RCDC (SACD) V09.04.00

Release Notes

RCDC V09.04.00 is here with new features enhancing the design capabilities. The newly introduced features are:

No	Module	Description
1	General	Reading SRSS & ABS Load Combinations from STAAD
2	Beam	Beam rebar diameter restricted as per column size for ductile (seismic) detailing for IS and ACI codes
3	Water Tank	Water Tank Structure design – Tech Preview
4	General	Enhancements

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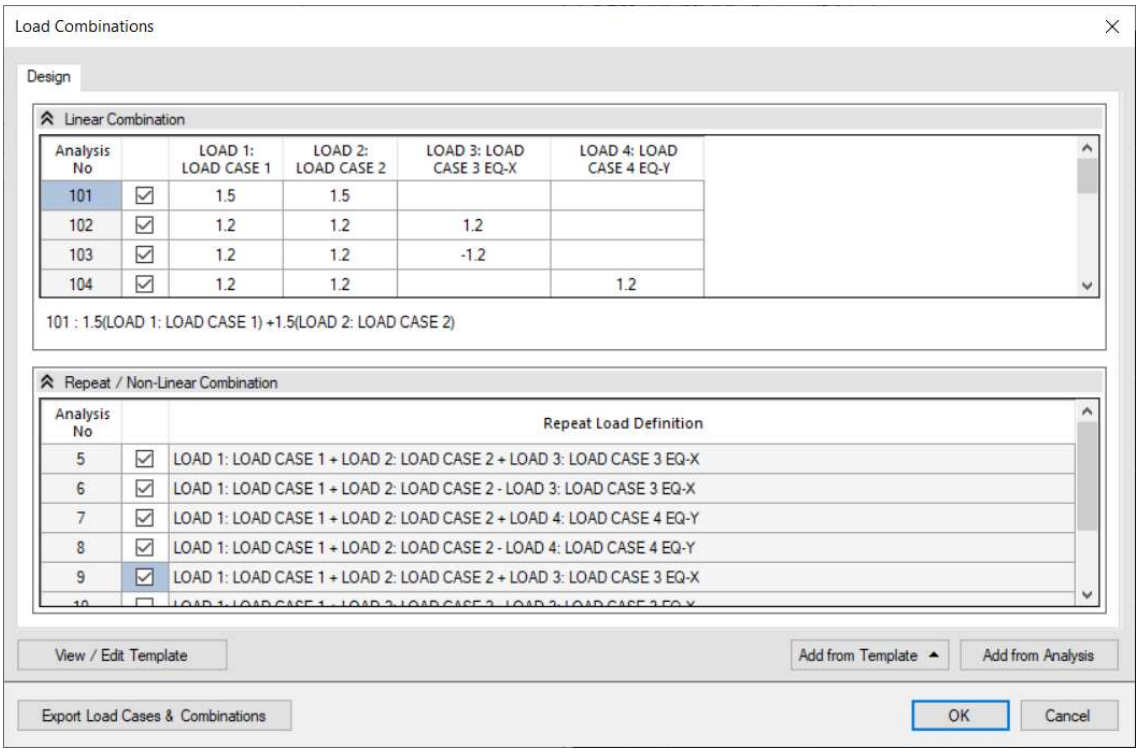
General — Reading SRSS & ABS Load Combinations from STAAD

RCDC will read the SRSS and ABS type load combinations available in STAAD. Load combination form would be like repeat load cases for SRSS & ABS load combinations. These combinations will be added under "Repeat / Non-Linear Combinations". SRSS and ABS load combinations are Non-editable in RCDC and load factors can't be changed for the SRSS and ABS load combinations. User can select and un-select the load combinations based on design requirements. User can decide to include these combinations for design, crack-width etc. in the respective tabs by checking the appropriate box.

Below is the form for Load combinations in case the analysis file consists of SRSS and ABS type load combinations.



