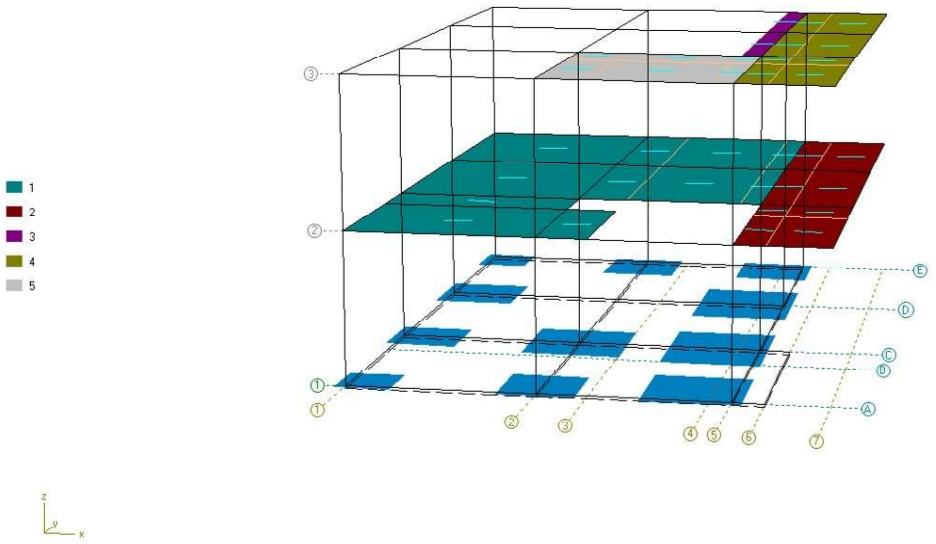

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1. INTRODUCCION

En el ejercicio de la construcción, históricamente, el ser humano ha encontrado la forma de adecuar el entorno según sus necesidades, estos factores antrópicos con el paso del tiempo son los que han formado las ciudades como las conocemos hoy.

En la definición de la geometría de las edificaciones se deben tener en cuenta los siguientes aspectos:

- Ubicación
- Clima
- Topografía
- Área del terreno
- Usos o tipo de construcción
- Plan de ordenamiento territorial
- Entre otros

Con base en estos componentes se proyecta un diseño arquitectónico acorde a las necesidades de la edificación y es este el punto de partida, paso seguido, se debe realizar un diseño estructural afín, que siga los lineamientos de la normatividad vigente y que cumpla la función siempre de salvaguardar las vidas humanas.

En este informe se podrá revisar la estructura completa de la edificación objeto de estudio descrita en la portada; para que tenga un orden lógico de lectura, se propone una tabla de contenido donde se encuentran todos los componentes técnicos de la estructura diseñada.

Cabe aclarar que, Ingeniamos cuenta con profesionales idóneos para el desarrollo del trabajo aquí planteado y el diseño realizado es optimo para el uso de la edificación.

2. OBJETIVOS

- Realizar el diseño estructural de la edificación objeto de estudio.
- Representar gráficamente y de manera sencilla resultados de dicho diseño para su posterior ejecución en obra.

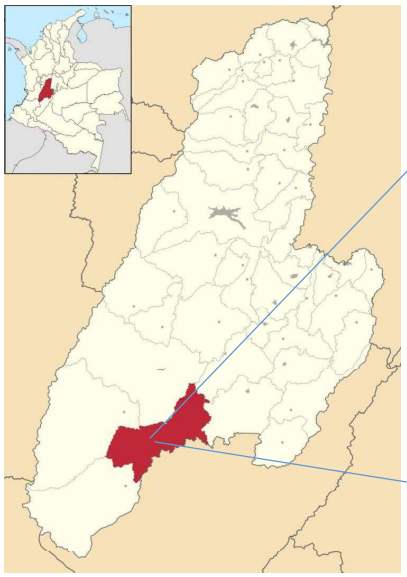
3. MARCO GEOGRAFICO

El proyecto a desarrollar está ubicado en Ataco, un municipio de Colombia situado en el departamento de Tolima. El término municipal limita con los municipios de Chaparral y Coyaima por el norte, con Rioblanco por el oeste, con Natagaima por el este, con Planadas por el suroeste, y por el sur con el departamento de Huila. La cabecera municipal se encuentra en un valle ubicado a orillas del río Saldaña y el oriente de la zona rural colinda con lomas, cerros y montañas de la Cordillera Central. En su totalidad el municipio de Ataco se encuentra al sur del departamento del Tolima, su cabecera municipal está a 143 km de Ibagué.

