RCDC (SACD) V11.03

Release Notes

RCDC V11.03.00 is here with new features enhancing the design capabilities. The newly introduced features are:

No	Module	Description
1	General	Addition of American code ACI 318-19
2	Footing	Update design functionality in footing module with new analysis file- All Design codes
3	Beam	Use of different Steel grades for Main and Shear reinforcement (Beams) – All Design Codes
4	General	Enhancements
5	General	Defects Resolved

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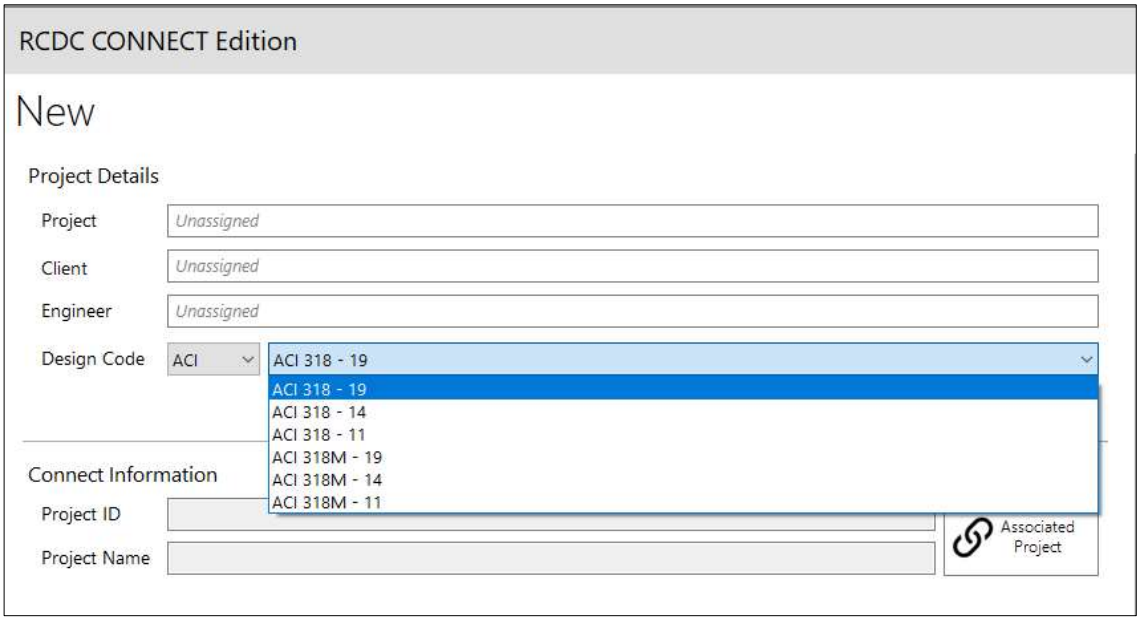
General — Addition of American code ACI 318-19

The 2019 edition of ACI 318 English-units edition (American Standard) is implemented in RCDC. With this addition, all the structural elements supported by the program, such as beams, columns, footings, etc., can now be designed using this code.



Footing — Update design functionality in footing module with new analysis file- All Design codes

The advantage of the 'Update Design' option is that users can check the existing design (which is based on an earlier analysis file) with the revised analysis file. If the existing design reinforcement is sufficient or more than the revised design reinforcement, then, the software will maintain the existing design. If the existing design is less than the required size /steel for the revised analysis, then, the software will show the updated design.

This feature handles changes in analysis such as changes in: footing location, column size, column orientation, loading and so on. There is a set of rules implemented in the software to identify changes in the superstructure data. The software then performs the calculations needed to address these changes. The workflow for using this feature is as below –

When an existing footing design file is opened, the following command is available in the File menu.

