

DISEÑO TANQUE EN CONCRETO REFORZADO

**ANAPOIMA CUNDINAMARCA
VEREDA EL CONSUELO
PROYECTO ASUARCOPSA**



**ANDREY FABIAN GARCIA CABRERA
C.C.80.122.739 BTA
MP.25202122786
INGENIERO CIVIL ECI**

BOGOTÁ D.C., NOVIEMBRE DE 2024

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GENERALIDADES

El objeto de la presente consultoría es el diseño de un tanque en concreto con el fin de tratar agua potable, Se tomaran como referencia los lineamientos dados por el Reglamento Colombiano de Construcción Sismoresistente NSR-10.

La estructura está compuesta por losas y muros unidas entre si, el tanque trabaja en las dos direcciones principales X y Z.

Para el análisis y diseño de la estructura se generó un modelo tridimensional, usando el programa **STAAD PRO**

Parámetros de diseño:

- Requerimientos de la Norma Sismo Resistente Colombiana NSR-10, para estructuras con capacidad de disipación de energía MODERADA.

1. DESCRIPCION DE LA ESTRUCTURA

Es un tanque en concreto reforzado con paredes de 0.30 m , losa de fondo de 0.30 , se toman estas dimensiones siguiendo lo establecido para el manejo de retracción de fraguado tal como se muestra acontinuacion:

Para este tipo de estructuras propias de ingeniería ambiental y sanitaria la resistencia mínima especificada del concreto a la compresión f_c' no debe ser menor de 28 MPa. No se define una resistencia máxima especificada a la compresión, a menos que se indique explícitamente en alguna sección del Reglamento NSR-10, el tanque se soporta sobre zapatas, columnas y vigas.

C.23-C.14.6 — Espesor mínimo de muros

C.23-C.14.6.1 — El espesor de los muros que no sean de carga cuya estabilidad vertical no se derive de curvatura del muro en planta no debe ser menor de 150 mm, ni menor de 1/30 de la distancia mínima entre elementos que le proporcionen apoyo lateral.

C.23-C.14.6.2 — El espesor mínimo de muros convencionales de concreto reforzado construidos en sitio que estén en contacto con líquidos y tengan más de 3 m de altura debe ser 300 mm.

C.23-C.15.14 — Losas sobre el terreno en estructuras ambientales

C.23-C.15.14.1 — Alcance — En estructuras ambientales se consideran tres tipos de losas sobre el terreno:

1. Losas estructurales de cimentación
2. Losas sobre el terreno
3. Losas-membrana

Los requisitos para losas estructurales de fundación se encuentran dentro de los requisitos contenidos en el Título C de la NSR-10. Esta sección cubre los requisitos para losas sobre el terreno y losas-membrana de estructuras ambientales de concreto reforzado. El diseño de este tipo de losas está basado en la premisa de que la losa trasmite las cargas directamente a la sub-base sin distribuirlas, o solo distribuye cargas de ruedas de vehículos a la sub-base como los pavimentos.

C.23-C.15.14.2 — Sub-base — La sub-base debe tener la suficiente resistencia, rigidez, y estabilidad para soportar las cargas a que se va a ver sometida.

C.23-C.15.14.2.2 — La posibilidad de asentamientos de la sub-base debe tenerse en cuenta en el diseño de la losa.

Asi se propone colocar un ciclópeo en suelo como mejoramiento y asi pasar mejor las cargas a al suelo.

ACTERISTICAS DEL SISTEMA ESTRUCTURAL

Sistema estructural (A.3.2 NSR-10):

Tipo de diseño sísmico (A.3.4.2 NSR-10):

MATERIALES

Concreto columnas:

Refuerzo principal ($\phi > 1/2"$)

Refuerzo para cortante ($\phi < 1/2"$)

Porticos de concreto

Análisis dinámico elástico

$f_c = 28.0$ MPa

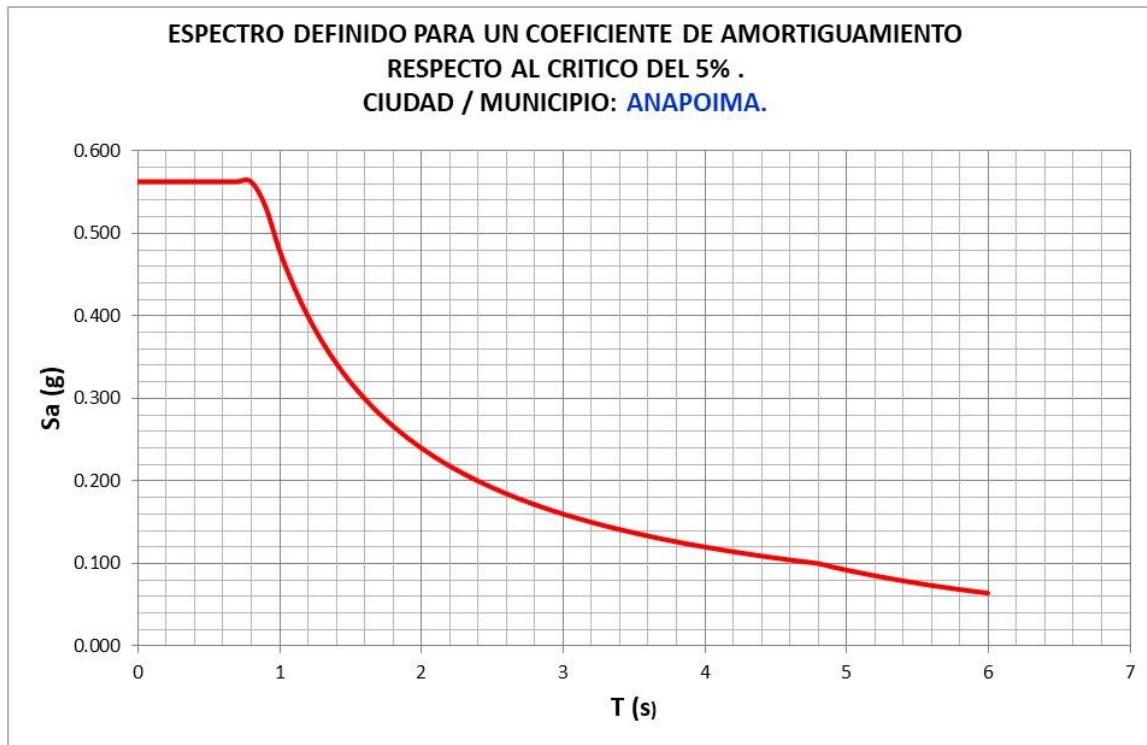
$f_y = 420.0$ MPa

$f_y = 420.0$ MPa

2. CARACTERISTICAS Y PARAMETROS SISMICOS DE DISEÑO.

ESPECTRO ELASTICO DE ACELERACIONES DE DISEÑO		
	Ciudad / Municipio	Anapoima
	Departamento	Cundinamarca
	Zona de amenaza sismica	Media
	Grupo de uso	1
	Coeficiente de importancia, I	1
	Tipo de perfil de suelo	D
	Aa (g)	0.15
	Av (g)	0.2
	Fa	1.5
	Fv	2
	To	0.178
	Tc	0.853
	TL	4.8

3. ESPECTRO DE DISEÑO



4. CAPACIDAD DE DISIPACION DE ENERGIA

CAPACIDAD DE DISIPACION DE ENERGIA

Sistema estructural (A.1.3.5 NSR-10):

Porticos de concreto

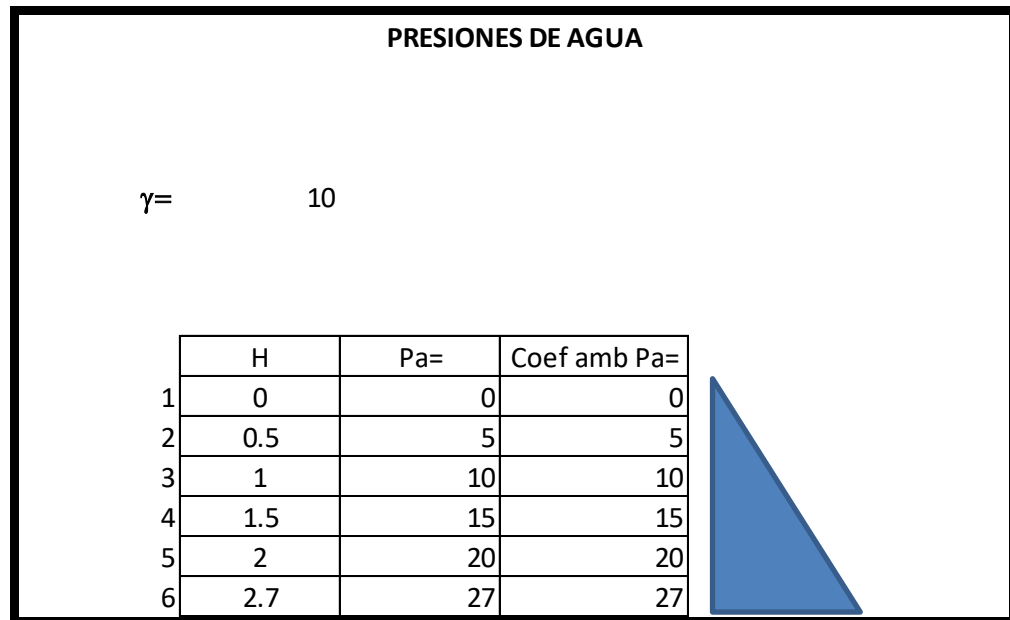
Coeficientes basicos

(Tablas A.3-1 a 4 NSR-10)

Coeficiente de capacidad de disipacion

Ro = 2.00

5. CARGAS DIFERENTES A LAS SOLICITACIONES SISMICAS



cargas vivas 1.80 KN/M2

6. COMBINACIONES DE CARGA

COMBINACIONES DE CARGA - CONCRETO					
ANALISIS DINAMICO ESPECTRAL					
1	CARGAS MUERTAS	D			
2	CARGAS VIVAS	L	$R_C =$	2.00	
3	FLUIDO	F			
4	SISMO X				
LOAD COMBINATION		5	1.4 D +1.4 F		
1	1.4	3	1.4		
LOAD COMBINATION		6	1.2 D + 1.2 F +1.6 L		
1	1.2	3	1.2	2	1.600
LOAD COMBINATION		7	1.2 D + 1.6 L		
1	1.2	2	1.6		
LOAD COMBINATION		8	0.9 D +1.6 F		
1	0.9	3	1.6		
LOAD COMBINATION		9	1.2 D + 1.0 L + 0.5 SX		
1	1.2	2	1	4	0.500
LOAD COMBINATION		10	0.9 D + 0.5 SX +1.6 F		
1	0.9	4	0.500	3	1.600

7. DISEÑO ELEMENTOS DE CONCRETO PAREDES.

TABLA C.23-C.7.12.2.1 — CUANTÍAS MÍNIMAS DE RETRACCIÓN DE FRAGUADO Y VARIACIÓN DE TEMPERATURA

Distancia entre juntas para compensar movimientos [†]	Cuantías mínimas de refuerzo de retracción de fraguado y variación de temperatura	
	$f_y = 240 \text{ MPa}$	$f_y = 420 \text{ MPa}$
menos de 6 m	0.0030	0.0030
6 a menos de 9 m	0.0040	0.0030
9 a menos de 12 m	0.0050	0.0040
12 m o más	0.0060*	0.0050*

[†]La distancia es entre juntas de expansión y juntas de contracción de profundidad total. Cuando se trate de juntas de contracción de profundidad parcial las cuantías mínimas se deben determinar multiplicando la distancia real entre juntas de contracción de profundidad parcial por 1.5.

*Corresponde a la cuantía máxima a emplear cuando no se proveen juntas para compensar movimientos.

DISEÑO ELEMENTOS				
DONDE POR FLEXION $\phi=0.90$				
MOMENTOS Y CUANTIAS				
	TAPA TRANSVERSAL EN X CARA SUPERIOR	TAPA TRANSVERSAL EN X CARA INFERIOR	TAPA LONGITUDINAL EN Z CARA SUPERIOR	TAPA LONGITUDINAL EN Z CARA INFERIOR
Momento	1.12 KN-m/m	1.12 KN-m/m	1.12 KN-m/m	1.12 KN-m/m
/0.30 m	3.73 KN-m	3.73 KN-m	3.73 KN-m	3.73 KN-m
Momento	3.73 KN-m	3.73 KN-m	3.73 KN-m	3.73 KN-m
f'c=	28.0 MPa	28.0 MPa	28.0 MPa	28.0 MPa
fy=	420.0 MPa	420.0 MPa	420.0 MPa	420.0 MPa
h=	0.40 m.	0.40 m.	0.40 m.	0.40 m.
b´=	1.00 m.	1.00 m.	1.00 m.	1.00 m.
d=	0.325 m.	0.350 m.	0.325 m.	0.325 m.
t=	0.075 m.	0.050 m.	0.075 m.	0.075 m.
ρ tomado	0.001500	0.001500	0.001500	0.001500
As mm²	487.50	525.00	487.50	487.50
Barra	1/2	1/2	1/2	1/2
Area Barra toma	129.00	129.00	129.00	129.00
CANT	3.78	4.07	3.78	3.78
VAR Cada	0.26	0.25	0.26	0.26
	1/2	1/2	1/2	1/2
Colocar Cada	0.18	0.18	0.18	0.18

*****END OF BEAM DESIGN*****

106. DESIGN ELEMENT ALL

ACI 318-11 ELEMENT DESIGN SUMMARY
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ELEMENT	LONG. REINF (SQ.MM/MM)	MOM-X /LOAD (KN-MM/MM)	TRANS. REINF (SQ.MM/MM)	MOM-Y /LOAD (KN-MM/MM)
---------	---------------------------	---------------------------	----------------------------	---------------------------

FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 36 TOP : Longitudinal direction - Only minimum steel required.
 36 BOT: Longitudinal direction - Only minimum steel required.
 36 TOP : Transverse direction - Only minimum steel required.
 36 BOT: Transverse direction - Only minimum steel required.
 36 TOP : 0.266 0.73 / 9 0.266 0.32 / 9
 BOT: 0.266 0.09 / 6 0.266 0.03 / 8

FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 37 TOP : Longitudinal direction - Only minimum steel required.

