section Designer
Incidents Resolved

*	Incident	Description
	89705	An incident was resolved for Section Designer where the right-click grid form for editing the properties of structural shapes did not always function correctly. In particular, if the user ever clicked the material drop-down box, exited the form, and then used the right-click grid form again to edit the same shape, then the shape name would be set to the material name and could not be changed. No results were affected. Now the shape name can be edited if the shape was specified parametrically, but not if the shape was imported.
	89937	An incident was resolved for Section Designer where the strain diagram plotted on the Moment Curvature Form could be incorrect when the material stress-strain was not symmetrical in tension and compression, with tension being stronger. This did not affect concrete, which is stronger in compression. This was a plotting error only for the strain diagram. No other results were affected. The moment-curvature curve was correct, as well as the stress and strain contours shown using the Contour button on the form.

*	Incident	Description
	93671 94292	An incident was resolved for Section Designer where an abnormal termination error could occur when displaying the PMM surface or moment-curvature curve for the fiber model of a section that had more than 20 rebars tributary to any single fiber. Increasing the fiber discretization would avoid this error. This was a display error only, and no results were affected.

Loading
Incidents Resolved

*	Incident	Description
*	81191 83339 90624 93002	An incident was resolved that addressed two issues that affect the lane loading points used to generate bridge influence surfaces for moving load analysis: (1.) When the influence line was kinked and the lane had width or was eccentric to the layout line, incorrect loading points could be generated within the angle subtended by the normals to the layout line on either side of the kink. This effect was generally local to the location of the kink (angular discontinuity). Extra loading points could be generated on the acute-angle side of the layout line and could be out of order. This affected the load applied to frame, shell, and solid elements. Loading points on the obtuse-angle side of the layout line were correct, but could be affected by item 2 as described below. In both cases the behavior has been improved by generating fewer, better-placed loading points in the vicinity of kinks in the layout line. Note that this issue mostly affected lanes defined from frames, where kinks are common. Bridge layout lines rarely have kinks. (2.) Lane loading points sometimes connected to frame elements that were far from the location of the loading point. This could occur because the connection was always being made by perpendicular projection to the nearest frame element. While this is generally desirable, this could lead to unexpected results when perpendicular projections cannot be found between the loading point and any nearby frame elements. This could occur, for example, on the obtuse-angle side of a kinked layout line as described in item 1 above. Now the perpendicular projections are also compared with the distances to the ends of nearby elements to determine the shortest connection. Note that item 2 does not affect lane loading points that connect to shell or solid elements, only to frames. For both items 1 and 2, no load was lost, but the location of the load applied to the structure could be different than expected. In both cases, the connections actually used could be viewed by using the command Home > Display > Show Lanes.
	90582	An incident was resolved in which the scale factor values in the vehicle Length Effects form were being converted each time the form was closed with the OK button if the units on the Vehicle Data form were different from the database units.
*	91696	An incident was resolved where API 4F (2008 and 2013) open-structure wind loads were not correctly applied to cable objects. The error was significant and obvious, and could affect the analysis and design results for load cases and load combinations that these loads. The loading on frame objects was correct, only cable objects were affected. Affected models should be re-run with the new version to check the results. All previous versions with API 4F open-structure wind loads were affected.

Analysis
Incidents Resolved

*	Incident	Description
	38010	An incident was resolved where the reactions at restrained joints could show incorrect values in a nonlinear static or staged construction load case with target force loading applied to elements connected to those joints. Only the reported reactions were incorrect. The overall structural response was correct and no other response quantity was affected. Only restraint supports were affected, not springs or one-joint links.
	86424	An incident was resolved where mass-proportional damping specified on the materials was incorrectly applied to the model for frame and solid elements in linear and nonlinear direct-integration time-history load cases. For frame elements, the mass damping forces were incorrectly applied to the element, which tended to underestimate the amount of damping. In addition, for a frame element with non-zero insertion points, the damping force was applied at the insertion points