Beam — Beam rebar diameter restricted as per column size for ductile (seismic) detailing for IS and ACI codes

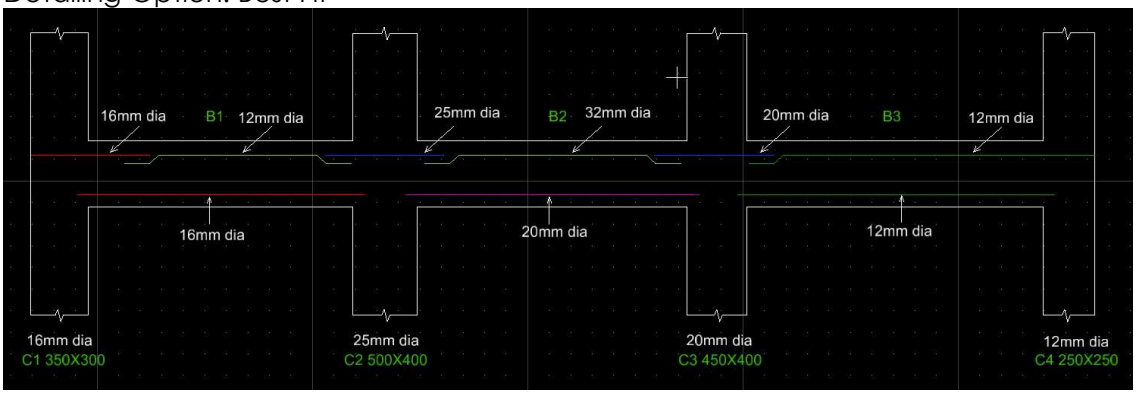
As per clause of 7.1.1 and 21.2.7.3 of IS 13920-2016 and ACI 318M-2011 (and similar clauses of ACI 318-2014, ACI 318-2011, ACI 318M-2014) respectively, the minimum size of column shall be calculated as per rebar diameter provided in Beam.

Analysis model is prepared by user in various analysis software. It is presumed that user has checked all the requirements before proceeding to design in RCDC. Hence, in RCDC we consider that column sizes available from analysis files are final. Applying

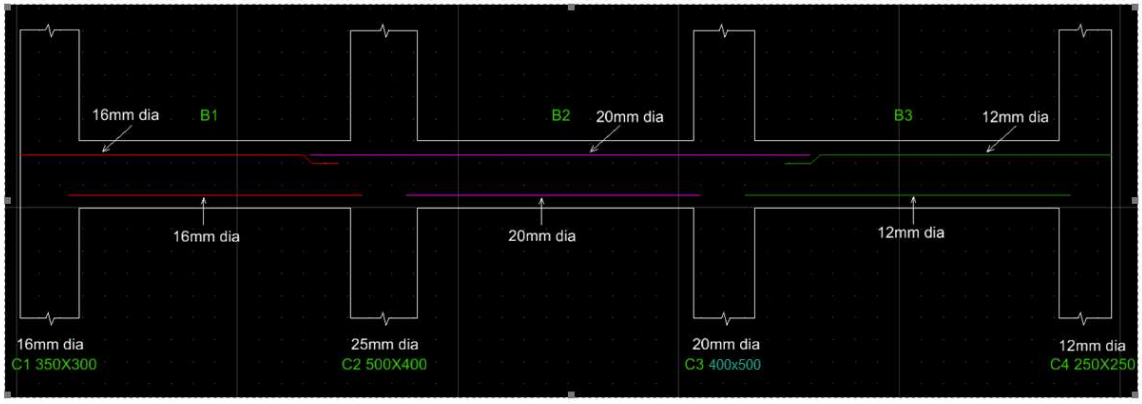
the clause mentioned earlier, RCDC will restrict the rebar to be provided in the beams as per column size available. This is applicable to top and Bottom reinforcement of beam along with SFR (Skin reinforcement).

RCDC allows user to detail the beam reinforcement in 3 styles for top reinforcement, as per 'Best fit', 'Maximum Diameter' and 'Minimum Diameter' options. Below are some snaps showing the effect of the above clauses in all three detailing options,

