CSiBridge® 2017 (Version 19.2.0)
Release Notes

Notice Date: 2017-08-21

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 v19.1.0 (Released 2017-03-14)

Graphics

Enhancements Implemented

*	Incident	Description
	85522	The speed of graphical display has been improved for models containing a large number of link objects.

Bridge Modeler

Enhancements Implemented

*	Incident	Description
	101958	An enhancement has been implemented in the bridge modeler such that the program is now able to recognize bearing angles with the format "Default+<angle>", where <angle> is a decimal value, when the region settings on the machine use a character other than a period (.) as the decimal separator in the <angle> value.
	102612	In the Bridge Object Data Form of the Bridge Modeler, the items "Traveler" and "Scheduler Wizard" under Modify/Show Assignments are now removed from the list if the bridge object is of the type "General". These assignments only pertain to "Segmental" bridge objects, and though they were previously available for "General" bridge objects, they had no effect.
	103201	The Bridge Modeler has been enhanced for generating tendons in curved composite bridges where the precast-concrete (or steel) I-girder or U-girder has been specified to be straight along the curved span. Now the bridge tendons will be generated along the girder line instead of the bridge layout line when the tendon is copied to a straight girder. Bridge tendons are still defined first along the layout line, then either copied to all girders or moved to a specific girder, at which time the geometry will be adjusted by the Bridge Modeler to match the straight girder. Note that bridge models created in previous versions will not be automatically modified. Instead, for bridge tendons not already aligned with the straight girders, it will be necessary to delete, redefine, and copy/move them to the girders to make the correction.
	103786	An enhancement has been implemented for layout lines in the Bridge Modeler where a new option “Curve Type” has been added to the "Horizontal Layout Line Data - Quick Start" form so that users can initially specify whether a horizontally curved segment(s) of a layout line is of type Spiral Curve (default) or Circular Curve. Previously a spiral curve was always assumed, which could subsequently be changed to a circular curve. Additionally, in the Modify Segment form where the segment type, end station, end bearing, radius of circle and/or the curve type are specified, the curve type previously called “Highway Curve” is now renamed as “Spiral Curve”, although the meaning is the same.
	202308	The Quick Bridge template used to create new general bridge models has been enhanced to allow specifying the bridge object name, definition of the layout, and customization of the selected deck-section definition.

Modeling

Enhancements Implemented

*	Incident	Description
*	201058	A new link property has been implemented to represent high-damping rubber bearings (isolators). These bearings represent coupled two-dimensional hysteretic damping in the shear degrees of freedom of the link, which is independent of axial force and rate of deformation. Parameters include control strains and strengths for one or more hysteresis loops, as well as a degradable elastic stiffness. These values can be determined from experiment or from the device manufacturer, such as Bridgestone or others. The mathematical formulation is based on N. Masaki, T. Mori, N. Murota, K. Kasai, "Validation of Hysteresis Model of Deformation-History Integral Type for High Damping Rubber Bearings," Paper 4583, *Proceedings of the 16th World Conference on Earthquake Engineering*, Santiago, Chile, 2017, and private communication with the authors.
*	201147	The assignment of insertion points (joint offsets) to cable objects has been removed. These offsets were of little practical use and could easily create instability in a model where the joints were pinned. A warning will be provided when opening a model from a previous version that has cable insertion points assigned, and they will be removed from the model. The command Assign > Cable > Insertion Point is removed. The associated database table Cable Insertion Point Assignments has been removed. The API (Application Programming Interface) functions SapModel.CableObj.SetInsertionPoint and GetInsertionPoint have been deprecated. SetInsertionPoint will have no effect on the model, and GetInsertionPoint will always return zeroes.

Loading

Enhancements Implemented

*	Incident	Description
*	102584	The Bridge Modeler and staged-construction analysis have been enhanced to more easily simulate the operations of placing concrete for the top slab of composite bridges having steel I-girder, Steel U-girder, or precast-concrete I-girder sections. A new type of bridge load, Slab Wet Concrete Load, can now be assigned to a bridge group of type Top Slab. The bridge group together with an assigned Slab Wet Concrete Load is called a Concrete Pour. Two new operations have been added to staged construction load cases: (1) Pour Concrete, which applies weight of a concrete pour as equivalent loads on top of the supporting girders before the top slab objects are actually added to the structure; the equivalent torsion due to overhanging bracket loads is included. (2) Remove Forms, which adds the actual top slab objects representing the concrete pour with their full stiffness and weight, while removing the equivalent line loads from the girders. These operations can be analyzed with or without time-dependent effects (creep, shrinkage, and age-dependent stiffness). An additional operation, Add Guide Structure, is also newly available so that the top slab objects can be added-in considering the vertical deflection of the girders, although this is not required to model the concrete pour. These new features require the bridge object to be updated as area objects, and cannot be applied to spine models.
*	202410	A new operation, Add Guide Structure, has been implemented for staged-construction analysis to improve deflection reporting for certain types of structures. Using this operation, frame, tendon, and homogeneous shell objects can be added as "guides" at the beginning of a staged construction analysis, to be replaced with the actual objects as the construction proceeds. A guide has the same geometry and connectivity as the actual object, but with reduced stiffness and no mass, weight, loading, or time-dependent behavior. Guide objects deflect with the portion of the structure that is already present, so that the reported deflections for a newly added object will include the deflections of the guide as caused by the previously existing portion of the structure. While the use of guides affects deflection reporting, it normally does not affect forces, moments, stresses, or design results except when large-displacement geometric nonlinearity is considered. Typical uses for guide structures include cantilever

*	Incident	Description
		construction, tall and unsymmetrical buildings, and composite bridges where the concrete slab is cast-in-place on previously erected girders.

