CSiBridge v25.2.0 Release Notes

Notice Date: 28-March-2024

This document lists changes made to CSiBridge since v25.1.0, released 01-December-2023. Items marked with an asterisk (*) in the first column are more significant.

Analysis

Enhancements Implemented

*	Ticket	Description
	10452	An enhancement has been implemented to speed up the creation of the analysis model (which occurs as part of running an analysis), especially for the second and subsequent runs of models with tendons subjected to temperature load. Certain other models may also see a speed increase.

Bridge Design and Rating

Enhancements Implemented

*	Ticket	Description
*	9875	Superstructure design in accordance with New Zealand NZTA Bridge Manual Third Edition, Amendment 4; and NZS 3101.1:2006 (Standards New Zealand, 2017) is now available for the following bridge sections: Precast I, Precast U, Precast Box, and Super-T girders with composite slab. Design checks include service stress, ultimate flexure, and shear. The results are presented graphically, in tables, and can produce detailed comprehensive calculation reports in Word format.
*	9876	The service cracking design check of substructure (bent) columns has been added according to the IRC 112-2020 code Section 12. This supplements the corresponding strength check that is already available in the software. Design is controlled by defining one or more Design Requests which can specify a set of load combinations, bent columns, column stations, and other parameters to be considered. Similar columns and stations with similar reinforcement can be designed together. The cross section used to calculate capacity can be different from that used for demand, so that different section shapes, materials, and rebar layout can be quickly iterated for design. Results for each design request are available in database tables and include values for intermediate calculation steps as well as the following demand capacity ratios (DCRs): (1) DCR for maximum compressive stress in concrete check; (2) DCR for maximum tensile stress in steel check; (3) DCR for minimum reinforcement for crack control check and (4) DCR for crack width check.
*	10269	An enhancement has been implemented to provide comprehensive calculation reports for AASHTO Steel I non-composite strength and service rating requests.

Bridge Modeler

Enhancements Implemented

*	Ticket	Description
*	612	The Bridge Modeler now offers the option to specify a crowned top slab for all bridge sections. There are two types of crowned top slabs: (1.) "Crowned-Constant Thickness", which offsets both the top and bottom of the slab vertically without changing the thickness of the slab, and (2.) "Crowned-Top Surface Only", which offsets only the top of the slab vertically by varying the slab thickness. Both types are available for all concrete box bridge sections, the steel I-girder bridge section, and the precast concrete I-girder bridge section. For all other bridge section types, only the "Crowned-Top Surface Only" option is available. For both options, the vertical offset can be specified at one or two transverse locations, and the top surface is linearly interpolated between these two points and the exterior edges of the slab. Locations that can be selected include the centerlines of the girders, the centerlines of the inter-girder spaces, and the two slab edges. When the crowned-slab feature is applied, the vertical location of each girder output point will be measured from the top surface of the slab at the girder centerline.
	10234	The Bridge Modeler has been enhanced to add a new option for defining the geometry of the bottom surface of the overhang for a steel I-girder bridge section. This optional overhang geometry is identical to the current overhang geometry of the steel U-girder bridge section, and is straight from the bottom of the outer edge of the slab to the bottom of the top flange of the corresponding exterior I-girder. The previous definition is also available as an option.

Data Files

Enhancements Implemented

*	Ticket	Description
*	10383	Three new frame section libraries have been added conforming to AISC Shapes Database v16.0. These libraries are consistent with the shape properties and dimensions tabulated in AISC Steel Construction Manual, 16th Edition, 1st Printing. The new shapes database files are (1) AISC16.xml - Shapes database in US customary units, (2) AISC16M.xml - Shapes database in metric units, and (3) AISC16-A1085.xml - This database contains dimensions and properties for HSS shapes covered under ASTM A1085/A1085M and is in US customary units.

Installation and Licensing

Enhancements Implemented

*	Ticket	Description
	10220	The version number has been changed to v25.2.0 for a new intermediate release.

