RCDC (SACD) V9.0.0

Release Notes

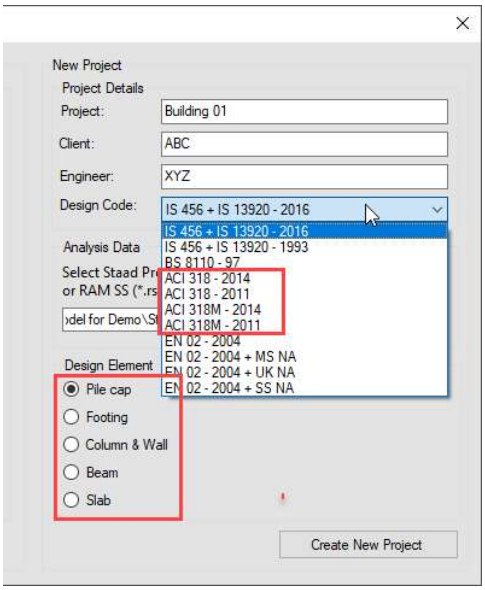
RCDC V9.0.0 is here with new features enhancing the design and addition of new codes. The newly introduced features are:

No	Module	Description
1	General	ACI 318-2011 & ACI 318-2014 with English Unit for All Modules
2	General	Defects

RCDC (SACD) V9.0.0

General — ACI 318-2011 & ACI 318-2014 with English Unit for All Modules

The ACI 318-2011 and ACI 318-2014 (English Unit System) have been added to the RCDC. Now these codes are available for all design modules. The design and detailing have been updated with option of the rebar reference numbering as per the US standard.



Following are sample design outputs:

Column:

Effective Length Calculation

Calculation Along Major Axis Of Column

Joint	Column Stiffness	Beam Sizes		Beam Stiffness		ψ
		Beam 1 (Length xWidth xDepth)	Beam 2 (Length xWidth xDepth)	Beam 1	Beam 2	
	lbs-ft	in	in	lbs-ft	lbs-ft	
Bottom	345.2	No Beam	No Beam	-	-	1
Top	345.2	314.96 x15.75 x31.5	No Beam	154.66	-	4.797

Sway Condition (as per Stability Index) = Non Sway
Effective Length Factor along Major Axis = 0.87

Calculation Along Minor Axis Of Column

Joint	Column Stiffness	Beam Sizes		Beam Stiffness		ψ
		Beam 1 (Length xWidth xDepth)	Beam 2 (Length xWidth xDepth)	Beam 1	Beam 2	
	lbs-ft	in	in	lbs-ft	lbs-ft	
Bottom	345.2	No Beam	No Beam	-	-	1
Top	345.2	224.8 x15.75 x31.5	No Beam	216.69	-	3.424

Sway Condition (as per Stability Index) = Non Sway
Effective Length Factor along Minor axis = 0.87

Resultant Moment (Combined Action)

Moment Capacity Check

Pt Calculated	=	1.03	
Reinforcement Provided	=	12-#6 + 8-#5	
Load Angle	=	$Tan^{-1}(Muy/Mux)$	
	=	82.57	deg
MRes	=	153	kip-ft
(φ) MCap	=	520.03	kip-ft
Capacity Ratio	=	MRes / MCap	
	=	0.294 < 1	

Beam Capacity At Joint:

Beams at Level: Top Joint

Beam Size	Beam angle w.r.t. column Ly	Torsion moment	Moment Capacity Beam at Top				Moment Capacity Beam at Bottom				Resultant Moment			
(in)	(deg)	(kip-ft)	Mu (kip-ft)	Ast req (in^2)	Ast pro (in^2)	Mu cap (kip-ft)	Mu (kip-ft)	Ast req (in^2)	Ast pro (in^2)	Mu cap (kip-ft)	Top @ D (kip-ft)	Top @ B (kip-ft)	Bot @ D (kip-ft)	Bot @ B (kip-ft)
15.75 x 31.5	0	0	203.16	1.6	1.77	224.13	38.52	1.32	1.37	175.99	224.13	0	175.99	0
15.75 x 31.5	270	0	205.07	1.61	1.77	224.13	107.18	1.32	1.37	175.99	0	224.13	0	175.99

Effective Moment for Column

	Mu Major (Along D) (kip-ft)		Mu Minor (Along B) (kip-ft)	
	Left	Right	Left	Right
Top	-	224.13	224.13	-
Bottom	-	175.99	175.99	-

Moment Along D:

Mntx	=	MAX((left,Bot + Right,Top), (left,Top + Right,Bot))	
	=	224.12	kip-ft

Moment Along B:

Mnty	=	MAX((Left,Top + Right,Bot), (Right,Top + Left,Bot))	
	=	224.12	kip-ft

Joint Checks:

1. Flexure Strength Of Joint:

Moment Capacity Calculations for Beam

Beam Size	Beam angle w.r.t. column Ly	Torsion moment	Moment Capacity Beam at Top				Moment Capacity Beam at Bottom				Resultant Moment			
(in)	(deg)	(kip-ft)	Mu (kip-ft)	Ast Req (in^2)	Ast Pro (in^2)	Mu Cap (kip-ft)	Mu (kip-ft)	Ast Req (in^2)	Ast Pro (in^2)	Mu Cap (kip-ft)	Top @ D (kip-ft)	Top @ B (kip-ft)	Bot @ D (kip-ft)	Bot @ B (kip-ft)
15.75 x 31.5	0	0	291.95	2.33	2.52	314.21	0	1.32	1.37	175.99	314.21	0	175.99	0
15.75 x 31.5	270	0	266.91	2.12	2.13	267.66	85.19	1.32	1.37	175.99	0	267.66	0	175.99

Effective Moment for Column

	Mu Major (Along D) (kip-ft)		Mu Minor (Along B) (kip-ft)	
	Left	Right	Left	Right
Top	-	314.21	267.66	-
Bottom	-	175.99	175.99	-

Moment Along D:

Mnb	=	MAX((Left Bottom + Right Top), (Left Top + Right Bottom))
	=	314.21 kip-ft
Mnc Top	=	477.61 kip-ft
Mnc Bottom	=	498.14 kip-ft
Mncd	=	975.75 kip-ft
Mncd	>=	1.2 x Mnb, Hence OK

Moment Along B:

Mnb	=	MAX((Left Top + Right Bottom), (Right Top + Left Bottom))
	=	267.66 kip-ft
Mnc Top	=	477.61 kip-ft
Mnc Bottom	=	498.14 kip-ft
Mncb	=	975.75 kip-ft
Mncb	>=	1.2 x Mnb, Hence OK

2. Shear Strength of Joint:

Beams Along D

Angle w.r.t Column Ly	Reference Location	Width	Depth	Ast Pro Top	Ast Pro Bot
(deg)		(in)	(in)	(in^2)	(in^2)
0	Right	15.75	31.5	2.52	1.37

Shear Checks

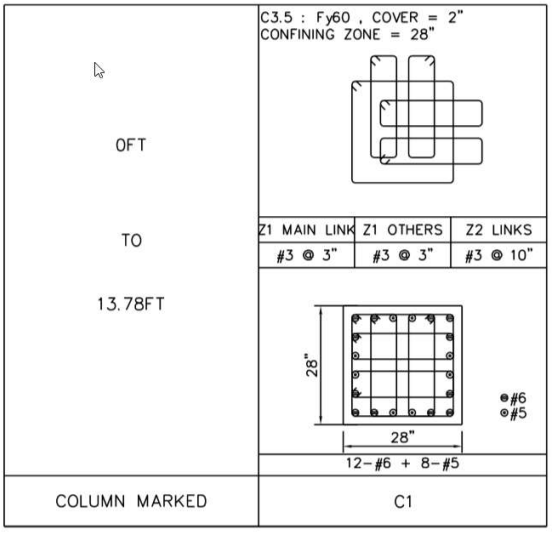
Conditions	AST-Total	V-Reinf	Vuy	Vj (Shear Demand)	B'	D'	Aj	Vn'	Vj < Vn'
	(in^2)	(kip)	(kip)	(kip)	(in)	(in)	(in^2)	(kip)	
Right Top + Left Bottom	2.52	189.05	95.77	93.28	27.56	27.56	759.5	541.11	OK
Left Top + Right Bottom	1.37	103.09	95.77	7.32	27.56	27.56	759.5	541.11	OK

Beams Along B

Angle w.r.t Column Ly	Reference Location	Width	Depth	Ast Pro Top	Ast Pro Bot
(deg)		(in)	(in)	(in^2)	(in^2)
270	Left	15.75	31.5	2.13	1.37

Shear Checks

Conditions	AST-Total	V-Reinf	Vux	Vj (Shear Demand)	B'	D'	Aj	Vn'	Vj < Vn'
	(in^2)	(kip)	(kip)	(kip)	(in)	(in)	(in^2)	(kip)	
Right Top + Left Bottom	1.37	103.09	81.58	21.5	27.56	27.56	759.5	541.11	OK
Left Top + Right Bottom	2.13	159.59	81.58	78.01	27.56	27.56	759.5	541.11	OK



Beams:

For Longitudinal Reinf						
	Beam Bottom			Beam Top		
	Left	Mid	Right	Left	Mid	Right
Critical L/C - RCDC	4	4	-	5	8	4
Mu (kip-ft)	34.32	96.29	-	161.98	7.35	187.62
As (flex) (in2) (C)	0.27	0.76	-	1.29	0.06	1.51
Asc (flex) (in2) (A)	-	-	-	-	-	-
Tu (kip-ft)	11.8	2.95	-	17.7	6.64	17.7
Tcr/4 (kip-ft)	8.91	8.91	-	8.91	8.91	8.91
Al, min(in2)(Tor.) (D)	1.71	-	-	1.65	-	1.65
Al (in2) (Tor.) (E)	0.55	-	-	0.61	-	0.61
Al (Dist) (in2) (D)	0.29	-	-	0.27	-	0.27
Ast (in2)	0.73	1.01	0.98	1.57	0.59	1.78
AstPrv (in2)	0.98	1.37	0.98	1.57	0.98	1.96
Reinforcement	5-#4	5-#4 2-#4	5-#4	5-#4 3-#4	5-#4	5-#4 5-#4