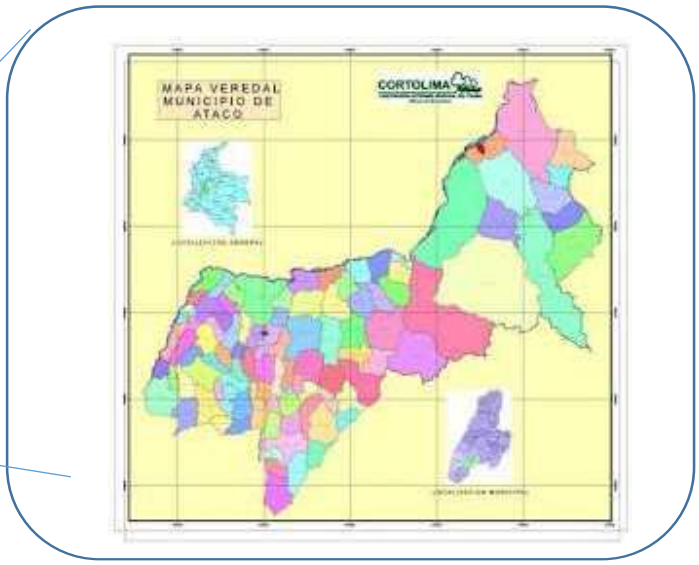
El municipio tiene un área de 996.82 km², de los cuales el 0.07% corresponde al área urbana y el 99.93% a la rural.

Fuente: https://es.wikipedia.org/wiki/Ataco_(Tolima).

Localización General



Fuente: https://alchetron.com/cdn/ataco-c6ac13b3-8621-4b55-8b1c-5198e9cfb5a-resize-750.jpg



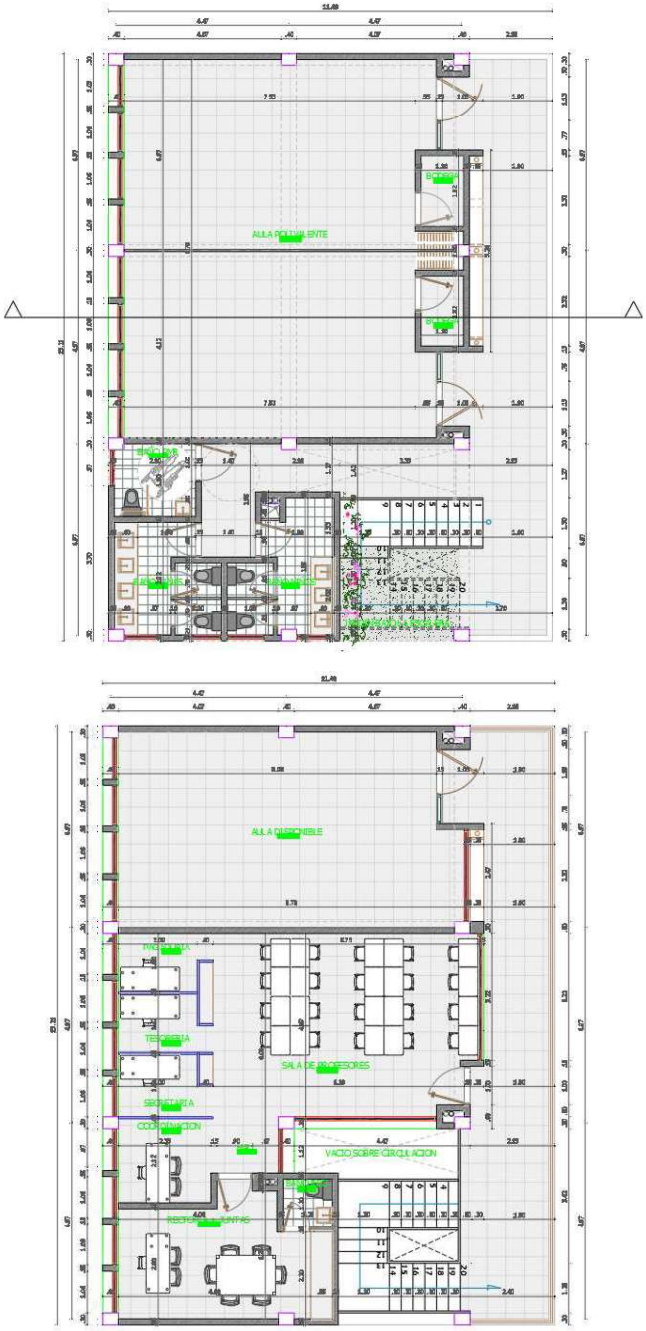
Fuente: https://unidosataco.blogspot.com/2010/05/embellecimiento-municipio-de-ataco.html