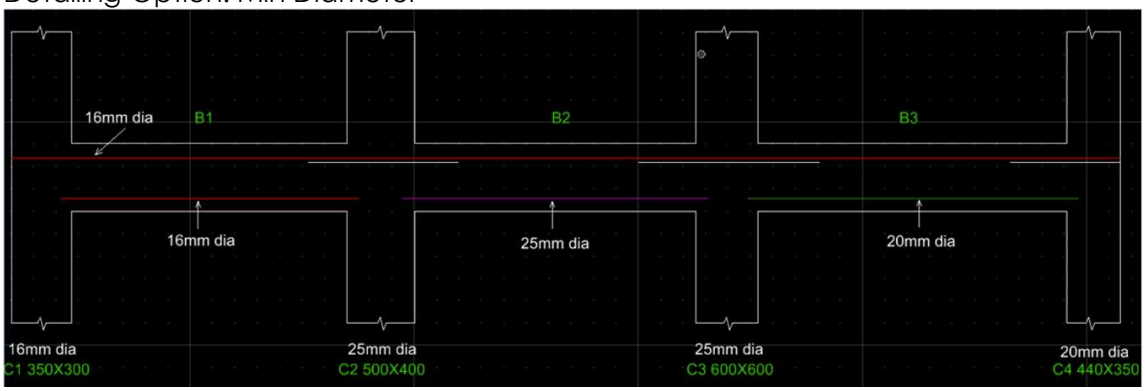
Detailing Option: Best Fit



Detailing Option: Max Diameter



Detailing Option: Min Diameter



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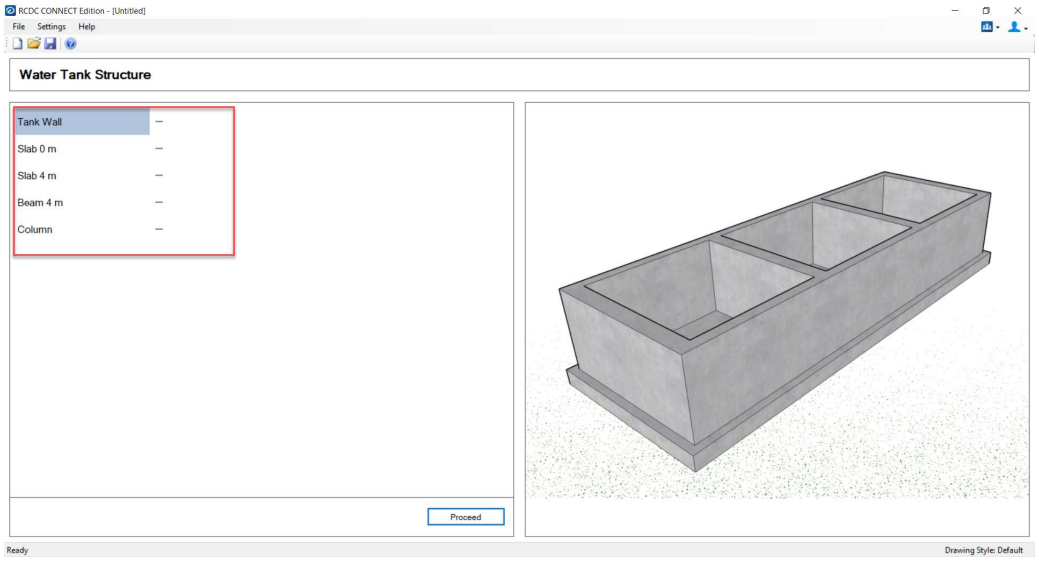
Water Tank **Water Tank Structure design – Tech Preview**

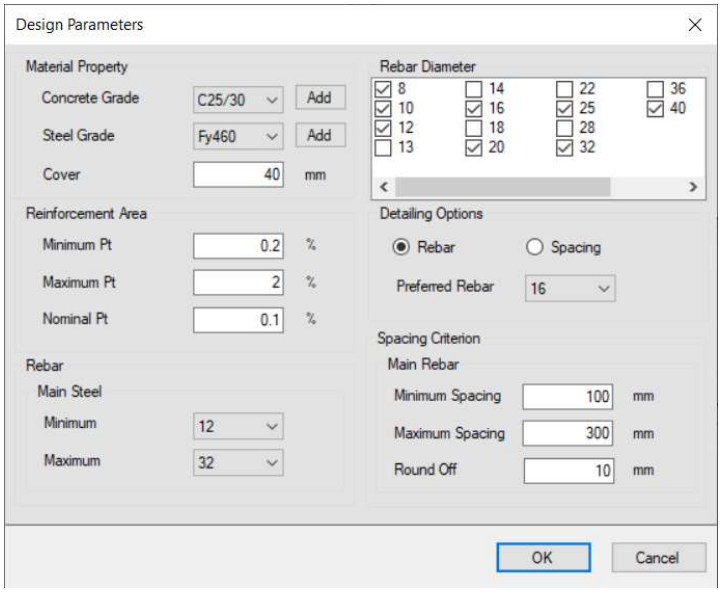
New module is added to RCDC for design of structures with tanks (liquid retaining structures). This is added as ***'Tech Preview'*** feature. The design would be based on EN 02 - 2004 + EN 03 – 2006 UK code. Design outputs like reinforcement provided and various drawings will be available. In This release, reports like design calculation and BOQ will not be available to user.

