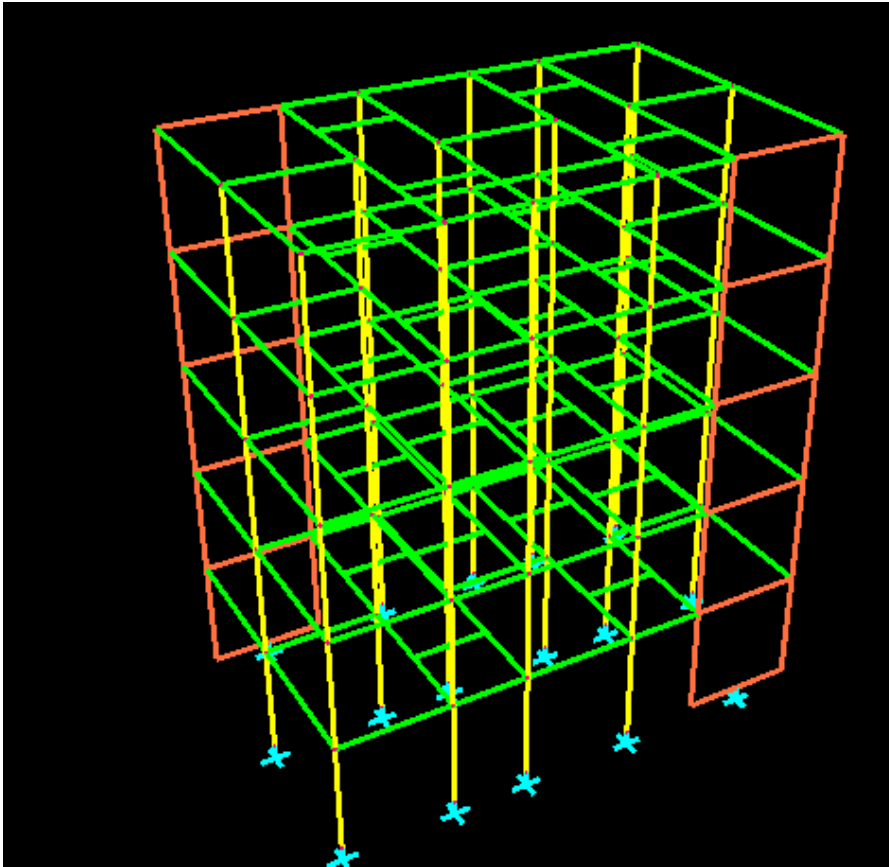
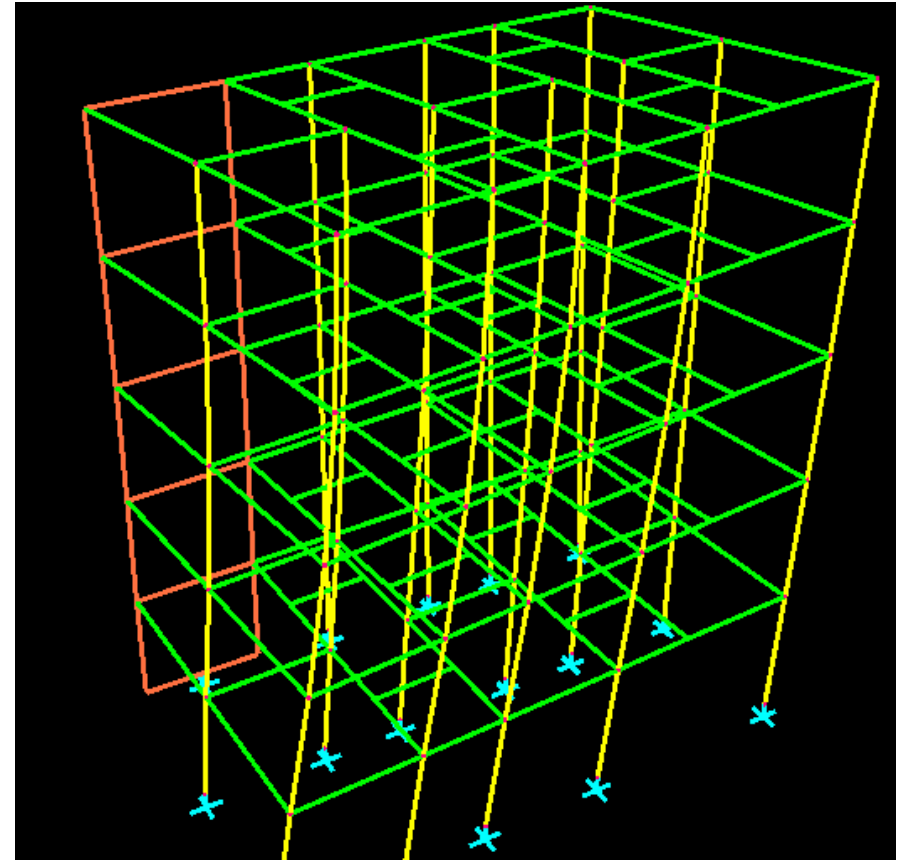


Animation for modes of vibrations

New Feature

Structure Without Animation



Structure With Animation

- Animation for Modes of vibrations is introduced to visualize structural behavior when subjected to EQ loads
- By viewing animation user can get an idea about weak elements. Such weak elements can be strengthened by increasing their stiffnesses (sizes).



