CSiBridge® Version 20.2.0
Release Notes

Notice Date: 2018-09-17

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 v20.1.0 (Released 2018-05-03)

Bridge Modeler

Enhancements Implemented

*	Incident	Description
	216246	The following new features have been implemented for the user-defined Section Designer bridge section: (1.) Merging two layouts: in Section Designer area or solid layout view, two selected adjacent area or solid layouts can be merged to one layout by ignoring the contact point(s) and using the information of the free-end points to define a new layout. (2.) "Show Selection", "Remove Selection", and "Show All" functions. (3.) Enhancement for editing shell layout. Users can directly work on the shape/polygon of an extruded shell layout instead of right clicking the shell layout line to input the data. (4.) Enhancement for auto-generating the area and solid layouts.
*	219851	An enhancement was implemented providing the ability to input superstructure loads within the bridge deck-section definition to capture barrier, median, sidewalk, haunch, construction, and wearing-surface loads.
*	219871	An enhancement has been implemented to allow input of additional data on the Quick General Bridge Template form, providing the ability to quickly define a more complete model from the start, including substructure and superstructure geometry, loading, and design criteria.
	220318	An enhancement was implemented to allow specifying the depth of diaphragms for precast I-girder and concrete tee bridge sections. Previously the diaphragm was always full depth.
	220321	An enhancement has been implemented to allow specifying the material property for solid bridge diaphragms used in any concrete bridge section type. Previously this capability was limited to user-defined and Section-Designer bridge sections. By default, solid bridge diaphragms will still use the slab material except for user-defined section designer sections.

Modeling

Enhancements Implemented

*	Incident	Description
*	76891	An enhancement has been implemented to allow a prestress tendon layout and loads to be defined within a concrete precast I-girder frame section property. When used within a precast I-girder bridge deck section, the tendons will be automatically generated/updated along with the bridge object.
	222142	A change has been made to default the modeling of tendons to be modeled as elements instead of loads. Old models opened in the new version will not be changed. This change only applies to newly generated tendons.

Loading

Enhancements Implemented

*	Incident	Description
	218127 218188	The staged-construction operations Add Guide Structure, Pour Concrete, and Remove Forms have been added to the Construction Scheduler. These operations were already available for staged-construction load cases. The Pour Concrete and Remove Forms operations are only available when one or more concrete pours have been defined in any bridge object.

Analysis

Enhancements Implemented

*	Incident	Description
*	18263	Rotational degrees of freedom will no longer be generated for frame (line) objects that represent truss members. Previously these zero-stiffness rotational degrees of freedom could generate instability warnings during analysis, even though the accuracy of the solution was not affected unless moment loads or rotational moments of inertia were applied at these degrees of freedom. A frame object is now automatically determined to be a truss member if (1.) End releases are assigned for moments M2 and M3 at both ends and for torsion at either end, (2.) The end offsets are zero at both ends, and (3.) The insertion points at both ends are at the centroid with no joint offsets. Note that a truss member may still exhibit internal bending moments due to transverse loading, including self-weight, but no moments will be transferred to the structure at the two ends of the member.
*	19076 95387	Tendons will now be treated as axial-only members, such that rotational degrees of freedom will no longer be generated for tendons modeled as elements. Previously these rotational degrees of freedom could generate instability warnings during analysis for straight tendons, even though the accuracy of the solution was not affected. This change also means that the small amount of torsion and bending moment that previously could be carried by a tendon will no longer be considered. This may result in a small change in analysis results compared to previous versions of the software when running the same model. This effect will generally be negligible. Tendons modeled as loads are not affected by this change. The calculated results for Verification Examples 1-009, 2-020, and 5-009 have changed due to this enhancement, and the published results have been updated for the new values. The difference was less than 0.03% for all three examples.
*	217067	The speed of the analysis has been increased for nonlinear static and direct-integration time-history load cases where a very large number of load patterns is applied. However, it is still more efficient to use the minimum number of unique load patterns required for any given purpose, rather than using duplicated load patterns.
*	221318	An enhancement has been implemented to allow objects to be removed during a nonlinear direct integration time history analysis for the purpose of simulating dynamic collapse. One or more objects can be removed from the structure at specified times during the load case. When an object is removed, it is replaced with equivalent forces that are then ramped down to zero over a specified duration. This feature can be used, among other purposes, to check that structures remain stable after removal of individual columns.