Analysis

Enhancements Implemented

*	Incident	Description
	100806 101201 102287	The speed of influence-based moving load analysis has been significantly increased for calculating reactions at joint restraints. For very large models, the speed increase may require using the 64-bit installation with an adequate amount of physical memory (RAM) on the machine.
*	103383	An enhancement has been made to allow additional modal damping in linear and nonlinear direct integration time history load cases. This feature uses the mode shapes and periods from a specified modal load case to calculate a modal damping matrix. This matrix is restricted to the shape of the stiffness matrix, meaning that modal damping does not couple elements that are not connected. The associated modal case must use the same mass source as the direct-integration load case, and must be run before the direct-integration load case that uses it. Modal damping parameters allow the damping ratio to be constant for all modes, interpolated by period or frequency, or determined based on a mass and stiffness proportional coefficient. Any modal damping specified as additional material damping will also be included in linear and nonlinear direct-integration time history load cases. When modal damping is specified in a nonlinear direct integration time history load case, more iterations may be necessary to reach equilibrium. Modal damping is in addition to any proportional damping that may be specified for the direct-integration load case. A small amount of stiffness proportional damping is recommended to control higher modes. The CSI Analysis Reference Manual has been updated for this topic.
*	200664	The displacement control option for nonlinear static load cases has been enhanced to allow additional controlled displacements, either as joint degrees of freedom or generalized displacements, to be specified in the load case definition. When additional controlled displacements are defined, the most significant of the monitored displacement and the additional displacements will be used to determine the displacement in a load step. Only the monitored displacement will be used when plotting the Static Pushover Curve results. Using multiple controlled displacements may improve convergence behavior for models with degrading strength, localized deformation, or snap-back behavior.
	202197	Convergence behavior for nonlinear static displacement-control analysis has been improved for Newton-Raphson iteration. For affected models, this produces fewer iterations and/or less sub-stepping, resulting in faster run-times and/or fewer convergence failures. For some models, analysis results for nonlinear static displacement-control load cases may change from previous versions, particularly for models with poor convergence behavior or large step sizes. Such changes in results are expected to be within the specified convergence tolerance. Verification examples 1-029, 2-018 and 2-019 were updated to reflect the effect of this change. The validity of these verification examples was not affected.

Bridge Design

Enhancements Implemented

*	Incident	Description
*	99342	Bridge design checking has been implemented for concrete solid-girder superstructure sections according to Eurocode. Separate design checks are provided for stress, flexural strength, shear strength and crack checks. The effect of mild reinforcing is included as well as the prestress tendons. Live-load distribution factors can be specified by the user, or determined from detailed 3-D live-load analysis. Design results are displayed graphically for each of the individual girders. Detailed tables showing all results and intermediate values are available for display, printing, and export to Excel or Access.