Loading

Enhancements Implemented

*	Ticket	Description
	6838	An enhancement has been implemented for the automated bridge wind load on live load to now include an input for the live-load exposure height. Previously this was taken as the code/standard recommended height for vehicle bridges. This applies to the CSA, Eurocode, and IRC automated wind loading on live load.
*	9041	The automated load combinations generated for New Zealand NZTA bridge design have been updated to the latest NZTA BM 3.4 design code. Previously the load combinations were based on the NZTA BM 3.3 code. Load combinations in models previously created for BM 3.3 will not be changed when opened in the new version, but any newly generated load combinations will be based on BM 3.4. For models created in previous versions, the bridge design preferences will be automatically updated to code NZTA BM 3.4 if the original bridge design preference code was NZTA BM 3.3.

Results Display and Output

Enhancements Implemented

*	Ticket	Description
	10456	An incident was resolved where the "Report" button was sometimes available on the on the superstructure Design tab of the ribbon interface or the Design menu of the menu interface, even when no design reports were available for the type of design requests that had been defined. This particularly affected AASHTO concrete box girder design and stress checks for multi-cell concrete box girder design. This did not cause any errors but could be confusing to the user.

Bridge Design and Rating
Incidents Resolved

*	Ticket	Description
*	10319	An incident was resolved for bridge superstructure design and rating of steel U-girder bridges where the design/rating would generate an error message and fail to run if any of the bridge-section concrete haunch heights (not including the steel U-girder top-flange thickness) was zero or negative along the bridge length. When this occurred, no design/rating results were available for the affected design/rating request.
	10384	An incident was resolved for the AASHTO Column Service check. The calculation of factor beta_s will now be based only on the bar closest to the extreme tensile fiber. Previously the factor was evaluated separately for each individual bar. The previous method resulted in overly conservative bar spacing requirements for bars not located closest to the extreme compression fiber.

Bridge Modeler
Incidents Resolved

*	Ticket	Description
	9790	An incident was resolved for the Bridge Modeler where the Segmental Bridge definition from a model created in CSiBridge v23.3.1 or older could not be recovered in later versions of the software.
*	9851	An improvement was made to the tendon layout locations within precast concrete box girder frame section definitions to include a cover distance on the upper edge of the bottom flange (abutting the void). Previously the layout allowed locations to be very close the edge of the void.
	9869	An incident was resolved for the Bridge Modeler where rail tracks specified to use Program Determined connectivity did not automatically connect to a bridge object at a closure-pour location, but were instead grounded at such locations. This was because the closure-pour area objects did not belong to the program-generated bridge slab group. Now rail tracks will automatically connect to bridge slab or closure-pour area objects for the Program Determined option. This behavior can be changed by defining a group that contains the desired objects and assigning that to the rail track.
*	10287	An incident was resolved for the Bridge Modeler where tendons defined as part of a frame section of type precast concrete I-girder, precast box girder, or super-T girder were generated as straight even when the girders were vertically curved to follow a vertically curved layout line. In some cases, this could cause the tendons to fall below the bottom of the girder near the center of the bridge span, losing connection with the girder. Now the horizontal tendons in precast girders will follow the vertical curve of the bridge. Harped tendons will be generated as straight, connecting to the horizontally curved segments at the bottom of the girder.
	10335	An incident was resolved for the Bridge Modeler where the generated model would sometimes fail to create an abutment diaphragm, if specified, when there was a staggered diaphragm with either or both ends close to the abutment. Results agreed with the model as generated.
	10459	An incident was resolved for the Bridge Modeler where the thickness of the diaphragms generated for Super-T girders did not match the specified value for this thickness. This issue only affected the Super-T bridge section type. Results agreed with the model as generated, and the primary effect of this was a minor error in the weight and mass of the structure.

Data Files

Incidents Resolved

*	Ticket	Description
	9608	An incident was resolved where some bridge models from versions v23.3.1 and older could not be opened if they contained bridge tendons, due to a numerical-tolerance check that was too strict. Affected models could only be opened in newer versions by first deleting the bridge tendons in the older version of the software, then redefining the tendons after opening the model in the later version.
	10325	An incident was resolved where the "TK 527 All Lift" vehicle in the PennDOT vehicle library had an incorrect spacing between the first two axles, previously being 4ft when it should have been 14ft. Analysis results were consistent with the 4ft spacing. The vehicle library has been corrected. If this vehicle is identified when opening a model from a version prior to v25.2.0, the user will be notified and given the option to correct the vehicle.
	10344	An incident was resolved where importing frame section-property data for a built-up I-section property that already existed in the model would not update the definition with the new values, but would instead retain the previous definition. This includes importing the database tables from a text (.$2K or .S2K) file, Excel, Access or XML file, as well as changes made in the interactive database editor, when the "Replace" option is chosen.