Bridge Design

Enhancements Implemented

*	Incident	Description
*	79610 215523	Additional bridge load rating checks have been added according to the Canadian CAN/CSA-S6-14 code. The new checks consider shear strength for composite steel I-girder bridge sections, and both flexural and shear strength checks for steel U-girder bridge sections. The flexural strength check for composite steel I-girder bridge sections was already available in the previous version. Live-load distribution factors can be specified by the user or determined from detailed 3-D live-load analysis. Rating results are displayed graphically for the entire box section or on a girder-by-girder basis for box girders and composite sections. Detailed tables showing all results and intermediate values are available for display, printing, and export to Excel or Access.
*	216176	Bridge load rating has been added for steel U-girder composite bridge superstructures according to the AASHTO "Manual for Bridge Evaluation", Second Edition, 2010, including the interim revisions to 2015. Separate rating requests are provided for the service and strength checks of composite superstructures. Live-load distribution factors can be automatically calculated using code formulae, specified by the user, or determined from a detailed 3-D live-load analysis. Rating results are displayed graphically on a girder-by-girder basis. Detailed tables showing all results and intermediate values are available for display, printing, and export to Excel and Access.
*	218227	All bridge superstructure design and rating requests that support the AASHTO code 7th Edition (2014) have been updated to the 8th Edition (2017). Both editions of the code are available as an option.

Results Display and Output

Enhancements Implemented

*	Incident	Description
	216109	A change has been made to the labeling of staged-construction load cases and stages generated from the Construction Scheduler. Previously, the text defined in the Output Label column was used for two purposes: (1) As the Output Label for the stage defined by the row in the Scheduler containing the text, and (2) As a suffix in the name of the subsequent load case created when the checkbox End Case was checked in the Scheduler. In some cases this could be misleading, particularly when the label was corresponding to a group header in the Scheduler. Now, load cases will always be labeled with an incremental integer suffix starting from "-1" and the Output Label string will be utilized only for stage definition. Note that labels on group headers are not recommended. They apply only to the operations defined as part of the group header itself, and not to stages defined as part of the group. The label should be applied to the last operation in the group rather than to the group header itself.
	216665	An enhancement was implemented for the table Bridge Object Girder Forces in which the field "Distance" was changed to "Station", and two new fields "Span" and "GirderDist" were added to the table to identify the location of each bridge section cut where results are provided. "GirderDist" is the distance measured along the centerline of the girder from the start of the "Span" containing the section cut.
	218282	An option has been added to the command Home > Set Display Options to control whether or not to show the Guide Structure when displaying analysis and design results. This only affects the display for load cases that are based on staged construction where the command Add Guide Structure has been used. This option affects each model window separately.

Installation and Licensing

Enhancements Implemented

*	Incident	Description
*	216251	The version number has been changed to v20.2.0 for a new intermediate release.

Bridge Modeler
Incidents Resolved

*	Incident	Description
	215731	An incident was resolved for the Bridge Modeler in which the "Copy Tendon to All Girders" feature did not work if a parametric variation was assigned to a bridge span and the difference between the span length and the length of the parametric variation was between 2.5 and 10 times the Auto Merge Tolerance. The Auto Merge Tolerance is set using the command File > Settings > Tolerances, and defaults to 0.1 inch or 1mm. When this error occurred, an error message was produced, the tendon was not copied, and the original tendon was retained.
	216068	An incident was resolved for the Bridge Modeler where a bridge object with bridge section of type Advanced Concrete Box Girder could not create or update its linked structural model when (1) the bridge object had not been created initially using the template from the command New > Quick Bridge, and (2) the bridge section option "Constant Girder and Fillet Dimensions?" was set to "No". When this occurred, no results were available for the affected bridge object.
	218109	An incident was resolved for the Bridge Modeler where the girder length within certain spans may not have been calculated correctly for a bridge object when the bridge section parametric variation assignment of the span was defined as "Reference to Another Span". This could affect, for example, the longitudinal location of section transitions (plate-size changes) in the model. This issue was rare and could be corrected by opening the Bridge Section Variation Definition form for the affected span and clicking OK (command Bridge > Spans > Modify/Show Section Variation Along Selected Span). Models will be automatically corrected when they are opened in the new version.
*	219274	An incident was resolved for the Bridge Modeler where the girder span length used when assigning transverse reinforcement to a bridge girder was incorrect for interior girders that were not present in one or more of the previous spans for that bridge object. For example, if the first two spans had two interior girders and the third span had three interior girders, the girder span lengths used when assigning transverse reinforcement for the third interior girder in the third and subsequent spans would actually be the lengths of the first and subsequent spans, respectively. If the girder span length used was shorter than expected, this could prevent assigning transverse reinforcement for the entire length of the desired span. If the girder span length used was longer than expected, this would result in an error message if transverse reinforcement was assigned beyond the actual end of the span. Design results were consistent with the actual reinforcement assigned. Analysis results were not affected.
	219638	An incident was resolved for the Bridge Modeler and the Bridge Scheduler where updating a linked bridge model would sometimes generate an error message if a construction schedule had been defined that referenced groups that were specified as part of the bridge object being updated. When this error message was displayed, the groups referenced in the staged-construction load case(s) generated by the Scheduler would not be correct and the analysis results produced for the affected load case(s) might not be as expected. Analysis results were consistent with the load case, but the load case was not consistent with the construction schedule. The text of the error message displayed when updating the linked bridge model was "Error writing schedule back to CSiBridge via API".
*	219932	An incident was resolved for segmental bridge models in which the program could terminate when using the View/Rename Segments command after deleting a duct template.