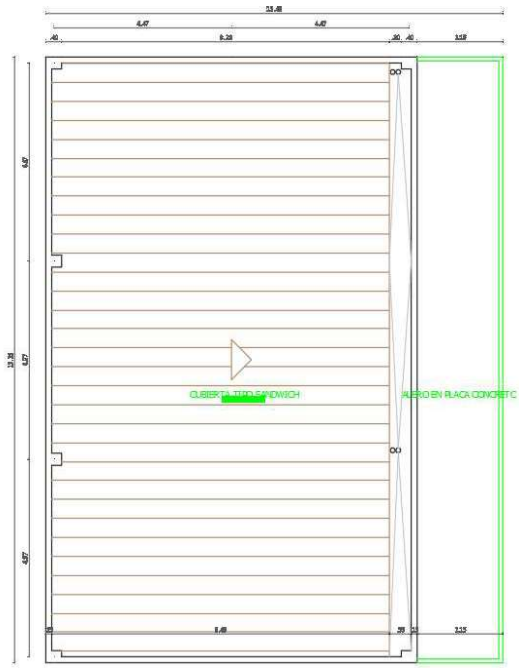
4. DESCRIPCION DE LA EDIFICACION

4.1. GENERALIDADES

N de Pisos	Descripcion
1	Aula polivalente, dos bodegas, baños niños, baños niñas, baños pmr.
2	Aulas, pagadería, tesorería, secretaría, coordinación, sala de profesores, recotería+juntas, baño rec.
Cubierta	Cubierta tipo sándwich, alero en placa de concreto.

5. PLANTAS ARQUITECTONICAS





Estos esquemas no son precisos ni detallados, para una mejor revisión, ver planos arquitectónicos definitivos.

6. CONFIGURACION GEOMETRICA DE LA ESTRUCTURA.

Numero de ejes numéricos (Sentido Vertical)	7 (1-7)
Numero de ejes Literales (sentido horizontal)	5 (A-E)
Número de pisos	2

Nota: las distancia entre ejes y alturas entre pisos se pueden observar en el anexo: DATOS DE ENTRADA.

7. SISTEMA ESTRUCTURAL ESCOGIDO

Se ha considerado un sistema estructural aporticado, que resiste las cargas verticales y las fuerzas horizontales, esencialmente completo, sin diagonales, construido en concreto siguiendo los requisitos para los materiales de acuerdo a la capacidad de disipación de energía.

La estructura se diseñó y calculo siguiendo todos los requisitos que exige la NSR-10; las columnas, vigas aéreas/cimentación y placas de entrepiso fueron chequeadas teniendo en

cuenta los factores de seguridad, deformaciones máximas, cuantías mínimas, cargas sugeridas y parámetros sísmicos que figuran en la NSR-10.

8. DATOS DEL PROYECTO Y ESPECIFICACIONES TECNICAS DE LOS MATERIALES:

Los elementos estructurales tales como:

- Vigas de cimentación
- Columnas
- Vigas aéreas
- Placas de entrepiso
- Escaleras

Deben ser construidos en:

Concreto de f´c =	**21**	**MPa.**
Acero de refuerzo Fy =	**420**	**MPa.**

Los agregados empleados en este concreto deben cumplir la norma NTC 174 (ASTM C33). El valor medio del modulo de elasticidad, para toda la información experimental nacional, sin distinguir por tipo de agregado, es:

Ec = 4700 √ f`c =	**21538.11**	**MPa.**

El cemento utilizado para elaborar este concreto debe cumplir con las normas NTC 121 y NTC 321 (ASTM 150).

Concreto premezclado debe mezclarse y entregarse de acuerdo con los requisitos de NTC 3318 (ASTM C94M) o NTC 4027 (ASTM C685M).

El concreto mezclado en obra debe cumplir con C.5.8.3. / NSR-10.

Se recomienda la realización de diseño de mezclas para concretos y morteros, previo a su utilización; con ello determinara cantidades exactas de cemento, arena, agregado pétreo, agua, así como también, las especificaciones técnicas de cada material.