37 BOTT: Longitudinal direction - Only minimum steel required.
 37 TOP : Transverse direction - Only minimum steel required.
 37 BOTT: Transverse direction - Only minimum steel required.
 37 TOP : 0.266 0.73 / 10 0.266 0.44 / 10
 BOTT: 0.266 0.28 / 7 0.266 0.00 / 8

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 38 TOP : Longitudinal direction - Only minimum steel required.
 38 BOTT: Longitudinal direction - Only minimum steel required.
 38 TOP : Transverse direction - Only minimum steel required.
 38 BOTT: Transverse direction - Only minimum steel required.
 38 TOP : 0.266 0.29 / 10 0.266 0.10 / 8
 BOTT: 0.266 0.66 / 7 0.266 0.23 / 9

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 39 TOP : Longitudinal direction - Only minimum steel required.
 39 BOTT: Longitudinal direction - Only minimum steel required.
 39 TOP : Transverse direction - Only minimum steel required.
 39 BOTT: Transverse direction - Only minimum steel required.
 39 TOP : 0.266 0.43 / 10 0.266 0.38 / 5
 BOTT: 0.266 0.23 / 7 0.266 0.00 / 9

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 40 TOP : Longitudinal direction - Only minimum steel required.
 40 BOTT: Longitudinal direction - Only minimum steel required.
 40 TOP : Transverse direction - Only minimum steel required.
 40 BOTT: Transverse direction - Only minimum steel required.
 40 TOP : 0.266 0.62 / 9 0.266 0.09 / 10
 BOTT: 0.266 0.41 / 6 0.266 0.16 / 7

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 41 TOP : Longitudinal direction - Only minimum steel required.
 41 BOTT: Longitudinal direction - Only minimum steel required.
 41 TOP : Transverse direction - Only minimum steel required.

 41 BOTT: Transverse direction - Only minimum steel required.
 41 TOP : 0.266 0.41 / 9 0.266 0.25 / 5
 BOTT: 0.266 0.04 / 6 0.266 0.05 / 10

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 42 TOP : Longitudinal direction - Only minimum steel required.
 42 BOTT: Longitudinal direction - Only minimum steel required.
 42 TOP : Transverse direction - Only minimum steel required.
 42 BOTT: Transverse direction - Only minimum steel required.
 42 TOP : 0.266 0.00 / 7 0.266 0.23 / 5
 BOTT: 0.266 0.53 / 10 0.266 0.79 / 9

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 43 TOP : Longitudinal direction - Only minimum steel required.
 43 BOTT: Longitudinal direction - Only minimum steel required.
 43 TOP : Transverse direction - Only minimum steel required.
 43 BOTT: Transverse direction - Only minimum steel required.
 43 TOP : 0.266 0.01 / 7 0.266 0.31 / 5
 BOTT: 0.266 0.36 / 10 0.266 0.42 / 9

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 44 TOP : Longitudinal direction - Only minimum steel required.
 44 BOTT: Longitudinal direction - Only minimum steel required.
 44 TOP : Transverse direction - Only minimum steel required.
 44 BOTT: Transverse direction - Only minimum steel required.
 44 TOP : 0.266 0.27 / 10 0.266 0.75 / 10
 BOTT: 0.266 0.19 / 7 0.266 1.14 / 7

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 45 TOP : Longitudinal direction - Only minimum steel required.

45 BOTT: Longitudinal direction - Only minimum steel required.
 45 TOP : Transverse direction - Only minimum steel required.
 45 BOTT: Transverse direction - Only minimum steel required.
 45 TOP : 0.266 0.12 / 10 0.266 0.09 / 10
 BOTT: 0.266 0.48 / 7 0.266 2.66 / 7

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 46 TOP : Longitudinal direction - Only minimum steel required.
 46 BOTT: Longitudinal direction - Only minimum steel required.
 46 TOP : Transverse direction - Only minimum steel required.
 46 BOTT: Transverse direction - Only minimum steel required.
 46 TOP : 0.266 0.38 / 10 0.266 0.81 / 10
 BOTT: 0.266 0.19 / 7 0.266 1.18 / 7

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 47 TOP : Longitudinal direction - Only minimum steel required.
 47 BOTT: Longitudinal direction - Only minimum steel required.
 47 TOP : Transverse direction - Only minimum steel required.
 47 BOTT: Transverse direction - Only minimum steel required.

 47 TOP : 0.266 0.00 / 10 0.266 0.93 / 10
 BOTT: 0.266 0.18 / 8 0.266 0.17 / 7

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 48 TOP : Longitudinal direction - Only minimum steel required.
 48 BOTT: Longitudinal direction - Only minimum steel required.
 48 TOP : Transverse direction - Only minimum steel required.
 48 BOTT: Transverse direction - Only minimum steel required.
 48 TOP : 0.266 0.00 / 10 0.266 0.53 / 10
 BOTT: 0.266 0.35 / 10 0.266 0.22 / 6

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 49 TOP : Longitudinal direction - Only minimum steel required.
 49 BOTT: Longitudinal direction - Only minimum steel required.
 49 TOP : Transverse direction - Only minimum steel required.
 49 BOTT: Transverse direction - Only minimum steel required.
 49 TOP : 0.266 0.51 / 10 0.266 1.06 / 10
 BOTT: 0.266 0.19 / 7 0.266 1.18 / 7

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 50 TOP : Longitudinal direction - Only minimum steel required.
 50 BOTT: Longitudinal direction - Only minimum steel required.
 50 TOP : Transverse direction - Only minimum steel required.
 50 BOTT: Transverse direction - Only minimum steel required.
 50 TOP : 0.266 0.27 / 10 0.266 0.44 / 10
 BOTT: 0.266 0.47 / 7 0.266 2.64 / 7

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 300.000 MM
 51 TOP : Longitudinal direction - Only minimum steel required.
 51 BOTT: Longitudinal direction - Only minimum steel required.
 51 TOP : Transverse direction - Only minimum steel required.
 51 BOTT: Transverse direction - Only minimum steel required.
 51 TOP : 0.266 0.38 / 10 0.266 0.61 / 10
 BOTT: 0.266 0.18 / 7 0.266 1.14 / 7

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 200.000 MM
 70 TOP : Longitudinal direction - Only minimum steel required.
 70 BOTT: Longitudinal direction - Only minimum steel required.
 70 TOP : Transverse direction - Only minimum steel required.
 70 BOTT: Transverse direction - Only minimum steel required.
 70 TOP : 0.177 0.19 / 7 0.177 0.00 / 10
 BOTT: 0.177 0.19 / 10 0.177 0.15 / 9

 FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 200.000 MM
 71 TOP : Longitudinal direction - Only minimum steel required.

71 BOTTT: Longitudinal direction - Only minimum steel required.
 71 TOP : Transverse direction - Only minimum steel required.
 71 BOTTT: Transverse direction - Only minimum steel required.

71 TOP : 0.177 0.32 / 9 0.177 0.00 / 10
 BOTTT: 0.177 0.01 / 8 0.177 0.13 / 6

FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 200.000 MM

72 TOP : Longitudinal direction - Only minimum steel required.
 72 BOTTT: Longitudinal direction - Only minimum steel required.
 72 TOP : Transverse direction - Only minimum steel required.
 72 BOTTT: Transverse direction - Only minimum steel required.

72 TOP : 0.177 0.75 / 7 0.177 0.55 / 6
 BOTTT: 0.177 0.00 / 8 0.177 0.00 / 6

FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 200.000 MM

73 TOP : Longitudinal direction - Only minimum steel required.
 73 BOTTT: Longitudinal direction - Only minimum steel required.
 73 TOP : Transverse direction - Only minimum steel required.
 73 BOTTT: Transverse direction - Only minimum steel required.

73 TOP : 0.177 0.63 / 6 0.177 0.57 / 6
 BOTTT: 0.177 0.13 / 10 0.177 0.00 / 6

FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 200.000 MM

74 TOP : Longitudinal direction - Only minimum steel required.
 74 BOTTT: Longitudinal direction - Only minimum steel required.
 74 TOP : Transverse direction - Only minimum steel required.
 74 BOTTT: Transverse direction - Only minimum steel required.

74 TOP : 0.177 0.19 / 7 0.177 0.00 / 6
 BOTTT: 0.177 0.20 / 10 0.177 0.14 / 6

FY: 419.997 MPA FC: 28.000 MPA COVER (TOP): 19.050 MM
 COVER (BOTTOM): 40.000 MM TH: 200.000 MM

75 TOP : Longitudinal direction - Only minimum steel required.
 75 BOTTT: Longitudinal direction - Only minimum steel required.
 75 TOP : Transverse direction - Only minimum steel required.
 75 BOTTT: Transverse direction - Only minimum steel required.

75 TOP : 0.177 0.30 / 9 0.177 0.00 / 6
 BOTTT: 0.177 0.02 / 8 0.177 0.14 / 6

8. DISEÑO COLUMNAS Y VIGAS

CONCRETE DESIGN
 134. CODE ACI
 135. TRACK 2 ALL
 136. CLB 0.04 MEMB 1 TO 29 44 TO 54
 137. CLS 0.04 ALL
 138. FC 28000 MEMB 1 TO 29 44 TO 54
 139. FYMAIN 420000 MEMB 1 TO 29 44 TO 54
 140. FYSEC 420000 ALL
 141. MAXMAIN 25 ALL
 142. MINSEC 10 ALL
 143. MINMAIN 25 MEMB 1 TO 18
 144. DESIGN COLUMN 1 TO 18

ACI 318-11 COLUMN NO. 1 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI

4 - 25 MM 2.182 6 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	103.33	0.28	0.00159

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	103.33	0.24	0.00139

	Pn	Mn	Pn	Mn	(@ Z)
P0	2156.26	84.11	1078.13	145.62	
*	1976.57	99.36	898.44	150.43	
*	1796.88	111.55	718.75	147.70	
Pn,max *	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
Pn *	1257.82	139.71	179.69	107.41	
NOMINAL *	Pn	Mn	Pn	Mn	(@ Y)
AXIAL *	2156.26	84.11	1078.13	145.62	
COMPRESSION *	1976.57	99.36	898.44	150.43	
Pb *Mb	1796.88	111.55	718.75	147.70	
*	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
* M0 Mn	1257.82	139.71	179.69	107.41	
* BENDING					
P-tens * MOMENT					

ACI 318-11 COLUMN NO. 2 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI

4 - 25 MM 2.182 6 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	4.32	0.01	0.00091

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	4.32	0.01	0.00065

Pn	Mn	Pn	Mn	(@ Z)
----	----	----	----	--------

			2156.26	84.11	1078.13	145.62	
P0	*		1976.57	99.36	898.44	150.43	
	*		1796.88	111.55	718.75	147.70	
Pn,max	*		1617.19	122.31	539.06	136.85	
	*		1437.50	131.56	359.38	123.19	
Pn	*		1257.82	139.71	179.69	107.41	
NOMINAL	*	Pn	Mn	Pn	Mn		(@ Y)
AXIAL	*		2156.26	84.11	1078.13	145.62	
COMPRESSION	*		1976.57	99.36	898.44	150.43	
Pb	-----*Mb		1796.88	111.55	718.75	147.70	
	*		1617.19	122.31	539.06	136.85	
	*		1437.50	131.56	359.38	123.19	
	*	M0 Mn,	1257.82	139.71	179.69	107.41	
	*	BENDING					
P-tens	*	MOMENT					

ACI 318-11 COLUMN NO. 3 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 25 MM	2.182	6	END	0.650

(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	105.62	0.16	0.00088

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	105.62	0.00	0.00000

			Pn	Mn	Pn	Mn	(@ Z)
			2156.26	84.11	1078.13	145.62	
P0	*		1976.57	99.36	898.44	150.43	
	*		1796.88	111.55	718.75	147.70	
Pn,max	*		1617.19	122.31	539.06	136.85	
	*		1437.50	131.56	359.38	123.19	
Pn	*		1257.82	139.71	179.69	107.41	
NOMINAL	*	Pn	Mn	Pn	Mn		(@ Y)
AXIAL	*		2156.26	84.11	1078.13	145.62	
COMPRESSION	*		1976.57	99.36	898.44	150.43	
Pb	-----*Mb		1796.88	111.55	718.75	147.70	
	*		1617.19	122.31	539.06	136.85	
	*		1437.50	131.56	359.38	123.19	
	*	M0 Mn,	1257.82	139.71	179.69	107.41	
	*	BENDING					
P-tens	*	MOMENT					

ACI 318-11 COLUMN NO. 4 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
AREA OF STEEL REQUIRED = 906.3 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 25 MM	2.182	6	END	0.650

(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)

TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	0.46	0.01	0.00852

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	0.46	0.00	0.00000

		Pn	Mn	Pn	Mn	(@ Z)
P0		2156.26	84.11	1078.13	145.62	
	*	1976.57	99.36	898.44	150.43	
	*	1796.88	111.55	718.75	147.70	
	* Pn,max	1617.19	122.31	539.06	136.85	
Pn		1437.50	131.56	359.38	123.19	
	*	1257.82	139.71	179.69	107.41	
	* NOMINAL	Pn	Mn	Pn	Mn	(@ Y)
	* AXIAL	2156.26	84.11	1078.13	145.62	
COMPRESSION		1976.57	99.36	898.44	150.43	
	* Pb	1796.88	111.55	718.75	147.70	
	* Pb	1617.19	122.31	539.06	136.85	
	* Pb	1437.50	131.56	359.38	123.19	
P-tens		1257.82	139.71	179.69	107.41	
	* M0 Mn,					
	* BENDING					
	* P-tens	MOMENT				

ACI 318-11 COLUMN NO. 5 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI

4 - 25 MM 2.182 6 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	103.33	0.28	0.00159

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	103.33	0.24	0.00139

		Pn	Mn	Pn	Mn	(@ Z)
P0		2156.26	84.11	1078.13	145.62	
	*	1976.57	99.36	898.44	150.43	
	*	1796.88	111.55	718.75	147.70	
	* Pn,max	1617.19	122.31	539.06	136.85	
Pn		1437.50	131.56	359.38	123.19	
	*	1257.82	139.71	179.69	107.41	
	* NOMINAL	Pn	Mn	Pn	Mn	(@ Y)
	* AXIAL	2156.26	84.11	1078.13	145.62	
COMPRESSION		1976.57	99.36	898.44	150.43	
	* Pb	1796.88	111.55	718.75	147.70	
	* Pb	1617.19	122.31	539.06	136.85	
	* Pb	1437.50	131.56	359.38	123.19	
P-tens		1257.82	139.71	179.69	107.41	
	* M0 Mn,					
	* BENDING					
	* P-tens	MOMENT				

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      | * BENDING
P-tens| * MOMENT
      |

ACI 318-11 COLUMN NO. 6 DESIGN RESULTS
=====

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI
-----
4 - 25 MM 2.182 6 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

-----
P0 Pn max P-bal. M-bal. e-bal. (MM)
2919.93 2335.94 821.12 152.41 185.6
M0 P-tens. Des.Pn Des.Mn e/h
90.23 -824.66 4.32 0.01 0.00091
-----

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

-----
P0 Pn max P-bal. M-bal. e-bal. (MM)
2919.93 2335.94 821.12 152.41 185.6
M0 P-tens. Des.Pn Des.Mn e/h
90.23 -824.66 4.32 0.01 0.00065
-----

