CSiBridge v23.0.0 Release Notes

Notice Date: 20-January-2021

This document lists changes made to CSiBridge since v22.2.0, released 20-October-2020. Items marked with an asterisk (*) in the first column are more significant.

Analysis

Enhancements Implemented

*	Ticket	Description
*	5527	An enhancement has been made to speed up moving load analysis on spine models with many influence points, with particular improvements for the calculation of influence lines (influence load cases) and joint reaction response.
	5553	An enhancement has been made to speed-up the recovery of the 'Element Nonlinear Energy By Group' and step-by-step 'Base Reactions' response tables for load cases with a large number of output steps.
*	5666	An enhancement has been made to speed-up the stiffness solution by parallelizing the global stiffness assembly phase when using the Advanced or Multi-threaded Solver options. This should increase the speed of nonlinear static, nonlinear multi-step static, and nonlinear direct-integration time-history load cases for medium-sized models, especially when using Newton-Raphson iteration and/or event-to-event stepping.

API

Enhancements Implemented

*	Ticket	Description
*	5864	An enhancement has been implemented to add access to the database tables through the API.

Bridge Design and Rating

Enhancements Implemented

*	Ticket	Description
	5360	Bridge superstructure design has been enhanced for the JTG 3662-2018 crack width design request to now calculate the value of ep in the equation for e, where e = ep + (Ms ± Mp2) / Np0. Here ep is the eccentricity of the concrete stresses at tendon and rebar locations. Previously ep was assumed to be zero when calculating e.
*	5465	Bridge superstructure design has been implemented for precast concrete Super-T bridge sections according to the New Zealand NZTA BM 3.3 bridge design manual. Two design requests are available: stress check and flexure check. Load combinations can be automatically generated, subject to user specifications, for a total of 25 limit states based on the NZTA BM 3.3 design manual. Design results are reported in database tables and and can be plotted in the Bridge Response Display form.

Bridge Modeler

Enhancements Implemented

*	Ticket	Description
*	1501	An enhancement has been implemented to allow definition of the bridge layout line using points of intersection. This new option is more aligned with roadway layout data.
*	4643	A new Super-T bridge section has been added to the Bridge Modeler, along with the Super-T frame section property used by this bridge section. The Super-T frame section is a precast concrete U-girder that can have variable width flanges and that can be either open or closed at the top between the webs. This frame section also includes the tendon layout,

*	Ticket	Description
		prestressing load, and debonding data. The Super-T bridge section defines the spacing between the Super-T girders, and the flange widths are automatically determined such that the flanges of adjacent girders abut each other or extend to the inner edge of the slab overhang.
*	4665	Job scripting is a new powerful feature that allows setting up, saving, and running a series of CSiBridge actions in one command. This tool expedites the iterative nature of bridge design and analysis, eliminating the need for user interaction upon completion of each action. Actions such as updating bridge objects, running analysis, running design and rating requests, printing calculation reports, exporting tables, and producing graphical output are set up and stored in a named Job Script definition. Every action available in the Job Script is accompanied by a corresponding type of named set, giving the user full control over each action's parameters. Multiple Job Scripts can be set to run simultaneously. Upon completion, a detailed log is produced, together with timestamps alerting the user about the status and duration of each executed action.

Data Files

Enhancements Implemented

*	Ticket	Description
*	5879	Starting with CSiBridge v23, the components necessary to open v15 and v16 models are no longer shipped with the installation in order to adhere to requirements set out by Microsoft for app certification. The necessary components are now provided in the CSI Knowledgebase with instructions on how to install them.

Installation and Licensing

Enhancements Implemented

*	Ticket	Description
*	5464	The version number has been changed to v23.0.0 for a new major release.
*	5795	CSiBridge now utilizes cloud licensing by default, allowing access to the license by multiple users and/or from multiple machines. The number of simultaneous users corresponds to the number of licenses owned. Cloud licensing requires connection to the internet while using the software, either directly or through a proxy. Connection to a company network or VPN is not necessary. Licenses can be checked out for a limited time period to allow use while disconnected from the internet. Legacy licensing options (Standalone and Network) are still available upon request.

Analysis

Incidents Resolved

*	Ticket	Description
*	5665	An incident was resolved where very sudden strength loss in single degree-of-freedom nonlinear hinges, nonlinear materials used in fiber hinges, or multi-linear plastic links could result in a stress value that is below the residual stress specified on the backbone curve. This issue could occur in nonlinear static, nonlinear staged construction, nonlinear direct-integration time-history, and nonlinear modal time-history (FNA) load cases. The affected hysteresis types were kinematic, isotropic, degrading, or BRB-hardening. Other types of hysteresis, as well as the Interacting and Parametric P-M2-M3 hinges, were not affected. This issue would be most noticeable for a backbone curve with significant loss of strength and when the strength-loss branch of the backbone curve was traversed quickly in only a few analysis steps. Additionally, the behavior of the kinematic, isotropic, degrading, and BRB-hardening hysteresis types, when reloading from the strength-loss branch of the backbone curve, were adjusted to be consistent with the other hysteresis types and the Interacting and Parametric P-M2-M3 hinges. Models which experience strength loss in single degree-of-freedom nonlinear hinges, nonlinear materials used in fiber hinges, or multi-linear plastic type links for the affected hysteresis types may now produce somewhat different results due to this change. In particular, the new results will tend to dissipate more energy following strength loss. Most models will not be affected.