Modal Masses

- As per IS 1893 (Part I) : 2002 clause 3.20 **Modal Mass (M_k)** of a structure subjected to horizontal or vertical, as the case may be, ground motion is a part of the total seismic mass of the structure that is effective in mode k of vibration. The modal mass for a given mode has a unique value irrespective of scaling of the mode shapes.

Modal mass of mode K is given by

$$M_K = \frac{\left[\sum_{i=1}^n W_i \phi_{ik} \right]^2}{g \sum_{i=1}^n W_i (\phi_{ik})^2}$$

Where

g = Acceleration due to gravity,

ϕ_{ik} = Mode shape coefficient at floor i in mode k

W_i = Seismic weight of floor i



Modal Participation Factors

New Report

- As per IS 1893 (Part I) : 2002 clause 3.21 Modal Participation Factor (P_k) of mode k of vibration is the amount by which mode k contributes to the overall vibration of the structure under horizontal and vertical earthquake ground motions. Since the amplitudes of 95 % mode shapes can be scaled arbitrarily, the value of this factor depends on the scaling used for mode shapes.

Modal Participation Factor mass of mode K is given by

$$P_K = \frac{\sum_{i=1}^n W_i \phi_{ik}}{\sum_{i=1}^n W_i (\phi_{ik})^2}$$

Where

ϕ_{ik} = Mode shape coefficient at floor i in mode k

W_i = Seismic weight of floor i

Floor Wise Lumped Loads on Column / Shear Wall Nodes:

Floor1

Node No.	DL(kN)	LL(kN)	Node No.	DL(kN)	LL(kN)	Node No.	DL(kN)	LL(kN)
16	48.699	0.000	17	88.793	0.000	18	88.868	0.000
19	48.787	0.000	20	88.037	0.000	21	138.504	0.000
22	138.302	0.000	23	87.822	0.000	24	88.149	0.000
25	137.591	0.000	26	138.472	0.000	27	87.842	0.000
33	89.244	0.000	34	48.919	0.000	30	106.647	0.000

Frequency and Time Period(Eigen Value Analysis):

Mode	Frequency		Time Period (sec)
	(rad/sec)	(cycle/sec)	
1	18.207	2.898	0.345
2	21.510	3.423	0.292
3	25.946	4.129	0.242

Modal Participation Masses:

Mode	X Direction		Y Direction	
	Mass(%)	Σ	Mass(%)	Σ
1	77.510	77.510	0.005	0.005
2	0.017	77.527	97.840	97.845
3	4.023	81.550	0.102	97.948

Mode Shape Coefficient and Modes of Vibration New Report

- As per IS 1893 (Part I) : 2002 clause 3.23
Mode shape coefficient (ϕ_{ik}) : When a system is vibrating in normal mode k, at any particular instant of time, the amplitude of mass i expressed as a ratio of the amplitude of one of the masses of the system, is known as mode shape coefficient (ϕ_{ik}).
- As per IS 1893 (Part I) : 2002 clause 3.22
Modes of Vibration : A system is said to be vibrating in a normal mode when all its masses attain maximum values of displacements and rotations simultaneously, and pass through equilibrium positions simultaneously.

Mode Shape Coefficient(Eigen Vector):

Node No.	Mode	δ_x	δ_y	δ_z	θ_x	θ_y	θ_z
16	1	0.1035	-0.0207	0.0003	0.0021	0.0072	0.0017
	2	-0.0007	0.0706	0.0005	-0.0076	0.0000	0.0034
	3	-0.0763	0.0849	0.0002	-0.0086	-0.0048	-0.0231
17	1	0.1036	-0.0056	-0.0002	0.0006	0.0022	0.0027
	2	-0.0008	0.0922	0.0006	-0.0096	0.0000	0.0027
	3	-0.0765	0.0409	0.0004	-0.0041	-0.0015	-0.0257
18	1	0.1036	0.0050	0.0002	-0.0005	0.0022	0.0024
	2	-0.0009	0.0913	0.0006	-0.0095	0.0000	-0.0042
	3	-0.0764	-0.0451	-0.0004	0.0045	-0.0015	-0.0255
19	1	0.1035	0.0180	-0.0003	-0.0018	0.0072	0.0013
	2	-0.0009	0.0626	0.0004	-0.0068	0.0000	-0.0055
	3	-0.0763	-0.0878	-0.0003	0.0089	-0.0048	-0.0229
20	1	0.1031	-0.0208	0.0005	0.0007	0.0070	0.0055
	2	0.0016	0.0707	-0.0002	-0.0025	0.0001	0.0018
	3	0.0278	0.0848	0.0000	-0.0029	0.0016	-0.0230
21	1	0.1032	-0.0055	-0.0002	0.0002	0.0022	0.0051
	2	0.0016	0.0922	-0.0002	-0.0032	0.0000	0.0017
	3	0.0278	0.0410	-0.0001	-0.0015	0.0006	-0.0236



Distribution of EQ loads on columns and walls floor wise and for whole structure

New Report

EQ Loads Generated By Response Spectrum:

Floor Wise Distribution of Base Shear

Floor	Base Shear			
	X - Direction EQX		Y - Direction EQY	
	Value (kN)	% Contribution	Value (kN)	% Contribution
Floor1	52.901	100.000	61.279	100.000
Σ	52.901	100.000	61.279	100.000

Distribution of Floor Base Shear to Column and Shear Wall Nodes

Floor1 EQX = 52.901 kN EQY = 61.279 kN

Shear Wall

Node No.	Base Shear					
	X - Direction EQX			Y - Direction EQY		
	Value (kN)	% Contribution		Value (kN)	% Contribution of	
		Floor	Total		Floor	Total
30	6.841	12.933	12.933	5.711	9.320	9.320
Σ	6.841	12.933	12.933	5.711	9.320	9.320