Pn Mn Pn Mn (@ Z )
| 2156.26 84.11 1078.13 145.62
P0 | * 1976.57 99.36 898.44 150.43
| * 1796.88 111.55 718.75 147.70
Pn,max | * 1617.19 122.31 539.06 136.85
| * 1437.50 131.56 359.38 123.19
Pn | * 1257.82 139.71 179.69 107.41
NOMINAL | * Pn Mn Pn Mn (@ Y )
AXIAL | * 2156.26 84.11 1078.13 145.62
COMPRESSION | * 1976.57 99.36 898.44 150.43
Pb | * 1796.88 111.55 718.75 147.70
| * 1617.19 122.31 539.06 136.85
| * 1437.50 131.56 359.38 123.19
| * M0 Mn, 1257.82 139.71 179.69 107.41
| * BENDING
P-tens | * MOMENT
|

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ACI 318-11 COLUMN NO. 7 DESIGN RESULTS
=====

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI
-----
4 - 25 MM 2.182 6 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

-----
P0 Pn max P-bal. M-bal. e-bal. (MM)
2919.93 2335.94 821.12 152.41 185.6
M0 P-tens. Des.Pn Des.Mn e/h
90.23 -824.66 110.08 0.00 0.00000
-----

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

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P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	110.08	0.12	0.00063

	Pn	Mn	Pn	Mn	(@ Z)
P0	2156.26	84.11	1078.13	145.62	
*	1976.57	99.36	898.44	150.43	
*	1796.88	111.55	718.75	147.70	
Pn,max	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
Pn	1257.82	139.71	179.69	107.41	
NOMINAL	Pn	Mn	Pn	Mn	(@ Y)
AXIAL	2156.26	84.11	1078.13	145.62	
COMPRESSION	1976.57	99.36	898.44	150.43	
Pb	1796.88	111.55	718.75	147.70	
*	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
*	1257.82	139.71	179.69	107.41	
*	M0	Mn,			
*	BENDING				
P-tens	MOMENT				

ACI 318-11 COLUMN NO. 8 DESIGN RESULTS
=====

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
AREA OF STEEL REQUIRED = 906.3 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 25 MM	2.182	9	END	0.650

(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	0.54	0.00	0.00000

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	0.54	0.14	0.09248

	Pn	Mn	Pn	Mn	(@ Z)
P0	2156.26	84.11	1078.13	145.62	
*	1976.57	99.36	898.44	150.43	
*	1796.88	111.55	718.75	147.70	
Pn,max	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
Pn	1257.82	139.71	179.69	107.41	
NOMINAL	Pn	Mn	Pn	Mn	(@ Y)
AXIAL	2156.26	84.11	1078.13	145.62	
COMPRESSION	1976.57	99.36	898.44	150.43	
Pb	1796.88	111.55	718.75	147.70	
*	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
*	1257.82	139.71	179.69	107.41	
*	M0	Mn,			
*	BENDING				
P-tens	MOMENT				

ACI 318-11 COLUMN NO. 9 DESIGN RESULTS
=====

FY - 420.0 FC - 28.0 MPA, RECT SIZE - 250.0 X 300.0 MMS, TIED

ONLY MINIMUM STEEL IS REQUIRED.
 AREA OF STEEL REQUIRED = 750.0 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 25 MM	2.618	6	END	0.650

(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
 TIE BAR NUMBER 10 SPACING 250.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2562.93	2050.34	674.40	139.45	206.8
M0	P-tens.	Des.Pn	Des.Mn	e/h
88.59	-824.66	94.01	0.00	0.00000

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2562.93	2050.34	589.51	104.85	177.9
M0	P-tens.	Des.Pn	Des.Mn	e/h
69.62	-824.66	94.01	0.00	0.00000

	Pn	Mn	Pn	Mn	(@ Z)
P0	1892.63	73.50	946.31	131.23	
P0 *	1734.91	87.27	788.59	136.06	
*	1577.19	98.41	630.88	137.48	
Pn,max	1419.47	108.38	473.16	128.45	
*	1261.75	117.13	315.44	116.88	
Pn	1104.03	125.00	157.72	103.38	
NOMINAL					(@ Y)
AXIAL	1892.63	58.41	946.31	98.22	
COMPRESSION	1734.91	69.24	788.59	101.28	
Pb	1577.19	77.92	630.88	104.12	
*	1419.47	85.47	473.16	99.69	
*	1261.75	90.78	315.44	91.00	
* M0 Mn	1104.03	94.79	157.72	80.81	
BENDING					
P-tens					
MOMENT					

ACI 318-11 COLUMN NO. 10 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, RECT SIZE - 250.0 X 300.0 MMS, TIED
 ONLY MINIMUM STEEL IS REQUIRED.
 AREA OF STEEL REQUIRED = 750.0 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 25 MM	2.618	6	END	0.900

(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
 TIE BAR NUMBER 10 SPACING 250.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2562.93	2050.34	674.40	139.45	206.8
M0	P-tens.	Des.Pn	Des.Mn	e/h
88.59	-824.66	-0.70	0.00	-0.00000

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2562.93	2050.34	589.51	104.85	177.9
M0	P-tens.	Des.Pn	Des.Mn	e/h
69.62	-824.66	-0.70	0.00	-0.00000

	Pn	Mn	Pn	Mn	(@ Z)
P0	1892.63	73.50	946.31	131.23	
P0 *	1734.91	87.27	788.59	136.06	
*	1577.19	98.41	630.88	137.48	
Pn,max	1419.47	108.38	473.16	128.45	
*	1261.75	117.13	315.44	116.88	

Pn		*	1104.03	125.00	157.72	103.38	
NOMINAL		*	Pn	Mn	Pn	Mn	(@ Y)
AXIAL		*	1892.63	58.41	946.31	98.22	
COMPRESSION		*	1734.91	69.24	788.59	101.28	
Pb		-----*	Mb	1577.19	77.92	630.88	104.12
		*	1419.47	85.47	473.16	99.69	
		*	1261.75	90.78	315.44	91.00	
		* M0 Mn,	1104.03	94.79	157.72	80.81	
		* BENDING					
P-tens		* MOMENT					

ACI 318-11 COLUMN NO. 11 DESIGN RESULTS
=====

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 25 MM	2.182	6	END	0.650

(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	110.08	0.00	0.00000

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	110.08	0.12	0.00063

		Pn	Mn	Pn	Mn	(@ Z)
P0		2156.26	84.11	1078.13	145.62	
		1976.57	99.36	898.44	150.43	
		1796.88	111.55	718.75	147.70	
Pn,max		1617.19	122.31	539.06	136.85	
		1437.50	131.56	359.38	123.19	
Pn		1257.82	139.71	179.69	107.41	
NOMINAL		Pn	Mn	Pn	Mn	(@ Y)
AXIAL		2156.26	84.11	1078.13	145.62	
COMPRESSION		1976.57	99.36	898.44	150.43	
Pb		1796.88	111.55	718.75	147.70	
		1617.19	122.31	539.06	136.85	
		1437.50	131.56	359.38	123.19	
		* M0 Mn,	1257.82	139.71	179.69	107.41
		* BENDING				
P-tens		* MOMENT				

ACI 318-11 COLUMN NO. 12 DESIGN RESULTS
=====

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
AREA OF STEEL REQUIRED = 906.3 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 25 MM	2.182	9	END	0.650

(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	0.54	0.00	0.00000

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	0.54	0.14	0.09248

	Pn	Mn	Pn	Mn	(@ Z)
P0	2156.26	84.11	1078.13	145.62	
*	1976.57	99.36	898.44	150.43	
*	1796.88	111.55	718.75	147.70	
Pn,max	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
Pn	1257.82	139.71	179.69	107.41	
NOMINAL	Pn	Mn	Pn	Mn	(@ Y)
AXIAL	2156.26	84.11	1078.13	145.62	
COMPRESSION	1976.57	99.36	898.44	150.43	
Pb	1796.88	111.55	718.75	147.70	
*	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
* M0 Mn,	1257.82	139.71	179.69	107.41	
* BENDING					
P-tens	MOMENT				

ACI 318-11 COLUMN NO. 13 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI
4 - 25 MM 2.182 6 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	103.33	0.28	0.00159

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	103.33	0.24	0.00139

	Pn	Mn	Pn	Mn	(@ Z)
P0	2156.26	84.11	1078.13	145.62	
*	1976.57	99.36	898.44	150.43	
*	1796.88	111.55	718.75	147.70	
Pn,max	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
Pn	1257.82	139.71	179.69	107.41	
NOMINAL	Pn	Mn	Pn	Mn	(@ Y)
AXIAL	2156.26	84.11	1078.13	145.62	
COMPRESSION	1976.57	99.36	898.44	150.43	
Pb	1796.88	111.55	718.75	147.70	
*	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
* M0 Mn,	1257.82	139.71	179.69	107.41	
* BENDING					
P-tens	MOMENT				

ACI 318-11 COLUMN NO. 14 DESIGN RESULTS
=====

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI

4 - 25 MM 2.182 6 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	4.32	0.01	0.00091

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	4.32	0.01	0.00065

	Pn	Mn	Pn	Mn	(@ Z)
P0	2156.26	84.11	1078.13	145.62	
*	1976.57	99.36	898.44	150.43	
*	1796.88	111.55	718.75	147.70	
Pn,max *	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
Pn	1257.82	139.71	179.69	107.41	
NOMINAL *	Pn	Mn	Pn	Mn	(@ Y)
AXIAL *	2156.26	84.11	1078.13	145.62	
COMPRESSION *	1976.57	99.36	898.44	150.43	
Pb -----*Mb	1796.88	111.55	718.75	147.70	
*	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
* M0 Mn,	1257.82	139.71	179.69	107.41	
* BENDING					
P-tens * MOMENT					

ACI 318-11 COLUMN NO. 15 DESIGN RESULTS
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FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
ONLY MINIMUM STEEL IS REQUIRED.
AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI

4 - 25 MM 2.182 6 END 0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	105.62	0.16	0.00088

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h

	90.23	-824.66	105.62	0.00	0.00000
			Pn	Mn	Pn Mn (@ Z)
			2156.26	84.11	1078.13 145.62
P0	*		1976.57	99.36	898.44 150.43
	*		1796.88	111.55	718.75 147.70
Pn,max	*		1617.19	122.31	539.06 136.85
	*		1437.50	131.56	359.38 123.19
Pn	*		1257.82	139.71	179.69 107.41
NOMINAL	*		Pn	Mn	Pn Mn (@ Y)
AXIAL	*		2156.26	84.11	1078.13 145.62
COMPRESSION	*		1976.57	99.36	898.44 150.43
Pb	-----*Mb		1796.88	111.55	718.75 147.70
	*		1617.19	122.31	539.06 136.85
	*		1437.50	131.56	359.38 123.19
	*	M0 Mn,	1257.82	139.71	179.69 107.41
	*	BENDING			
P-tens	*	MOMENT			

ACI 318-11 COLUMN NO. 16 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
 AREA OF STEEL REQUIRED = 906.3 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI
4 - 25 MM	2.182	6	END	0.650
(PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)				
TIE BAR NUMBER 10 SPACING 300.00 MM				

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	0.46	0.01	0.00852

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	0.46	0.00	0.00000

			Pn	Mn	Pn	Mn	(@ Z)
			2156.26	84.11	1078.13	145.62	
P0	*		1976.57	99.36	898.44	150.43	
	*		1796.88	111.55	718.75	147.70	
Pn,max	*		1617.19	122.31	539.06	136.85	
	*		1437.50	131.56	359.38	123.19	
Pn	*		1257.82	139.71	179.69	107.41	
NOMINAL	*		Pn	Mn	Pn	Mn	(@ Y)
AXIAL	*		2156.26	84.11	1078.13	145.62	
COMPRESSION	*		1976.57	99.36	898.44	150.43	
Pb	-----*Mb		1796.88	111.55	718.75	147.70	
	*		1617.19	122.31	539.06	136.85	
	*		1437.50	131.56	359.38	123.19	
	*	M0 Mn,	1257.82	139.71	179.69	107.41	
	*	BENDING					
P-tens	*	MOMENT					

ACI 318-11 COLUMN NO. 17 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
 ONLY MINIMUM STEEL IS REQUIRED.
 AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION	REINF PCT.	LOAD	LOCATION	PHI

4 - 25 MM 2.182 6 END 0.650
 (PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
 TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	103.33	0.28	0.00159

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	103.33	0.24	0.00139

	Pn	Mn	Pn	Mn	(@ Z)
P0	2156.26	84.11	1078.13	145.62	
*	1976.57	99.36	898.44	150.43	
*	1796.88	111.55	718.75	147.70	
Pn,max *	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
Pn *	1257.82	139.71	179.69	107.41	
NOMINAL	Pn	Mn	Pn	Mn	(@ Y)
AXIAL *	2156.26	84.11	1078.13	145.62	
COMPRESSION *	1976.57	99.36	898.44	150.43	
Pb -----*Mb	1796.88	111.55	718.75	147.70	
*	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
* M0 Mn,	1257.82	139.71	179.69	107.41	
* BENDING					
P-tens * MOMENT					

ACI 318-11 COLUMN NO. 18 DESIGN RESULTS

FY - 420.0 FC - 28.0 MPA, SQRE SIZE - 300.0 X 300.0 MMS, TIED
 ONLY MINIMUM STEEL IS REQUIRED.
 AREA OF STEEL REQUIRED = 900.0 SQ. MM

BAR CONFIGURATION REINF PCT. LOAD LOCATION PHI

4 - 25 MM 2.182 6 END 0.650
 (PROVIDE EQUAL NUMBER OF BARS ON EACH FACE)
 TIE BAR NUMBER 10 SPACING 300.00 MM

COLUMN INTERACTION: MOMENT ABOUT Z -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	4.32	0.01	0.00091

COLUMN INTERACTION: MOMENT ABOUT Y -AXIS (KN-MET)

P0	Pn max	P-bal.	M-bal.	e-bal. (MM)
2919.93	2335.94	821.12	152.41	185.6
M0	P-tens.	Des.Pn	Des.Mn	e/h
90.23	-824.66	4.32	0.01	0.00065

	Pn	Mn	Pn	Mn	(@ Z)
P0	2156.26	84.11	1078.13	145.62	
*	1976.57	99.36	898.44	150.43	
*	1796.88	111.55	718.75	147.70	
Pn,max *	1617.19	122.31	539.06	136.85	
*	1437.50	131.56	359.38	123.19	
Pn *	1257.82	139.71	179.69	107.41	
NOMINAL	Pn	Mn	Pn	Mn	(@ Y)
AXIAL *	2156.26	84.11	1078.13	145.62	
COMPRESSION *	1976.57	99.36	898.44	150.43	
Pb -----*Mb	1796.88	111.55	718.75	147.70	

	*	1617.19	122.31	539.06	136.85
	*	1437.50	131.56	359.38	123.19
	* M0 Mn,	1257.82	139.71	179.69	107.41
	* BENDING				
P-tens	* MOMENT				

*****END OF COLUMN DESIGN RESULTS*****

145. MINMAIN 12 MEMB 19 TO 29 44 TO 54
146. DESIGN BEAM 19 TO 29 44 TO 54

ACI 318-11 BEAM NO. 19 DESIGN RESULTS
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LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
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1	56.	2 - 12MM	0.	1425.	YES YES

CRITICAL POS MOMENT= 0.42 KN-MET AT 356.MM, LOAD 17					
REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2	246.	2 - 12MM	0.	819.	YES NO

CRITICAL NEG MOMENT= 0.93 KN-MET AT 0.MM, LOAD 14					
REQD STEEL= 13.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3	246.	2 - 12MM	547.	1425.	NO YES

CRITICAL NEG MOMENT= 1.01 KN-MET AT 1425.MM, LOAD 17					
REQD STEEL= 15.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	4./ 10.	0./ 1.	25/ 14
119.	4./ 7.	0./ 1.	25/ 14
238.	4./ 4.	0./ 0.	17/ 22
356.	5./ 2.	0./ 0.	17/ 22
475.	5./ 1.	0./ 0.	17/ 22
594.	4./ 0.	0./ 0.	17/ 0
713.	4./ 0.	0./ 0.	7/ 0
831.	4./ 0.	0./ 0.	17/ 0
950.	4./ 1.	0./ 0.	17/ 22
1069.	4./ 2.	0./ 0.	17/ 22
1188.	3./ 5.	0./ 0.	25/ 14
1306.	3./ 8.	0./ 1.	25/ 14
1425.	2./ 11.	0./ 1.	22/ 17

BEAM NO. 19 DESIGN RESULTS - SHEAR

AT START SUPPORT - Vu= 1.36 KNS Vc= 66.21 KNS Vs= 0.00 KNS
 Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
 STIRRUPS ARE NOT REQUIRED.
 AT END SUPPORT - Vu= 1.54 KNS Vc= 66.21 KNS Vs= 0.00 KNS
 Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
 STIRRUPS ARE NOT REQUIRED.