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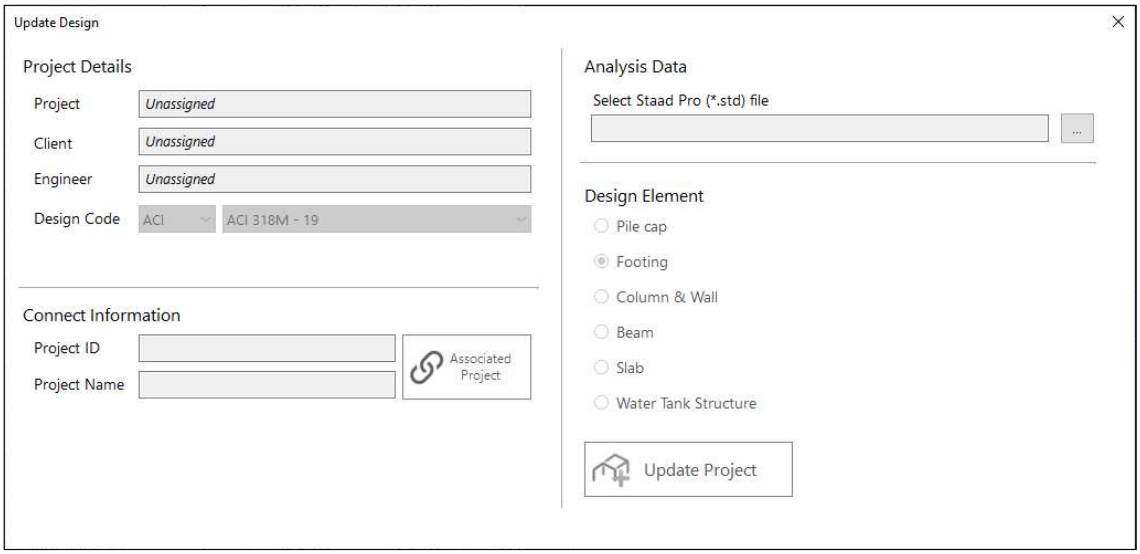
Once the user clicks on this, program will prompt the user to select the revised analysis file



The data from the revised analysis is read and if there are any changes in load cases in the revised analysis file compared to earlier, the user needs to set the type for the additional load cases and proceed.