Column

Node No.	Base Shear					
	X - Direction EQX			Y - Direction EQY		
	Value (kN)	% Contribution		Value (kN)	% Contribution of	
		Floor	Total		Floor	Total
16	2.233	4.222	4.222	1.821	2.972	2.972
17	4.075	7.703	7.703	4.138	6.753	6.753
18	4.078	7.710	7.710	4.102	6.694	6.694
19	2.237	4.229	4.229	1.626	2.654	2.654

21	6.281	11.873	11.873	6.459	10.541	10.541
22	6.272	11.856	11.856	6.390	10.428	10.428
23	3.979	7.522	7.522	2.931	4.783	4.783
24	2.498	4.723	4.723	3.306	5.395	5.395
25	3.903	7.378	7.378	6.413	10.465	10.465
26	3.929	7.427	7.427	6.398	10.441	10.441
27	2.491	4.708	4.708	2.933	4.786	4.786
33	0.058	0.110	0.110	4.120	6.723	6.723
34	0.035	0.067	0.067	1.632	2.663	2.663
Σ	46.059	87.067	87.067	55.567	90.680	90.680

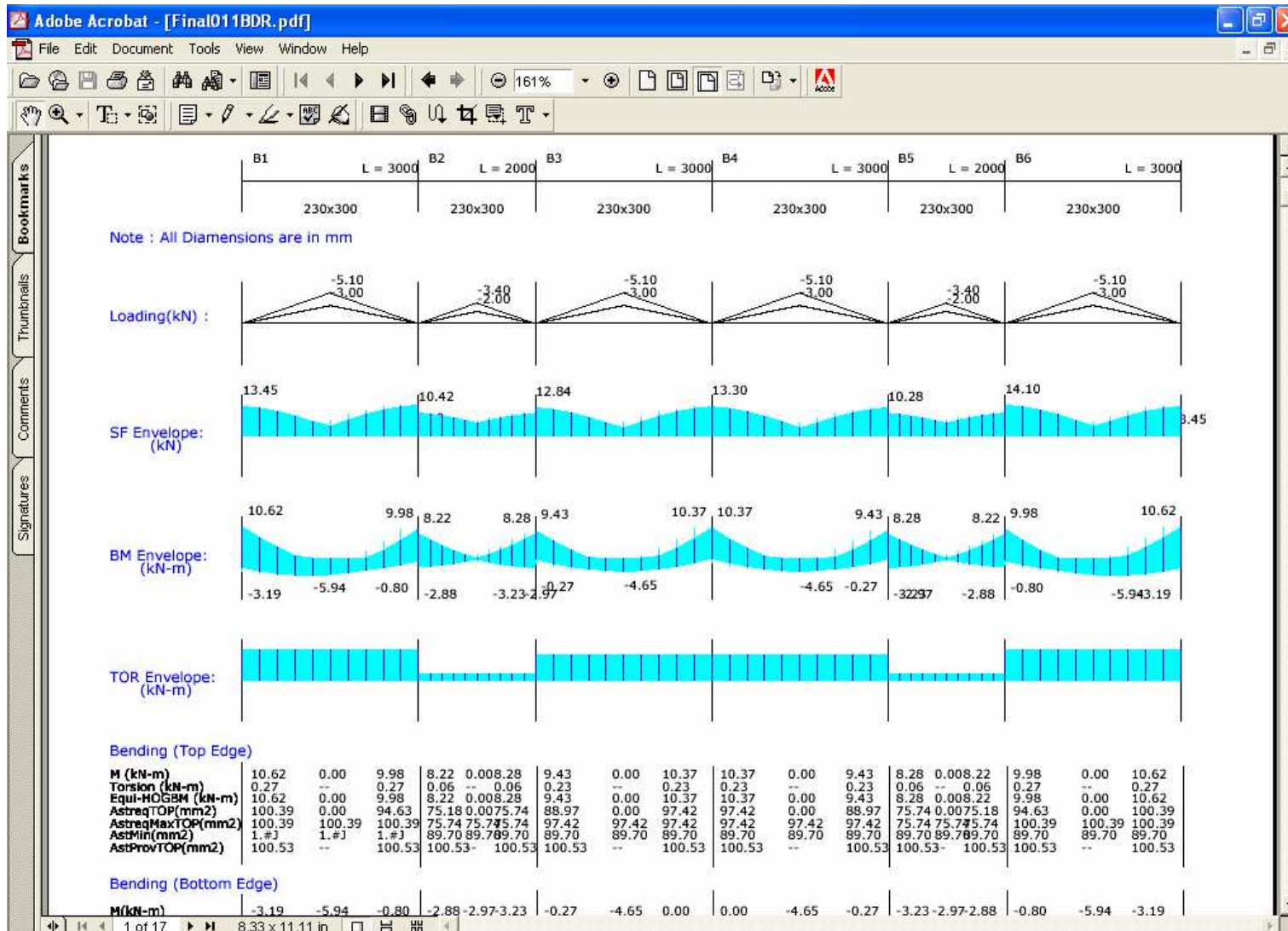
Contribution of Shear Wall & Column in EQ Resistance:

Direction	Base Shear				
	Total (kN)	Shear Wall		Column	
		Value (kN)	%	Value (kN)	%
X	52.901	6.841	12.933	46.059	87.067
Y	61.279	5.711	9.320	55.567	90.680



New PDF report for Beam Design

New Report



A short PDF report is introduced for Beam design. Get a concise report of all beams in a few pages.