20J	1425X 310X 300	23J
2No12 H 246. 0.TO 819	2No12 H 246. 547.TO 1425	
2No12 H 56. 0.TO 1425		

2#12	2#12	2#12	2#12
2#12	2#12	2#12	2#12

ACI 318-11 BEAM NO. 20 DESIGN RESULTS

LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 250. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
1	56.	2 - 12MM	172.	1193.	NO NO

CRITICAL POS MOMENT=	0.27 KN-MET AT	713.MM, LOAD	7
REQD STEEL=	4.MM2, RHO=0.0001, RHOMX=0.0212	RHOMN=0.0033	
MAX/MIN/ACTUAL BAR SPACING=	250./ 37./ 138. MMS		
REQD. DEVELOPMENT LENGTH =	344. MMS		

Cracked Moment of Inertia Iz at above location = 7827.2 cm^4

2	246.	2 - 12MM	0.	700.	YES	NO

CRITICAL NEG MOMENT=		0.52 KN-MET	AT	0.MM, LOAD	15	
REQD STEEL=		7.MM2, RHO=0.0001,	RHOMX=0.0212	RHOMN=0.0033		
MAX/MIN/ACTUAL BAR SPACING=		250./	37./	138. MMS		
REQD. DEVELOPMENT LENGTH =		344. MMS				

Cracked Moment of Inertia Iz at above location = 7959.1 cm^4

3	246.	2 - 12MM	665.	1425.	NO	YES

CRITICAL NEG MOMENT=		0.46 KN-MET AT 1425.MM, LOAD			17	
REQD STEEL=		7.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033				
MAX/MIN/ACTUAL BAR SPACING=		250./ 37./ 138. MMS				
REQD. DEVELOPMENT LENGTH =		344. MMS				

Cracked Moment of Inertia Iz at above location = 7959.1 cm^4

REQUIRED REINF. STEEL SUMMARY :

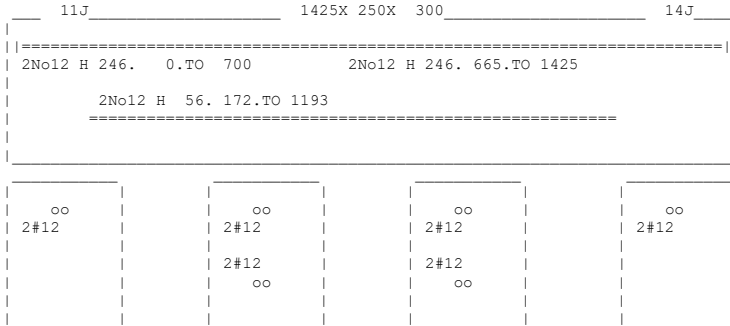
SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	0./ 6.	0./ 1.	0/ 15
119.	0./ 4.	0./ 0.	0/ 15
238.	1./ 2.	0./ 0.	24/ 15
356.	2./ 1.	0./ 0.	16/ 23
475.	2./ 0.	0./ 0.	7/ 0
594.	3./ 0.	0./ 0.	7/ 0
713.	3./ 0.	0./ 0.	7/ 0
831.	3./ 0.	0./ 0.	7/ 0
950.	2./ 0.	0./ 0.	7/ 0
1069.	2./ 0.	0./ 0.	7/ 22
1188.	1./ 1.	0./ 0.	26/ 15

1306. 0./ 3. 0./ 0. 0/ 15
 1425. 0./ 5. 0./ 0. 0/ 17

B E A M N O . 20 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.18 KNS Vc= 53.44 KNS Vs= 0.00 KNS
 Tu= 0.00 KN-MET Tc= 1.7 KN-MET Ts= 0.0 KN-MET LOAD 6
 STIRRUPS ARE NOT REQUIRED.

AT END SUPPORT - Vu= 1.15 KNS Vc= 53.44 KNS Vs= 0.00 KNS
 Tu= 0.00 KN-MET Tc= 1.7 KN-MET Ts= 0.0 KN-MET LOAD 6
 STIRRUPS ARE NOT REQUIRED.



ACI 318-11 BEAM NO . 21 DESIGN RESULTS
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LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
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1	56.	2 - 12MM	0.	1425.	YES YES
----- CRITICAL POS MOMENT= 0.42 KN-MET AT 356.MM, LOAD 17 REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS -----					

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2	246.	2 - 12MM	0.	819.	YES NO
----- CRITICAL NEG MOMENT= 0.93 KN-MET AT 0.MM, LOAD 14 REQD STEEL= 13.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS -----					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3	246.	2 - 12MM	547.	1425.	NO YES
----- CRITICAL NEG MOMENT= 1.01 KN-MET AT 1425.MM, LOAD 17 REQD STEEL= 15.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS -----					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

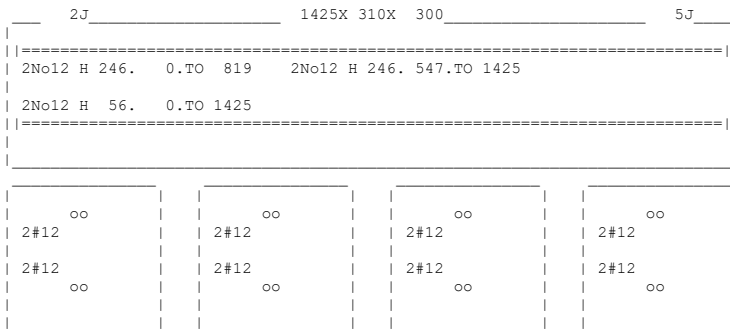
REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	4./ 10.	0./ 1.	25/ 14

119.	4./	7.	0./	1.	25/	14
238.	4./	4.	0./	0.	17/	22
356.	5./	2.	0./	0.	17/	22
475.	5./	1.	0./	0.	17/	22
594.	4./	0.	0./	0.	17/	0
713.	4./	0.	0./	0.	7/	0
831.	4./	0.	0./	0.	17/	0
950.	4./	1.	0./	0.	17/	22
1069.	4./	2.	0./	0.	17/	22
1188.	3./	5.	0./	0.	25/	14
1306.	3./	8.	0./	1.	25/	14
1425.	2./	11.	0./	1.	22/	17

BEAM NO. 21 DESIGN RESULTS - SHEAR

AT START SUPPORT - Vu= 1.36 KNS Vc= 66.21 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.54 KNS Vc= 66.21 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.



ACI 318-11 BEAM NO. 22 DESIGN RESULTS

LEN - 1350. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
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1	56.	2 - 12MM	0.	1350.	YES YES

CRITICAL POS MOMENT= 0.39 KN-MET AT 338.MM, LOAD 13					
REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2	246.	2 - 12MM	0.	794.	YES NO

CRITICAL NEG MOMENT= 0.99 KN-MET AT 0.MM, LOAD 10					
REQD STEEL= 14.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3	246.	2 - 12MM	500.	1350.	NO YES

CRITICAL NEG MOMENT= 0.85 KN-MET AT 1350.MM, LOAD 13					
REQD STEEL= 12.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL(+VE/-VE) (SQ. MM)		MOMENTS (+VE/-VE) (KNS-MET)		LOAD (+VE/-VE)	
0.	3./	11.	0./	1.	21/	10
112.	4./	8.	0./	1.	21/	10
225.	4./	5.	0./	0.	21/	10
338.	4./	3.	0./	0.	13/	18
450.	4./	1.	0./	0.	13/	18
562.	4./	0.	0./	0.	13/	0
675.	3./	0.	0./	0.	6/	0
788.	3./	0.	0./	0.	13/	0
900.	4./	0.	0./	0.	13/	18
1012.	4./	2.	0./	0.	13/	18
1125.	4./	4.	0./	0.	13/	18
1238.	4./	6.	0./	1.	21/	10
1350.	3./	9.	0./	1.	18/	13

B E A M N O. 22 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.39 KNS Vc= 66.03 KNS Vs= 0.00 KNS
Tu= 0.02 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.28 KNS Vc= 66.03 KNS Vs= 0.00 KNS
Tu= 0.02 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

26J	1350X 310X 300	17J
2No12 H 246. 0.TO 794 2No12 H 246. 500.TO 1350		
2No12 H 56. 0.TO 1350		
2#12 2#12 oo	2#12 2#12 oo	2#12 2#12 oo

ACI 318-11 BEAM NO. 23 DESIGN RESULTS
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LEN - 1350. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
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1	56.	2 - 12MM	0.	1246.	YES NO
CRITICAL POS MOMENT= 0.40 KN-MET AT 675.MM, LOAD 7					
REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8078.9 cm⁴

2	246.	2 - 12MM	0.	794.	YES NO
CRITICAL NEG MOMENT= 0.79 KN-MET AT 0.MM, LOAD 11					
REQD STEEL= 11.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

3 246. 2 - 12MM 725. 1350. NO YES

```

|-----|
| CRITICAL NEG MOMENT=        0.47 KN-MET    AT   1350.MM, LOAD   13|
| REQD STEEL=        7.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=    250./    37./   198. MMS        |
| REQD. DEVELOPMENT LENGTH =    344. MMS                            |
|-----|

```

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL(+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD(+VE/-VE)
0.	0./	9.	0./
112.	1./	6.	0./
225.	2./	4.	0.
338.	3./	2.	0.
450.	4./	1.	0.
562.	4./	0.	0.
675.	4./	0.	0.
788.	4./	0.	0.
900.	4./	0.	0.
1012.	3./	0.	0.
1125.	1./	1.	0.
1238.	0./	3.	0.
1350.	0./	5.	0.

BEAM NO. 23 DESIGN RESULTS - SHEAR

AT START SUPPORT - Vu= 1.46 KNS Vc= 63.80 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
 STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.21 KNS Vc= 66.80 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
 STIRRUPS ARE NOT REQUIRED.

```

_____ 23J _____ 1350X 310X 300 _____ 14J _____
|=====|
| 2No12 H 246.    0.TO 794                            2No12 H 246. 725.TO 1350 |
| 2No12 H 56.    0.TO 1246                                                            |
|=====|

```

2#12	2#12	2#12	2#12
2#12	2#12	2#12	2#12

ACI 318-11 BEAM NO. 24 DESIGN RESULTS

LEN - 1350. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
-------	----------------	----------	--------------	------------	----------------------

1 56. 2 - 12MM 0. 1350. YES YES

```

|-----|
| CRITICAL POS MOMENT=        0.39 KN-MET    AT   338.MM, LOAD   13|
| REQD STEEL=        6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=    250./    37./   198. MMS        |
| REQD. DEVELOPMENT LENGTH =    344. MMS                            |
|-----|

```

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

```

2      246.      2 - 12MM      0.      794.      YES NO
|-----|
| CRITICAL NEG MOMENT=      0.99 KN-MET AT      0.MM, LOAD 10 |
| REQD STEEL=      14.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=      250./      37./      198. MMS |
| REQD. DEVELOPMENT LENGTH =      344. MMS |
|-----|

```

Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

```

3      246.      2 - 12MM      500.      1350.      NO YES
|-----|
| CRITICAL NEG MOMENT=      0.85 KN-MET AT      1350.MM, LOAD 13 |
| REQD STEEL=      12.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=      250./      37./      198. MMS |
| REQD. DEVELOPMENT LENGTH =      344. MMS |
|-----|

```

Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

REQUIRED REINF. STEEL SUMMARY :

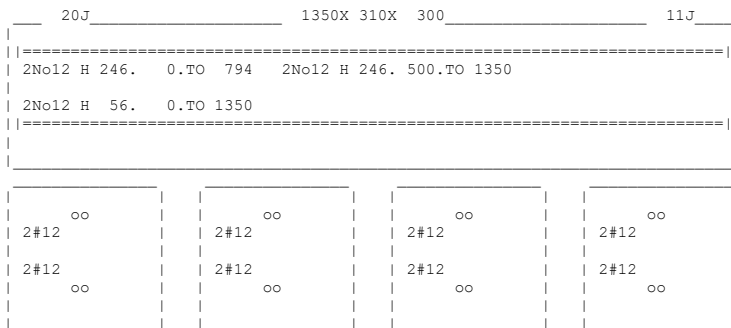
SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	3./ 11.	0./ 1.	21/ 10
112.	4./ 8.	0./ 1.	21/ 10
225.	4./ 5.	0./ 0.	21/ 10
338.	4./ 3.	0./ 0.	13/ 18
450.	4./ 1.	0./ 0.	13/ 18
562.	4./ 0.	0./ 0.	13/ 0
675.	3./ 0.	0./ 0.	6/ 0
788.	3./ 0.	0./ 0.	13/ 0
900.	4./ 0.	0./ 0.	13/ 18
1012.	4./ 2.	0./ 0.	13/ 18
1125.	4./ 4.	0./ 0.	13/ 18
1238.	4./ 6.	0./ 1.	21/ 10
1350.	3./ 9.	0./ 1.	18/ 13

B E A M N O. 24 D E S I G N R E S U L T S - S H E A R

```

AT START SUPPORT - Vu=      1.39 KNS Vc=      66.03 KNS Vs=      0.00 KNS
Tu=      0.02 KN-MET Tc=      2.3 KN-MET Ts=      0.0 KN-MET LOAD      6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu=      1.28 KNS Vc=      66.03 KNS Vs=      0.00 KNS
Tu=      0.02 KN-MET Tc=      2.3 KN-MET Ts=      0.0 KN-MET LOAD      6
STIRRUPS ARE NOT REQUIRED.