Es necesario corroborar esta información con ensayos, de acuerdo a C.5.6.2., C.5.6.3. y C.5.6.4.

Se recomienda tener en cuenta todo lo contenido en C.5. / NSR-10: CALIDAD DEL CONCRETO, MEZCLADO Y COLOCACION.

Los agregados deben cumplir con C.3.3. / NSR-10, NTC 174 (ASTM C33). El agua debe cumplir con C.3.4. / NSR-10, NTC 3459 (BS3148).

Para la relación agua – cemento ver C.4.1., C.4.2. y C.4.3. y en especial las tablas C.4.2.1.y C.4.3.1.

El constructor responsable debe conocer lo expuesto en C.3.8. / NSR-10 y complementar este diseño estructural con la información contenida allí, en cuanto a la normatividad aplicable de los materiales empleados en la construcción.

No se recomienda la soldadura en barras de refuerzo. Tampoco se recomienda el uso de acero liso en elementos estructurales o no estructurales.

El refuerzo liso debe cumplir con la norma NTC 161 (ASTM A 615).

Los muros divisorios, antepechos, cerramiento y cuchillas, en mampostería de ladrillo tolete común y/o con perforación vertical, que cumple con la norma NTC 4205 (ASTM C34, C56 Y C62) y F'cu = 15 MPa.

Mortero de pega Tipo M, con resistencia mínima a la compresión, F'cp = 17.5 MPa, con dosificación 2.5:1 en volumen (arena: cemento).

9. ANALISIS SISMICO.

9.1. METODO DE ANALISIS SISMICO A UTILIZAR SEGÚN LA NSR-10

La NSR-10 indica varios métodos de análisis, entre los más comunes se encuentran los siguientes:

9.1.1. MÉTODO DE LA FUERZA HORIZONTAL EQUIVALENTE (A.3.4.2.1)

(a) Todas las edificaciones, regulares e irregulares, en las zonas de amenaza sísmica baja.

(b) Todas las edificaciones, regulares e irregulares, pertenecientes al grupo de uso I, localizadas en zonas de amenaza sísmica intermedia.

(c) Edificaciones regulares, de 20 niveles o menos y 60 m de altura o menos medidos desde la base, en cualquier zona de amenaza sísmica, exceptuando edificaciones localizadas en lugares que tengan un perfil de suelo tipo D, E o F, con periodos de vibración mayores de Tc.

(d) Edificaciones irregulares que no tengan más de 6 niveles ni más de 18 m de altura medidos a partir de la base.

(e) Estructuras flexibles apoyadas sobre estructuras más rígidas que cumplan los requisitos de A3.24.3.

9.1.2. MÉTODO DEL ANÁLISIS DINÁMICO ELÁSTICO (A.3.4.2.2)

(a) Edificaciones de más de 20 niveles o de más de 60 m de altura, exceptuando las edificaciones mencionadas en A.3.4.2.1 (a) y (b).

(b) Edificaciones que tengan irregularidades verticales de los tipos 1aA, 1bA, 2A y 3A, tal como se definen en A.335,

(c) Edificaciones que tengan irregularidades que no estén descritas en A.3.3.4 y A3.3.5, exceptuando el caso descrito en A.3.2.4.3,

(d) Edificaciones de más de 5 niveles o de más de 20 m de altura, localizadas en zonas de amenaza sísmica alta, que no tengan el mismo sistema estructural en toda su altura, con la excepción de los prescrito en A.3.243.

(e) Estructuras, regulares o irregulares, localizadas en sitios que tengan un perfil de suelo D, E o F y que tengan un periodo mayor de 2Tc. En este caso el análisis debe incluir los efectos de interacción suelo-estructura, tal como los prescribe el Capítulo A7, cuando se realice un análisis de la estructura suponiéndola empotrada en su base.

Fuente: tomado textualmente de la NSR-10 Titulo A, A.3.4.2.1 y A.3.4.2.2

El METODO DE ANALISIS SISMICO UTILIZADO EN EL PRESENTE INFORME ES EL DE LA FUERZA HORIZONTAL EQUIVALENTE. (VER ANEXO: RESULTADO ANALISIS SISMICO)

9.2. EFECTOS LOCALES

Aa:	0.25	Según apéndice A-4 NSR-10
Av:	0.20	
Ae:	0.07	
Ad:	0.04	
Fa:	1.30	Según tabla A.2.4-3 NSR-10
Fv:	2.00	

9.3. COEFICIENTE DE IMPORTANCIA Y GRUPO DE USO.

DEFINICION DE LOS GRUPOS DE USO SEGÚN LA NSR-10

A.2.5.1.1- Grupo IV Edificaciones indispensables - Son aquellas edificaciones de atención a la comunidad que deben funcionar durante y después de un sismo, y cuya operación no puede ser trasladada rápidamente a un lugar altero.