*	Incident	Description
		rather than at the joints where the mass is located; the effect of this on the results was generally inconsequential. For solid elements with only material-based mass-proportional damping specified, stiffness-proportional damping was also erroneously being included in the damping force. This tended to overestimate the amount of damping, and also caused convergence issues when running the nonlinear direct-integration time-history cases.
	92664	An incident was resolved where the stiffness-proportional damping matrix computed for line springs and area springs was not being scaled by tributary length or area for nonlinear load cases. For nonlinear direct-integration time-history load cases, the calculated damping was correct to within the convergence tolerance, but the convergence behavior could be poor. For linear direct-integration time-history load cases using the stiffness from a nonlinear load case, this caused the damping to be overestimated for springs with smaller tributary regions and to be underestimated for larger tributary regions. Linear direct-integration time-history load cases starting from the unstressed (zero) state were not affected. Modal time-history analysis, including FNA, was not affected.
*	93487	An incident was resolved in which linear springs assigned to line, area and/or solid objects sometimes provided stiffness along directions other than the chosen tension and compression direction. The affected linear line/area/solid springs were only those specified as "Tension and Compression", not "Tension Only" or "Compression Only". This error only happened when the user displayed a linear link property that had non-zero stiffness along any of the directions other than the tension/compression direction of the line/area/solid springs before running the analysis. Displaying other types of link properties, even after initially displaying a linear link property, did not affect the line/area/solid springs. Closing and re-opening the software temporarily resolved the issue, but did not prevent it from reoccurring if a linear link property was displayed again before running the next analysis. This was not a common problem, but when it occurred the error may not have been obvious. Correct results were always obtained by opening the software and model, unlocking the model (if locked), and running the analysis.

Bridge Design

Incidents Resolved

*	Incident	Description
	89723	An incident was resolved for the superstructure rating of steel I-girder bridge sections where the error message "Error locating section cut at Diaphragm for section ... in Span ..." would appear, and the rating request would fail to run, under the condition that a bridge span was modeled as two or more sub-spans and the number of girders in the up-station sub-span was more than that in the down-station sub-span. Sub-spans are those spans that have no bent support at one end or the other, and are used to model changes in the bridge section that occur between bents or abutments. Note that, starting with this new version, an all-spaces type of diaphragm (cross brace) must be assigned at the transition (no-bent) location between two sub-spans that have different numbers of girders in their bridge sections.
	91034	An incident was resolved for bridge superstructure design where the AASHTO LRFD (all versions) Steel-I Comp Strength design check would fail to run if the design request parameter “Use Stage Analysis?” was set to “Yes” and the steel I-girder section was compact. When this occurred, no results were available for the affected design request.
	91481	An incident was resolved for bridge superstructure design and rating of steel I-girder bridge sections using the AASHTO LRFD codes where an error message "Error locating section cut at diaphragm..." could be generated while running design/rating requests if a staggered diaphragm was located very near, but not exactly at, a section cut. When this error occurred, the design/rating request was unable to determine the unbraced length near the section cut. This caused the design/rating request to fail and no results were produced. This error did not occur if the Cb parameter was specified by the user in the design/rating request, since the unbraced length would not need to be calculated in this case. This error affected the AASHTO LRFD steel I-girder bridge Strength and Constructibility design requests and the Strength rating request.