Loading
Incidents Resolved

*	Incident	Description
*	213033	An incident was resolved where bridge temperature-gradient loads were not correctly calculated for bridge objects having a user-defined (Section Designer) bridge section if the vertical Y coordinate (in Section Designer) of the bottom-most point of the bridge section was not zero. Affected models should be re-run in the new version to determine the effect of this error. Only temperature-gradient loads applied to user-defined bridge sections were affected. User-defined sections have been available starting with version 18.0.0.
*	218198 219840	An incident was resolved where the operation Remove Forms in staged-construction load cases added concrete material at age zero, which caused excessive deflection when time-dependent analysis was performed. Staged-construction load cases that did not consider time-dependent material behavior and/or concrete materials that did not consider time-dependent behavior were not affected. The Remove Forms operation only applies to Concrete Pours (Slab Wet Concrete Loads), which can be defined for the top slab of bridge objects. Now the Remove Forms operation requires specification of the age of the concrete when the forms are removed, which must be greater than zero. Models from previous versions will have this age set to 3 days, but this can be modified after opening the model in the new version. Additionally, the default age has been set to 3 days for all staged-construction operations that use age; previously the default value was 0 or 1 day.
*	220179	An incident was resolved where the response to influence-based moving-load cases could be incorrect when floating lanes were used. The transverse position of the lanes could be calculated incorrectly for the case where there was a transverse gap between two sets of lanes within a floating lane set. In some cases, this could lead to a smaller value of the response than should have been calculated for the lanes with a gap. The case where all floating lanes within a floating lane set were contiguous was correct, and usually governed the response. Even for responses where the contiguous set of lanes did not govern the response, it still provided a lower bound for the response, so that the error was generally small. The affected cases were primarily restricted to localized response where lanes divided between the two outer edges of the superstructure governed. This rarely had a significant effect on the superstructure response of girders, slabs, and composite response used for bridge superstructure design and rating. On the other hand, transverse members, such as bent caps, were more likely to be affected.

Section Designer
Incidents Resolved

*	Incident	Description
*	217402	An incident was resolved for Section Designer in which the angle specified between the Section Designer X axis and the frame-section local 2-axis, as well as the maximum mesh sizes specified to determine the mesh used to calculate the torsional and plastic section properties, are now all saved in the model file (.BDB) and in database table "Section Designer Properties 01 - General". These parameters may be different for each Section Designer section. Previously the angle was saved in the model file, but not in the database table, so it would be lost upon import from text file. The maximum mesh sizes were not being saved at all, and were reset to default values each time the model was opened or the section was opened in Section Designer. In addition, the specification of the maximum mesh sizes in Section Designer has now been moved from the Options > Preferences form to the Display > Section Properties form, where the angle was already being specified.