A.2.5.1.2- Grupo III Edificaciones de atención a la comunidad Este grupo comprende aquellas edificaciones, y sus accesos, que son indispensables después de un temblor para atender la emergencia y preservar la salud y la seguridad de las personas, exceptuando las incluidas en el grupo IV.

A.2.5.1.3-Grupo II-Estructuras de ocupación especial cubre las siguientes estructuras:

Edificaciones en donde se puedan reunir más de 200 personas en un mismo salón, Graderías al aire libre donde pueda haber más de 2000 personas a la vez, Almacenes y centros comerciales con más de 500 m² por piso, (d) Edificaciones de hospitales, clínicas y centros

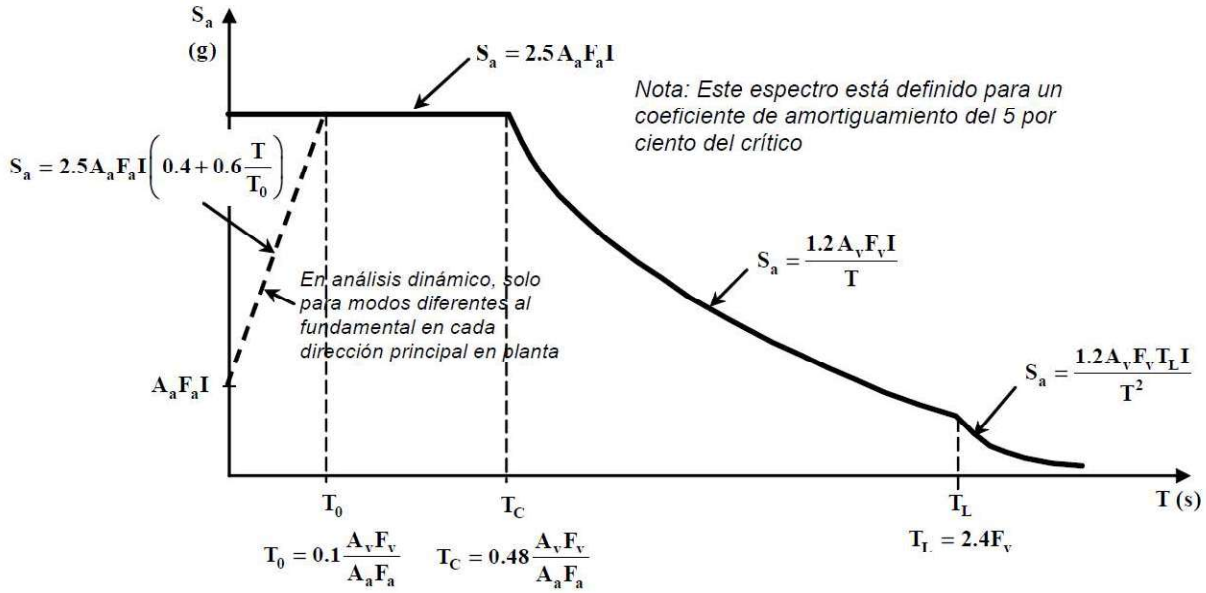
de salud, no cubiertas en A.2.5.1.1. Edificaciones donde trabajen o residan más de 3000 personas y Edificios gubernamentales.

A.2.5.1.4 Grupo I- Estructuras de ocupación normal Todas las edificaciones cubiertas por el alcance de este Reglamento, pero que no se han incluido en los Grupos II, III y IV.