*	Incident	Description
	91521	An incident was resolved for bridge load rating of Steel I-girder bridges using the AASHTO 2007 and 2010 codes in the composite and noncomposite strength rating requests where the values of f0, f1, fmid, f2, and Cb were reported incorrectly in the tables "Bridge Super Rating AASHTORATE10 23 - SteelINonCompStrgth-Flx" and "Bridge Super Rating AASHTORATE10 28 - SteelICompStrgth-Flx". This was a reporting error only. The correct values were used in all calculations and no other results were affected. In addition, the moment gradient calculation has been added to the AASHTO LRD steel I-girder noncomposite strength rating request. In the previous versions the Cb gradient was always assumed to be 1.0 when the "Method for determining moment gradient factor Cb" in the rating request parameters had been set to "Program Determined". This affects all versions and iterims of the AASHTO LRFD code.
*	91766	An incident was resolved for bridge superstructure design of steel U-girder bridge sections where the yield stress, fy, used for design was switched between the web and top flange. The actual value of the yield stress used for design was reported in the design results tables, and all design results were consistent with the reported value. Models where the same yield stress was used for both the web and top flange were not affected. This error affected all steel U-girder ("Steel-U Comp ...") design requests for all codes.
	91776	An incident was resolved for superstructure design of steel U-girder bridge sections using the AASHTO LRFD code (all versions and interims) where the strength design check ("Steel-U Comp Strength") could fail when processing positive moment demands if the U-girder section was noncompact and the design request parameter "Use Stage Analysis" was set to "Yes". When this occurred the error message "Unable to read valid stress point at steel beam bottom flange" was produced, and affected results were not available. Results that were produced were not affected.
*	92213 93417	An incident was resolved that addressed two issues: (1.) For a steel U-girder bridge section with top lateral bracing assigned to any of the girders, after the model was saved and reopened, the frame section property assigned to the top lateral bracing could be incorrectly changed to a different frame section. This could also cause the generated bridge section cuts to be incorrect, affecting superstructure analysis and design results. (2.) For a steel I- or U-girder bridge section, when an All Spaces or All Girder Interiors diaphragm (cross frame) was assigned to a location that was closer to another section cut by a distance just slightly greater than the merge tolerance, two section cuts could be generated so close together that the aspect ratio of the girder area objects between them were invalid and excluded from the model. This could significantly affect the stiffness of the girders. Results agreed with the model as generated. It will be necessary to update the linked bridge model for all bridge objects affected by this error in order to correct the model after opening it in the new version.
*	93236	An incident was resolved for bridge superstructure design of steel U-girder bridge sections where stresses were not being correctly calculated when the option "Use Stage Analysis" was set to "Yes". The reported stresses were too low, resulting in an under-estimation of the demand/capacity (D/C) ratio. The effect of axial force was being ignored for the stresses calculated at the top and bottom of the steel girder. This error affected all versions of all codes for steel U-girder strength and service design requests with the option "Use Stage Analysis" set to "Yes", and the staged version of the constructibility design requests. Results were not affected for strength and service design requests when the option "Use Stage Analysis" was set to "No" or for the non-staged version of the constructability design requests.

Frame Design
Incidents Resolved

*	Incident	Description
	92235	An incident was resolved for AASHTO 2007, 2012, and 2014 concrete frame design in which the seismic zone selected in the concrete frame design preferences was not always the value that got used during design.