Some of the sample forms and outputs are shown below,

1. User will be able to design all the elements like tank wall, tank slab, column and beams (if they exist) in tank structures in a single 'design' file. The new form shown below allows use to navigate between various elements.



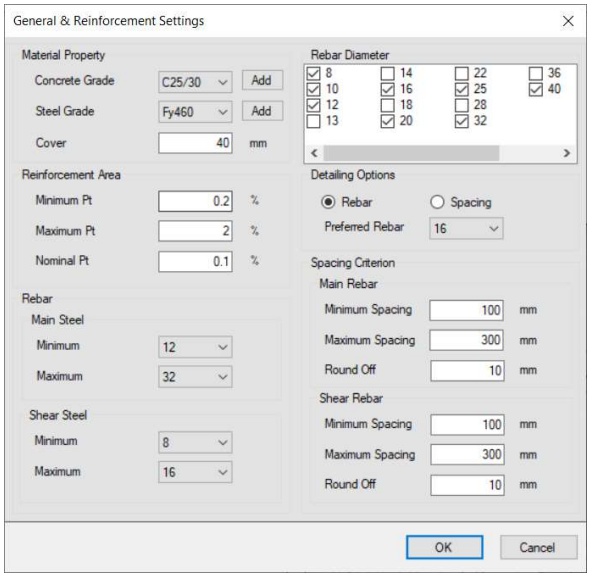
2. General & Reinforcement setting form – Tank Slab



Bentley Advancing Infrastructure

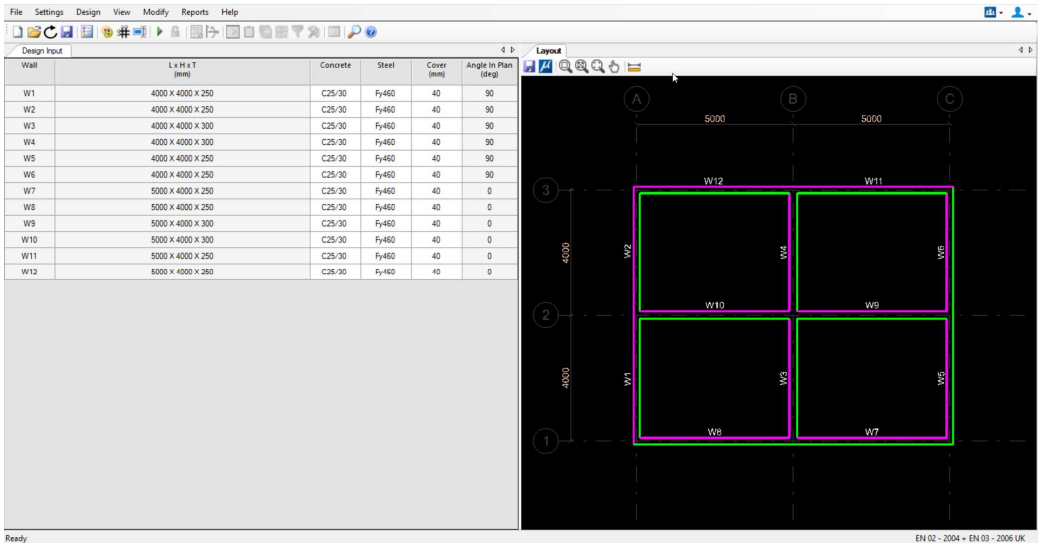
Detailed explanation for each of the entries is covered separately.