Analysis

Incidents Resolved

*	Incident	Description
	215596	An incident was resolved where a material property, hinge property, or nonlinear-plasticity link property using the Pivot-type hysteresis model and having a backbone curve with compression-only or tension-only behavior (i.e., zero force and stiffness in one direction) would produce undefined analysis results after yielding occurred. These analysis results would be reported as "NaN" (not a number) instead of as numerical values. Graphical displays of such analysis results would be blank. This behavior could affect all response quantities reported for the model, not just for those objects using the nonlinear material, hinge, or link property itself. Only nonlinear load cases and linear load cases using the stiffness at the end of a nonlinear load case could be affected. Nonlinear material properties only affect fiber hinges and layered shells. This error was not common since the Pivot model is not really applicable to tension-only or compression-only behavior.
*	215894 217830	An incident was resolved where the direct strain reported for a layered shell with nonlinear directional material was incorrect for nonlinear static and nonlinear direct-integration time-history load cases. This typically affected strains E11, E22, Emax, Emin, and Evm, and the reported values were half of the expected value. The only layers affected those where the material was specified as Directional and one or more of the components S11, S22, and S12 were set to Nonlinear. Layers where the material was specified as Coupled, or where all three components were set to Linear, were not affected. Linear load cases were not affected, nor were nonlinear modal (FNA) time-history load cases.
	216323	An incident was resolved where a material property defined with nonlinear hysteresis type "Isotropic" was being treated as a "Pivot" hysteresis model with the following properties: Alpha1 = 100, Alpha2 = 100, Beta1 = 1, Beta2 = 1, and Eta = 0. This would only affect nonlinear static and direct-integration time-history load cases for models where such a material was used in fiber hinges (frame or wall) and/or in layered shells. The energy dissipation would be less than expected for an "Isotropic" hysteresis model, and would be similar to that for the "Takeda" hysteresis model.
*	214417 219777 221011	An incident was resolved where a “Remove Forms” operation (usually following a “Pour Concrete” operation) on a staged construction case properly added the slab objects with their full stiffness but ignored their weight.
*	216608	An incident was resolved where the transverse shear stiffness was too flexible by a factor of two for layered shell elements with nonlinear properties (both Directional and Coupled types). Layers where the components S11, S22 and S12 were all specified as Linear and/or Inactive were not affected. For a shell element with multiple layers, only those layers with one or more components specified as Nonlinear contributed to the excess flexibility. For most models, where flexural flexibility dominates, the effect of this error was negligible.
*	217190	An incident was resolved where element loads on a shell element and specified to act in a fixed coordinate direction (such as gravity) would be incorrect after a change modifier command from a nonlinear staged construction load case was used to change the weight modifier of the element. This issue was not present if the weight modifier was not changed in the current or prior load cases. 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".
*	222053	An incident was resolved where mass-proportional damping specified in the material property definitions was not being considered for shell elements in nonlinear direct-integration time-history load cases. Additionally, this issue sometimes required extra iteration to reach convergence. Mass-proportional damping specified in the load case itself was not affected. Models without shell elements or without mass-proportional damping in materials used by shell elements were not affected.

Bridge Design
Incidents Resolved

*	Incident	Description
*	212584 220221	An incident was resolved where the Ritz modes calculated for "Load Inertia" loading could be incorrect. These special type of Ritz modes are used only for bridge seismic design requests of type "Caltrans Fault Crossing", and they do not affect other types of analysis or design. The effect of this error on Caltrans Fault Crossing seismic design was often insignificant, but could cause incorrect calculation of the dynamic (response-spectrum) portion of the demand. The nonlinear-static portion of the demand was correct, as was the capacity. Bridge seismic design requests of type "Caltrans Fault Crossing" should be rerun with the new version.
*	215296	An incident was resolved for steel U-girder superstructure design according to the Canadian CAN/CSA S6-06 and S6-14 codes where the yield moment was not calculated correctly causing an invalid assessment that the section yielded under Mdc+Mdnc demands. This affected the Steel U Composite Strength and Constructability (Staged and NonStaged) design requests.
	215905	An incident was resolved for bridge superstructure design of steel U-girder bridges per the AASHTO LRFD code where the LambdaF factor was calculated using the entire width of the bottom flange. Now only the width of the flange between the webs is used per AASHTO 6.11.8.2.2-8. The previous version resulted in slightly conservative values of LambdaF. Impacted design checks are: Steel U Comp - Strength, Service and Constructability for the AASHTO LRFD code, all versions.
*	217496	An incident was resolved where the stresses calculated for a steel I-girder bridge could be incorrect at a bridge-object section cut in the following case. If the steel I-girder was non-prismatic with a stepped section transition, and the section cut was near but not right at the stepped transition, then the stresses computed in the steel I-girder could be incorrect either before or after the section cut. In such a case the forces and moments acting at the section cut were correct, but the stresses were computed assuming the section properties on the other side of the transition. This affected the stress output shown in the Bridge Response Display form, reported in the database tables, and used for bridge superstructure design. Design checks that use forces and moments rather than stresses were not affected. This error was not common, particularly when girder-local sections cuts were used, since these are generated right at the section transitions. Stresses in the slab were not affected.
*	217820	An incident was resolved for bridge superstructure rating of steel I-girder bridge sections using the AASHTO code where the rating request was terminated with the error message "Error locating non-prismatic section at section cut index". This error could occur when some sections were classified as invalid for code-based live-load distribution factors (LLDF). When this occurred, no results were available for the affected rating requests. This error did not occur when the live-load distribution for the design request was calculated directly from analysis or with user-specified LLDF. Impacted rating requests: Steel I Strength and Steel I Service for the AASHTO LRFD code, all versions.
	218537	An incident was resolved for bridge superstructure rating where the command Design/Rating > Load Rating > Optimize Bridge generated an error message and and was unable to perform rating optimization for steel I-girder and U-girder bridge sections. No other results were affected. Optimization for superstructure design was not affected.
	218681	An incident was resolved for the bridge superstructure design, rating, and optimization of steel I-girder and U-girder bridge sections where the presence of an all-space (full-width) diaphragm could be ignored from consideration by the design/rating request if the longitudinal distance between the diaphragm location and the nearest bridge section-cut location was small, in particular, between the merge tolerance and ten times merge tolerance. The merge tolerance is defined using command File > Settings > Tolerances, and is typically on the order of 0.1 inch or 1 mm. This error was not common. All design and rating requests for steel I-girder and U-girder bridge sections were affected for all codes. Analysis results were not affected.