Results Display & Output

Incidents Resolved

*	Incident	Description
	61893	An incident was resolved where the joint reactions in a staged construction load case that continues from another nonlinear load case and that removes objects in the first stage were incorrect at joints connected to the removed objects. The error in the reaction was equal to the amount of force/moment carried by removed objects at those joints at the end of the previous load case. Only the joint reactions at restraints were affected, and only at joints where objects were removed in the first stage. Overall structural response was unaffected. No other displacement, force, moment, or stress response was affected. This error only occurred at restraints, not at spring or one-joint link supports.
	82588	An incident was resolved that corrected two items related to report generation. (1.) An error would occur when generating a report from certain user-defined report content XML files that contained no tables. (2.) The group parameter of a picture element in the report XML contents file was not being applied.
	89048	An incident was resolved where in rare cases some components of the joint reactions did not display until the first time the load case or combination was changed for which results were displayed.
	89394	An incident was resolved where the sign of the major moment M3 displayed on the Bridge Response Display form in the fields labeled "Response At Current Location", "Response Just Before Current Location", or "Response Just After Current Location" could be incorrect after clicking the "Refresh" button in the case when the option "Moment Diagrams on Tension Side" was selected in the Other Settings form. The error was obvious because the sign of the displayed values was opposite that of those plotted in the graph on the same form. No other results were affected. The Bridge Response Display form is accessed using ribbon command Home > Display > Show Bridge Superstructure Forces/Stresses, and the Other Settings form is accessed using the ribbon command File > Settings > Other Settings.
	89748	An incident was resolved where the Bridge Object Response Display form (command Home > Display > Show Bridge Superstructure Forces/Stresses) was unable to display analysis results for a bridge object containing a bridge section of type Concrete Box Girder - Ext. Girders Sloped Max when the bridge object was updated as a solid model. This was a display issue only. No results were affected.
	89838	An incident was resolved where moving load case results could fail to display on the Bridge Object Response Display form (command Home > Display > Show Bridge Superstructure Forces/Stresses) for a bridge object with a concrete bridge section that had been updated as a solid model. When this error occurred, it could result in the response being plotted as zero, generating an error message saying that results could not be recovered, or an abnormal termination. When the error did not occur, the displayed results were correct. Affected concrete bridge sections that can be updated as solid models are the Box Girder, Tee Beam, and Flat Slab sections. No other results were affected.
	89912	An incident was resolved where the plotted potential and hysteretic energies for FNA load cases were wrong for certain types of link objects: Multilinear Elastic, Gap, Hook, Plastic (Wen), Rubber Isolator, and all three Friction-Pendulum Isolators (the first three types exhibit potential energy only). When this error occurred the effect was usually obvious from the unrealistic plots, which could include negative energies. No other results were affected. Versions 17.2.0 to 18.1.1 were affected.
	91600	An incident was resolved for bridge superstructure design and/or rating of steel I-girder and U-girder bridges where the design/rating results for the right exterior girder were sometimes reported as zero in the Bridge Object Response Display form when the number of girders varied in different bridge spans. This could occur in spans that had more girders than present in the first span of the bridge object. This was a display issue only and no results were affected.

*	Incident	Description
	91763	An incident was resolved where single degree-of-freedom frame hinges using the Takeda hysteresis model could sometimes indicate that yielding had occurred at force or moment values lower than the specified yield value (point B). This could occur the first time the force value changed sign. Only the reported state (past point B) was affected, not the actual force-deflection or moment-rotation behavior. No other results were affected. This error did not affect other hysteresis types (isotropic, kinematic, Pivot).
	91841	The descriptions of the database table columns (fields) were missing for all AASHTO LRFD steel U-girder bridge superstructure design result tables. No results were affected.
	92254	An incident was resolved where the units used in a report may not be those expected the first time the report is created.
	92365	An incident was resolved where bridge stresses could not be plotted on the Bridge Object Response Display form for certain models. No other results were affected. This was not common.
*	93548	An incident was resolved where the stresses computed for the flanges of a steel I-girder in a bridge object could be incorrect at certain bridge section cuts in the case when a nonprismatic hybrid I frame section was assigned to the steel I-girder bridge section and either (1.) the bridge section cut was near to, but not at, the location where a section transition that changed the top flange dimensions, or (2.) the bridge section cut was at a location where the top or bottom flange dimensions were tapered (varied linearly). When this occurred the flange stresses displayed in the Bridge Object Response Display could be incorrect, since the flange thickness was taken as double its specified value. In addition, this could affect the bridge design results for design requests with the "Use Staged Analysis" option set to "Yes" due to incorrect flange stresses. Such design requests should be re-run for verification with the new version. This error only affected steel I-girder bridges modeled as area objects with the girders using the mixed model, not the frame or area models for the girders. This error did not affect the analysis model or any analysis results except the flange stresses in the Bridge Object Response Display.
	94642	An incident was resolved where the user-specified range for various types of plotted response contours was always being set in database units rather than user-selected display units. This affected the contour display for displacements; soil pressures; frame stresses; shell resultants, stresses, and design results; and the stresses for plane, asolid, and solid elements. Only contour results were affected. All other results were correct, including the values shown under the mouse cursor and in the right-click details forms. Contour results were only incorrect when the display units selected in the lower-right corner of the graphical user interface were different from the database units, which are the units selected whenever the model is opened.