Bridge Design and Rating

Incidents Resolved

*	Ticket	Description
	5504	An incident was resolved for steel I-girder bridge rating where no informational message was being provided when the rating could not be calculated at sections where the presence of too much longitudinal rebar in the slab caused the neutral axis of the composite section to be above the top flange for evaluating the plastic moment for negative bending. Now when this occurs, the following error message is reported in the tables: "Too much longitudinal reinforcement defined in the girder, plastic neutral axis for negative moment above the top flange - not valid section."
*	5505	An incident was resolved for steel I-girder and steel U-girder bridge design and rating where the incorrect classification of shear panels could occur in locations where the spacing of diaphragms (cross frames) was smaller than 1.5 times the web depth. This impacted the Strength Design requests and Strength Rating requests for all versions of the AASHTO LRFD code. The classification actually used was being reported.
	5792	An incident was resolved for the bridge superstructure rating of concrete box girder concrete bridge sections where rating requests could fail to run if the bridge section was an advanced concrete box girder having non-zero top-slab offsets. The error was an inability to calculate the torsion circuit, and therefore it affected all concrete box rating requests, but not multi-cell concrete box rating requests, for all codes.

Bridge Modeler

Incidents Resolved

*	Ticket	Description
*	5392	An incident was resolved for the Bridge Modeler where bridge objects containing a user-defined bridge section could not be updated as a solid-object model because some of the auto-generated solid layout units were not convex quadrilaterals. This can occur for complex bridge sections, especially those with many re-entrant (concave) sides. Now when solid layout units are auto-generated, a check will be performed for invalid shapes. If any are detected, they will be highlighted, and the user will be advised to delete them and manually draw valid shapes. Two additional errors were resolved in Section Designer for editing user-defined bridge sections: (1) Pressing Ctrl-A to select ALL would cause Section Designer to close without saving changes to the user-defined bridge section; (2) Solid layout

*	Ticket	Description
		units could not be drawn manually.
*	5640	An incident was resolved for the Bridge Modeler using the advanced box bridge section. When parametric variations were applied to increase the web thickness, the bridge section polygons could be generated incorrectly if the web thickness and fillet were both wide enough such that the edge of the fillet crossed the nominal (before applying parametric variation) center line of the adjacent opening polygon. This affected the bridge section property calculation used during bridge superstructure design and rating such that the design/rating results could be incorrect. This was not common. When this occurred, the error was generally obvious.
	5736	An incident was resolved for the Bridge Modeler where the software could terminate abnormally when using the steel Beam Editor to change plate dimensions of a steel U-girder for a bridge section.
*	5765	An incident was resolved for the Bridge Modeler where the Balanced Cantilever portion of a segmental bridge could not be generated when the Windows region settings were set to 'Turkish (Turkey)'. Only the abutment segments were generated in this case.
*	5868	An incident was resolved for the Bridge Modeler where the bounding box calculated for a bridge spine model having an advanced concrete box section could be calculated incorrectly when the depth of the bridge section was not constant. When this occurred, the bounding box might not be deep enough to cover the entire bridge section. Tendons in the bottom slab, if any, might be outside the bounding box, and thus not properly connected. This issue only affected bridge objects updated as spine models. For bridge objects updated as area or solid models, bounding boxes computed based on the individual webs and slabs rather than for the whole section.

Loading

Incidents Resolved

*	Ticket	Description
*	5518	An incident was resolved where the prestress force applied to tendons defined in a precast I-girder frame section was always 0.75 times the ultimate strength, Fu, of the tendon instead of the user-specified value in the girder tendon layout data form. The force 0.75 * Fu is only intended to be the default value. Note that these tendons and the corresponding prestress forces are only generated when the precast I-girder is used in a bridge object through the Bridge Modeler.
	5561	An incident was resolved for the Bridge Modeler where the haunch height for the exterior girders was calculated incorrectly for steel I-girder bridge sections when the overhang slab thickness was greater than the interior slab thickness. When this occurred, the generated bridge haunch loads defined in the bridge section and used in Concrete Pours would be incorrect. This affected the wet-slab concrete load calculation such that the analysis results of the operations 'Pour Concrete' and 'Remove Forms' in staged construction load case were incorrect. The effect was generally very small.

Results Display and Output

Incidents Resolved

*	Ticket	Description
	5775	An incident was resolved for bridge superstructure design and rating where the calculation report was not produced for Steel I-girder and Steel U-girder Service checks when SI units were used. The issue had no impact on the design and rating result presented in the tables or the design and rating optimizer, only the generation of the calculation report itself. This issue only affected the AASHTO Service design and rating requests for steel girder bridge sections.

User Interface

Incidents Resolved

*	Ticket	Description
	5409	An incident was resolved where adding a new vehicle class assignment to a moving load case when there is at least one floating-lane set defined in the model would sometimes cause the list of lanes that can be loaded by the vehicle class to become disordered such that the wrong lanes (or no lanes) would be loaded by the vehicle class. Removing the loaded lanes from the assignment and reapplying them (while still working in the moving load case definition) would correct the issue.