Bar Bending Schedule Report in HTML format

New Report

D:\Testing\January2008\7Jan\Help\help11BBND.html - Microsoft Internet Explorer

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Bar Bending Schedule Report As Per IS 456 : 2000

Floor1 - Default Level: 3.000 m

Grid Name : 1

Beam	Bar Shape	Bar ID	DiaNos	x ₁	x ₂	x ₃	x ₄	x ₅	Length	SumLength
B1	Straight	1	# 12 - 2	0.270	3.125	---	---	---	3.395	6.790
	Straight	2	# 8 - 2	0.270	3.125	---	---	---	3.395	6.790
	Ex Left	3	# 8 - 2	---	0.750	---	---	---	0.750	1.500
	Ex Right	4	# 12 - 2	0.750	0.750	---	---	---	1.500	3.000
Beam	Bar Shape	Bar ID	DiaNos	x ₁	x ₂	x ₃	x ₄	x ₅	Length	SumLength
B2	Straight	5	# 8 - 3	---	3.090	0.270	---	---	3.360	10.080
	Straight	6	# 8 - 2	---	3.090	0.270	---	---	3.360	6.720
	Ex Right	7	# 12 - 2	0.750	---	---	---	---	0.750	1.500

Grid Name : 2

Beam	Bar Shape	Bar ID	DiaNos	x ₁	x ₂	x ₃	x ₄	x ₅	Length	SumLength
B3	Straight	1	# 12 - 2	0.270	3.125	---	---	---	3.395	6.790
	Straight	2	# 8 - 3	0.270	3.125	---	---	---	3.395	10.185
	Ex Left	3	# 8 - 3	---	0.750	---	---	---	0.750	2.250
	Ex Right	4	# 12 - 2	0.750	0.750	---	---	---	1.500	3.000
Beam	Bar Shape	Bar ID	DiaNos	x ₁	x ₂	x ₃	x ₄	x ₅	Length	SumLength
B4	Straight	5	# 12 - 2	---	3.000	---	---	---	3.000	6.000
	Straight	6	# 8 - 3	---	3.000	---	---	---	3.000	9.000
	Ex Right	7	# 12 - 2	0.750	0.750	---	---	---	1.500	3.000
Beam	Bar Shape	Bar ID	DiaNos	x ₁	x ₂	x ₃	x ₄	x ₅	Length	SumLength
	Straight	8	# 12 - 2	---	3.090	0.270	---	---	3.360	6.720

Done My Computer

Now the bar bending schedule report is available in HTML format also



New Beam Quantity Report in HTML format

New Report

D:\Testing\January2008\7Jan\Help\help11BQNTT.html - Microsoft Internet Explorer

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Back Forward Stop Home Search Favorites Print Mail

Address D:\Testing\January2008\7Jan\Help\help11BQNTT.html

Sum =	2.898	4.347	39.690
-------	-------	-------	--------

[Concrete Volume Summary Report Default Level: 3.000 m](#)

Concrete	Volume m ³		Cost/m ³ (Rs.)	Amount(Rs.)	
	Clear	With Slab		Clear	With Slab
M20	2.898	4.347	1764.65	5113.97	7670.95

[Steel Quantity Report Default Level: 3.000 m](#)

Beam Name	Main Steel Weight(Kg)			Total Weight(Kg)	Stirrup Weight(Kg)	Total Weight(Kg)
	8 #	10 #	12 #			
B1	3.271	0.000	8.692	8.692	10.393	10.393
B2	6.629	0.000	3.995	3.995	10.393	10.393
B3	4.907	0.000	8.692	8.692	10.393	10.393
B4	3.551	0.000	10.654	10.654	10.393	10.393
B5	4.865	0.000	8.630	8.630	10.393	10.393
B6	4.907	2.774	6.028	6.028	10.393	10.393
B7	3.551	5.549	5.327	5.327	10.393	10.393
B8	4.907	2.774	6.028	6.028	10.393	10.393
B9	9.730	0.000	1.332	1.332	10.393	10.393
B10	6.386	0.000	6.028	6.028	10.393	10.393
B11	4.019	0.925	10.023	10.023	10.393	10.393
B12	7.103	2.774	3.995	3.995	10.393	10.393
B13	3.841	1.850	8.425	8.425	10.393	10.393
B14	0.000	6.036	10.023	10.023	10.393	10.393
B15	3.551	2.774	10.654	10.654	10.393	10.393

Now the Beam Quantity Report is available in HTML format also.



Provision for number of layers in beam detail

New Feature

Design Parameters

Slab | **Beam** | Column | Footing | ShearWall

Reinforcement Details

Stirrups
 Min. Spacing: 100 mm
 Stirrup Dia: 8 mm
 Stirrup Leg: 2 mm

Main Steel
 Min. Spacing: 20 mm
 Min. Dia Of Anchor Bar: 8 mm

Bars Detailing Type
☐ BentUp
☒ Curtailment
☐ None

Grade Of Steel
 MainSteel (fy): Fe415
 Stirrups (fys): Fe250

Effective Covers
 Tension (Ct): 33 mm
 Compression (Cb): 33 mm
 Side (Cs): 25 mm

Design Considerations
☒ Design As Doubly
☒ Torsion Effect in Design
☐ Support Width Effect in Design
☒ Effect Of Concrete in Shear

Detailing
☐ IS 13920 provision for EQ Detailing
☒ User defined detailing

Data For Results No. Of Divisions: 10

Max Layer of bars: 3

OK Cancel Apply Help

In beam design parameters dialog box an option is given to decide the maximum layers of bars which will be helpful in detailing of beam reinforcement.



