

# Masonry Analysis Structural Systems Version 3.0

## List of Changes

*National Masonry Design Programs*

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MASS™ Version 3.0 is the first version of the software to design using the updated CSA S304-14 design standard. All calculations as well as equations, code references, and bitmap symbols have been updated to bring MASS functionality from older versions to now design with this new standard. The biggest change is found in shear calculations for beams, which has been overhauled within the standard to more closely follow the process used for reinforced concrete. The scope of MASS Version 3 has *not* been changed from Version 2.2. Below is an overview of other changes made to MASS Version 3.0. A full version history with a cumulative list of changes for each version can be found in Section 1.6 of the Help Files (open by pressing F1 while using MASS™)

### **Shear wall bar spacing selection now checked against assemblage dimensions**

Shear wall designs with vertical reinforcement spacings that exceed the length of the wall or horizontal bond beam spacings that exceed the height no longer result in successful designs. Previously, designs with larger reinforcement spacings were allowed to pass with the bars being placed at a lesser, allowable spacing which would not match the highlighted user selections corresponding to that design. If none of the default selections in a shear wall design have been changed, there will be no difference in design results. However, if only selections which are too large to fit within the shear wall are selected, the design will fail accompanied with an error message explaining the reason for the failure. The vertical reinforcement is checked during moment design and the horizontal reinforcement is checked during shear design.

### **Different file type added: “.masonry14” Project Files**

A new file type, .masonry14, was introduced in order for the program to differentiate between MASS project files designed in accordance to the 2014 CSA S304 masonry standard from the projects created in Versions 2.2 and previous which were designed in accordance with the 2004 edition of the same CSA standard. While the original .masonry file format can be opened by newer versions of MASS, the user will immediately be prompted to save the .masonry project as a .masonry14 project with the same inputs and parameters. This change was implemented to prevent confusion as to which edition of the S304 standard was used for any saved MASS projects.

### **Fix for Recent Projects crash experienced by Windows 10 users**

Version 2.2 users running the Windows 10 operating system had been experiencing a crash upon program start-up related to the added “Recent Projects” tab on the welcome screen. This has been addressed in the release of MASS Version 3.0.

### **Unhandled Design error for shear wall design fixed**

A bug has been fixed where in previous versions, a shear wall passing moment design then failing shear design would display an “unhandled design” error for moment design under certain conditions. This would occur when

the moment design would pass using the highest block size and strength made available via user input selection. When shear walls in this situation fail shear design, MASS attempts to find another passing configuration using a higher unit size and strength. However, since there are no larger sizes and higher strengths to attempt, the “unhandled design” would be displayed rather than correctly showing the user the shear design failure message. This has been fixed for Version 3.0.

### **Critical Buckling Load addressed**

Previously in all versions of MASS, Under a very specific combination of conditions, the critical axial load for a reinforced wall,  $P_{cr}$ , was calculated using both  $(EI)_{eff}$  of  $0.4E_m I_0$  and  $\Phi_{er}$  of 0.75, resulting in a  $P_{cr}$  value that incorrectly combines aspects of reinforced and unreinforced analysis. In addition to addressing this bug with the release of Version 3.0, a modified Version 2.2.1 was also created so that a version of the software could design using the old 2004 CSA standards without the presence of this bug. A full explanation of the bug can be found on the MASS [Known Bugs](#) page and instructions on how to replace Version 2.2 with Version 2.2.1 [can be found online](#).

### **Reaction Drawing Values corrected**

In previous versions of MASS, the reaction drawings would display incorrect values for the beam, wall, and shear wall modules. While many of these errors were corrected with the release of Version 2.2, remaining issues have been corrected with the release of Version 3.0. It should be noted that at no time were there any incorrect calculations or processes having to do with reaction forces or axial loads. This bug was simply a database reading error resulting in incorrect values being displayed on the reaction force drawings and in all of these instances where, the values in the actual “Results” area are correct.

### **When closing a new or modified project, MASS now properly saves and closes**

MASS now promptly saves and closes .masonry14 projects when the user attempts to close a project without saving their changes. This change has been made to follow the expected behaviour of conventional software (Microsoft Word, Excel, PowerPoint, etc.) to improve the overall user experience.