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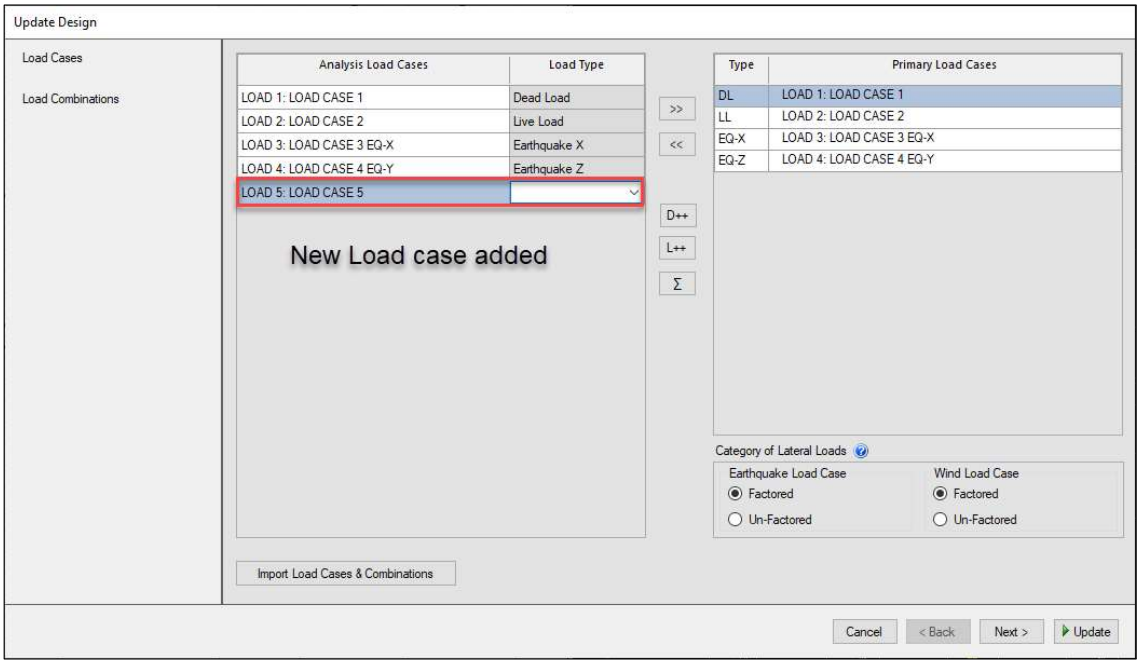
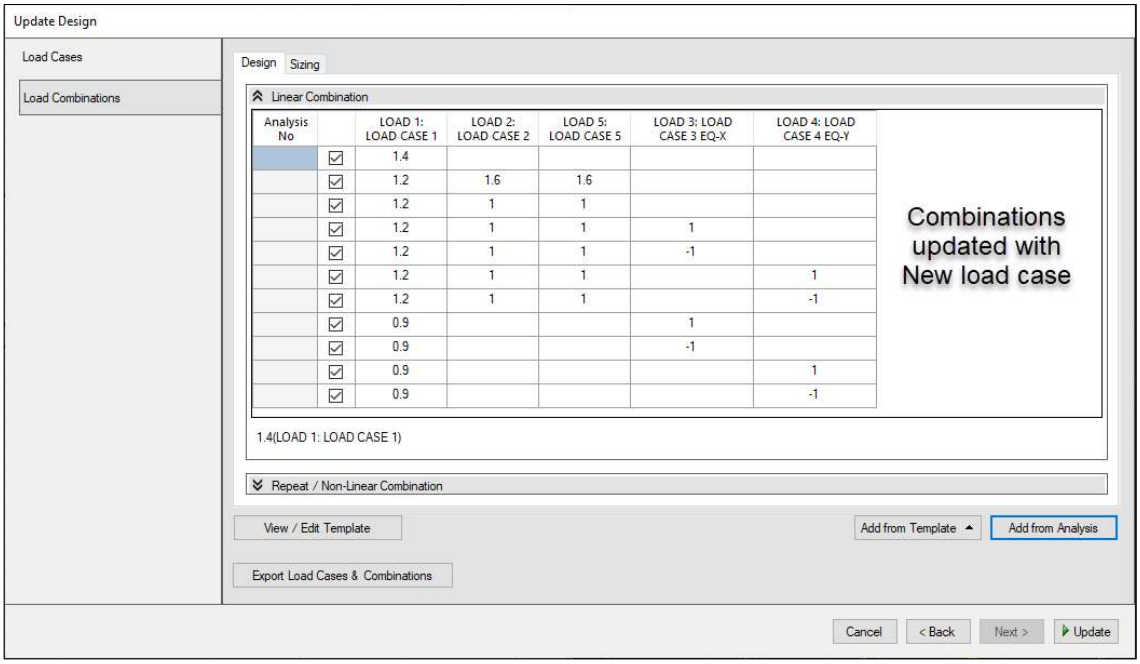


Additionally, if there are any changes in load cases, the user needs to redefine the set of load combinations for concrete design and sizing.



The program then performs the calculations and produces updated design results. Users can now compare the existing design with the updated design. The Changed report is available after update design is performed. This report will be auto saved in the same folder where the RCDC file is saved.

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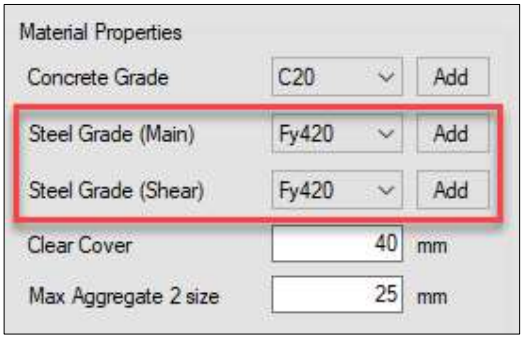
Please refer to section "Footing – Update Footing design" of the program documentation for information regarding the rules used by the program to identify changes in the superstructure model.

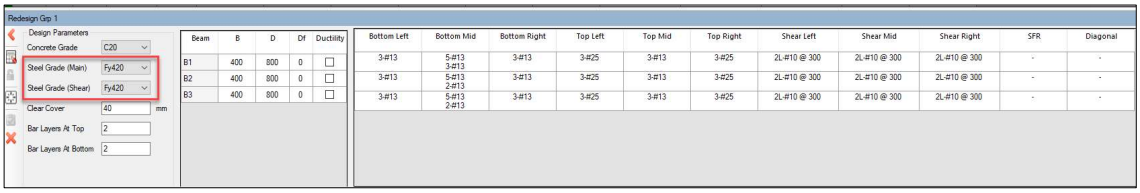
General — Use of different Reinforcement grades for Main and Shear Links (Beams) –All Design Codes

Different steel grades for Main and shear reinforcement can now be specified for the beam design module. This functionality is enabled for all design codes available in RCDC.