For Transverse Reinf			
	Left	Mid	Right
Critical L/C - RCDC	1	1	1
PtPrv (%)	0.346	0.303	0.433
Vu (kip)	28.59	19.15	31.59
Mu-Sect (kip-ft)	111.53	21.67	150.82
V^{D+L} (kip)	24.07	0	23.87
Mh (kip-ft)	268.91	0	331.69
Ms (kip-ft)	171.39	0	171.39
Sway-Right (kip)	3.06	0	44.88
Sway-Left (kip)	42.46	0	5.49
Vu-Sway (kip)	42.46	0	44.88
Vud (kip)	42.46	0	44.88
Φ Vc (kip)	29.78	30.39	29.81
Vs (kip)	-	-	2.96
Av (in2/ft)	0.16	0.16	0.16
Tu (kip-ft)	20.65	10.33	20.65
Aoh (in2)	379.66	379.66	379.66
At (in2/ft)	0.2	0.16	0.2
Legs	2	2	2
Stirrup Rebar	3	3	3
At Torsion (in2/ft)	0.2	0.16	0.2
Av Total Reqd (in2/ft)	0.2	0.16	0.23
Asv Reqd (in2/ft)	0.2	0.16	0.23
SCalc (in)	3	10	3
SPrv (in)	3	10	3
Av Total Prv (in2/ft)	0.87	0.26	0.87

Maximum Spacing Criteria:

Basic

Spc1	=	16.7	in
Spc2	=	12	in

For Torsion

(X1 = 21.4, Y1 = 33.4)

Spc3	=	12	in
Spc4=(X1+Y1)/4	=	13.7	in

For Ductility (Special Frames)

Left Section, Right Section

Spc5 = 6 x Small Longitudinal Dia	=	3	in
Spc6 = d / 4	=	8.3	in
Spc7	=	5.9	in
Provided Spacing	=	3	in

Mid Section

Provided Spacing	=	11.8	in

BEAM SCHEDULE (C3:Fy60) (LEVEL: 20ft)

BEAM NUMBERS	SIZE		BOTTOM REINFORCEMENT			TOP REINFORCEMENT			SHEAR STIRRUPS			SFR	DIAGONAL	REMARKS
	B	D	LEFT	MID SPAN	RIGHT	LEFT	MID SPAN	RIGHT	LEFT	MID SPAN	RIGHT			
B1,B4	24"	36"	6-#5	6-#5	6-#5	+ 7-#5 4-#4	4-#5	+ 7-#5 4-#4	25-2L-#3@3" C/C	14-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B2,B3	24"	36"	5-#5	5-#5	5-#5	+ 7-#5 4-#4	4-#5	+ 7-#5 4-#4	25-2L-#3@3" C/C	14-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B19	12"	30"	+ 4-#5 4-#5	+ 4-#5 4-#5	+ 4-#5 4-#5	+ 3-#8 3-#8	2-#8	+ 3-#8 3-#8	21-2L-#4@3" C/C	17-2L-#4@9" C/C	21-2L-#4@3" C/C	-	-	-
B20	24"	36"	+ 7-#4 2-#4	+ 7-#4 2-#4	+ 7-#4 2-#4	+ 6-#6 2-#5	4-#6	+ 6-#6 2-#5	25-2L-#3@3" C/C	14-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B21	24"	36"	4-#5	6-#5	6-#5	+ 6-#6 2-#5	4-#6	+ 6-#6 2-#5	25-2L-#3@3" C/C	14-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B22	24"	36"	6-#5	6-#5	6-#5	+ 6-#6 2-#5	4-#6	+ 6-#6 2-#5	25-2L-#3@3" C/C	14-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B23	24"	36"	7-#4	+ 7-#4 2-#4	+ 7-#4 5-#4	+ 6-#6 2-#5	4-#6	+ 6-#6 6-#5	25-2L-#3@3" C/C	14-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B24	24"	36"	+ 7-#4 5-#4	+ 7-#4 7-#4	+ 7-#4 4-#4	+ 6-#6 6-#5	4-#6	+ 6-#6 6-#5	25-2L-#3@3" C/C	24-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B25	24"	36"	7-#4	+ 7-#4 5-#4	+ 5-#4 5-#4	+ 7-#5 5-#5	4-#5	+ 7-#5 5-#5	25-2L-#3@3" C/C	18-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B26	24"	36"	7-#4	+ 7-#4 4-#4	+ 5-#4 5-#4	+ 7-#5 5-#5	4-#5	+ 7-#5 5-#5	25-2L-#3@3" C/C	18-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-
B27	24"	36"	+ 5-#4 5-#4	+ 7-#4 5-#4	+ 7-#4 2-#4	+ 7-#5 5-#5	4-#5	+ 7-#5 4-#5	25-2L-#3@3" C/C	18-2L-#3@10" C/C	25-2L-#3@3" C/C	-	-	-