*	Incident	Description
*	99819 101937 102297 103485	The behavior of bridge superstructure design and rating for steel I-girder bridges has been enhanced and clarified for consideration of girder local section cuts. By way of background, global section cuts are locations along the bridge length where the generated slab mesh cuts across the entire bridge section. Girder local section cuts are slab mesh lines created for individual girders where staggered diaphragms, girder splices, or sudden changes in I-girder section properties occur. Local section cuts are only created if the option to "Mesh Slab at Critical Steel I-Girder Locations" is selected (checked) when updating the bridge structural model. The following behavior has been implemented for all design/rating requests that consider vehicle live load: (1) When staggered diaphragms are present that do not coincide with global section cuts, the option "Mesh Slab at Critical Steel I-Girder Locations" must be selected in order to run affected requests. If not selected, a warning message will be produced when trying to run these types of design/rating requests, and they will not be run. (2) When only girder splices and/or sudden changes in steel I-girder section properties are present that do not coincide with global section cuts, and the option "Mesh Slab at Critical Steel I-Girder Locations" is not selected, affected requests can still be run. However, a warning message will be produced indicating that the results may be approximate because the design/rating was not performed at the critical locations where the splices or section changes occurred. (3) When staggered diaphragms, girder splices and/or sudden changes in steel I-girder section properties are present that do not coincide with global section cuts, and the option "Mesh Slab at Critical Steel I-Girder Locations" is selected, the Live Load Distribution (LLD) Method for the design/rating request must be set to use "Use Directly Girder Forces from Analysis" in order to produce design results at the girder local section cuts. Otherwise, affected requests can still be run, but a warning message will be produced indicating that the results may be approximate because the design/rating was not performed at the girder local section cuts. Design/rating will only be performed at the global section cuts for this case.
*	102373 103590 201940	New detailed calculation reports have been added for bridge superstructure design of steel I-girder bridges per the AASHTO LRFD code for the following types of design requests: (1) Steel I Comp Service (2) Steel I Comp Fatigue (3) Steel I Comp Constructability NonStaged (4) Steel I Comp Constructability Stage
	103266	Bridge design/rating of steel U-girder bridge sections has been changed for the calculation and plotting of the web angle for non-prismatic sections. In previous versions the web angle was calculated at the start of each non-prismatic segment and assumed to be constant throughout the segment. Now the web angle is calculated as an average of the web angles at both ends of the non-prismatic segment and assumed to be constant along the length. The web angle is used for plotting and the calculation of horizontal web widths and the clear width of the bottom flange between webs. All other plate sizes were and still are interpolated based on sections defined at the two ends of the non-prismatic segment. Note that it is unusual for the web angle to vary with length, so this change will affect very few models. The bridge design/rating optimizer has been enhanced to now display the web angle in the span elevation for steel U-girder sections. This information will assist the user to check if the web angle on non-prismatic cross sections stays constant within a span, since this reflects the industry practice (to avoid fabrication of warped webs). Note that the user will need to delete the previous design results and re-run the design/rating in order to see the new plot.
	201745	For superstructure design of steel I-girder bridges per the AASHTO LRFD code, minor changes have been made to the corresponding output tables for the constructability design requests. A new column named "DoverCSlab" with description "Ratio of longitudinal tensile stress in the top slab over phi x fr. If larger than 1 longitudinal reinforcement needs to be provided per LRFD 6.10.3.2.4." has been added to the negative flexure output tables. Also, the description of the existing "DoverC" column has been changed to "Demand over capacity ratio controlled by stresses in the steel section." The following design requests were impacted: Steel I Comp Constructability Staged, and Steel I Comp Constructability NonStaged. By way of background, in the previous versions the value of ratio of longitudinal tensile stress in the top

*	Incident	Description
		slab over phi x fr was reported in the DoverC column provided the ratio was larger than the demand over capacity ratio controlled by stresses in the steel section. The addition of the new output column provides more information but does not change the way the stresses are evaluated and reported.

Application Programming Interface

Enhancements Implemented

*	Incident	Description
	100528	The API has been enhanced to allow MATLAB client applications to attach to a running instance of CSiBridge. The documented MATLAB API example has been updated to demonstrate this new feature.

Miscellaneous

Enhancements Implemented

*	Incident	Description
	101823	The version number has been changed to v19.2.0 for a new intermediate update.

User Interface and Display
Incidents Resolved

*	Incident	Description
	88674	An incident was resolved where resizing the frame design details form would cause the section image to grow in size.
	99600	An incident was resolved in which the program would close if the Show Desktop button was clicked while the section designer form was open.
	200310	An incident was resolved in which an abnormal error could occur after defining a construction schedule and then attempting to access it again for further editing.
	202087	An incident was resolved to correct the menu command Analyze > Set Load Cases to Run which previously did not do anything when selected.

Graphics
Incidents Resolved

*	Incident	Description
	81713 82980 86578	An incident was resolved where the extruded view was sometimes incorrect when the display coordinate system was changed to something other than GLOBAL. This was a graphical issue only and did not affect results.
	89390	An incident was resolved where the display of the animated deformed shape in DirectX Graphics mode did not animate the symbols representing link objects. This was a graphical effect only and results were not affected.
	100686	An incident was resolved where bridge point loads were sometimes not being displayed for models that also contained wave loads or area uniform-to-frame loads. This was an issue affecting the display of assigned loads, and no results were affected.
	102001	An incident was resolved where the extruded view of cover plated sections was not showing correctly. This was a display issue only and no results were affected.
	200713	An incident was resolved where assigned frame distributed and concentrated loads may have been displayed on the model in the wrong orientation if the selected display coordinate system was None (Display as Defined).

Bridge Modeler
Incidents Resolved

*	Incident	Description
	96118 101054	An incident was resolved for segmental bridges modeled as areas where unexpected reactions were being developed for the bridge travelers during staged construction load cases for bridge segments that were discretized into two or more area objects along the length of the construction segment. This is controlled by the Discretization Length setting on the Update Bridge Structural Model form (command Bridge > Update > Update). Reactions were only generated for construction segments that were longer than the discretization length. When this occurred, the cantilever portion of the bridge was being supported by the traveler, producing a different stress state in the superstructure than expected. This would affect construction forces, moments, and stresses, as well as creep and aging effects. However, it had negligible effect on the equilibrium of the structure once the travelers were removed. This issue was not affected by the submesh (element) size set on the Update Bridge Structural Model form. However, it is recommended in general that Submesh Size be set the same or larger than the discretization length to avoid dividing area objects into smaller elements. Travelers only support the construction segments at area-object boundaries (section cuts), not at the area-element boundaries.
	100738	An incident was resolved for the Bridge Modeler where steel I-girder bridge connection plates at one end of staggered cross frames (diaphragms) would not have been created as expected at the interior girders if: (1) the option "Both Sides of Web" was checked for the cross frame connection plate definition, (2) the bridge had skewed supports and the section-cut orientations were parallel to the support within the length from the beginning of the span where the cross