Design – Concrete Frame

Incidents Resolved

*	Ticket	Description
	1984	An incident was resolved for concrete frame design according to the AASHTO LRFD 2012 and 2014 codes in which the design reported that the reinforcement exceeds the maximum allowed for seismic zone 0. This check was incorrect for seismic zone 0 and has now been changed to the same limit as seismic zone 1, which is 8% in accordance with AASHTO 5.7.4.2.
	9048	An incident was resolved for concrete frame design codes AASHTO LRFD 2012 and AASHTO LRFD 2007 in which the Beta_d ratio, the ratio of maximum factored permanent load moment to maximum factored total load moment, used all gravity load moments instead of just the dead load moment as the permanent load moment. Now, the design uses the dead load moment as a permanent load moment. The previous behavior gave a higher value of Beta_d, a lower value of effective EI, a lower value of Pe, and a larger value of Delta_b. The effect was conservative.
*	10329	An Incident was resolved for Eurocode 2-2004 concrete frame design where the value of the k_c coefficient in the service cracking check may have been incorrectly calculated when the design cross-section was in compression. This was caused by using a very small positive value of the h* parameter instead of the h* value required by the code. This typically resulted in the k_c value of 0.4 and subsequently affected the calculated minimum area of reinforcing steel within the tensile zone. Design should be rerun in the updated version to obtain the correct results.
	10341	An incident was resolved for concrete frame design codes AASHTO Concrete 07, AASHTO LRFD 2012, AASHTO LRFD 2014, and AASHTO LRFD 2020 where the display Options for phi in the Interaction Surface form were not labelled correctly. This has been corrected by changing the labels from "phi" to "Non-Seismic Phi," from "no phi" to "Seismic Phi," and from "no phi with fy increased" to "No Phi". This was a display issue only.

Loading

Incidents Resolved

*	Ticket	Description
*	9526	An incident was resolved where program-generated bridge-design load combinations for the AASHTO LRFD 2017 and 2020 codes were still using gamma_p as the load factors for permanent loads in the Extreme Event I and Extreme Event II limit states, as was correct for AAHSTO LRFD 2014 and older versions. The permanent load factors are now corrected to be 1.0.

*	Ticket	Description
	10415	An incident was resolved for the Bridge Modeler where bridge point loads might not be applied to the model if the point-load location along the layout line was close to the same station where two or more staggered diaphragms were located for a steel I-girder bridge section.
*	10458	An incident was resolved where tendons modeled as loads could generate unexpected moments acting on the structure where they connected to triangular area (shell) elements. This was because the offset distance between the tendon and the mid-surface of the triangular element was calculated incorrectly. The magnitude of the moment error was proportional to the perpendicular distance from the mid-surface of the triangle to the global origin. This error did not affect tendons modeled as elements.
*	10462	An incident was resolved for the Bridge Modeler where the load created to represent the wet concrete load on a steel U-girder bridge section produced an incorrect force couple for the bracket load on the right side of the U-girder if there was only a single U-girder in the bridge section. This only affected the load used for Pour Concrete operations during staged construction, and this load would be removed and corrected in the subsequent Remove Forms operation in the staged-construction load case. Only steel U-girder bridge sections with a single U-girder were affected.

Results Display and Output

Incidents Resolved

*	Ticket	Description
*	9578	An incident has been resolved where the girder/beam responses for composite bridge sections would be incorrect when the girders were modeled as straight and the layout line was curved within bridge-object length. The error was caused by incorrectly calculating the forces and moments based on layout line orientation instead of the straight-girder orientation. The effect was most notable on torsion, transverse shear (V3), and transverse moment (M2), especially at the ends of the span. The effect on axial force was much less significant, and was insignificant for vertical shear (V2) and moment (M3). Mid-span forces and moments were not affected where the straight girder was parallel to the tangent of the curved layout line.