Further, new steel grades for main as well as shear reinforcement can be added to the program's library.

The option of changing steel grade is also available on the input screens for redesign, and it can be set for individual beams.



General — Enhancements

The following are the enhancements made in this release to existing features.

- **ADO ID – 790191, 790882, 800815 – General improvements in various modules based on our renewed understanding of the ACI 318-2014 code.**

  Following are General enhancements

  1. Capping steel grades for flexural design as per Table 20.2.2.4a,
  2. Restricting value of Sqrt(f'c) to calculate shear capacity of section footing, pile-cap and slab as per clause 25.5.3

3. restricting value of Sqrt(f'c) to calculate development length for footing, pile-cap and slab as per Clause 25.4.1.4

Column,

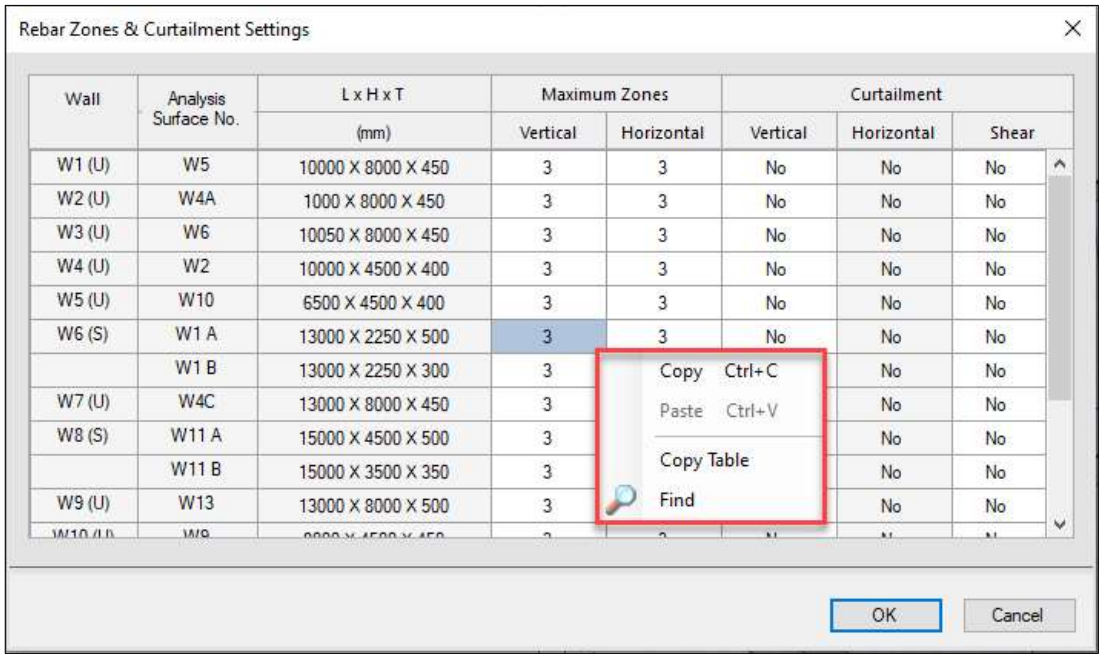
1. Additional shear for ordinary frame column in case of short column action as per Clause 18.3.3.
2. Minimum area of shear links in beam column joints as per Clause 15.4.1.
3. Spacing of links based of shear carried by links as per Clause 10.7.6.5.2
4. Criteria for minimum link diameter based on main reinforcement as per Clause 25.7.2.2.

Beam,

1. Criteria for maximum % reinforcement for special frames beams as per Clause 18.6.3.1
2. Spacing of shear stirrups as per Clause 9.7.6.2.2
3. Strength reduction factor for coupling beams as per Clause 21.2.4.3
4. Minimum reinforcement at any section of bottom based on maximum bottom reinforcement as per Clause 18.3.2.