*	Incident	Description
		frames were located, and (3) the staggered cross diaphragms were assigned at the same girder distances for two adjacent girder spaces and the dimensions of the connection plates were identical. When this occurred, results agree with the model as generated. The effect on analysis results was small.
	101071	An incident was resolved for the Bridge Modeler where link objects generated to represent support bearings may not be correct for a concrete box-girder bridge section, updated as a solid model, in the case where the section dimensions were such that one of the solid objects contained a triangular face on the bridge section cut at the support location. When this occurred, the error in the generated model was obvious and results agreed with the model as generated.
	101407	An incident was resolved for the Bridge Modeler where the force in a tendon could show an unexpected drop at the end of the tendon due to the use of a rigid body constraint to connect the tendon to the superstructure in the following unusual case: for a bridge object with the advanced concrete box bridge section, having parametric variations assigned to the fillet dimensions, and when the distance of one or more of the variation control points are within the merge tolerance to a section cut location. The analysis meshing for this condition has been improved to avoid the adverse effect upon tendon forces.
	101455	An incident was resolved for the Bridge Modeler where the length unit used for specifying the support bearing offset overwrite for general bearing locations was always based on the database units regardless of the current units chosen in the graphical user interface. Database units are those in effect when the model is created or imported. Results agreed with the model as actually created.
	101695	An incident was resolved for the Bridge Modeler where user-defined bridge groups for segmental-type bridge objects could not be deleted or modified after being created. This issue did not affect bridge groups defined for general-type bridge objects.
	101860	An incident was resolved for the Bridge Modeler where the model generated for a segmental-type bridge object could incorrectly contain overlapping area objects when there were two or more "Segmental - Bottom Span" tendons defined. When this occurred, the error was generally obvious, and results agreed with the model as generated. When an affected model is opened in the new version, it will be necessary to correct the generated model as follows: Redefine the "Segmental - Bottom Span" tendons; Clear and Create the linked model; If any construction schedules were created for this bridge object, use the Schedule Wizard to recreate the affected schedules.
	102012	An incident was resolved for the Bridge Modeler where some of the link objects representing support bearings might not be created for bridge objects with composite bridge sections at highly skewed bent supports if there were staggered diaphragms (cross-frames) assigned near to the support. Composite bridge sections include steel and precast-concrete I-girder or U-girder sections. When this occurred, the error was obvious, and results agreed with the model as generated.
	102470	An incident was resolved for the Bridge Modeler where the model generated for precast concrete I-girder bridges did not always represent staggered diaphragms at the specified orientation, particularly for skewed bridges. When this occurred, the error was obvious, and results agreed with the model as generated.
	102480	An incident was resolved for the Bridge Modeler where the link objects representing support bearings at the bents would not be generated in the following uncommon case: (1) The first span of the bridge object initially used a standard bridge section and the beginning abutment of the bridge was assigned a double-bearing bent, (2) The bridge object was updated as a spine model, (3) The bridge section for the first span was converted to a user-defined bridge section, and (4) The bridge object was updated again. The bearings, while present in Step 2, were missing in step 4. Results agreed with the model as generated. This has been resolved for new models. For existing models opened in the new version, it will be necessary to re-define the number of bearings at the beginning abutment support and update the bridge object again in order to correct the model.