Enhancement in column detailing

New Feature

Design Parameters

Slab | Beam | **Column** | Footing | Shear/Wall

Grade Of Materials
 Main Steel : Fe415
 Ties : Fe415

Minimum Eccentricity
 @ X-Axis : 20 mm
 @ Y-Axis : 20 mm

Effective Length Factor
☐ Calculate Automatically
 X-Axis : 1
 Y-Axis : 1

Change Sizes
☐ Internally
☐ Width
☐ Depth
☐ Both

Reinforcement Details
Spacing Between Bars
 Main Bars
 Maximum : 300 mm
 Minimum : 25 mm
 Ties
 Minimum : 150 mm
 Clear Cover : 40 mm
 Steel Ratio-
 AstX/AstY : 1
☐ Minimum steel percentage
 based on actual resisting
 section

Steel Percentage
 Maximum : 2
 Minimum : 0.8

R/F Placing
☒ 2 - Sided
☐ 4 - Sided

Select Main Bar Dia(s)
 Min. Dia of
 Ties : 6

Design Considerations
☐ Detailing as per IS13920
☐ Provide Confinement R/F
☐ Check horizontal bracings
☐ Consider live load reduction

Design Type
☐ Axial
☐ Uniaxial
☒ Biaxial

Detailing consideration
☐ Make lower floor column section bigger / equal than upper floor
☐ Make lower floor column main steel area bigger / equal than upper floor
☐ Make lower floor column main bars nos bigger / equal than upper floor

OK Cancel Apply Help

Column detailing with various options given below is provided

1. Make lower floor column section bigger / equal than upper floor
2. Make lower floor column main steel area bigger / equal than upper floor
3. Make lower floor column main bars numbers bigger / equal than upper floor

User can select either of the three or all 3 options at a time for design and detailing of columns.



Footing Quantity in HTML format

New Report

D:\Testing\January2008\7Jan\Help\helpFTQNTT.html - Microsoft Internet Explorer

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Back Forward Stop Home Search Favorites

Address D:\Testing\January2008\7Jan\Help\helpFTQNTT.html

Footing Type :- Trapezoidal Footings

Footing Group	Column Nos.	Concrete Grade	Steel Grade	Concrete Volume m ³			Reinforcement Weight (kg)		Formwork m ²	
				Straight	Slant	Total	Each	Total	Each	Total
FG1	C1	M20	Fe415	0.139	0.070	0.209	7.121	7.121	0.578	0.578
FG2	C2	M20	Fe415	0.198	0.125	0.323	9.926	9.926	0.690	0.690
FG3	C3	M20	Fe415	0.211	0.148	0.359	10.250	10.250	0.713	0.713
FG4	C4	M20	Fe415	0.299	0.286	0.585	14.781	14.781	0.848	0.848
FG5	C5	M20	Fe415	0.289	0.277	0.566	14.519	14.519	0.833	0.833
FG6	C6	M20	Fe415	0.203	0.143	0.345	10.034	10.034	0.698	0.698
FG7	C7	M20	Fe415	0.299	0.286	0.585	14.781	14.781	0.848	0.848
FG8	C8	M20	Fe415	0.299	0.286	0.585	14.781	14.781	0.848	0.848
FG9	C9	M20	Fe415	0.198	0.125	0.323	9.926	9.926	0.690	0.690
FG10	C10	M20	Fe415	0.207	0.129	0.336	10.142	10.142	0.705	0.705
FG11	C11	M20	Fe415	0.142	0.060	0.202	7.213	7.213	0.585	0.585
Sum				--	--	4.419	--	123.477	--	8.032

Diameter wise Breakup of Reinforcement

Diameter (mm)	Length (m)	Weight (kg)	Cost / kg (Rs.)	Amount (Rs.)
10.00	200.28	123.477	18.00	2222.59
12.00	95.18	123.477	19.00	2346.06

Concrete Summary Table

Concrete Grade	Quantity / m ³	Cost / m ³	Amount (Rs.)
M20	4.419	1764.65	7797.89

Formwork Summary Table

Done

Now Footing Quantity Report is available in HTML format.



User interactive detailing in DXF format

New Feature

Drawing Settings

Slab | Beam | Column | Shear Wall | Footing

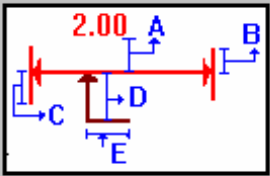
Layer Specifications

Drawing Object: **Plan** ☐ Default Colour Setting ☐ Default Font Setting

Layer	Colour	Font Height	Font Style	Line Type	Layer On/Off
CenterLine	Gray	0.200	Arial	Dotted	On
GridName	White	0.200	Arial	Continuous	On
Grid_Dimension	White	0.200	Arial	Continuous	On
Layout	Yellow	0.200	Arial	Continuous	On
Slab_Name	Cyan	0.200	Arial	Continuous	On
Slab_Thick	Cyan	0.200	Arial	Continuous	On
Slab_Sunk_Value	Cyan	0.200	Arial	Continuous	On
Slab_Group	Green	0.200	Arial	Continuous	Off
Slab_Icon	Magenta	0.200	Arial	Continuous	On
Schedule	Green	0.200	Arial	Continuous	On
Reinforcement-Xdir	Red	0.150	Arial	Continuous	On
Reinforcement-Ydir	Green	0.150	Arial	Continuous	On