Grupo de uso	Coeficiente de importancia, I	Grado de Desempeño
IV	1.5	Superior
III	1.25	Superior
II	1.1	Bueno
I	**1**	**Bajo**
Fuente: Tabla A.2.5-1 Valores del coeficiente de importancia, / Tabla A.9.2-1 NSR-10		

GRADO DE DESEMPEÑO MINIMO REQUERIDO	
Grupo De Uso	**Grado De Desempeño**
IV	Superior
III	Superior
II	Bueno
I	**Bajo**

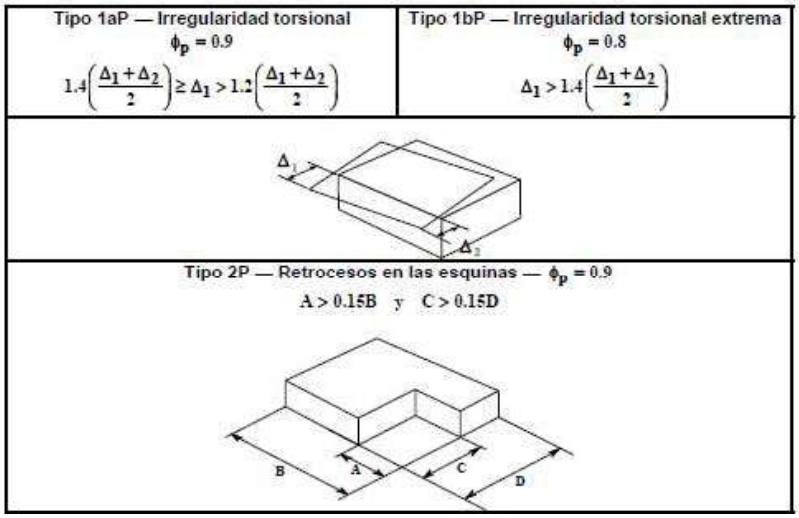
9.4. ESPECTRO ELÁSTICO DE ACELERACIONES DE DISEÑO COMO FRACCIÓN DE G



Fuente: NSR-10

10. DETALLAMIENTO.

10.1. IRREGULARIDADES



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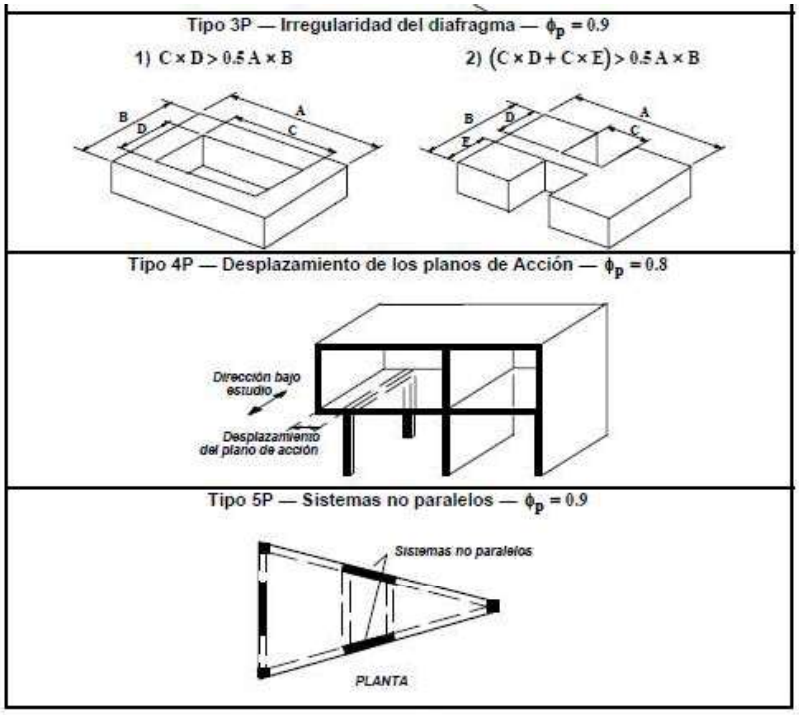
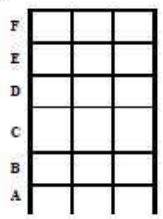
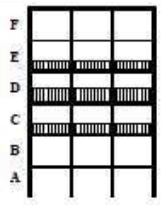


Figura A.3-1 — Irregularidades en planta

Fuente: Capitulo A.3 /NSR-10

Tipo 1aA — Piso flexible $\phi_a = 0.9$ 0.60 Rigidez $K_D \leq$ Rigidez $K_C <$ 0.70 Rigidez K_D o 0.70 $(K_D+K_E+K_F)$ /3 $\leq$ Rigidez $K_C <$ 0.80 $(K_D+K_E+K_F)$ /3	
Tipo 1bA — Piso flexible extremo $\phi_a = 0.8$ Rigidez $K_C <$ 0.60 Rigidez K_D o Rigidez $K_C <$ 0.70 $(K_D+K_E+K_F)$ /3	
Tipo 2A — Distribución masa — $\phi_a = 0.9$ $m_D > 1.50\ m_E$ o $m_D > 1.50\ m_C$	