3. General & Reinforcement setting form – Tank Wall

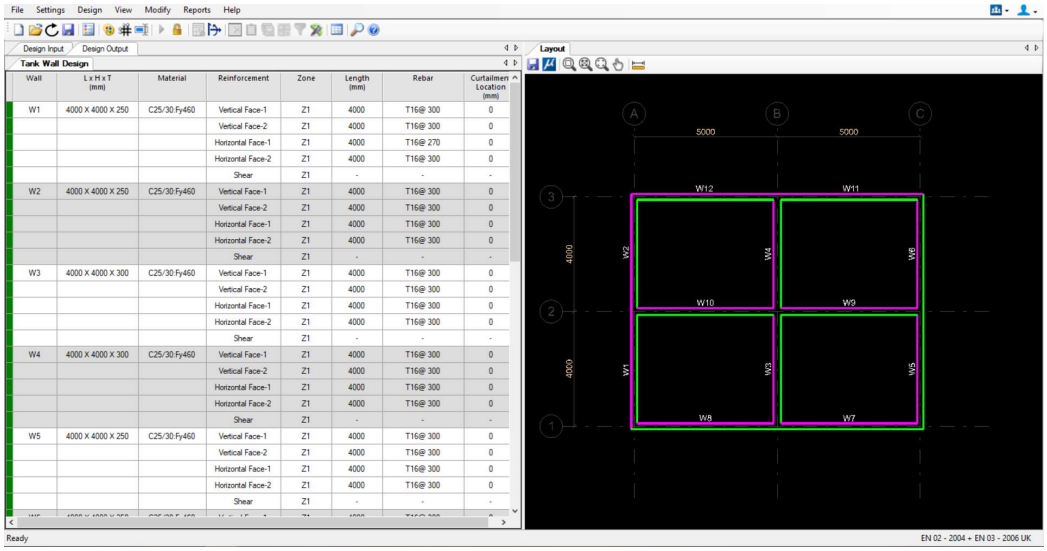


Detailed explanation for each of the entries is covered separately.

4. Input form showing the geometry, size and other information for Tank-wall module (Note: that tank walls are treated differently and designed with separate procedure from normal shear walls).



5. Output form includes design details of reinforcement and other information. The design of reinforcement for wall is carried out and presented as per the 'tension-face' along vertical and horizontal direction. The sign convention of BM is considered to determine the appropriate face for tension. The 'green' edge represents 'Face-1' of wall and 'pink' edge represents the 'Face-2' of wall.



6. Output Report: Text schedule

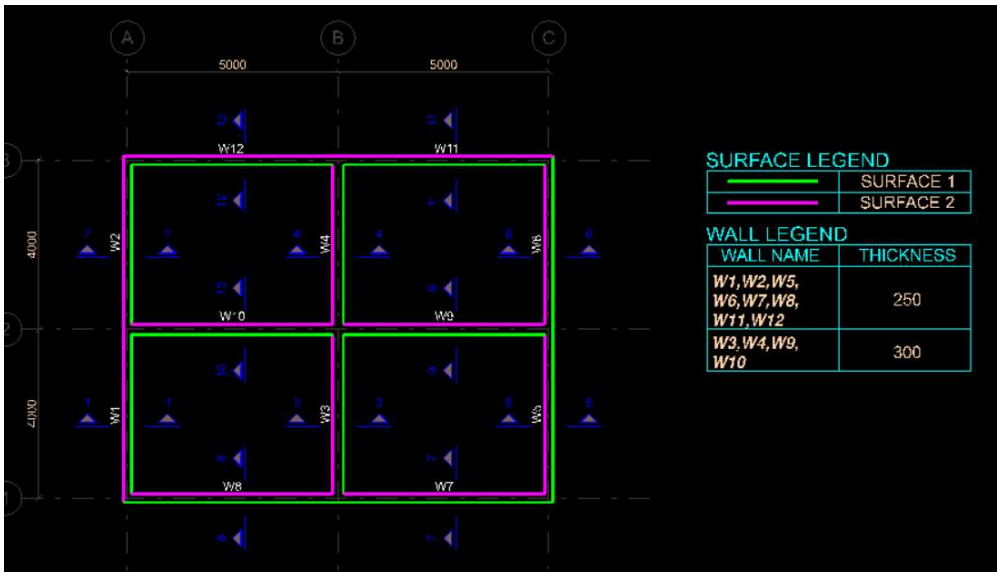
A detailed text schedule is available for user. In this, each wall is represented by reinforcement on each face and each direction.

In the current release, only one combination of rebar diameter and spacing is provided for each direction on each face. Going further, various zones would be possible for each direction on each face. In each zone, 'curtailment' of rebar also would be possible.