Colour: **Gray** Font Size: **0.2** Font Style: **Arial** Line Type: **Dotted** Layer On/Off: ☒

Dimension Specification



Text Clearance (A): **0.2** Arrow Extension (E): **0.1**

Extension Line Length (B): **0.05** Text Height: **0.1**

Extension Line Length (C): **0.1** Text Style: **Arial**

Arrow Length (D): **0.1**

Text Position: ☐ Left ☒ Center ☐ Right

User can specify the drawing parameters for Slab, Beam, Column, Shear Wall, & Footing using this New Dialog Box

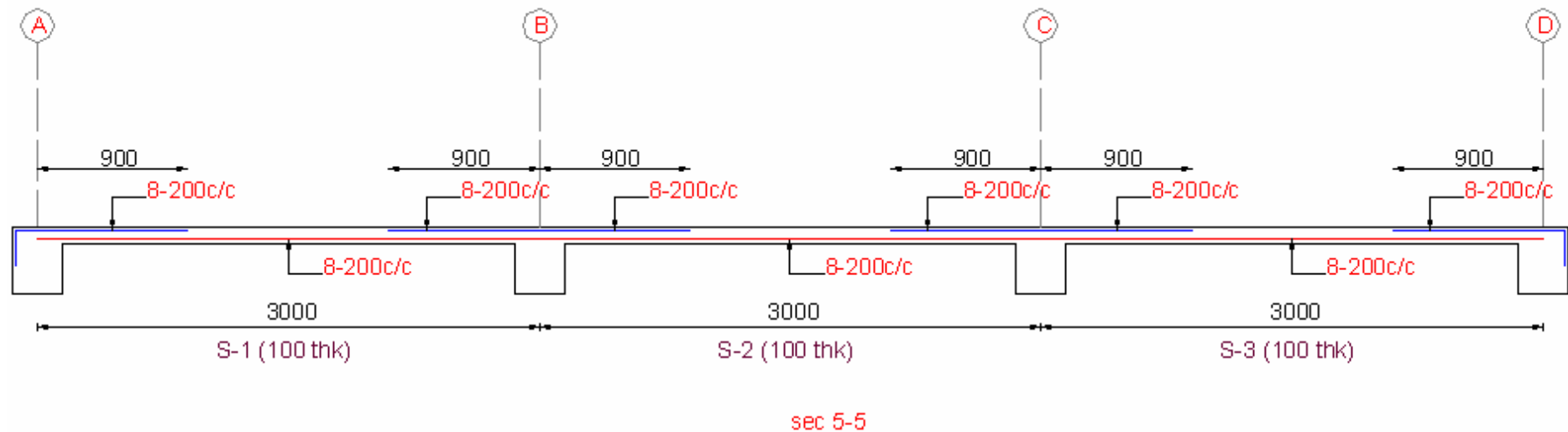
This Dialog Box having two parts

- 1] Layer Specifications
- 2] Dimension Specifications

User can set the various options as per his requirements to get the output in required font size and color. Also can avoid overlapping of text by this.