*	Incident	Description
*	219373	An incident was resolved for bridge superstructure design of steel I-girder and U-girder bridge sections per the Eurocode where the SigmaS value was sometimes not calculated correctly based on values from Eurocode 1994-2 Table 7.1 (bar diameter dependent). Due to a rounding error, in certain cases the SigmaS was read as if belonging to a higher bar diameter than specified, resulting in a lower value of SigmaS. This could be unconservative. This error affected the Steel I Comp Min Rebar and the Steel U Comp Min Rebar design checks.
*	220335	An incident was resolved for bridge superstructure design and rating where the code-based live load distribution factors (LLDF) for steel U-girder bridges with precast slab sections were incorrectly calculated using the AASHTO LRFD formulas for Concrete Deck on Concrete Spread Box Beams. The formulas have been corrected to now use the AASHTO LRFD formulas for Concrete Deck on Multiple Steel Box Girders. The impacted design and rating requests include Steel U Strength, Steel U Service, and Steel U Web Fatigue for all versions of AASHTO LRFD. Design and rating requests using forces directly from analysis or user-defined LLDF were not affected.

Results Display and Output

Incidents Resolved

*	Incident	Description
	215221	An incident was resolved where the AASHTO LRFD Steel I Comp Fatigue complete calculation report was not showing the correct calculation of live load distribution factors. The complete report failed to take into account the fact that for fatigue loads only one lane is loaded and a compensation needs to be made for multiple lane presence factors. The demands and DoverC calculations were utilizing the correct LLDF factor, only the part of the report where the LLDF is evaluated was incorrect.
	215670	An incident was resolved where certain individual girder analysis and design results could not be displayed on the Bridge Object Response Display form when a bridge object contained two or more spans and the number of girders in one span was larger than the number of girders in the subsequent span. This error affected versions 19.0.0 to 20.1.0. No results were affected. This form is accessed using commands Home > Show Bridge Superstructure Forces/Stresses and Home > Show Bridge Superstructure Design Results.
*	218106	An incident was resolved in which the program would terminate for certain models when attempting to export data to Excel from the Bridge Object Response Display form.
	218678	An incident was resolved for bridge superstructure design of steel I-girder bridges per the AASHTO code where the AASHTO equation 6.10.9.3.2-6, used for determining the C value, was presented incorrectly in the detailed design report. The (E*k/Fyw) term was incorrectly displayed within a square root. The actual value was correctly calculated (no square root was used) for the design calculation, and no results were affected. The error was only in the report presentation. The impacted calculation reports were for design requests: Steel I Strength, Steel I Constructibility, Steel I Fatigue, and Rating Steel I Strength for all versions of AASHTO LRFD.
	221143	An incident was resolved where the Bridge Object Response Display form would not show results for certain girders in one bridge object if there was another bridge object in the same model that had fewer girders, and if the bridge object with more girders had been updated after the bridge object with fewer girders. The number of girders that could be displayed in both bridge objects was limited to the smaller number. The affected commands were Home > Display > Show Bridge Superstructure Forces/Stresses, Show Bridge Superstructure Design Results. This was a display issue only. Results presented in tables and used for superstructure design and rating were not affected.

User Interface

Incidents Resolved

*	Incident	Description
*	216471 217193 217285 219575 219929 219943	An incident was resolved in which the program would terminate when attempting to display the Define Bridge Deck Sections form from the ribbon, the menu, or the bridge wizard. This was a user interface issue only and did not affect results.
	217425	An incident was resolved in which the splice definition name was unable to be modified from the default using the Bridge Splice Property form. It was possible to modify the name via the interactive database. This was a user interface issue only and did not affect results.