```



ACI 318-11 BEAM NO. 25 DESIGN RESULTS

```

LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS
LEVEL HEIGHT BAR INFO FROM TO ANCHOR
(MM) (MM) (MM) (MM) STA END

```

```

1      56.      2 - 12MM      0.      1425.      YES YES
|-----|
| CRITICAL POS MOMENT=      0.26 KN-MET AT 950.MM, LOAD 17 |
| REQD STEEL=      4.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=      250./ 37./ 198. MMS |
| REQD. DEVELOPMENT LENGTH =      344. MMS |
|-----|

```

Cracked Moment of Inertia Iz at above location = 8078.9 cm⁴

```

2      246.      2 - 12MM      0.      819.      YES NO
|-----|
| CRITICAL NEG MOMENT=      0.87 KN-MET AT 0.MM, LOAD 14 |
| REQD STEEL=      12.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=      250./ 37./ 198. MMS |
| REQD. DEVELOPMENT LENGTH =      344. MMS |
|-----|

```

Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

```

3      246.      2 - 12MM      547.      1425.      NO YES
|-----|
| CRITICAL NEG MOMENT=      0.89 KN-MET AT 1425.MM, LOAD 17 |
| REQD STEEL=      13.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=      250./ 37./ 198. MMS |
| REQD. DEVELOPMENT LENGTH =      344. MMS |
|-----|

```

Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL(+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	1./ 10.	0./ 1.	25/ 14
119.	2./ 7.	0./ 1.	25/ 14
238.	2./ 4.	0./ 0.	25/ 14
356.	3./ 2.	0./ 0.	17/ 22
475.	3./ 0.	0./ 0.	17/ 22
594.	3./ 0.	0./ 0.	17/ 0
713.	3./ 0.	0./ 0.	6/ 0
831.	3./ 0.	0./ 0.	17/ 0
950.	3./ 1.	0./ 0.	17/ 22
1069.	3./ 2.	0./ 0.	17/ 22
1188.	2./ 4.	0./ 0.	25/ 14
1306.	2./ 7.	0./ 1.	25/ 14
1425.	1./ 10.	0./ 1.	22/ 17

B E A M N O . 25 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.45 KNS Vc= 65.84 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.45 KNS Vc= 65.84 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

```

21J      1425X 310X 300      24J
|-----|
| 2No12 H 246. 0.TO 819 2No12 H 246. 547.TO 1425 |
| 2No12 H 56. 0.TO 1425 |
|-----|

```

2#12 oo	2#12 oo	2#12 oo	2#12 oo
2#12 oo	2#12 oo	2#12 oo	2#12 oo

```

ACI 318-11 BEAM NO. 26 DESIGN RESULTS
=====
LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 250. X 300. MMS

LEVEL HEIGHT BAR INFO FROM TO ANCHOR
      (MM)              (MM) (MM) STA END

1      56. 2 - 12MM 293. 1192. NO NO
|-----|
| CRITICAL POS MOMENT= 0.20 KN-MET AT 713.MM, LOAD 6 |
| REQD STEEL= 3.MM2, RHO=0.0000, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS |
| REQD. DEVELOPMENT LENGTH = 344. MMS |
|-----|

Cracked Moment of Inertia Iz at above location = 7827.2 cm^4

2      246. 2 - 12MM 0. 938. YES NO
|-----|
| CRITICAL NEG MOMENT= 0.69 KN-MET AT 0.MM, LOAD 7 |
| REQD STEEL= 10.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS |
| REQD. DEVELOPMENT LENGTH = 344. MMS |
|-----|

Cracked Moment of Inertia Iz at above location = 7959.1 cm^4

3      246. 2 - 12MM 784. 1425. NO YES
|-----|
| CRITICAL NEG MOMENT= 0.39 KN-MET AT 1425.MM, LOAD 17 |
| REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS |
| REQD. DEVELOPMENT LENGTH = 344. MMS |
|-----|

Cracked Moment of Inertia Iz at above location = 7959.1 cm^4

```

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL(+VE/-VE) (SQ. MM)	MOMENTS(+VE/-VE) (KNS-MET)	LOAD(+VE/-VE)
0.	0./ 8.	0./ 1.	0/ 7
119.	0./ 5.	0./ 0.	0/ 7
238.	0./ 3.	0./ 0.	0/ 26
356.	1./ 2.	0./ 0.	17/ 26
475.	1./ 1.	0./ 0.	16/ 26
594.	2./ 0.	0./ 0.	6/ 26
713.	2./ 0.	0./ 0.	6/ 0
831.	2./ 0.	0./ 0.	6/ 0
950.	2./ 0.	0./ 0.	16/ 0
1069.	1./ 0.	0./ 0.	16/ 0
1188.	1./ 1.	0./ 0.	26/ 15
1306.	0./ 2.	0./ 0.	0/ 15
1425.	0./ 4.	0./ 0.	0/ 17

BEAM NO. 26 DESIGN RESULTS - SHEAR

```

AT START SUPPORT - Vu= 1.25 KNS Vc= 53.43 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 1.7 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.09 KNS Vc= 53.43 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 1.7 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

```

```

12J 1425X 250X 300 15J
|-----|
| 2No12 H 246. 0.TO 938 2No12 H 246. 784.TO 1425 |
| 2No12 H 56. 293.TO 1192 |
|-----|

```

oo 2#12	oo 2#12	oo 2#12	oo 2#12
	oo 2#12	oo 2#12	

ACI 318-11 BEAM NO. 27 DESIGN RESULTS

LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
-------	----------------	----------	--------------	------------	-------------------

1	56.	2 - 12MM	0.	1425.	YES YES
---	-----	----------	----	-------	---------

CRITICAL POS MOMENT=	0.26 KN-MET	AT	950.MM,	LOAD	17
REQD STEEL=	4.MM2,	RHO=0.0001,	RHOMX=0.0212	RHOMN=0.0033	
MAX/MIN/ACTUAL BAR SPACING=	250./	37./	198.	MMS	
REQD. DEVELOPMENT LENGTH =	344.	MMS			

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2	246.	2 - 12MM	0.	819.	YES NO
---	------	----------	----	------	--------

CRITICAL NEG MOMENT=	0.87 KN-MET	AT	0.MM,	LOAD	14
REQD STEEL=	12.MM2,	RHO=0.0002,	RHOMX=0.0212	RHOMN=0.0033	
MAX/MIN/ACTUAL BAR SPACING=	250./	37./	198.	MMS	
REQD. DEVELOPMENT LENGTH =	344.	MMS			

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3	246.	2 - 12MM	547.	1425.	NO YES
---	------	----------	------	-------	--------

CRITICAL NEG MOMENT=	0.89 KN-MET	AT	1425.MM,	LOAD	17
REQD STEEL=	13.MM2,	RHO=0.0002,	RHOMX=0.0212	RHOMN=0.0033	
MAX/MIN/ACTUAL BAR SPACING=	250./	37./	198.	MMS	
REQD. DEVELOPMENT LENGTH =	344.	MMS			

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
-------------------	------------------------------------	---------------------------------	----------------

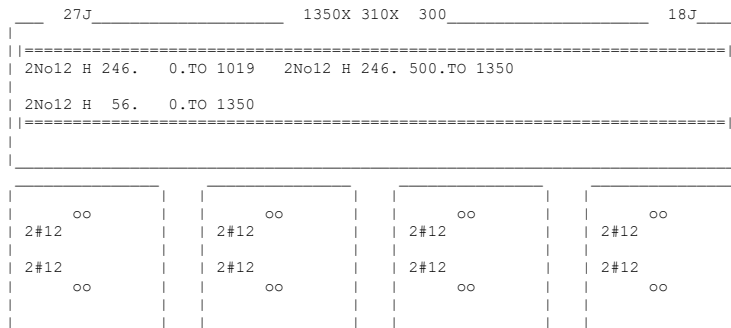
0.	1./ 10.	0./ 1.	25/ 14
119.	2./ 7.	0./ 1.	25/ 14
238.	2./ 4.	0./ 0.	25/ 14
356.	3./ 2.	0./ 0.	17/ 22
475.	3./ 0.	0./ 0.	17/ 22
594.	3./ 0.	0./ 0.	17/ 0
713.	3./ 0.	0./ 0.	6/ 0
831.	3./ 0.	0./ 0.	17/ 0
950.	3./ 1.	0./ 0.	17/ 22
1069.	3./ 2.	0./ 0.	17/ 22
1188.	2./ 4.	0./ 0.	25/ 14
1306.	2./ 7.	0./ 1.	25/ 14
1425.	1./ 10.	0./ 1.	22/ 17

BEAM NO. 27 DESIGN RESULTS - SHEAR

AT START SUPPORT - Vu= 1.45 KNS Vc= 65.84 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

AT END SUPPORT - Vu= 1.45 KNS Vc= 65.84 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

AT START SUPPORT - Vu= 1.41 KNS Vc= 66.04 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.26 KNS Vc= 66.04 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.



ACI 318-11 BEAM NO. 29 DESIGN RESULTS

LEN - 1350. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	END
-------	-------------	----------	-----------	---------	------------	-----

1	56.	2 - 12MM	0.	1350.	YES	YES
CRITICAL POS MOMENT= 0.24 KN-MET AT 900.MM, LOAD 13 REQD STEEL= 3.MM2, RHO=0.0000, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2	246.	2 - 12MM	0.	1019.	YES	NO
CRITICAL NEG MOMENT= 0.98 KN-MET AT 0.MM, LOAD 7 REQD STEEL= 14.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3	246.	2 - 12MM	500.	1350.	NO	YES
CRITICAL NEG MOMENT= 0.74 KN-MET AT 1350.MM, LOAD 13 REQD STEEL= 11.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

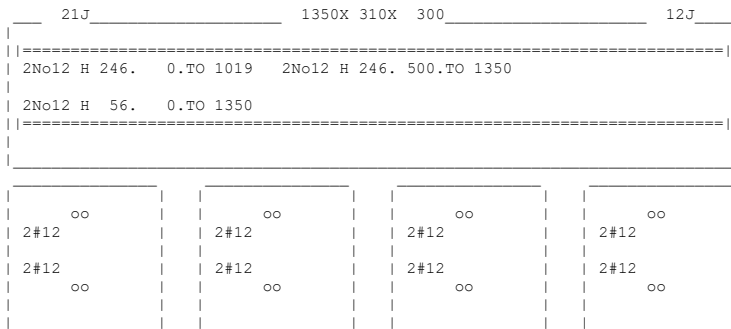
REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	0./ 11.	0./ 1.	21/ 7
112.	1./ 8.	0./ 1.	21/ 7
225.	2./ 6.	0./ 1.	21/ 26
338.	2./ 4.	0./ 0.	13/ 26
450.	3./ 3.	0./ 0.	13/ 26
562.	2./ 1.	0./ 0.	13/ 26
675.	2./ 1.	0./ 0.	6/ 26
788.	2./ 0.	0./ 0.	13/ 0

900.	3./	0.	0./	0.	13/	18
1012.	3./	2.	0./	0.	13/	18
1125.	2./	3.	0./	0.	21/	10
1238.	2./	6.	0./	1.	21/	10
1350.	1./	8.	0./	1.	18/	13

BEAM NO. 29 DESIGN RESULTS - SHEAR

AT START SUPPORT - Vu= 1.41 KNS Vc= 66.04 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.26 KNS Vc= 66.04 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.



ACI 318-11 BEAM NO. 44 DESIGN RESULTS

LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
-------	----------------	----------	--------------	------------	-------------------

1	56.	2 - 12MM	0.	1425.	YES YES

CRITICAL POS MOMENT= 0.42 KN-MET AT 1069.MM, LOAD 17					
REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2	246.	2 - 12MM	0.	819.	YES NO

CRITICAL NEG MOMENT= 1.01 KN-MET AT 0.MM, LOAD 14					
REQD STEEL= 15.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3	246.	2 - 12MM	547.	1425.	NO YES

CRITICAL NEG MOMENT= 0.93 KN-MET AT 1425.MM, LOAD 17					
REQD STEEL= 13.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

REQUIRED REINF. STEEL SUMMARY :

SECTION	REINF STEEL (+VE/-VE)	MOMENTS (+VE/-VE)	LOAD (+VE/-VE)
---------	-----------------------	-------------------	----------------

(MM)	(SQ. MM)	(KNS-MET)
0.	2./	11.
119.	3./	8.
238.	3./	5.
356.	4./	2.
475.	4./	1.
594.	4./	0.
713.	4./	0.
831.	4./	0.
950.	5./	1.
1069.	5./	2.
1188.	4./	4.
1306.	4./	7.
1425.	4./	10.

B E A M N O. 44 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.54 KNS Vc= 66.21 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.36 KNS Vc= 66.21 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

23J 1425X 310X 300 26J

2No12 H 246. 0.TO 819 2No12 H 246. 547.TO 1425

2No12 H 56. 0.TO 1425

2#12	2#12	2#12	2#12
2#12	2#12	2#12	2#12
oo	oo	oo	oo

ACI 318-11 BEAM NO. 45 DESIGN RESULTS

LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 250. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	END
-------	-------------	----------	-----------	---------	------------	-----

1	56.	2 - 12MM	172.	1193.	NO	NO
CRITICAL POS MOMENT= 0.27 KN-MET AT 713.MM, LOAD 7 REQD STEEL= 4.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 7827.2 cm^4

2	246.	2 - 12MM	0.	700.	YES	NO
CRITICAL NEG MOMENT= 0.46 KN-MET AT 0.MM, LOAD 15 REQD STEEL= 7.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 7959.1 cm^4

3	246.	2 - 12MM	665.	1425.	NO	YES
CRITICAL NEG MOMENT= 0.52 KN-MET AT 1425.MM, LOAD 17 REQD STEEL= 7.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033						

```

| MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS |
| REQD. DEVELOPMENT LENGTH = 344. MMS |
|-----|

```

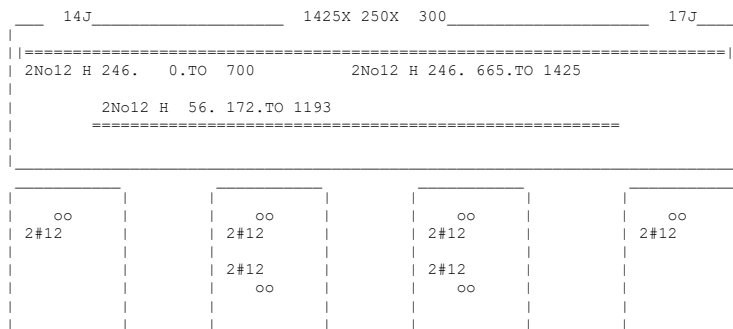
Cracked Moment of Inertia Iz at above location = 7959.1 cm⁴

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL(+VE/-VE) (SQ. MM)		MOMENTS (+VE/-VE) (KNS-MET)		LOAD (+VE/-VE)	
0.	0./	5.	0./	0.	0/	15
119.	0./	3.	0./	0.	0/	15
238.	1./	1.	0./	0.	26/	15
356.	2./	0.	0./	0.	7/	22
475.	2./	0.	0./	0.	7/	0
594.	3./	0.	0./	0.	7/	0
713.	3./	0.	0./	0.	7/	0
831.	3./	0.	0./	0.	7/	0
950.	2./	0.	0./	0.	7/	0
1069.	2./	1.	0./	0.	16/	23
1188.	1./	2.	0./	0.	24/	15
1306.	0./	4.	0./	0.	0/	15
1425.	0./	6.	0./	1.	0/	17

BEAM NO. 45 DESIGN RESULTS - SHEAR

AT START SUPPORT - Vu= 1.15 KNS Vc= 53.44 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 1.7 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.18 KNS Vc= 53.44 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 1.7 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.