TANK WALL SCHEDULE (C25/30:Fy460)

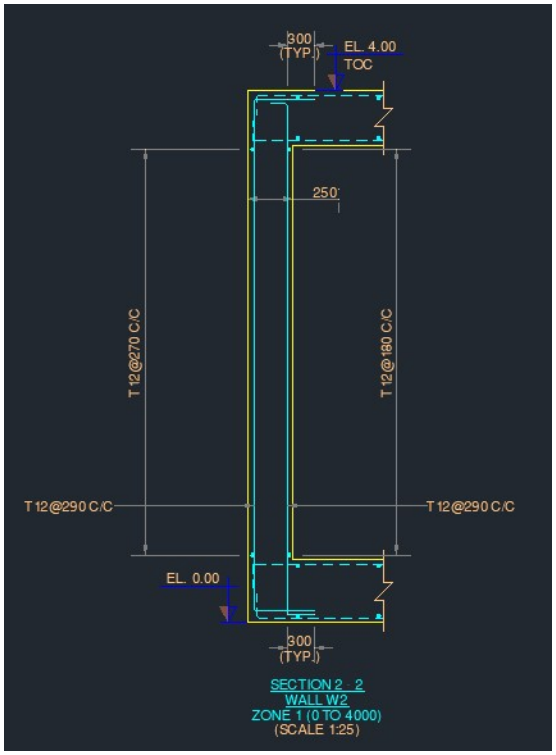
WALL MARKED	WALL THICKNESS	REINFORCEMENT DIRECTION	ZONE DETAILS		REBAR DETAILS		REMARKS
			ZONE NUMBER	LENGTH	REBAR	CURTAILMENT	
W1	250	VERTICAL FACE-1	Z1	4000	T16@300 C/C	-	---
		VERTICAL FACE-2	Z1	4000	T16@300 C/C	-	---
		HORIZONTAL FACE-1	Z1	4000	T16@270 C/C	-	---
		HORIZONTAL FACE-2	Z1	4000	T16@300 C/C	-	---
		SHEAR	Z1	-	-	-	---
W2	250	VERTICAL FACE-1	Z1	4000	T16@300 C/C	-	---
		VERTICAL FACE-2	Z1	4000	T16@300 C/C	-	---
		HORIZONTAL FACE-1	Z1	4000	T16@300 C/C	-	---
		HORIZONTAL FACE-2	Z1	4000	T16@300 C/C	-	---
		SHEAR	Z1	-	-	-	---
W3	300	VERTICAL FACE-1	Z1	4000	T16@300 C/C	-	---
		VERTICAL FACE-2	Z1	4000	T16@300 C/C	-	---
		HORIZONTAL FACE-1	Z1	4000	T16@300 C/C	-	---

7. Output Report: Detailed Drawings
   a. Wall Layout



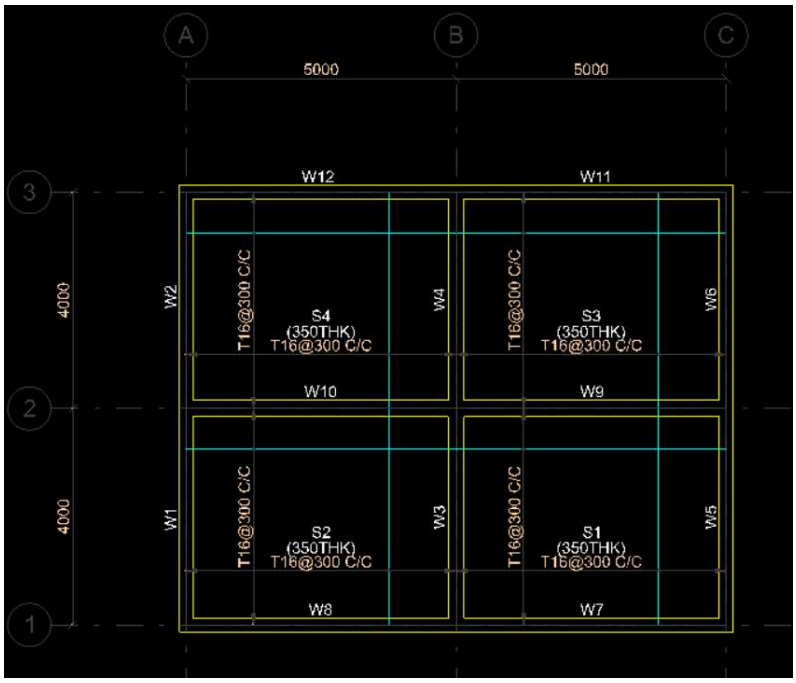
Plan showing wall layout is created for reference. In this, all the walls from analysis are covered. The walls are presented irrespective of the starting and stopping elevations of each wall.