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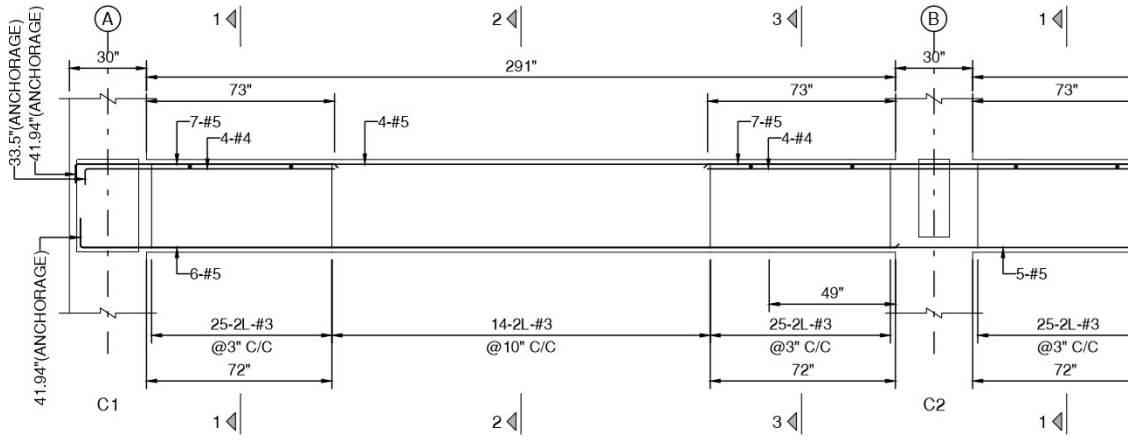

B1:24"x36"

(SCALE: H = 1:48 / V = 1:48)

Footing:

Check For Maximum Soil Pressure:

Critical Load Combination	=	[9] : (LOAD 1: LOAD CASE 1) +0.75 (LOAD 2: LOAD CASE 2) -0.525 (LOAD 4: LOAD CASE 4 EQ-Y)	
Pcomb	=	246.42	kip
P	=	Pcomb + Effective Self Weight	
P	=	335.83	kip
Mx	=	-13.48	kip-ft
My	=	-72.86	kip-ft
P/A	=	4303.86	lbs/ft^2
Mx/Zx	=	-117.38	lbs/ft^2
My/Zy	=	-634.29	lbs/ft^2
Maximum Soil Pressure	=	5055.53	lbs/ft^2
Allowable Soil Pressure	=	1 X 4000 + 1149.95	lbs/ft^2
	=	5149.95	lbs/ft^2

Check For Minimum Soil Pressure:

Critical Load Combination	=	[12] : 0.6 (LOAD 1: LOAD CASE 1) +0.6 (LOAD 4: LOAD CASE 4 EQ-Y)	
Pcomb	=	101.13	kip
P	=	Pcomb + Effective Self Weight x 0.6	
P	=	154.77	kip
Mx	=	-11.82	kip-ft
My	=	62.6	kip-ft
P/A	=	1983.49	lbs/ft^2
Mx/Zx	=	-102.76	lbs/ft^2
My/Zy	=	544.9	lbs/ft^2
Minimum Soil Pressure	=	1335.83	lbs/ft^2
	>	0	

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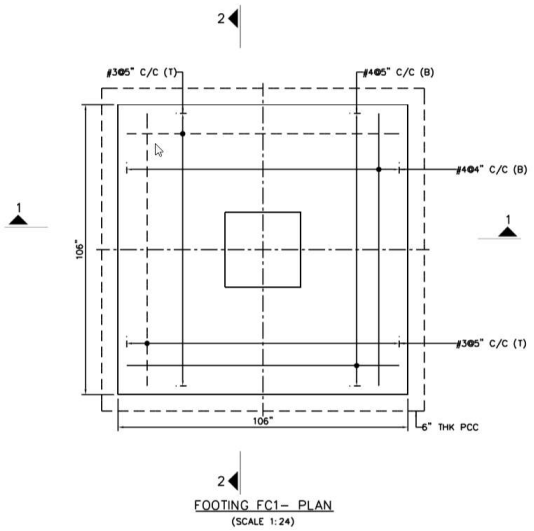
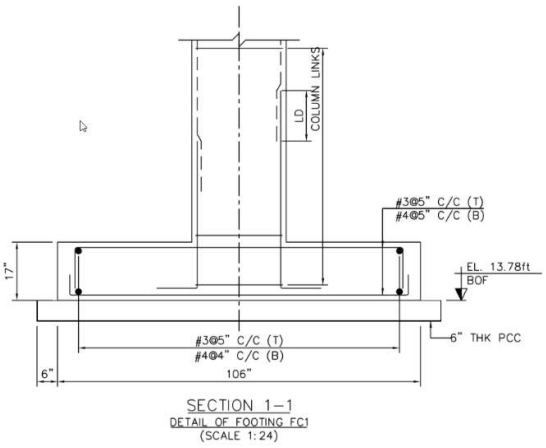
Footing No	=	FC1	
Column No	=	C1	
Design Code	=	ACI 318 - 2014	
Depth of founding layer	=	10	ft
Density of Soil	=	115	lbs/ft^3
Soil Bearing Capacity	=	4000	lbs/ft^2
Gross Bearing Capacity	=	5150	lbs/ft^2
Permissible SBC Increase for EQ	=	0	%
Permissible SBC Increase for Wind	=	0	%
Live Load Reduction	=	0	%
Design cross section by	=	Maximum pressure	
Footing Type	:	Pad	
Footing Size (L X B X D)	:	106in X 106in X 17in	
Effective Self Weight	=	89.41 kip	