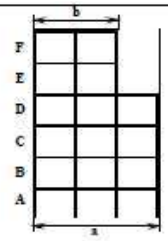
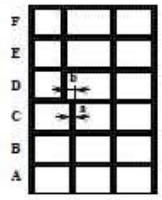
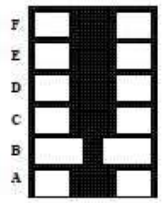
Tipo 3A — Geométrica — $\phi_a = 0.9$ $a > 1.30\ b$	
Tipo 4A — Desplazamiento dentro del plano de acción — $\phi_a = 0.8$ $b > a$	
Tipo 5aA — Piso débil $\phi_a = 0.9$ 0.65 Resist. Piso C ≤ Resist. Piso B < 0.80 Resist. Piso C	
Tipo 5bA — Piso débil extremo $\phi_a = 0.8$ Resistencia Piso B < 0.65 Resistencia Piso C	

Figura A.3-2 — Irregularidades en la altura

Fuente: Capitulo A.3 /NSR-10

10.2. REDUNDANCIA ESTRUCTURAL.

Para que una estructura sea redundante deben cumplirse dos características fundamentales:

1) Que el sistema tenga la mayor cantidad de pórticos y estos a su vez la mayor cantidad de columnas adecuadamente dispuestas que eviten concentraciones de esfuerzos.

2) Que los elementos tengan la capacidad de disipar la energía más allá del rango de deformaciones elásticas (ductilidad).
De esta forma los elementos menos cargados absorben esfuerzos de los más cargados, generándose un mecanismo de distribución de esfuerzos, que determina un comportamiento adecuado del sistema.

10.3. CAPACIDAD DE DISIPACION DE ENERGIA MINIMA REQUERIDA.

Dependiendo del tipo de material estructural y de las características del sistema de resistencia sísmica se establecen los grados de capacidad de disipación de energía mínimos.

Capacidad mínima de disipación de energía DMI

Capacidad moderada de disipación de energía DMO

Capacidad especial de disipación de energía DES

CAPACIDAD DE DISIPACION DE ENERGIA	ZONA DE AMENAZA SISMICA		
	BAJA	INTERMEDIA	ALTA
MINIMA DMI	X	N/A	N/A
MODERADA DMO	X	X	N/A
ALTA DES	X	X	X

Fuente: prefacio-Apendice I, NSR-10

LA PRESENTE ESTRUCTURA DE DISEÑO CON UNA CAPACIDAD ESPECIAL DE DISIPACION DE ENERGIA DES.

10.4. COEFICIENTE DE DISIPACIÓN DE ENERGIA

Ro Inicial (Según tabla A.3-3 / NSR-10)				7.00
IRREGULARIDADES EN PLANTA				0.8
	TIPO	Φ	SI/NO	
1aP	Torsional	0.9	NO	
1bP	Torsional Extrema	0.8	SI	
2P	Retroceso en las esquinas	0.9	NO	
3P	Irregulaaridad del diafragma	0.9	NO	
4P	Desplazamiento en los planos de accion	0.8	NO	
5P	Sistemas no paralelos	0.9	NO	
IRREGULARIDADES EN ALTURA				1
	TIPO	Φ	SI/NO	
1aA	Piso flexible	0.9	NO	
1bA	Piso flexible Extremo	0.8	NO	
2A	Distribucion de masa	0.9	NO	
3A	Geometrica	0.9	NO	
4A	Desplazamiento dentro del plano de accion	0.8	NO	
5aA	Piso debil	0.9	NO	
5bA	Piso debil Extremo	0.8	NO	
REDUNDANCIA		**X**	**Y**	1
		1	1	
REDUCCION DEL VALOR DE R				**5.6**
R = øa.øp.ør.Ro				
Donde:				
øa = coeficiente de reducción de la capacidad de disipación de energía causada por la irregularidad en la altura.				
øp = coeficiente de reducción de la capacidad de disipación de energía causada por la irregularidad en la planta.				
ør = Factor de reduccion por ausencia de redundancia				