ACI 318-11 BEAM NO. 46 DESIGN RESULTS

LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
-------	----------------	----------	--------------	------------	-------------------

1	56.	2 - 12MM	0.	1425.	YES YES
CRITICAL POS MOMENT= 0.42 KN-MET AT 1069.MM, LOAD 17 REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8078.9 cm⁴

2	246.	2 - 12MM	0.	819.	YES NO
CRITICAL NEG MOMENT= 1.01 KN-MET AT 0.MM, LOAD 14 REQD STEEL= 15.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS					

```

|-----|
|
| Cracked Moment of Inertia Iz at above location =      8214.1 cm^4
|
| 3          246.      2 - 12MM      547.      1425.      NO  YES
|
|-----|
| CRITICAL NEG MOMENT=      0.93 KN-MET  AT 1425.MM, LOAD 17|
| REQD STEEL=      13.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS |
| REQD. DEVELOPMENT LENGTH = 344. MMS |
|-----|

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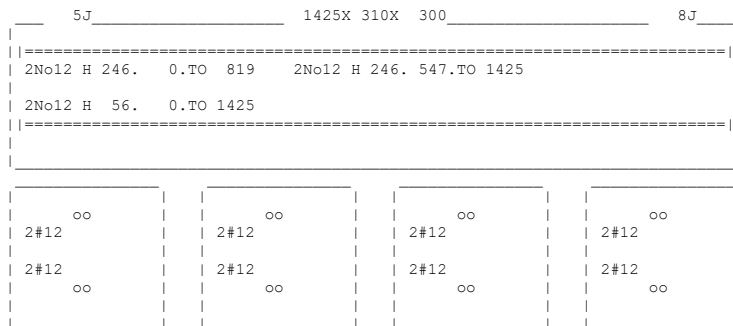
Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	2./ 11.	0./ 1.	25/ 14
119.	3./ 8.	0./ 1.	25/ 14
238.	3./ 5.	0./ 0.	25/ 14
356.	4./ 2.	0./ 0.	17/ 22
475.	4./ 1.	0./ 0.	17/ 22
594.	4./ 0.	0./ 0.	17/ 0
713.	4./ 0.	0./ 0.	7/ 0
831.	4./ 0.	0./ 0.	17/ 0
950.	5./ 1.	0./ 0.	17/ 22
1069.	5./ 2.	0./ 0.	17/ 22
1188.	4./ 4.	0./ 0.	17/ 22
1306.	4./ 7.	0./ 1.	25/ 14
1425.	4./ 10.	0./ 1.	22/ 17

B E A M N O. 46 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.54 KNS Vc= 66.21 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.36 KNS Vc= 66.21 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.



ACI 318-11 BEAM NO. 47 DESIGN RESULTS

LEN - 1350. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
-------	----------------	----------	--------------	------------	-------------------

1	56.	2 - 12MM	0.	1350.	YES YES

CRITICAL POS MOMENT= 0.39 KN-MET AT 1013.MM, LOAD 13					
REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

```

|-----|
|
| Cracked Moment of Inertia Iz at above location =      8078.9 cm^4
|
| 2      246.      2 - 12MM      0.      794.      YES NO
|-----|
| CRITICAL NEG MOMENT=      0.85 KN-MET AT      0.MM, LOAD 10|
| REQD STEEL=      12.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=      250./      37./ 198. MMS |
| REQD. DEVELOPMENT LENGTH =      344. MMS |
|-----|
|
| Cracked Moment of Inertia Iz at above location =      8214.1 cm^4
|
| 3      246.      2 - 12MM      500.      1350.      NO YES
|-----|
|
| CRITICAL NEG MOMENT=      0.99 KN-MET AT 1350.MM, LOAD 13|
| REQD STEEL=      14.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=      250./      37./ 198. MMS |
| REQD. DEVELOPMENT LENGTH =      344. MMS |
|-----|
|
| Cracked Moment of Inertia Iz at above location =      8214.1 cm^4

```

REQUIRED REINF. STEEL SUMMARY :

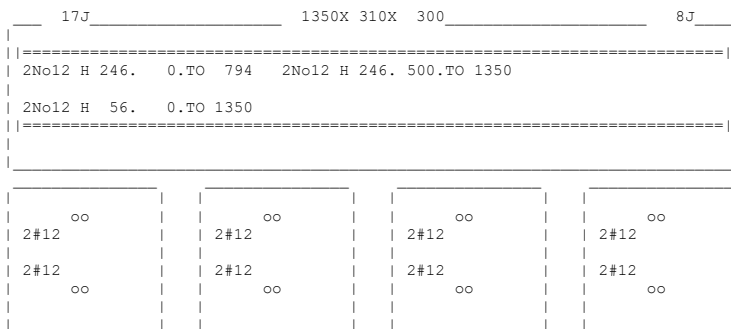
SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	3./ 9.	0./ 1.	21/ 10
113.	4./ 6.	0./ 1.	21/ 10
225.	4./ 4.	0./ 0.	13/ 18
338.	4./ 2.	0./ 0.	13/ 18
450.	4./ 0.	0./ 0.	13/ 18
562.	3./ 0.	0./ 0.	13/ 0
675.	3./ 0.	0./ 0.	6/ 0
788.	4./ 0.	0./ 0.	13/ 0
900.	4./ 1.	0./ 0.	13/ 18
1013.	4./ 3.	0./ 0.	13/ 18
1125.	4./ 5.	0./ 0.	21/ 10
1238.	4./ 8.	0./ 1.	21/ 10
1350.	3./ 11.	0./ 1.	18/ 13

B E A M N O . 47 D E S I G N R E S U L T S - S H E A R

```

AT START SUPPORT - Vu=      1.28 KNS Vc=      66.03 KNS Vs=      0.00 KNS
Tu=      0.02 KN-MET Tc=      2.3 KN-MET Ts=      0.0 KN-MET LOAD      6
                    STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu=      1.39 KNS Vc=      66.03 KNS Vs=      0.00 KNS
Tu=      0.02 KN-MET Tc=      2.3 KN-MET Ts=      0.0 KN-MET LOAD      6
                    STIRRUPS ARE NOT REQUIRED.

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ACI 318-11 BEAM NO. 48 DESIGN RESULTS

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LEN - 1350. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS
LEVEL HEIGHT BAR INFO FROM TO ANCHOR

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(MM)	(MM)	(MM)	STA	END
------	------	------	-----	-----

1	56.	2 - 12MM	47.	1350.	NO	YES

CRITICAL POS MOMENT= 0.40 KN-MET AT 675.MM, LOAD 7						
REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033						
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS						
REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2	246.	2 - 12MM	0.	569.	YES	NO

CRITICAL NEG MOMENT= 0.47 KN-MET AT 0.MM, LOAD 11						
REQD STEEL= 7.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033						
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS						
REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3	246.	2 - 12MM	500.	1350.	NO	YES

CRITICAL NEG MOMENT= 0.79 KN-MET AT 1350.MM, LOAD 13						
REQD STEEL= 11.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033						
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS						
REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL(+VE/-VE) (SQ. MM)	MOMENTS(+VE/-VE) (KNS-MET)	LOAD(+VE/-VE)
0.	0./ 5.	0./ 0.	0/ 11
113.	0./ 3.	0./ 0.	20/ 11
225.	1./ 1.	0./ 0.	26/ 19
338.	3./ 0.	0./ 0.	7/ 0
450.	4./ 0.	0./ 0.	7/ 0
562.	4./ 0.	0./ 0.	7/ 0
675.	4./ 0.	0./ 0.	7/ 0
788.	4./ 0.	0./ 0.	7/ 0
900.	4./ 1.	0./ 0.	7/ 19
1013.	3./ 2.	0./ 0.	26/ 19
1125.	2./ 4.	0./ 0.	26/ 11
1238.	1./ 6.	0./ 1.	20/ 11
1350.	0./ 9.	0./ 1.	18/ 13

B E A M N O . 48 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.21 KNS Vc= 66.80 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

AT END SUPPORT - Vu= 1.46 KNS Vc= 63.80 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

14J	1350X 310X 300	5J
=====		
2No12 H 246. 0.TO 569 2No12 H 246. 500.TO 1350		
2No12 H 56. 47.TO 1350		
=====		
2#12	2#12	2#12
2#12	2#12	2#12
2#12	2#12	2#12
2#12	2#12	2#12

| _____ | | _____ | | _____ | | _____ |

ACI 318-11 BEAM NO. 49 DESIGN RESULTS
=====

LEN - 1350. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END
-------	----------------	----------	--------------	------------	-------------------

1	56.	2 - 12MM	0.	1350.	YES YES

CRITICAL POS MOMENT= 0.39 KN-MET AT 1013.MM, LOAD 13					
REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2	246.	2 - 12MM	0.	794.	YES NO

CRITICAL NEG MOMENT= 0.85 KN-MET AT 0.MM, LOAD 10					
REQD STEEL= 12.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3	246.	2 - 12MM	500.	1350.	NO YES

CRITICAL NEG MOMENT= 0.99 KN-MET AT 1350.MM, LOAD 13					
REQD STEEL= 14.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033					
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS					
REQD. DEVELOPMENT LENGTH = 344. MMS					

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)		MOMENTS (+VE/-VE) (KNS-MET)		LOAD (+VE/-VE)	
0.	3./	9.	0./	1.	21/	10
113.	4./	6.	0./	1.	21/	10
225.	4./	4.	0./	0.	13/	18
338.	4./	2.	0./	0.	13/	18
450.	4./	0.	0./	0.	13/	18
562.	3./	0.	0./	0.	13/	0
675.	3./	0.	0./	0.	6/	0
788.	4./	0.	0./	0.	13/	0
900.	4./	1.	0./	0.	13/	18
1013.	4./	3.	0./	0.	13/	18
1125.	4./	5.	0./	0.	21/	10
1238.	4./	8.	0./	1.	21/	10
1350.	3./	11.	0./	1.	18/	13

B E A M N O. 49 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.28 KNS Vc= 66.03 KNS Vs= 0.00 KNS
Tu= 0.02 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.39 KNS Vc= 66.03 KNS Vs= 0.00 KNS
Tu= 0.02 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

11J	1350X 310X 300	2J
=====		
2No12 H 246. 0.TO 794 2No12 H 246. 500.TO 1350		
2No12 H 56. 0.TO 1350		
=====		

2#12	2#12	2#12	2#12
2#12	2#12	2#12	2#12
2#12	2#12	2#12	2#12

ACI 318-11 BEAM NO. 50 DESIGN RESULTS

LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL HEIGHT BAR INFO FROM TO ANCHOR
(MM) (MM) (MM) STA END

1 56. 2 - 12MM 0. 1425. YES YES
CRITICAL POS MOMENT= 0.26 KN-MET AT 475.MM, LOAD 17
REQD STEEL= 4.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS
REQD. DEVELOPMENT LENGTH = 344. MMS

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2 246. 2 - 12MM 0. 819. YES NO
CRITICAL NEG MOMENT= 0.89 KN-MET AT 0.MM, LOAD 14
REQD STEEL= 13.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS
REQD. DEVELOPMENT LENGTH = 344. MMS

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3 246. 2 - 12MM 547. 1425. NO YES
CRITICAL NEG MOMENT= 0.87 KN-MET AT 1425.MM, LOAD 17
REQD STEEL= 12.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS
REQD. DEVELOPMENT LENGTH = 344. MMS

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL(+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	1./ 10.	0./ 1.	25/ 14
119.	2./ 7.	0./ 1.	25/ 14
238.	2./ 4.	0./ 0.	25/ 14
356.	3./ 2.	0./ 0.	17/ 22
475.	3./ 1.	0./ 0.	17/ 22
594.	3./ 0.	0./ 0.	17/ 0
713.	3./ 0.	0./ 0.	6/ 0
831.	3./ 0.	0./ 0.	17/ 0
950.	3./ 0.	0./ 0.	17/ 22
1069.	3./ 2.	0./ 0.	17/ 22
1188.	2./ 4.	0./ 0.	25/ 14
1306.	2./ 7.	0./ 1.	25/ 14
1425.	1./ 10.	0./ 1.	22/ 17

B E A M N O. 50 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.45 KNS Vc= 65.84 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.45 KNS Vc= 65.84 KNS Vs= 0.00 KNS
Tu= 0.00 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

24J	1425X 310X 300	27J
2No12 H 246. 0.TO 819 2No12 H 246. 547.TO 1425		
2No12 H 56. 0.TO 1425		
2#12	2#12	2#12
2#12	2#12	2#12

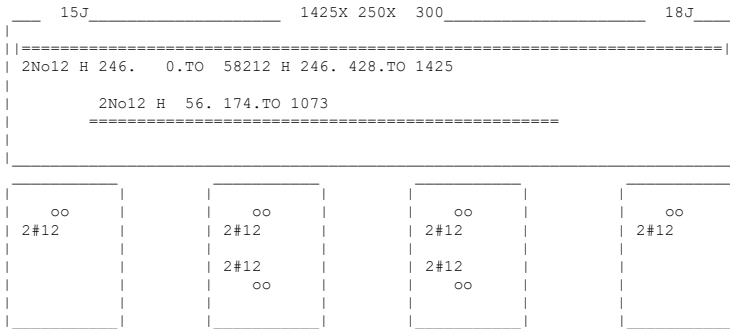
ACI 318-11 BEAM NO. 51 DESIGN RESULTS						
=====						
LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 250. X 300. MMS						
LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA END	
1	56.	2 - 12MM	174.	1073.	NO	NO
CRITICAL POS MOMENT= 0.20 KN-MET AT 713.MM, LOAD 6						
REQD STEEL= 3.MM2, RHO=0.0000, RHOMX=0.0212 RHOMN=0.0033						
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS						
REQD. DEVELOPMENT LENGTH = 344. MMS						
Cracked Moment of Inertia Iz at above location = 7827.2 cm^4						
2	246.	2 - 12MM	0.	582.	YES	NO
CRITICAL NEG MOMENT= 0.39 KN-MET AT 0.MM, LOAD 15						
REQD STEEL= 6.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033						
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS						
REQD. DEVELOPMENT LENGTH = 344. MMS						
Cracked Moment of Inertia Iz at above location = 7959.1 cm^4						
3	246.	2 - 12MM	428.	1425.	NO	YES
CRITICAL NEG MOMENT= 0.69 KN-MET AT 1425.MM, LOAD 7						
REQD STEEL= 10.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033						
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 138. MMS						
REQD. DEVELOPMENT LENGTH = 344. MMS						
Cracked Moment of Inertia Iz at above location = 7959.1 cm^4						

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)		MOMENTS (+VE/-VE) (KNS-MET)		LOAD (+VE/-VE)	
0.	0./	4.	0./	0.	0/	15
119.	0./	2.	0./	0.	0/	15
238.	1./	1.	0./	0.	26/	15
356.	1./	0.	0./	0.	16/	0
475.	2./	0.	0./	0.	16/	0
594.	2./	0.	0./	0.	6/	0
713.	2./	0.	0./	0.	6/	0
831.	2./	0.	0./	0.	6/	26
950.	1./	1.	0./	0.	16/	26
1069.	1./	2.	0./	0.	16/	26
1188.	0./	3.	0./	0.	0/	26
1306.	0./	5.	0./	0.	0/	7
1425.	0./	8.	0./	1.	0/	7

BEAM NO. 51 DESIGN RESULTS - SHEAR

AT START SUPPORT - Vu= 1.09 KNS Vc= 53.43 KNS Vs= 0.00 KNS
 Tu= 0.00 KN-MET Tc= 1.7 KN-MET Ts= 0.0 KN-MET LOAD 6
 STIRRUPS ARE NOT REQUIRED.
 AT END SUPPORT - Vu= 1.25 KNS Vc= 53.43 KNS Vs= 0.00 KNS
 Tu= 0.00 KN-MET Tc= 1.7 KN-MET Ts= 0.0 KN-MET LOAD 6
 STIRRUPS ARE NOT REQUIRED.