*	Incident	Description
*	102959 201146	An incident was resolved for the Bridge Modeler where the model generated for bridge objects having precast-concrete I-girder or U-girder bridge sections could be incorrect for the case where the girders were set to be modeled as straight along a straight layout line if a parametric variation was applied such that the bridge-section width, girder spacing, or overhang length was changed along the span length. In such a case, the bounding boxes used to determine if tendons connected to the precast-concrete girders could be incorrectly calculated, which could cause the tendons to only connect to the precast girders near the girder ends. Analysis results and design results would be affected in such a case, consistent with such girder-tendon connection.
	103384	An incident was resolved for the Bridge Modeler where an error message or abnormal termination could occur when defining segmental bridge tendons and performing the following operations: (1) Choose the "Prestress Tendons" option for a segmental bridge object; (2) Choose the "Segmental - Bottom Span" or "Segmental - Top Span" option and then "Define Segmental Tendons"; (3) Either (a) click the "+" button under "Select Tendon Duct Template" and add a new Tendon Ducts and Anchors Template or change the name of an existing one, or (b) click the "+" button under "Tendon Parameters" and add a new Tendon Parameters Definition or change the name of an existing one; and finally (4) On the Bottom/Top Span Tendon Definitions form, click "Add" to add a new tendon. The error did not occur if only existing data was changed, but no names were changed or added. If this error did occur in a model, correction requires deleting and redefining the segmental bridge object in the new version.
*	200299	An incident was resolved for automated bridge seismic design where, in very rare cases, the bent bearing properties specified in the bridge object could be changed to be fully pinned in the generated model after running a bridge seismic design request where the longitudinal pushover type was set as "Full Bridge Along Chord". This affected results for other analyses and designs run after the bridge seismic design request, until the bridge object was updated again to regenerate the linked model. This was not common. Note that the use of substitute pinned bearings can be expected for bridge seismic design requests that consider the "Full Bridge Along Chord" case, but not for other load cases
	200760	An incident was resolved for the Bridge Modeler where a segmental bridge object, when updated as a solid model, was unable to be analyzed if there was a staged-construction load case to be run that contained the operation "Set Traveler for Segment". In addition, the load case simulator was unable to display travelers for such staged-construction load cases. The load case simulation could be accessed using commands Home > Display > Show Object Load Assignments > Load case or Analysis > Show Tree > Show Active Structure. Segmental bridge objects updated as spine or area models were not affected.
	201140	An incident was resolved for the Bridge Modeler where the model generated for steel I-girder and U-girder bridge sections would sometimes have steel material properties assigned to the concrete deck slab objects in one span if (1) Some of the steel girders in the previous span were non-prismatic and the web and/or flange material varied along the girder length, and (2) The affected span had a non-prismatic section transition, staggered diaphragm, and/or girder splice assigned in between two global section cuts. When this occurred, the steel material was assigned to the concrete slab as a material overwrite. Results agreed with the model as generated. Spine models were not affected.
	201474	An incident was resolved for the Bridge Modeler where the link objects representing support bearings at double bearing bents were not being generated when a diaphragm (cross frame) had been assigned along the bent bearing location as an in-span diaphragm (command Bridge > Span Items > Diaphragms) rather than as part of the bent assignment (command Bridge > Supports > Bents). While the latter method is preferred, the bearing link objects will now be generated using either method. Results agreed with the model as generated.

Section Designer
Incidents Resolved

*	Incident	Description
	99638	An incident was resolved where the rebar size for import of section designer sections from a DXF file would always use the default value instead of what the user selected.
	102693	An incident was resolved for Section Designer where the concrete model report produced for Mander confined concrete models with a circular core always presented the effective confined area value and equation for hoop confinement, regardless of whether the specified confinement was hoop or spiral. This error only affected the report. The correct value of effective confined area was used for all material stress-strain calculations affecting moment-curvature plots and frame hinges generated from the section. The technical note "S-TN-MAT-001.pdf" is also correct.
	202070	An incident was resolved in section designer where an error condition would occur after clicking on the "Show Interaction Surface" button when the concrete frame design code was set to SP 63.13330.2012.

Loading
Incidents Resolved

*	Incident	Description
*	202004	An incident was resolved where lane loading points used for moving-load analysis were sometimes not being generated under the following conditions: (1) The lane line (layout line or collection of frame objects defining the lane) was not straight, (2) In the lane definition, the "Objects Loaded by Lane" was set to a "Group" rather than "Program Determined", and either (3a) None of the objects in the group were frames and none intersected the lane line, and/or (3b) There was a large number of frame objects in the group. When this occurred, the error was usually obvious from viewing the lane loading points using the command Display > Show Lanes. Analysis and design results would be affected and agreed with the lane loading points as displayed. This error was not common, and only affected v19.0.0 and v19.1.0.
*	202054	An incident was resolved where strain, temperature, or surface pressure loads assigned to a layered shell object were not being applied during nonlinear load cases (static, staged-construction, or direct-integration time-history) under certain circumstances. This issue occurred when there were multiple load patterns applied in the given load case, and for a given layered shell object there were strain, temperature, and/or surface pressure loads assigned in any of the applied load patterns except the first for that load case. This issue was not present if the load case contained only one load pattern and did not affect other types of area loads (e.g. self-weight, gravity, or uniform loading). This issue did not affect plane or asolid objects and did not affect shell object types other than the layered shell.

Analysis
Incidents Resolved

*	Incident	Description
	74529 101003	An incident was resolved where element loads on a shell, solid, or planar element and specified to act in a fixed coordinate direction (such as gravity) would rotate with the element after being applied during an analysis with large-displacement geometric nonlinearity. This issue only affected nonlinear static and nonlinear direct-integration time history load cases with the "Geometric Nonlinear Parameters" set to "P-Delta plus Large Displacements". When this issue occurred, the computed response was in equilibrium with the rotated load and the issue was reflected in the reported forces and base reactions. Loads specified to act in an element-local coordinate direction are expected to rotate with the element under large-displacements, and that has not changed. Frame and link elements were not affected. Asolid elements do not support large-displacement effects.