Design Table (C1):

L/C	Analysis Forces			Ptotal = P + Eff. Self Wt (kip)	Soil Pressures			Max. Soil Pressures (lbs/ft^2)	Min. Soil Pressures (lbs/ft^2)	SBC Increase (%)	Permissible Gross SBC (lbs/ft^2)	Loss of Contact (%)	FOS for Buoyancy	FOS for Sliding	Overturning Factor B	Overturning Factor L
	P (kip)	Mx (kip-ft)	My (kip-ft)		P/A (lbs/ft^2)	Mx/Zxx (lbs/ft^2)	My/Zyy (lbs/ft^2)									
1	207.61	-15.55	-11.31	297.02	3806.58	-135.34	-98.37	4040.29	3572.87	0	5150	0	8.54	26.57	74.51	102.44
2	232.01	-15.7	-12.43	321.42	4119.23	-136.59	-108.19	4364.01	3874.46	0	5150	0	9.24	28.77	80.67	101.88
3	194.56	46.07	-12.77	283.96	3639.29	401	-111.11	4151.4	3126.97	0	5150	0	8.17	26.43	23.89	86.2
4	220.66	-77.16	-9.85	310.07	3973.87	-671.68	-85.63	4731.18	3216.36	0	5150	0	8.92	11.24	15.76	123.5
5	180.26	-18.45	69.64	269.67	3456.12	-160.61	606.3	4222.83	2689.21	0	5150	0	7.76	12.64	56.24	14.9
6	216.12	30.56	-13.24	305.53	3915.6	266.08	-115.29	4296.97	3534.44	0	5150	0	8.79	38.47	39.14	90.31
7	235.7	-61.87	-11.05	325.11	4166.64	-538.64	-96.28	4801.35	3531.73	0	5150	0	9.35	14.07	20.73	116.04
8	205.4	-17.83	48.56	294.81	3778.18	-155.18	422.72	4356.28	3200.28	0	5150	0	8.48	19.07	64.4	23.65
9	246.42	-13.48	-72.86	335.83	4303.86	-117.38	-634.29	5055.53	3552.4	0	5150	0	9.66	12.96	98.64	18.25
10	113.38	43.49	-8.04	167.02	2140.55	378.65	-69.97	2588.96	1691.93	0	5150	0	4.8	14.33	17.06	92.34
11	135.75	-62.14	-5.53	189.4	2427.31	-540.93	-48.25	3016.48	1838.13	0	5150	0	5.45	8.29	13.53	152.02
12	101.13	-11.82	62.6	154.77	1983.49	-102.76	544.9	2631.36	1335.83	0	5150	0	4.45	7.35	58.23	10.99
13	148	-6.84	-76.17	201.65	2584.36	-59.52	-663.11	3306.79	1861.73	0	5150	0	5.8	7.51	130.87	11.75



FOOTING FC1– PLAN
(SCALE 1:24)



SECTION 1–1
DETAIL OF FOOTING FC1
(SCALE 1:24)

Pile-cap:

Check for Maximum Load on One Pile:

Critical Load Combination	:	[9] : (LOAD 1: LOAD CASE 1) +0.75 (LOAD 2: LOAD CASE 2) -0.525 (LOAD 4: LOAD CASE 4 EQ-Y)	
Pcomb	=	246.42	kip
Ptotal	=	Pcomb + (1 x Pilecap Wt.)	
	=	278.41	kip
Mx	=	-13.48	kip-ft
My	=	-72.86	kip-ft
P	=	Ptotal/ No. of Piles	
	=	92.8	kip
Pmx	=	-0.93	kip
Pmy	=	8.74	kip
Maximum load on pile	=	100.61	kip
Allowable load on pile	=	200 x 1	
	=	200	kip

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Check for Maximum Load on Pile Group:

Critical Load Combination	:	[2] : (LOAD 1: LOAD CASE 1) +(LOAD 2: LOAD CASE 2)	
Pcomb	=	232.01	kip
Ptotal	=	Pcomb + (1 x Pilecap Wt.)	
	=	264	kip
Mx	=	-15.7	kip-ft
My	=	-12.43	kip-ft
Maximum load on pile group	=	264	kip
Allowable load on pile group	=	3 x 200 x 1.1	
	=	660.04	kip