ACI 318-11 BEAM NO. 52 DESIGN RESULTS

LEN - 1425. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL	HEIGHT (MM)	BAR INFO	FROM (MM)	TO (MM)	ANCHOR STA	END
-------	-------------	----------	-----------	---------	------------	-----

1	56.	2 - 12MM	0.	1425.	YES	YES
CRITICAL POS MOMENT= 0.26 KN-MET AT 475.MM, LOAD 17 REQD STEEL= 4.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8078.9 cm⁴

2	246.	2 - 12MM	0.	819.	YES	NO
CRITICAL NEG MOMENT= 0.89 KN-MET AT 0.MM, LOAD 14 REQD STEEL= 13.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

3	246.	2 - 12MM	547.	1425.	NO	YES
CRITICAL NEG MOMENT= 0.87 KN-MET AT 1425.MM, LOAD 17 REQD STEEL= 12.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS REQD. DEVELOPMENT LENGTH = 344. MMS						

Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)		MOMENTS (+VE/-VE) (KNS-MET)		LOAD (+VE/-VE)	
0.	1./	10.	0./	1.	25/	14
119.	2./	7.	0./	1.	25/	14
238.	2./	4.	0./	0.	25/	14
356.	3./	2.	0./	0.	17/	22
475.	3./	1.	0./	0.	17/	22

BEAM NO. 52 DESIGN RESULTS - SHEAR

6J		1425X 310X 300		9J	
=====					
2No12 H 246.	0.TO 819	2No12 H 246. 547.TO 1425			
=====					
2No12 H 56.	0.TO 1425				
=====					
2#12	oo	2#12	oo	2#12	oo
2#12	oo	2#12	oo	2#12	oo

ACI 318-11 BEAM NO. 53 DESIGN RESULTS

LEVEL	HEIGHT	BAR INFO	FROM	TO	ANCHOR
	(MM)		(MM)	(MM)	STA END

Cracked Moment of Inertia I_z at above location = 8078.9 cm⁴

Cracked Moment of Inertia I_z at above location = 8214.1 cm⁴

Cracked Moment of Inertia I_z at above location = 8214.1 cm⁴

REQUIRED REINF. STEEL SUMMARY :

SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)		MOMENTS (+VE/-VE) (KNS-MET)		LOAD (+VE/-VE)	
0.	1./	8.	0./	1.	21/	10
113.	2./	6.	0./	1.	21/	10
225.	2./	3.	0./	0.	21/	10
338.	3./	2.	0./	0.	13/	18
450.	3./	0.	0./	0.	13/	18
562.	2./	0.	0./	0.	13/	0
675.	2./	1.	0./	0.	6/	26
788.	2./	1.	0./	0.	13/	26
900.	3./	3.	0./	0.	13/	26
1013.	2./	4.	0./	0.	13/	26
1125.	2./	6.	0./	1.	21/	26
1238.	1./	8.	0./	1.	21/	7
1350.	0./	11.	0./	1.	18/	7

BEAM NO. 53 DESIGN RESULTS - SHEAR

AT START SUPPORT - Vu= 1.26 KNS Vc= 66.04 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.41 KNS Vc= 66.04 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.

18J	1350X 310X 300	9J
2No12 H 246. 20.TO H7946. 275.TO 1350		
2No12 H 56. 0.TO 1350		
2#12	2#12	2#12
2#12	2#12	2#12

ACI 318-11 BEAM NO. 54 DESIGN RESULTS

LEN - 1350. MM FY - 420. FC - 28. MPA, SIZE - 310. X 300. MMS

LEVEL HEIGHT BAR INFO FROM TO ANCHOR
(MM) (MM) (MM)

1 56. 2 - 12MM 0. 1350. YES YES
CRITICAL POS MOMENT= 0.24 KN-MET AT 450.MM, LOAD 13
REQD STEEL= 3.MM2, RHO=0.0000, RHOMX=0.0212 RHOMN=0.0033
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS
REQD. DEVELOPMENT LENGTH = 344. MMS

Cracked Moment of Inertia Iz at above location = 8078.9 cm^4

2 246. 2 - 12MM 0. 794. YES NO
CRITICAL NEG MOMENT= 0.74 KN-MET AT 0.MM, LOAD 10
REQD STEEL= 11.MM2, RHO=0.0001, RHOMX=0.0212 RHOMN=0.0033
MAX/MIN/ACTUAL BAR SPACING= 250./ 37./ 198. MMS
REQD. DEVELOPMENT LENGTH = 344. MMS

Cracked Moment of Inertia Iz at above location = 8214.1 cm^4

3 246. 2 - 12MM 275. 1350. NO YES

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-----
| CRITICAL NEG MOMENT=      0.98 KN-MET  AT 1350.MM, LOAD  7|
| REQD STEEL=      14.MM2, RHO=0.0002, RHOMX=0.0212 RHOMN=0.0033 |
| MAX/MIN/ACTUAL BAR SPACING=  250./  37./ 198. MMS |
| REQD. DEVELOPMENT LENGTH =  344. MMS |
-----

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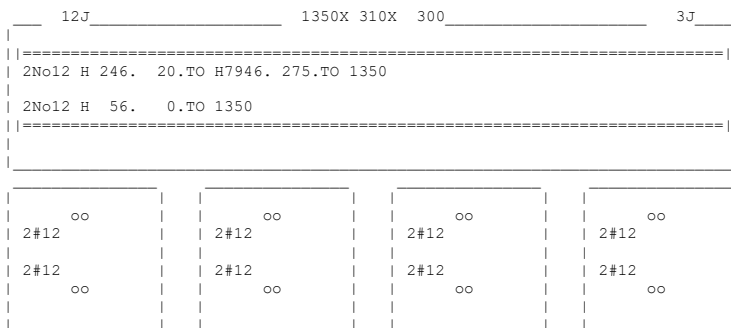
Cracked Moment of Inertia Iz at above location = 8214.1 cm⁴

REQUIRED REINF. STEEL SUMMARY :

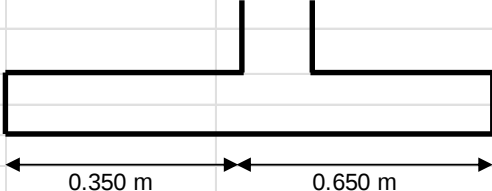
SECTION (MM)	REINF STEEL (+VE/-VE) (SQ. MM)	MOMENTS (+VE/-VE) (KNS-MET)	LOAD (+VE/-VE)
0.	1./ 8.	0./ 1.	21/ 10
113.	2./ 6.	0./ 1.	21/ 10
225.	2./ 3.	0./ 0.	21/ 10
338.	3./ 2.	0./ 0.	13/ 18
450.	3./ 0.	0./ 0.	13/ 18
562.	2./ 0.	0./ 0.	13/ 0
675.	2./ 1.	0./ 0.	6/ 26
788.	2./ 1.	0./ 0.	13/ 26
900.	3./ 3.	0./ 0.	13/ 26
1013.	2./ 4.	0./ 0.	13/ 26
1125.	2./ 6.	0./ 1.	21/ 26
1238.	1./ 8.	0./ 1.	21/ 7
1350.	0./ 11.	0./ 1.	18/ 7

B E A M N O. 54 D E S I G N R E S U L T S - S H E A R

AT START SUPPORT - Vu= 1.26 KNS Vc= 66.04 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.
AT END SUPPORT - Vu= 1.41 KNS Vc= 66.04 KNS Vs= 0.00 KNS
Tu= 0.01 KN-MET Tc= 2.3 KN-MET Ts= 0.0 KN-MET LOAD 6
STIRRUPS ARE NOT REQUIRED.



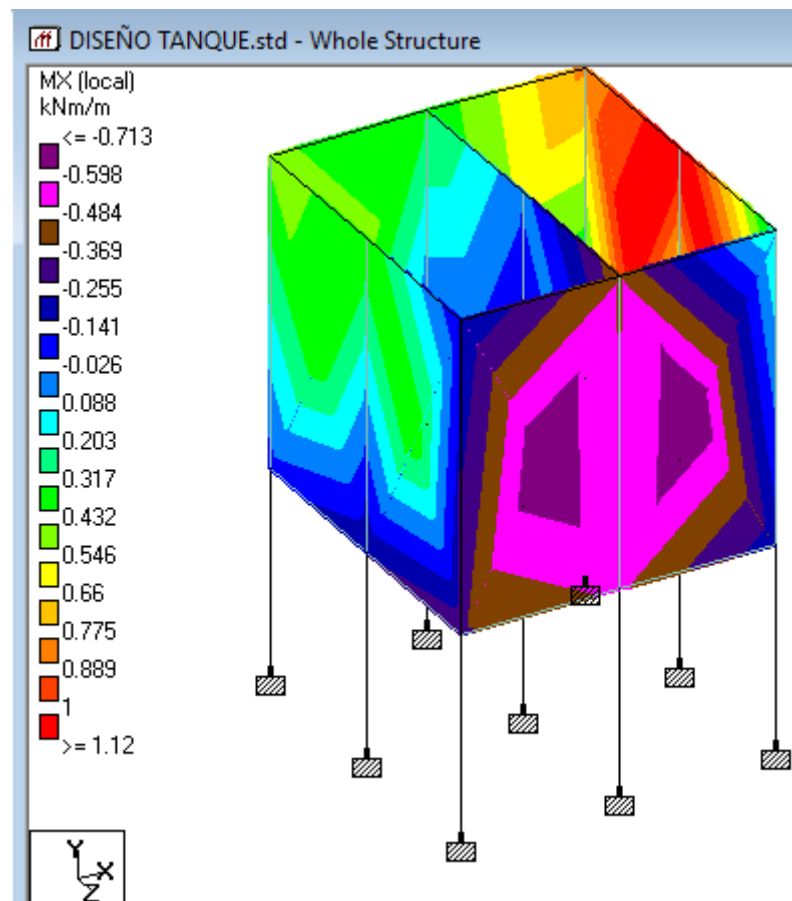
9. DISEÑO DE ZAPATAS

CIMENTACION ZAPATA		Z-1
CALCULO ESFUERZOS SOBRE EL SUELO		
COLUMNA	c=	0.300 m
CARGA AXIAL+SOBRECARGA	P=	99.866 KN
SUELO	σ =	200.000 KN/m ²
CONCRETO	f'c=	28000 KN/m ²
ACERO	f _y =	420000 KN/m ²
varilla columna #	5	
ℓ_{db}	0.32 m	
ℓ_{db} norma	0.27 m	
DIMENSIONAMIENTO		
	CARGAS	99.866 KN
	PESO PROPIO (10%)	7.989 KN
	TOTAL	107.855 KN
	AREA DE CIMENTACION	0.539 m ²
	L	1.00 m
	σ_{neta}	99.87 KN/m ² OK
DISEÑO ESTRUCTURAL ZAPATA		
CARGAS CON COMBINACIONES DE CARGA		
CARGA AXIAL+SOBRECARGA	P=	109.853 KN
	PESO PROPIO (10%)	10.985 KN
	TOTAL	120.838 KN
FLEXION		
		
	M borde de la columna	6.728 KN m
	M _u	11.438 KN m
	b	1.00 m
	h asumido	0.40 m
	d	0.33 m
	ρ	0.000287
	A _s	93.35 mm ²
	A _s mínimo	720.00 mm ²
	A _s a colocar	720.00 cm ²
	varilla #	4
	colocar	colocar 6 varillas
	cada	0.12 cm
		OK

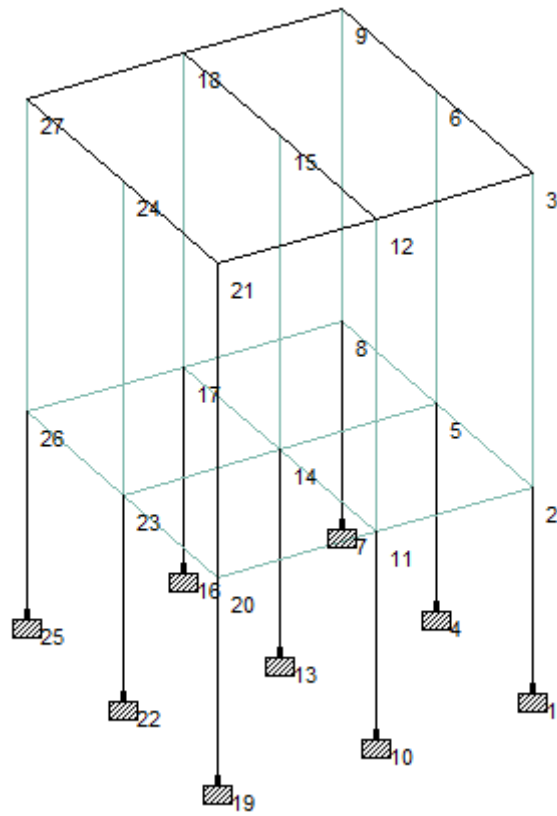
CORTANTE			
ACCION EN DOS DIRECCIONES PARA SECCION CRITICA A D/2 DEL BORDE DE LA COLUMNA			
V(d/2)=	60.86 KN		
Vu=	91.28 KN		
$(c) V_c = 0.33\lambda\sqrt{f'_c}b_o d$			
λ=	1		
Vc=	1418.78 KN		
ϕ Vc=	1064.09 KN	OK	
$(b) V_c = 0.083\left(\frac{\alpha_s d}{b_o} + 2\right)\lambda\sqrt{f'_c}b_o d$			
αs=	20		
λ=	1		
Vc=	1641.49 KN		
ϕ Vc=	1231.12 KN	OK	
B ACCION COMO VIGA PARA SECCION RITICA A D DEL BORDE DE LA COLUMNA			
V(d)=	99.87 KN		
V(d)=	2.50 KN		
Vu=	3.74 KN		
$\phi V_c = \phi 0.17\sqrt{f'_c}b_w d$			
B=	1		
λ=	1		
Vc=	292.36 KN		
ϕ Vc=	219.27 KN	OK	
Resistencia al aplastamiento en la base de la columna			
ϕ P _{nb} = ϕ(0.85f' _c A _l) =	1392.30 KN	109.85 KN	OK