   b. Wall section



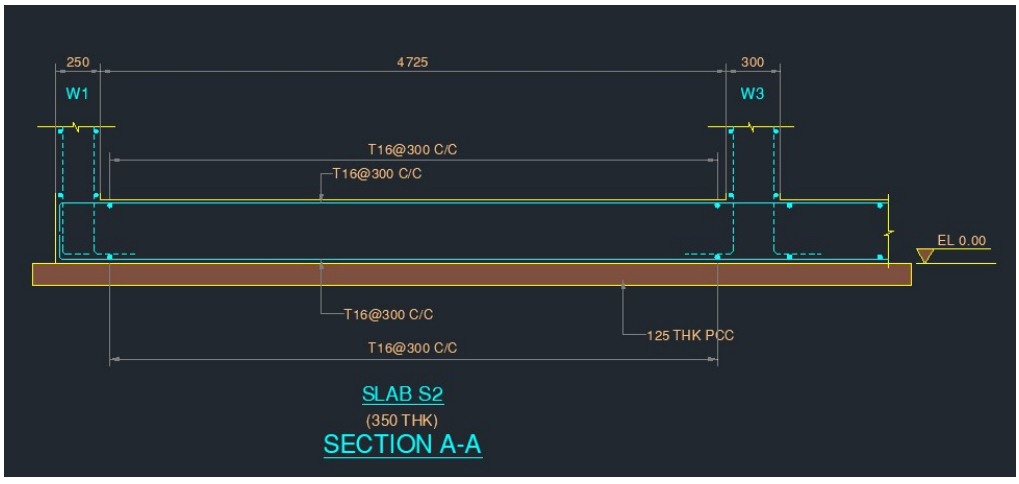
One vertical section can be created for each wall. User can choose to create sections for all or select walls.

c. Tank Slab Reinforcement



Bottom and top reinforcement for all slabs of tank would be available. There would be only one rebar diameter and spacing combination for slabs in both directions and on both surfaces,

d. Tank slab Section



A drawing showing section through the slabs with rebars can be created. Section would be available for one slab at a time.

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General Enhancements

Following are the Enhancements done in this release.

- **ADO ID – 429959**

  For design and detailing of beams as per ACI code for seismic requirement demands shear calculation based on sway conditions. For sway shear calculation, when Shear force is calculated due to (DL+LL) + Sway-Right & Shear due to (DL+LL) + Sway-left, the DL factor should be multiplied with 1.2 as per clause 21.3 of ACI 318M-2011. This is applicable to all codes of ACI (Metric and English).

  It is applicable to Intermediate and Special frames

For Transverse Reinf			
	Left	**Mid**	**Right**
Critical L/C - RCDC	7	6	6
PtPrv (%)	0.392	0.304	0.392
Vu (kN)	154.46	109.41	168.69
Mu-Sect (kNm)	240.14	0.63	286.21
V^{D+L} (kN)	126.28	0	125.21
Mh (kNm)	412.62	0	412.62
Ms (kNm)	142.72	0	234.62
Sway-Right (kN)	50.21	0	201.29
Sway-Left (kN)	214.94	0	36.55
Vu-Sway (kN)	214.94	0	201.29
Vud (kN)	214.94	0	201.29
Φ Vc (kN)	0	0	0
Vs (kN)	257.43	182.35	281.15
Av (sqmm/m)	839.64	594.74	916.99
Tu (kNm)	0	0	0
Aoh (sqmm)	-	-	-
At (sqmm/m)	-	-	-
Legs	2	2	2
Stirrup Rebar	10	10	10
At Torsion (sqmm/m)	-	-	-
Av Total Reqd (sqmm/m)	839.64	594.74	916.99
Asv Reqd (sqmm/m)	1168.43	594.74	1094.18
SCalc (mm)	75	235	75
SPrv (mm)	75	235	75
Av Total Prv (sqmm/m)	1890.13	603.23	1890.13