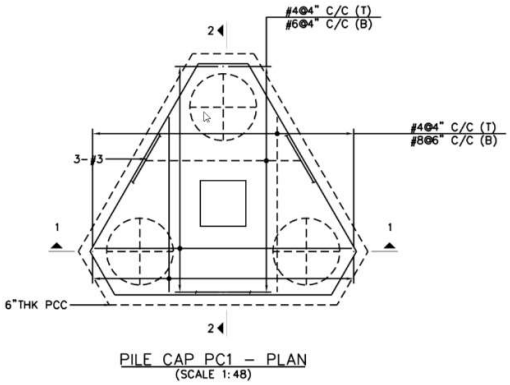
Check for Maximum shear on Pile Group:

Critical Load Combination	:	[4] : (LOAD 1: LOAD CASE 1) -0.7 (LOAD 3: LOAD CASE 3 EQ-X)	
Pcomb	=	220.66	kip
Ptotal	=	Pcomb + (1 x Pilecap Wt.)	
	=	252.65	kip
Mx	=	-77.16	kip-ft
My	=	-9.85	kip-ft
Vx	=	2.01	kip
Vy	=	-9.59	kip
Maximum shear on pile group	=	$sqrt(2.01^2 + -9.59^2)$	
	=	9.8	kip
Shear capacity of pile group	=	3 x 50 x 1 x 1	

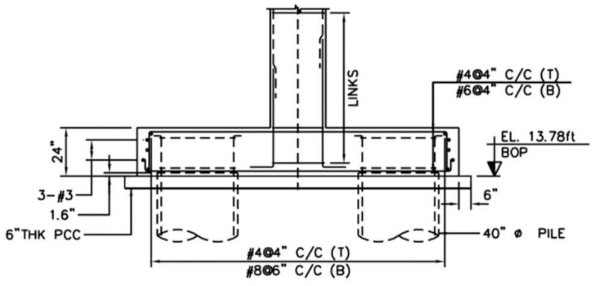
Pilecap No	:	PC1	
Column No	:	C1	
Design Code	:	ACI 318 - 2014	
Pile No	:	3	
Depth of founding layer	:	12	ft
Density of Soil	=	115	lbs/ft^3
Permissible SBC Increase for EQ	=	0	%
Permissible SBC Increase for Wind	=	0	%
Live Load Reduction	=	0	%
Pile Load Reduction Factor	=	0	%
Pile Over Loading Factor	=	10	%
Pile Group Overloading Factor	=	10	%
Permissible Load on Group of Piles	=	660.04	kip
Pilecap Size	:	Tri 130.02 X 24	in
Effective Self Weight	=	31.99	kip

Design Table (C1):

Load Combination	Analysis Forces			P total	Max. Load on One Pile	Max. Load on Group of Pile	Shear Load on Group of Pile	Tension on Pile	Permissible Shear Capacity	Pile Capacity	Pile Capacity Increase Factor	Permissible Load on one Pile	Permissible Tension Load on one Pile
	P (kip)	Mx (kip-ft)	My (kip-ft)	(kip)	(kip)	(kip)	(kip)	(kip)	(kip)	(kip)	(%)	(kip)	(kip)
1	207.61	-15.54	-11.31	239.6	82.02	239.6	3.95	-	150	200	1.1	220	50
2	232.01	-15.69	-12.43	264	90.18	264	3.98	-	150	200	1.1	220	50
3	194.56	46.07	-12.77	226.54	80.24	0	3.77	-	150	200	1.1	220	50
4	220.66	-77.16	-9.85	252.65	94.91	0	9.8	-	150	200	1.1	220	50
5	180.26	-18.45	69.64	212.25	77.83	0	7.44	-	150	200	1.1	220	50
6	216.12	30.55	-13.24	248.11	86.41	0	2.82	-	150	200	1.1	220	50
7	235.7	-61.87	-11.05	267.69	97.8	0	8.26	-	150	200	1.1	220	50
8	205.4	-17.83	48.56	237.39	83.72	0	5.46	-	150	200	1.1	220	50
9	246.42	-13.48	-72.86	278.41	100.61	0	9.3	-	150	200	1.1	220	50
10	113.38	43.48	-8.04	132.57	48.17	0	3.69	-	150	200	1.1	220	50
11	135.75	-62.14	-5.53	154.95	60.26	0	7.46	-	150	200	1.1	220	50
12	101.13	-11.82	62.6	120.32	46.8	0	6.53	-	150	200	1.1	220	50
13	148	-6.84	-76.17	167.2	64.4	0	8.89	-	150	200	1.1	220	50



PILE CAP PC1 – PLAN
(SCALE 1:48)



SECTION 1-1
DETAIL OF PC1
(SCALE 1:48)

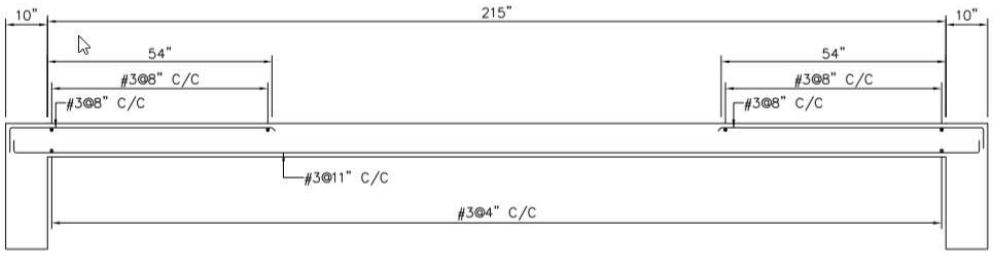
Bentley
Advancing Infrastructure

RCDC (SACD) V9.0.0

Slab:

Slab No. :		**S1**	
Level	=	53.34ft	
Design Code	=	ACI 318 - 2014	
Grade Of Concrete	=	C3	
Grade Of Steel	=	Fy60	
Clear Cover	=	1.000	in
Long Span, Ly	=	26.250	ft
Short Span, Lx	=	18.730	ft
Imposed Load	=	30.000	lbs/ft^2
Live Load, Qk	=	30.000	lbs/ft^2
Slab Thickness	=	8.000	in
Effective Depth Along LX, Deffx	=	6.800	in
Effective Depth Along LY, Deffy	=	6.410	in
Self Weight	=	106.100	lbs/ft^2
Total Load, TL (ultimate)	=	211.320	lbs/ft^2
Span	=	2-Way	
Load Combination	=	1.2 DL + 1.6 LL	

	Short Span		Long Span	
	Side1	Side2	Side1	Side2
Beam				
B (in)	15.75	17.72	17.72	15.75
D (in)	31.5	31.5	31.5	31.5
Ib (in^4) $x10^3$	41	46.13	46.13	41
Adjacent Slab				
Thk (in)	-	11	8	-
Span (in)	-	350.39	314.96	-
Ib (in^4) $x10^3$	4.79	24.23	13.44	6.72
αf lx, αf ly	8.55	1.9	3.43	6.1
αf	5			
Ln (in)	208.03		298.27	
L2 (in)	165.87		120.75	
Effective Width (in)	78.75		56.19	
Total BM (kip-ft)	109.72		164.21	
Bottom				
Moment Coefficent	0.57		0.57	
Distributed Moment (kip-ft)	62.54		93.6	
CS Moment (kip-ft)	39.37		58.92	
MS Moment (kip-ft)	23.17		34.67	



SLAB S1
(TWO WAY) (8" THK)

SECTION A–A

RCDC (SACD) V9.0.0

General Defects

Following are the Major defects have been resolved in this release.

- TFS ID – 1032235 & 1033944
  Boundary wall design as per IS 13920-2016, Issue related to Minimum Horizontal percentage reinforcement in mid zone has been updated

Design Of Links

Main Links

Links in the zone where special confining links are not required			
Normal Links			
Horizontal reinforcement as per type of wall			
hw	=	4200	mm
Lw	=	2400	mm
hw/Lw	=	1.75	
Type of wall	=	1 <= 1.75 <= 2, hence, Intermediate wall	
tw	=	300	mm
Ph	=	0.0025	
Pvweb	=	0.0025	
Pth min	=	0.42	%
Diameter of main horizontal steel	=	8	mm
Thus, Spacing	=	125	mm
Spacing of horizontal reinforcement is minimum of following			
D / 5	=	480	mm
3 x B	=	900	mm
Maximum	=	450	mm
Spacing considered	=	125	mm

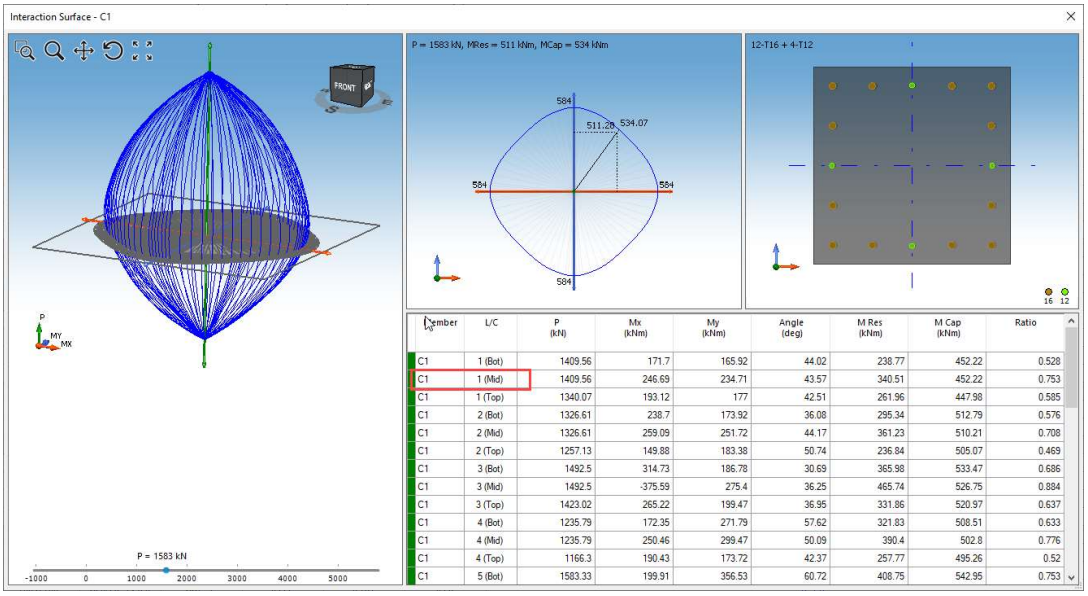
- TFS ID – 1033952
  Footing Shear Reinforcement in Drawings for Stepped and On-raft footings has been matched with the design.
- TFS ID – 1036913
  Sloped footing self-weight calculation formula updated in BOQ calculations.
- TFS ID – 1033948
  Euro Code, Beam Axial+ Biaxial design. Qualification for detailing as per Beam or column is now checked against 0.1 fcd