10. LISTADOS DE ENTRADA Y SALIDA DEL PROGRAMA ESTRUCTURA EN CONCRETO Y ACERO

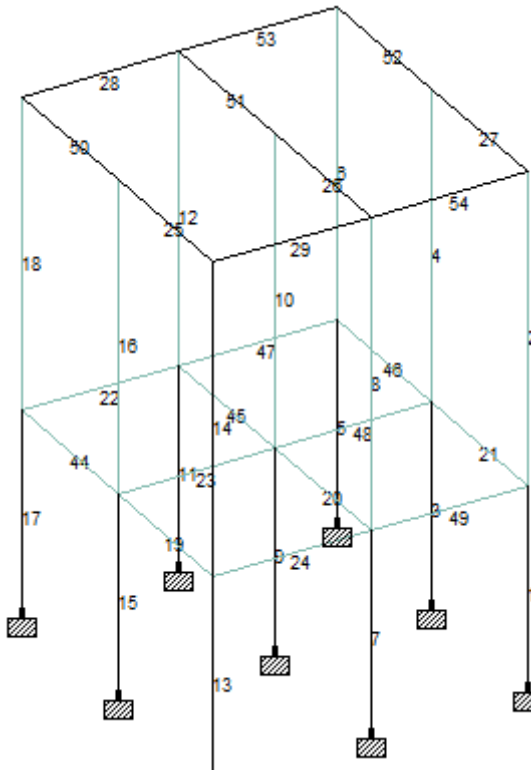
GRAFICOS



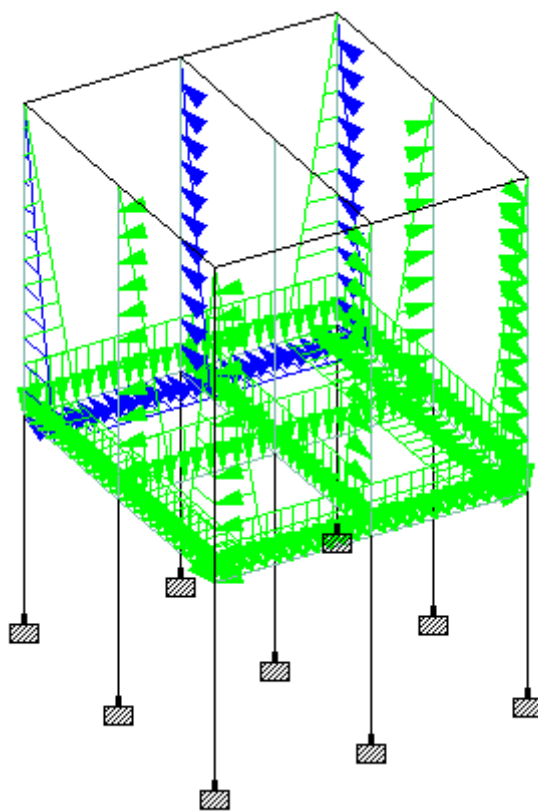
3D



NUDOS



ELEMENTOS



CARGAS

LISTADO ENTRADA Y SALIDA

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1. STAAD SPACE DXF IMPORT OF TANQUE FILTRO.DXF
INPUT FILE: D:\ANDREY\PROYECTOS 2024\ANAPOIMA ASUARCOPSA\STAAD TANQUE\DISEÑO TANQUE.STD
2. START JOB INFORMATION
3. ENGINEER DATE 17-NOV-24
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT METER KN
7. JOINT COORDINATES
8. 1 4.24716 -0.049479 7.82345; 2 4.24716 1.65052 7.82345
9. 3 4.24716 4.35052 7.82345; 4 4.24716 -0.049479 6.39845
10. 5 4.24716 1.65052 6.39845; 6 4.24716 4.35052 6.39845
11. 7 4.24716 -0.049479 4.97345; 8 4.24716 1.65052 4.97345
12. 9 4.24716 4.35052 4.97345; 10 2.89716 -0.049479 7.82345
13. 11 2.89716 1.65052 7.82345; 12 2.89716 4.35052 7.82345
14. 13 2.89716 -0.049479 6.39845; 14 2.89716 1.65052 6.39845
15. 15 2.89716 4.35052 6.39845; 16 2.89716 -0.049479 4.97345
16. 17 2.89716 1.65052 4.97345; 18 2.89716 4.35052 4.97345
17. 19 1.54716 -0.049479 7.82345; 20 1.54716 1.65052 7.82345
18. 21 1.54716 4.35052 7.82345; 22 1.54716 -0.049479 6.39845
19. 23 1.54716 1.65052 6.39845; 24 1.54716 4.35052 6.39845
20. 25 1.54716 -0.049479 4.97345; 26 1.54716 1.65052 4.97345
21. 27 1.54716 4.35052 4.97345
22. MEMBER INCIDENCES
23. 1 1 2; 2 2 3; 3 4 5; 4 5 6; 5 7 8; 6 8 9; 7 10 11; 8 11 12; 9 13 14; 10 14 15
24. 11 16 17; 12 17 18; 13 19 20; 14 20 21; 15 22 23; 16 23 24; 17 25 26; 18 26 27
25. 19 20 23; 20 11 14; 21 2 5; 22 26 17; 23 23 14; 24 20 11; 25 21 24; 26 12 15
26. 27 3 6; 28 27 18; 29 21 12; 44 23 26; 45 14 17; 46 5 8; 47 17 8; 48 14 5
27. 49 11 2; 50 24 27; 51 15 18; 52 6 9; 53 18 9; 54 12 3
28. ELEMENT INCIDENCES SHELL
29. 30 20 11 14 23; 31 11 2 5 14; 32 23 14 17 26; 33 14 5 8 17; 34 2 3 6 5
30. 35 5 6 9 8; 36 8 9 18 17; 37 17 18 27 26; 38 26 23 24 27; 39 23 20 21 24
31. 40 14 11 12 15; 41 17 14 15 18; 42 20 11 12 21; 43 11 2 3 12
32. ELEMENT PROPERTY
33. 30 TO 43 THICKNESS 0.3
34. DEFINE MATERIAL START
35. ISOTROPIC CONCRETE
36. E 2.48870E+007
37. POISSON 0.17
38. DENSITY 23.5616

39. ALPHA 1E-005
40. DAMP 0.05
41. TYPE CONCRETE
42. STRENGTH FCU 28000
43. END DEFINE MATERIAL
44. MEMBER PROPERTY AMERICAN
45. 1 TO 8 11 TO 18 PRIS YD 0.3 ZD 0.3
46. 9 10 PRIS YD 0.3 ZD 0.25
47. 19 21 TO 25 27 TO 29 44 46 TO 50 52 TO 54 PRIS YD 0.3 ZD 0.31
48. 20 26 45 51 PRIS YD 0.3 ZD 0.25
49. CONSTANTS
50. MATERIAL CONCRETE ALL
51. SUPPORTS
52. 1 4 7 10 13 16 19 22 25 FIXED
53. LOAD 1 LOADTYPE DEAD TITLE DD
54. SELFWEIGHT Y -1
55. LOAD 2 LOADTYPE LIVE TITLE DL
56. ELEMENT LOAD
57. 30 TO 33 PR -1.
58. LOAD 3 LOADTYPE FLUIDS TITLE FLUIDO
59. ELEMENT LOAD
60. 30 TO 33 PR -27
61. 42 43 TRAP GZ Y 27 0
62. 36 37 TRAP GZ X -27 0
63. 34 35 TRAP GX X 27 0
64. 38 39 TRAP GX Y -27 0
65. LOAD 4 SISMOX
66. SELFWEIGHT X 1
67. SELFWEIGHT Z 1
68. SPECTRUM SRSS X 1 ACC SCALE 9.8
69. 0 0.563; 0.1 0.563; 0.2 0.563; 0.3 0.563; 0.4 0.563; 0.5 0.563; 0.6 0.563
70. 0.7 0.563; 0.8 0.563; 0.9 0.533; 1 0.48; 1.1 0.436; 1.2 0.4; 1.3 0.369
71. 1.4 0.343; 1.5 0.32; 1.6 0.3; 1.7 0.282; 1.8 0.267; 1.9 0.253; 2 0.24
72. 2.1 0.229; 2.2 0.218; 2.3 0.209; 2.4 0.2; 2.5 0.192; 2.6 0.185; 2.7 0.178
73. 2.8 0.171; 2.9 0.166; 3 0.16; 3.1 0.155; 3.2 0.15; 3.3 0.145; 3.4 0.141
74. 3.5 0.137; 3.6 0.133; 3.7 0.13; 3.8 0.126; 3.9 0.123; 4 0.12; 4.1 0.117
75. 4.2 0.114; 4.3 0.112; 4.4 0.109; 4.5 0.107; 4.6 0.104; 4.7 0.102; 4.8 0.1
76. 4.9 0.096; 5 0.092; 5.1 0.089; 5.2 0.085; 5.3 0.082; 5.4 0.079; 5.5 0.076
77. 5.6 0.073; 5.7 0.071; 5.8 0.068; 5.9 0.066; 6 0.064
78. LOAD 5 SISMOZ
79. SPECTRUM SRSS Z 1 ACC SCALE 9.8
80. 0 0.563; 0.1 0.563; 0.2 0.563; 0.3 0.563; 0.4 0.563; 0.5 0.563; 0.6 0.563
81. 0.7 0.563; 0.8 0.563; 0.9 0.533; 1 0.48; 1.1 0.436; 1.2 0.4; 1.3 0.369
82. 1.4 0.343; 1.5 0.32; 1.6 0.3; 1.7 0.282; 1.8 0.267; 1.9 0.253; 2 0.24
83. 2.1 0.229; 2.2 0.218; 2.3 0.209; 2.4 0.2; 2.5 0.192; 2.6 0.185; 2.7 0.178

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84. 2.8 0.171; 2.9 0.166; 3 0.16; 3.1 0.155; 3.2 0.15; 3.3 0.145; 3.4 0.141
 85. 3.5 0.137; 3.6 0.133; 3.7 0.13; 3.8 0.126; 3.9 0.123; 4 0.12; 4.1 0.117
 86. 4.2 0.114; 4.3 0.112; 4.4 0.109; 4.5 0.107; 4.6 0.104; 4.7 0.102; 4.8 0.1
 87. 4.9 0.096; 5 0.092; 5.1 0.089; 5.2 0.085; 5.3 0.082; 5.4 0.079; 5.5 0.076
 88. 5.6 0.073; 5.7 0.071; 5.8 0.068; 5.9 0.066; 6 0.064
 89. LOAD COMB 6 1.4 D
 90. 1 1.4
 91. LOAD COMB 7 1.2 D + 1.4 LF
 92. 1 1.2 3 1.4
 93. LOAD COMB 8 1.2 D + 1.6 L
 94. 1 1.2 2 1.6

 95. LOAD COMB 9 1.2 D + 1.2 F + 1.6 L
 96. 1 1.2 2 1.6 3 1.2
 97. LOAD COMB 10 1.2 D + 1.0 L + 0.200 SX + 0.060 SZ
 98. 1 1.2 2 1.0 4 0.2 5 0.06
 99. LOAD COMB 11 1.2 D + 1.0 L + 0.200 SX - 0.060 SZ
 100. 1 1.2 2 1.0 4 0.2 5 -0.06
 101. LOAD COMB 12 1.2 D + 1.0 L - 0.200 SX + 0.060 SZ
 102. 1 1.2 2 1.0 4 -0.2 5 0.06
 103. LOAD COMB 13 1.2 D + 1.0 L - 0.200 SX - 0.060 SZ
 104. 1 1.2 2 1.0 4 -0.2 5 -0.06
 105. LOAD COMB 14 1.2 D + 1.0 L + 0.200 SZ + 0.060 SX
 106. 1 1.2 2 1.0 5 0.2 4 0.06
 107. LOAD COMB 15 1.2 D + 1.0 L + 0.200 SZ - 0.060 SX
 108. 1 1.2 2 1.0 5 0.2 4 -0.06
 109. LOAD COMB 16 1.2 D + 1.0 L - 0.200 SZ + 0.060 SX
 110. 1 1.2 2 1.0 5 -0.2 4 0.06
 111. LOAD COMB 17 1.2 D + 1.0 L - 0.200 SZ - 0.060 SX
 112. 1 1.2 2 1.0 5 -0.2 4 -0.06
 113. LOAD COMB 18 0.9 D + 0.200 SX + 0.060 SZ
 114. 1 0.9 4 0.2 5 0.06
 115. LOAD COMB 19 0.9 D + 0.200 SX - 0.060 SZ
 116. 1 0.9 4 0.2 5 -0.06
 117. LOAD COMB 20 0.9 D - 0.200 SX + 0.060 SZ
 118. 1 0.9 4 -0.2 5 0.06
 119. LOAD COMB 21 0.9 D - 0.200 SX - 0.060 SZ
 120. 1 0.9 4 -0.2 5 -0.06
 121. LOAD COMB 22 0.9 D + 0.200 SZ + 0.060 SX
 122. 1 0.9 5 0.2 4 0.06
 123. LOAD COMB 23 0.9 D + 0.200 SZ - 0.060 SX
 124. 1 0.9 5 0.2 4 -0.06
 125. LOAD COMB 24 0.9 D - 0.200 SZ + 0.060 SX
 126. 1 0.9 5 -0.2 4 0.06
 127. LOAD COMB 25 0.9 D - 0.200 SZ - 0.060 SX
 128. 1 0.9 5 -0.2 4 -0.06
 129. LOAD COMB 26 0.9 D +1.60 F
 130. 1 0.9 3 1.6
 131. PERFORM ANALYSIS

Bogotá D.C., Noviembre de 2024

Referencia: Carta de compromiso

Por medio de la presente yo, **ANDREY FABIAN GARCIA CABRERA**, identificado con C.C. No. **80.122.199** de **Bogotá** y con matrícula profesional No. **25202122786 CND**, me hago responsable del **diseño estructural**. Para el proyecto tanque filtro agua potable asuarcopsa, en Anapoima Cundinamarca.

Cordialmente,



ANDREY FABIAN GARCIA CABRERA
C.C.80.122.739 BTA
MP.25202122786
INGENIERO CIVIL ECI