Database Tables

Incidents Resolved

*	Incident	Description
	64725	An incident was resolved in which using the interactive database to input user-defined time history functions with a large number of data points would either freeze the user interface or only partially import the data. This issue was previously resolved in v17.2.0 but inadvertently omitted from the release notes.

Data Files

Incidents Resolved

*	Incident	Description
	79862	An incident was resolved where an error was generated when importing a model text file containing precast-I or U sections imported from a XML library. When this happened the section was imported as a default section instead of the expected precast section and the results reflected this.

*	Incident	Description
	89236	An incident was resolved where staged-construction Schedule data were not properly imported from CSiBridge text/table files (.b2k, .$br, .xls, .xlsx, .mdb, .accdb) if any of the group names referenced in a Schedule contained a space character. When this occurred, an error message was generated during import. The Schedule data itself was correctly imported, but any staged-construction load cases generated from the imported Schedules would have no operations defined for the stages. This was able to be corrected by using the Modify/Show operation for each staged-construction load case, and then clicking OK to update them. No other data was affected.
	91727	An incident was resolved for the Bridge Modeler where updating the linked bridge model would fail for Steel I- or U-girder bridge sections and for concrete I-girder bridge sections if (1.) Parametric variation was assigned to the first span, and (2.) One or more staggered diaphragms were assigned between the first and second section cuts. When this occurred, the model could not be generated and run, so results were not available. Adding a user-defined discretization point before the first staggered diaphragm was an option to avoid this problem.

Application Programming Interface

Incidents Resolved

*	Incident	Description
	89069 89446 91921	An incident was resolved where some API users creating 32-bit COM clients were experiencing 'Runtime error "429": ActiveX component can't create object', when attempting to use the 64-bit program via the API. This has been resolved as part of the installation process.
	89961	An incident was resolved in which the API for the v18.0.0 and v18.0.1 64-bit version still used the same GUIDs as v17 and these GUIDs were different than v18 32-bit API. This could cause an issue for COM clients in the following scenarios. (1.) If v17 and v18 64-bit were installed on the same machine, the API client may connect to the wrong instance of SAP2000. (2.) A v18 API client couldn't work with both the 32-bit and 64-bit without having two different versions of the client, compiled against the different API assemblies. This issue was resolved in v18.1.0 but was inadvertently omitted from the Release Notes.

Documentation

Incidents Resolved

*	Incident	Description
	90091	An incident was resolved in which the Define Load Patterns help topic referred to load pattern types 'Super Dead' and 'Reduce Live' which are not available in CSiBridge. The documentation has been updated.
	90431	An incident was resolved in which the concrete frame design manual for CSA A23.3-14 contained references to Chapter 4 in the table of contents but there was no Chapter 4 in the manual. This was only an error in the table of contents.
	92252	An incident has been resolved in the concrete frame design manual for ACI 318-14 code in which the expression of T_th had a term (A_cp/p_cp)^2 instead of (A_cp^2 / p_cp). This was a documentation issue only and did not affect design results.
	92175	An incident was resolved in which the steel frame design manuals for AISC 360-05 and 360-10 incorrectly documented the equation for Fez in section 3.5.2.1.2.3.4. This was a documentation issue only and did not affect design results.

External Import/Export

Enhancements Implemented

*	Incident	Description
	70171	An incident was resolved in which some general reference lines imported from LandXML files were unable to be converted to layout lines. This typically happened when the beginning or ending stations were not consistent between the horizontal and vertical layout data. Now the horizontal and vertical layout are adjusted at either end to make them compatible and allow the general reference line to be converted to a layout line.

Installation and Licensing

Incidents Resolved

*	Incident	Description
	84181 84655 73430	An incident was resolved in which installing CSiBridge using System Center Configuration Manager (SCCM) could fail due to a permissions issue. This was resolved with the release of CSiBridge 2016 v18.0.0.