Check For Design

Critical L/C - RCDC	=	1	
Ned	=	77.65	kN
MY (Major Axis Mu)	=	171.75	kNm
MX (Minor Axis Mu)	=	2.44	kNm
Axial Stress	=	Pu / (b_w x h)	
	=	0.24	N/sqmm
0.1 x fcd	=	1.33	N/sqmm
Axial Stress	<	0.1 x fcd, Detailing Provision Of Beam Applied	

- TFS ID – 1034066
  Euro Code Ductile (beam design Minimum Reinforcement pt issue resolved.
- TFS ID – 1040509
  Euro Code PM curve Interaction Surface representation improved for Accidental load combinations with appropriate material safety factors.
- TFS ID – 1040511
  Euro Code PM curve Interaction Surface table for slenderness column: Location has been updated to “Mid” from “Top”.

RCDC (SACD) V9.0.0



Member	L/C	P (kN)	Mx (kNm)	My (kNm)	Angle (deg)	M Res (kNm)	M Cap (kNm)	Ratio
C1	1 (Bot)	1409.56	171.7	165.92	44.02	238.77	452.22	0.528
C1	1 (Mid)	1409.56	246.69	234.71	43.57	340.51	452.22	0.753
C1	1 (Top)	1340.07	193.12	177	42.51	261.96	447.98	0.585
C1	2 (Bot)	1326.61	238.7	173.92	36.08	295.34	512.79	0.576
C1	2 (Mid)	1326.61	259.09	251.72	44.17	361.23	510.21	0.708
C1	2 (Top)	1257.13	149.88	183.38	50.74	236.84	505.07	0.469
C1	3 (Bot)	1492.5	314.73	186.78	30.69	365.98	533.47	0.686
C1	3 (Mid)	1492.5	-375.59	275.4	36.25	465.74	526.75	0.884
C1	3 (Top)	1423.02	265.22	199.47	36.95	331.86	520.97	0.637
C1	4 (Bot)	1235.79	172.35	271.79	57.62	321.83	508.51	0.633
C1	4 (Mid)	1235.79	250.46	299.47	50.09	390.4	502.8	0.776
C1	4 (Top)	1166.3	190.43	173.72	42.37	257.77	495.26	0.52
C1	5 (Bot)	1583.33	199.91	356.53	60.72	408.75	542.95	0.753

- TFS ID – 1041921

  ACI Beam Flexural design report modifications done to cover all possible cases considered in design.

Mubal	: 1079.63	kNm
As,min (flex) (B)	: 973.33	sqmm
As,nominal (Bn)	: 379.6	sqmm
As,min(user input)(B')	: 379.6	sqmm

For Longitudinal Reinf						
	Beam Bottom			Beam Top		
	Left	Mid	Right	Left	Mid	Right
Critical L/C - RCDC	-	4	-	5	8	4
Mu (kNm)	-	130.58	-	219.89	9.89	254.16
As (flex) (sqmm) (C)	-	483.11	-	825.72	35.88	960.05
Asc (flex) (sqmm) (A)	-	-	-	-	-	-
Tu (kNm)	-	-	-	-	-	-
Tcr/4 (kNm)	-	-	-	-	-	-
Al, min(sqmm)(Tor.) (D)	-	-	-	-	-	-
Al (sqmm) (Tor.) (E)	-	-	-	-	-	-
Al (Dist) (sqmm) (D)	-	-	-	-	-	-
Ast (sqmm)	506.72	642.53	506.72	973.33	379.6	973.33
AstPrv (sqmm)	633.4	886.76	633.4	992.8	633.4	992.8
Reinforcement	5-#13	5-#13 2-#13	5-#13	5-#16	5-#13	5-#16

Note: Calculation of Ast

Ast	=	Max {B, C+D, A+D} (for Mu > 0 and C x 1.33 > B)
Ast	=	Max{B', C x 1.33 + D, A+D} (for Mu > 0 and C x 1.33 < B)
Ast	=	Bn (for Mu = 0)

Where,

A	=	Asc (flex)	=	Compression reinforcement required for bending moment
B	=	As,min (flex)	=	Min area of flexural reinforcement
Bn	=	As,nominal	=	Nominal area of reinforcement
C	=	As (flex)	=	Total area of longitudinal reinforcement calculated at a given section
D	=	Al (Dist)	=	Distributed longitudinal torsional reinforcement at section considered
Ast (Dist) (sqmm)			=	Max(Al,min (Tor), Al (Tor)) x ((2B) / (2B + 2D))