- **ADO ID – 671873 – Copy Paste option on various Screen of Tanks structures**

copy paste facility is now available for reinforcement bar zone and curtailment settings, input, and output screen of tank wall structures.



On this screen user can copy paste the number of zones and curtailment option.

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Design Input

Wall	Levels	Analysis Surface No.	L x H (mm)	Type	Thickness (mm)	Reduction Side	Concrete	Steel	Cover (mm)	Angle In Plan (deg)	Top Slab
W1 (U)	0 m to 8 m	W5	10000 X 8000	Uniform	500	-	C25/30	Fy460	40	0	Yes
W2 (U)	0 m to 8 m	W4A	1000 X 8000	Uniform	500	-	C25/30	Fy460	40	90	Yes
W3 (U)	0 m to 8 m	W6	10050 X 8000	Uniform	450	-	C25/30	Fy460	40	174	Yes
W4 (U)	0 m to 4.5 m	W2	10000 X 4500	Uniform	400	-	C25/30	Fy460	40	0	Yes
W5 (U)	0 m to 4.5 m	W10	6500 X 4500	Uniform	400	-	C25/30	Fy460	40	157	No
W6 (S)	0 m to 2.25 m	W1 A	13000 X 2250	Stepped	500	-	C25/30	Fy460	40	90	No
	2.25 m to 4.5 m	W1 B	13000 X 2250	Stepped	300	Both	C25/30	Fy460	40	90	Yes
W7 (U)	0 m to 8 m	W4C	13000 X 8000	Uniform	450	-	C25/30	Fy460	40	90	Yes
W8 (S)	0 m to 4.5 m	W11 A	15000 X 4500	Stepped	500	-	C25/30	Fy460	40	90	Yes
	4.5 m to 8 m	W11 B	15000 X 3500	Stepped	350	Both	C25/30	Fy460	40	90	Yes
W9 (U)	0 m to 8 m	W13	13000 X 8000	Uniform	500	-	C25/30	Fy460	40	90	Yes
W10 (U)	0 m to 4.5 m	W9	8000 X 4500	Uniform	450	-	C25/30	Fy460	40	90	No
W11 (U)	0 m to 4.5 m	W8	6500 X 4500	Uniform	400	-	C25/30	Fy460	40	23	No
W12 (U)	0 m to 4.5 m	W3	10000 X 4500	Uniform	400	-	C25/30	Fy460	40	0	Yes
W13 (U)	0 m to 8 m	W4B	1000 X 8000	Uniform	450	-	C25/30	Fy460	40	90	Yes
W14 (U)	0 m to 8 m	W7	10050 X 8000	Uniform	450	-	C25/30	Fy460	40	6	Yes
W15 (U)	0 m to 8 m	W12	10000 X 8000	Uniform	450	-	C25/30	Fy460	40	0	Yes

On Design input screen, user can copy paste the type of wall, thickness, Material grades and cover.

Design Input | Design Output

Tank Wall Design

Wall	Analysis Surface No.	Levels (mm)	L x H x T (mm)	Material	Reinforcement	Zone	Length (mm)	Rebar	Curtailment Location (mm)
W1 (U)	W5	0 m to 8 m	10000 X 8000 X 500	C40/50:Fy460	Vertical Face -1	Z1	10000	T16@ 230	-
					Vertical Face -2	Z1	10000	T16@ 230	-
					Horizontal Face -1	Z1	8000	T16@ 220	-
					Horizontal Face -2	Z1	8000	T16@ 220	-
W2 (U)	W4A	0 m to 8 m	1000 X 8000 X 500	C25/30:Fy460	Vertical Face -1	Z1	1000	T16@ 230	-
					Vertical Face -2	Z1	1000	T16@ 230	-
					Horizontal Face -1	Z1	3000	T16@ 220	-
						Z2	2000	T16@ 160	-
						Z3	3000	T16@ 220	-
					Horizontal Face -2	Z1	8000	T16@ 220	-
W3 (U)	W6	0 m to 8 m	10050 X 8000 X 450	C25/30:Fy460	Vertical Face -1	Z1	914	T16@ 300	-
						Z2	9137	T16@ 260	-
					Vertical Face -2	Z1	914	T16@ 300	-
						Z2	9137	T16@ 260	-
					Horizontal Face -1	Z1	8000	T16@ 250	-
					Horizontal Face -2	Z1	8000	T16@ 250	-