*	Incident	Description
*	100793	An incident was resolved where shell (area) objects that are not subject to a Change Section operation in a staged-construction load case starting from zero could be affected by a Change Section operation in another staged-construction load case that was analyzed earlier in the same run, even if the affected load case did not continue from the prior-run load case. This did not occur if the two load cases were analyzed in separate runs.
	101017	An incident was resolved where the bridge superstructure moments M3 reported for individual composite girders (beam plus slab) did not always correctly sum to the total superstructure M3 moment for composite bridge sections (steel I-girder and U-girder, precast concrete I-girder and U-girder). This only affected sections where the girder depth varied along the span, such that the vertical location about which the M3 moment was taken was not consistent between the girders and the overall section at some section-cut locations. When this occurred, the magnitude of the error depended on the change in depth and the presence of axial force. Only the plotted and tabulated analysis results for M3 in the composite girders were affected. Moments in the individual steel or concrete beams and in the slabs were not affected. Moments and/or stresses used for design were independently calculated and design results were not affected.
*	101220	An incident was resolved where linear load cases using the stiffness from a staged-construction load case starting from zero could be affected by the operations (Add, Remove, etc.) in another staged-construction load case that was analyzed earlier in the same run, even if the affected load case did not continue from the prior-run load case. This did not occur if the two staged-construction load cases were analyzed in separate runs. This only affected the stiffness of shell elements used for the linear load cases. No other type of element was affected.
	101426	An incident was resolved where a memory error could sometimes occur when creating the analysis model while generating bridge lane loads if (1) A lane was defined with "Objects Loaded by Lane" specified as "Program Determined", and (2) One or more bridge objects within the station range of that lane had not been created (the linked model had never been updated or had been cleared). This error was not common. When it did occur, results were not available. The error could be avoided by setting "Objects Loaded by Lane" to group "All" or another defined group for the affected lanes.
	101716	An incident was resolved for the Construction Scheduler (command Analysis > Load Cases > Schedule Stages) in which the decimal value for the "Age At Add" parameter entered into a construction schedule was rounded to the nearest integer when the schedule was saved. The corresponding staged construction load case generated from the construction schedule used the rounded integer value. Results agreed with the integer value of "Age At Add" in the load case. Only time-dependent behavior (creep, shrinkage, age-dependent stiffness) was affected, if requested.
	200419	An incident was resolved where the analysis model could not be created, and hence the analysis could not be run, in certain cases where point, line, or area objects were deleted by the user after they had been generated by the Bridge Modeler for composite bridge sections updated as area models. When this occurred, no results were available. Composite bridge sections include steel and precast-concrete I-girder and U-girder sections.
	200421	An incident was resolved where the analysis would terminate with an error if a target-force load was applied in a nonlinear staged-construction load case in any stage after the first stage. When this issue occurred, no results were available from the stage where the target-force load was applied, and subsequent stages would not be run. This issue affected CSiBridge 2017 v19.0.0 and v19.1.0.
	202146	An incident was resolved where the stiffness and self-weight of a frame object could vary with discretization if the frame was assigned both a non-prismatic section property and significant joint offsets. This issue only affected frame objects where the joint offsets and/or cardinal point changed the length of the frame object compared to the distance between the two end joints. This included the case where axial joint offsets were specified, and the case where transverse joint offsets inclined the local 1-axis with respect to the line connecting the two joints. Only frame objects that were discretized due to auto-meshing assignments or hinge overwrite lengths were affected. When this issue occurred, the differences in stiffness and self-weight were small and generally insignificant. Small changes in results may occur for models that use many non-

*	Incident	Description
		prismatic frame section properties with significant joint offsets. Note that the affected joint offsets were those specified as part of the insertion point assignment. End offset assignments were not affected by this issue.

Bridge Design

Incidents Resolved

*	Incident	Description
	98486	An incident was resolved where bridge superstructure design of steel I-girder bridge sections was not being performed for the AASHTO design check type “Constructability NonStaged” when the option "Mesh Slab at Critical Steel I-Girder Locations" was checked in the "Update Bridge Structural Model" form, but only if local girder section cuts were actually created. These occur at non-prismatic girder section transitions, girder splices, or staggered diaphragms that are not at global (entire bridge width) section-cut locations. When this error occurred, results for this type of design check were not available. Now the design will be performed and results reported at all global section cuts. “Constructability NonStaged” design cannot be performed at local girder section cuts because the forces and moments across the entire bridge section are required.
	102045 103099	An incident was resolved for bridge design and rating of Steel I-girder bridges where design/rating requests would produce an error message and fail to run if (1) The steel I-girders were modeled as area objects (area flanges and area web) and (2) Two adjacent spans had no interior bent support and no diaphragm assigned at the location between the two spans. In this case, the design/rating request failed to correctly identify the unbraced length, caused the design/rating to fail. This error affected all bridge design codes and all types of superstructure design/rating requests for steel I-girder bridges. This error did not occur when the steel I-girders were modeled as frames or mixed (frame flanges and area web). This error did not occur if there was either a bent and/or a diaphragm at all inter-span locations. Note that for existing models opened in the new version it will be necessary to clear and create/update the linked bridge model in order to correct this issue.
*	102397	An incident was resolved for the bridge strength design and rating of steel I-girder bridge superstructures where the girder lateral bracing points could be incorrectly determined in the case where there was both a user discretization point and a girder splice between two all-space diaphragms (cross frames), i.e., between two stations where diaphragms connected each pair of girders across the width of the section. The unbraced length of a girder with a splice near the two all-space diaphragms could be then calculated incorrectly and affect the strength design and rating results. This error impacted all design codes. Staggered diaphragms were not affected. Cases with girder splices but no user discretization point were not affected, hence this error was not common.
	102853	An incident was resolved for Bridge Seismic Design where column hinges were not being generated for certain columns when (1) The "Concrete Hinge Type" or "Steel Hinge Type" specified in the bridge seismic design preferences was "Auto: From Bent" and (2) In the Bridge Bent Column Data form, the "Hinge Prop. Top" or "Hinge Prop. Bottom" was set to "None" for any column. In such a case, hinges were not being generated for all subsequent columns in that bent and subsequent bents, regardless of the values specified for "Hinge Prop. Top" or "Hinge Prop. Bottom" for those columns. Results agree with the model as generated.
	103103 200163	An incident was resolved for bridge superstructure design of concrete flat slab bridges using the Eurocode design code where design requests of types "Conc Slab Flexure" and "Conc Slab Crack" failed to run when Longitudinal Reinforcement was specified for the bridge object. When this occurred, an error message was generated and no results were available for the affected design requests. No other results were affected. No other codes, design requests, or types of bridge sections were affected.