DXF Detailing output of Slabs

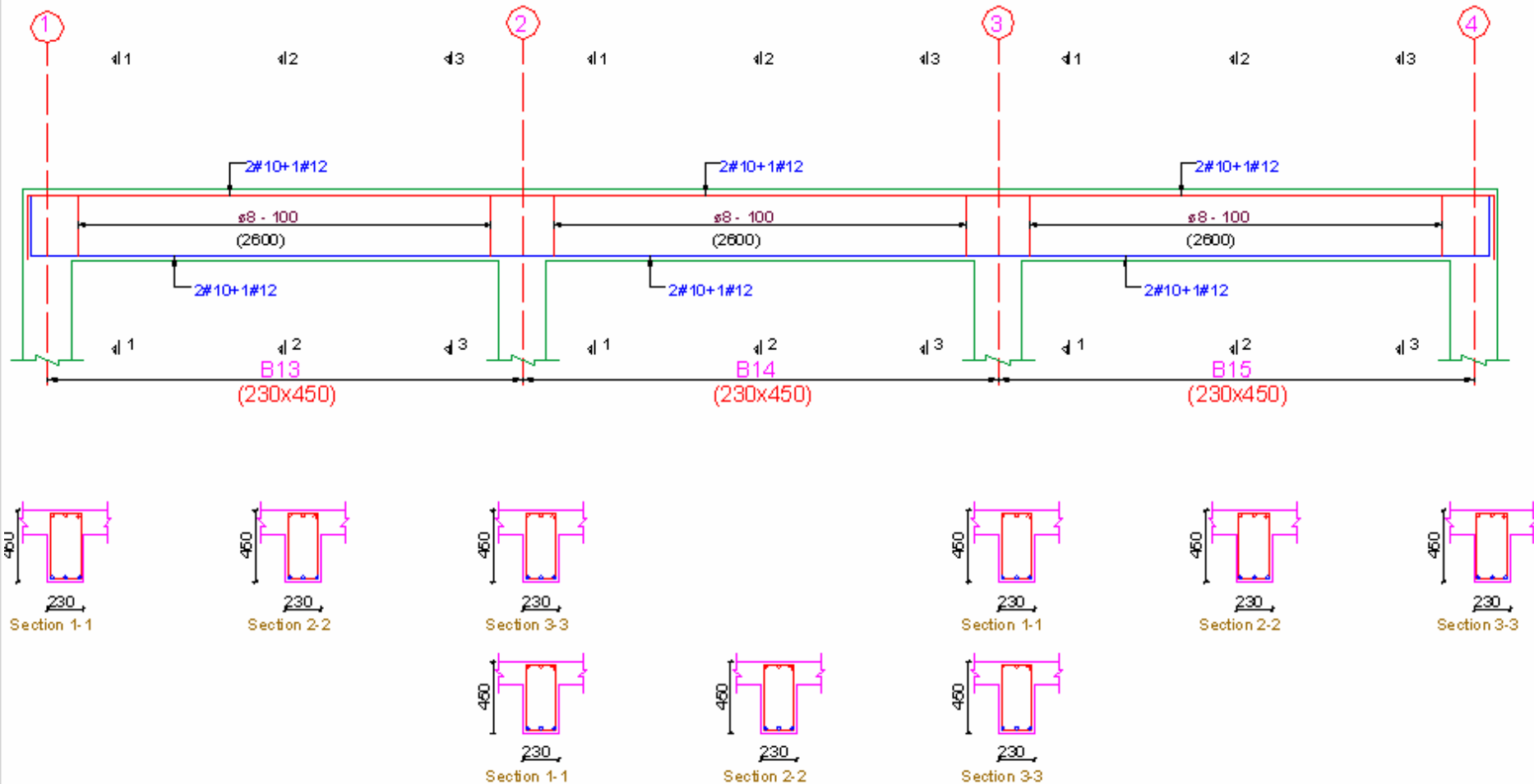
Improvement

Improvements in slab longitudinal section drawing and slab plan drawing.

(No overlapping of text with drawings)



DXF Detailing output of Beams.

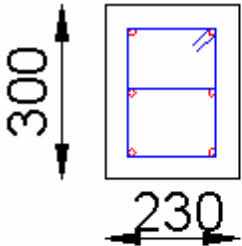
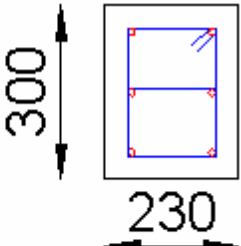
Improvement


Improvements in beam longitudinal section and cross section drawing also in beam plan drawing.

(No overlapping of text with drawings / detailing for drop beams corrected)

DXF Detailing output of Columns

Improvement

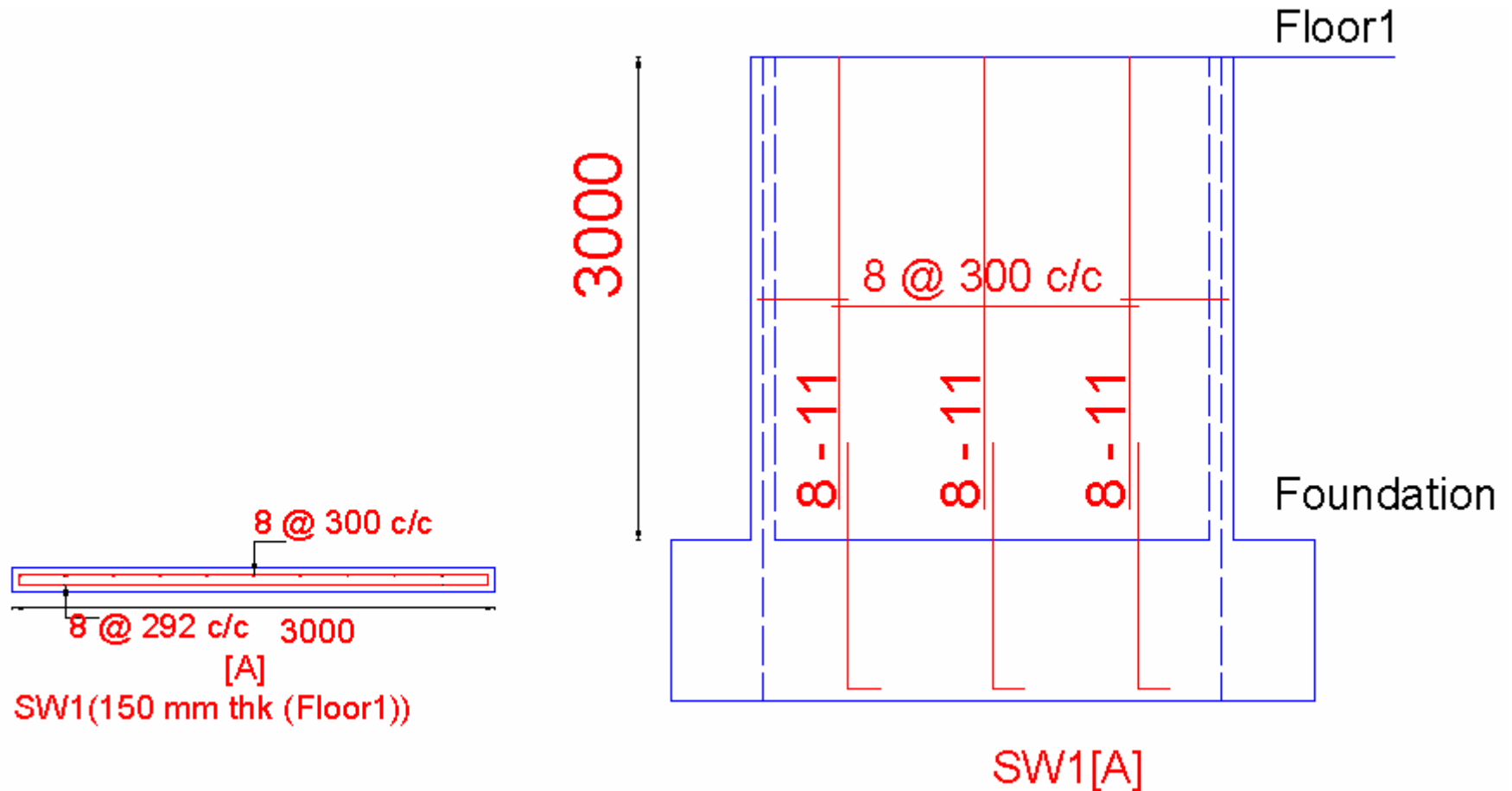
 <p>A square cross-section of a column with a height of 300 and a width of 230. It shows 6 main steel bars (3 on each side) and ties. The drawing is oriented with the width dimension at the bottom.</p>	 <p>A square cross-section of a column with a height of 300 and a width of 230. It shows 6 main steel bars (3 on each side) and ties. The drawing is oriented with the width dimension at the bottom. A centerline symbol is present on the right side of the column.</p>
DIMENSION : 230 x 300	DIMENSION : 230 x 300
MAIN STEEL : 6 #12	MAIN STEEL : 6 #12
TIES: #8 @190	TIES: #8 @190
COLUMN ID : C1	COLUMN ID : C2
COLUMN GROUP-NAME : CG1	COLUMN GROUP-NAME : CG2