On output screen, reinforcement bar for vertical, horizontal and shear reinforcement can be copy-pasted. Copy-Paste is also available for vertical reinforcement bar with curtailment if any. When the copy paste operation is performed on these forms, various design checks are performed. If the new reinforcement is sufficient and satisfies all the design checks, only then it is accepted. Else, an error message is displayed.

- **ADO ID – 746018 – Providing Unsupported length and effective length factor for grouped columns and levels in redesign tool**

  On redesign section and redesign column, RCDC now allows users to provide the unsupported length factor and effective length factor for each column if the column / walls are grouped or levels are grouped.

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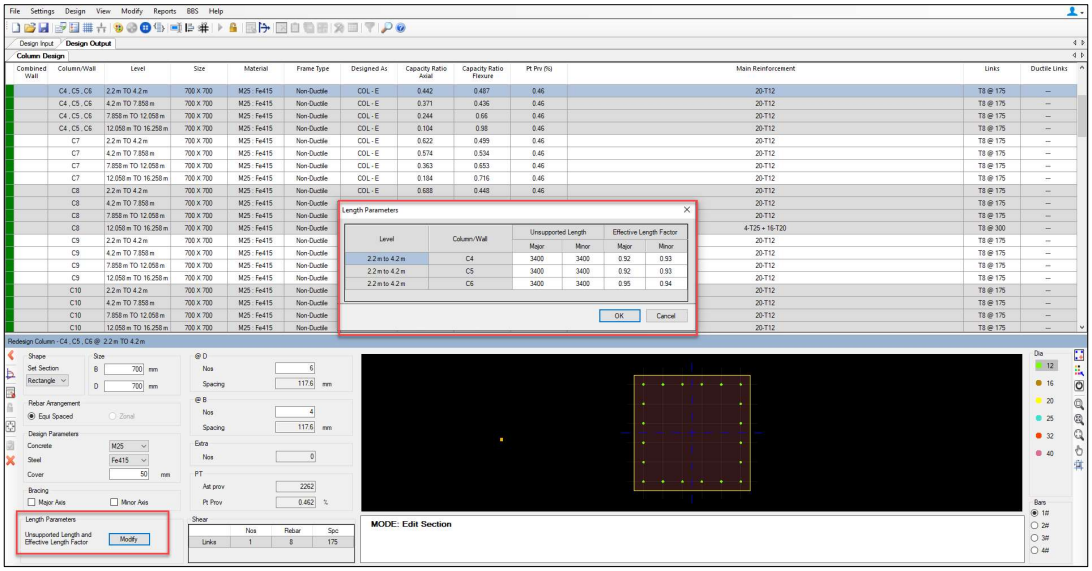
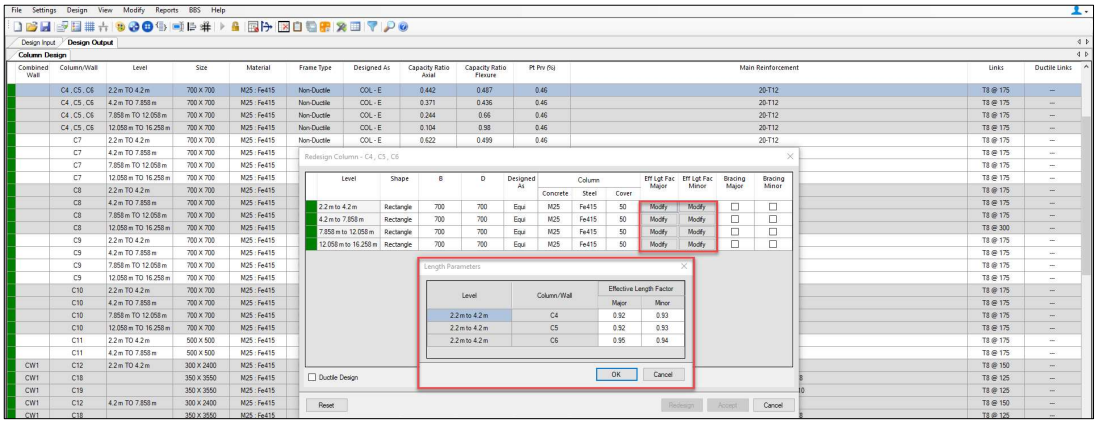
Redesign Section:



Redesign Column:



- **ADO ID – 801072 – ETABS - Reading the new Table format of ETABS .accdb 2019 and 2020 version.**
  Import of data from .accdb files for E-tabs 2019 and 2020 versions is now supported.

- **ADO ID - 604932 – Pile-cap capacity reduction are applied to tension capacity of pile in uplift check**
  When there is a tension in the pile for uplift force check, the pile-cap capacity reduction factors are now applied to tension capacity. So, if user provides capacity reduction factor in the design settings, it applied to compression and tension capacity of the pile.

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- **ADO ID - 794514 – ACI 318M-2019 modification in % vertical reinforcement used for shear check**
  For Non ductile / intermediate type wall, 50% of main reinforcement of wall is used to calculate section capacity in shear check. For Ductile wall with or without boundary element, 20% of main reinforcement is used. This is to account for the fact that not all reinforcement will be in tension for a given load combination calculation in the calculation of section shear capacity.

General Defects Resolved

Following are the list of Defects resolved in this release.

- **ADO ID - 794515 - Shear walls are not read by RCDC in this specific case**
  If the structure contains walls and slabs as parametric surfaces and the surface type is not set for the slab, RCDC is unable to read the walls. This issue has been resolved. Now if the slab is present as a parametric surface without the type defined, RCDC can read the walls.

- **ADO ID - 763741 - Tank wall output window shear failure presentation issue**
  When a tank wall fails in shear check, the failure was not shown on the output form. Now, it is marked as failed on the output screen so that user can take corrective action. It was a reporting error since, when a wall fails in any of the checks, RCDC doesn't generate the output reports.

- **ADO ID - 797070 - Time taken to read Steel Structural file to be reduced**
  For superstructure models containing steel members, if a user wants to design a pedestal and a footing, RCDC was taking a long time to read the entire model. Reading time has been reduced by skipping the reading of super structure steel members for beam propagation logic.

- **ADO ID - 797965 - Issue while importing load cases that have special character(s)**
  In Ram SS files, if rotation axes are specified for seismic loads, the load case title contains special character(s) by default. RCDC was displaying an error reading file message for these types of load cases. This has been resolved now by skipping special characters in load case title during the reading phase.

- **ADO ID - 804275 - Column Crack width - Neutral axis depth value is presented incorrectly in the report when section is Un-cracked.**
  RCDC performs the crack-width check at top and bottom location of the column. If the axial force in the column is compressive, the section is identified as uncracked in the crack width check. In one of the cases where column is cracked

at bottom location and Un-cracked at top location, the value of Neutral axis presented was incorrect for uncracked section. However, crack-width check is correct, and all other values are shown correct. This has now resolved, and correct value of Neutral axis is presented

- **ADO ID - 799654 - NBN code presentation issue for area required for torsion**
  For BS EN Belgium annex Beam design, area of shear links required for torsion was incorrectly presented in the design calculation report. The final area of shear reinforcement required was correct in the design. This has been resolved and correct values are now printed in the design calculation report.

- **ADO ID - 831691 - Issue in importing RAM SS file in Slab module**
  For NBN code, if a user provides a custom concrete grade in the RAM SS file, meaning, a grade other than one available in the code, with values up to two decimals, RCDC was encountering an error in reading the RAM SS file. This has been resolved.

- **ADO ID - 799629 – Diameter of vertical reinforcement in Boundary zone should be used to calculate ductile link spacing**
  The boundary element ductile links spacing is dependent on the diameter of main reinforcement provided in the boundary element zone. In earlier versions, RCDC was using minimum diameter provided across the wall to calculate ductile links spacing in boundary element zone. Now, as the ductile links are provided for Boundary element vertical reinforcement only, minimum diameter of vertical reinforcement is used to calculate ductile link spacing.