*	Incident	Description
	103352 103533	An incident was resolved for bridge superstructure strength design of steel I-girder bridges using the AASHTO LRFD code (all versions) where the detailed calculation report for "Steel I Comp Strength" design requests was showing the incorrect stress calculation for fbu when design-request parameter "Use Stage Analysis" was set to "Yes". Now the report shows the value of fbu as determined directly from the analysis results. This was a reporting error only. The actual design and all other results used the analysis value of fbu.
	103541	An incident was resolved for bridge superstructure design of steel I-girder bridges per the AASHTO code where the detailed calculation reports, when applicable, were available only for global section cuts, not local section cuts, even when the design had been performed at local section cuts. Now reports are available for local section cuts as well. By way of background, global section cuts are locations along the bridge length where the generated object mesh cuts across the entire bridge section and forces, moments, stresses, and design results are computed. Local section cuts are object mesh lines created for individual girders where staggered diaphragms, girder splices, or sudden changes in I-girder section properties occur. Local section cuts are only created if the option to mesh slab at critical locations is chosen when updating the bridge object model. Design is only performed at local section cuts for certain design requests and under certain conditions. No calculated results were affected.
*	103846	An incident was resolved for bridge superstructure design and rating where Live Load Distribution (LLD) Factors were not being applied to moving load cases for which the Design Load Type was set to Vehicle Deflection, Vehicle Fatigue, or Permit Veh Fatigue, or for moving load cases containing vehicles of these types when the Design Load Type was set to Program Determined. When this occurred, the moving load was divided equally to the girders, underestimating the LLD factors. No other Design Load Type used for vehicle live loads was affected. Correct LLD factors were obtained for moving load cases containing these types of vehicles if the Design Load Type was explicitly set to Vehicle Live, Permit Veh Live, or one of the Eurocode vehicle load models.
	201378	An incident was resolved for bridge superstructure design and rating of steel I-girder bridge sections where the design would sometimes fail with an error message for a bridge object, updated as an area model, that contained two or more spans, and a given span had more girders and section cuts than the previous span. When this error occurred, the design failed and no design results were available, although analysis results were unaffected. For models that did not exhibit this error, design results were unaffected.
	201798	An incident was resolved for bridge superstructure design and rating using the AASHTO LRFD code to address the following issue: For design/rating checks where the flexural resistance is based on lateral torsional buckling, the flange stress fl due to lateral bending should be determined as the largest value throughout unbraced length in the flange under consideration per AASHTO LRFD 6.10.1.6. In previous versions the flange stress fl was determined as the corresponding value at the section under consideration, potentially underestimating the DoverC (demand-capacity) ratios. Now the stress fl reported and used for design at a given section cut will be the largest over all section cuts contained in the unbraced length that includes the given section cut. This change affects the following AASHTO LRFD design and rating requests: Steel I Comp Strength, Steel I Comp Constructability Staged and Non-Staged, Steel I Rating - Strength Composite.

Database Tables

Incidents Resolved

*	Incident	Description
	100104	An incident was resolved where the weight reported in the Material List tables could be different from that used in the analysis. This happened when joint offsets were applied to an element changing its geometry. The Material List tables did not account for any joint offsets whereas the analysis did. Now both account for the joint offsets. This was only a reporting discrepancy and the results for analysis and design were correct.