Improvements in Column cross section drawing and column centerline drawing.



DXF Detailing output of Shearwalls

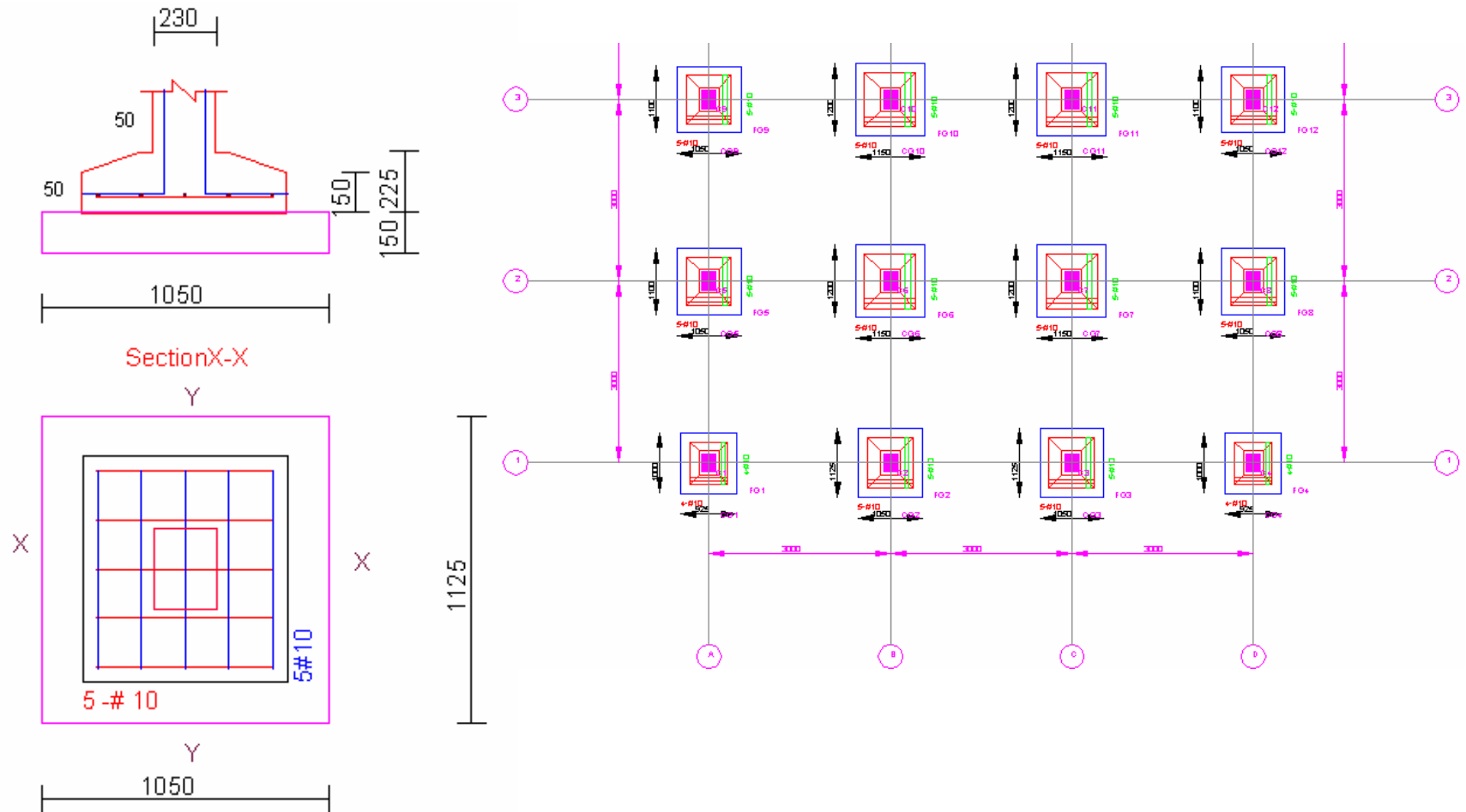
Improvement



Improvements in Shearwall detailing drawing.
(No overlapping of text with drawings)



DXF Detailing output of Footings

Improvement


Improvements in Footing cross section drawing and Footing centerline drawing.

(No overlapping of text with drawings)