Results Display and Output

Incidents Resolved

*	Incident	Description
	101359	An incident was resolved where the Bridge Seismic Design Report would omit the figures for the pushover curves and response spectrum functions if there was a Chinese character in the path (folder) name of the model file. No results were affected.
	101636 101732	An incident was resolved where the checkbox "Include Tendon Force" on the Bridge Response Display form (command Home > Display > Show Bridge Superstructure Forces/Stresses) did not work correctly when it was checked or unchecked for a given step or envelope result of a load case or load combination. The results shown for a given step or envelope result were always those corresponding to the state of the "Include Tendon Force" checkbox the first time that particular step or envelope result was displayed. Those results were being saved for faster plotting next time, and were not being changed when the checkbox was changed. This issue only affected version 19.1.0, and only affected models with bridge tendons and load cases or combinations with non-zero tendon forces.
	102609 102682	An incident was resolved where an abnormal termination was generated in the Bridge Response Display form (command Home > Display > Show Bridge Superstructure Forces/Stresses) when trying to display the Longitudinal Stress - Top and Bottom - Left, Center and Right for the Entire Bridge Section for bridge objects using any of the following types of bridge sections: concrete box, Tee beam, flat slab, or concrete solid girder. No results were affected.
*	102804	An incident was resolved for the Bridge Modeler where the torsion (T) or transverse moment (M2) for the entire bridge section plotted in the Bridge Response Display form, reported in the tables, or used for bridge superstructure design and rating could be incorrect for unsymmetrical bridge sections when the bridge object was updated as spine model. This was due to taking the moments about a point with transverse location midway between the left and right exterior girders rather than about the centroid of the section. The magnitude of the error in torsion T depended on the magnitude of the vertical shear V2. The magnitude of the error in transverse moment M2 depended on the magnitude of the axial force P. The error was most often conservative. The superstructure vertical moment M3 was not affected. Bridge sections symmetrical about their own vertical axis (before superelevation) were not affected. Forces, moments, and stresses reported in elements and at joints were not affected. This error did not affect bridge objects updated as area or solid models. Affected spine models should be rerun and checked in the new version. This error affected versions 15.0.0 to 19.1.0.
	102996	An incident was resolved for the bridge object response display form where the analysis results could not be plotted in the bridge response display form for a bridge object with a user-defined bridge section. This was a plotting issue and did not affect the analysis results.
	200504	An incident was resolved where the display of frame force/moments could be slow when there was a very large number of load patterns defined for the model, even when those load patterns were not relevant to the response being displayed. This has been optimized to consider only relevant load patterns, increasing the speed of display for load cases with fewer load patterns. No results were affected.
	200739	An incident was resolved where the girder transverse displacement values, when available, were always being displayed in database units on the Bridge Object Response Display form, even when the units had been changed on the form or on the main graphics window. Only the values shown at the bottom of the form corresponding to the mouse cursor were affected. Values shown on the graph (axis scale and maximum/minimum) were correct. Note that database units are those selected when the model is first created or imported. The Bridge Object Response Display form is accessed using the command Home > Display > Show Bridge Superstructure Forces/Stresses. No other results were affected.

Data Files

Incidents Resolved

*	Incident	Description
	101934	An incident was resolved where importing bridge line and area loads from database-table files (.b2k, .$br, Excel, Access) would change loads applied in the "Gravity" direction to being applied in the "Gravity Projected" direction. Results agreed with the model as generated. The effect of this error was generally very small since the bridge loads always apply to the superstructure, and even for bridges with non-zero grade or superelevation the difference between the chord length and projected length is very small.
	101935	An incident was resolved that corrected two issues affecting models imported from database-table files (.b2k, .$br, Excel, Access): (1) when importing a user-defined bridge section, the material of each polygon would be always set to the bridge-section reference material rather than the material specified for the polygon. (2) In the Section Designer Stress Strain Concrete Mander Confined Circle table, the data would not be imported if the shape was Pie or PieArc. For both cases, results agreed with the model as imported.
	200791	An incident was resolved where an inconsequential error message was being displayed when opening a model file (.BDB) containing a bridge object with steel I-girder bridge sections if it was created during bridge design optimization by the following process: (1) After analysis and design, perform design optimization using the command Design/Rating > Superstructure Design > Optimize > Modify Section, and change some sections or stiffeners, (2) Recalculate Resistance, (3) Choose the New File option after the resistance calculation is complete, (4) Close CSiBridge and re-open the newly saved model file. In such a case, the error message "Corrupted material reference in frame section data found. Material default. Please check model." could be displayed. This message referred to certain unused data, and could be ignored. The model would correct itself, and analysis and design results obtained using this model were not affected.
	201437	An incident was resolved where the model database file (.b2k, .$br, Excel, Access) could not be imported for certain models containing a bridge object with a steel I-girder bridge section. When this occurred, the model was able to be imported after updating (or clearing and creating) the linked bridge model and saving the file. With the new version, affected model database files can be imported without needing to update and save the linked bridge model. This error was not common. No results were affected for such models that were not imported.
	201481	An incident was resolved in which XML schema validation errors were generated when attempting to create a report that contained tables not listed in the CSiDefaultReportContents.xsd schema file. This was a reporting issue only and did not affect results.

Documentation

Incidents Resolved

*	Incident	Description
	98850	The concrete frame design manuals have been updated to remove the Concrete Design Preferences, Concrete Frame Overwrites, and Error messages and Warnings appendices (where applicable), as these provided redundant information. This information is already available within the software Concrete Frame Design Preferences form, Concrete Frame Design Overwrites form, and the various design reports.