11. EVALUACION DE CARGAS.

11.1. CARGAS VIVAS

CARGAS VIVAS	kN/m²
Salones	2.00
Corredores	5.00
Cubierta teja	0.50

11.2. ENTREPISOS

11.2.1. TIPO DE LOSA

CARGA PLACA ALIGERADA

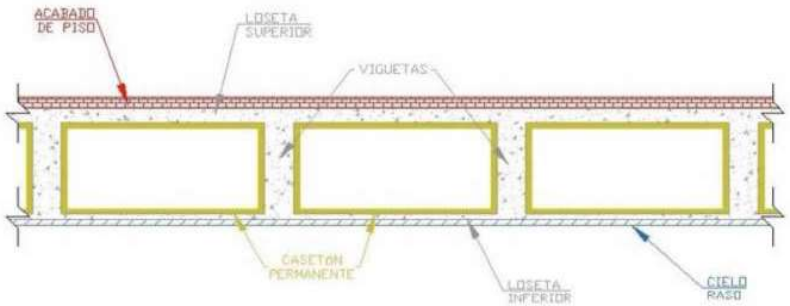
Las losas aligeradas son aquellas que forman vacíos en las secciones donde lleva casetón. El casetón o bovedilla es una placa de poliestireno expandido

El casetón brinda ligereza, simplifica el armado, aislamiento temo-acústico.

Otra opción para utilizar el casetón es como nivelación y relleno para grandes cantidades de volumen

Las densidades de este producto son entre 8 y 10 kg/m³.

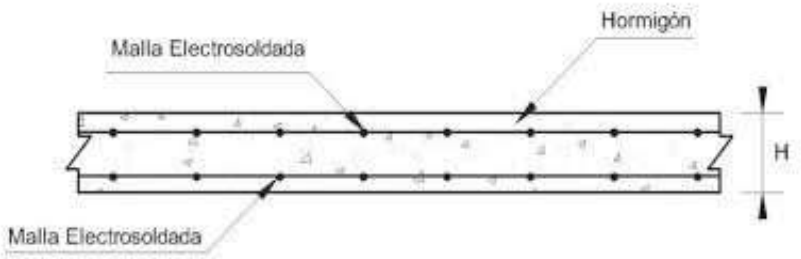
Esos vacíos que forma el casetón aligeran la carga muerta debido al peso propio. Estas losas son más eficientes que las losas macizas ya que permiten tener espesores mayores sin aumentar el volumen de concreto con respecto a una losa maciza.



Fuente: https://ingdanielrg.com/losa-aligerada-proceso-constructivo/

CARGA PLACA MACIZA EN CONCRETO REFORZADO

Las placas macizas se usan para espacios donde las luces no son excesivas y están llenas en todo su volumen, es decir, no tienen espacios vacíos como si sucede con las aligeradas.



Fuente:http://repositorio.ug.edu.ec/bitstream/redug/16541/1/MOREIRA_R%C3%93MULO_TRABAJO_TITULACION_GENERALES_INGENIERIA_NOVIEMBRE_2016.pdf

DETERMINACION ESPESOR VIGAS Y PLACAS ENTREPISOS ZONA VIVIENDA

Según la tabla CR.9.5 / NSR-10 para vigas no preesforzadas o losas en concreto reforzado en una direccion que soporten muros divisorios y particiones fragiles susceptibles de dañarse debido a deflexiones grandes, se tiene:

Voladizos	L/5		0.0
Simplemente apoyadas	L/11	487	44.3
Un apoyo continuo	L/12	487	40.6
Dos apoyos continuos	L/14		0.0
Por lo tanto h definitivo		**0.50**	**m**

Separacion entre viguetas		h	x	2.5	≈	1.25
Por lo tanto a definitivo		**1.00**		**m**		
Calculo espesor placa superior		**0.05**		**m**		
Espesor placa superior definitivo		**0.05**		**m**		

DETERMINACION ESPESOR LOSA MACIZA ALERO

Según la tabla C.9.5 (a) / NSR-10 para vigas no preesforzadas o losas en concreto reforzado en una direccion que no soporten muros divisorios y particiones fragiles susceptibles de dañarse debido a deflexiones grandes, se tiene:

Voladizos	L/10		0.0
Simplemente apoyadas	L/20	222	11.1
Un apoyo continuo	L/24		0.0
Dos apoyos continuos	L/28		0.0
Por lo tanto h definitivo		**0.12**	**m**

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Cálculo ingeniamos

EVALUACIÓN DE CARGAS

CARGA PLACA ALIGERADA ENTREPISOS	e	0.50	m		KN/m2
Plaqueta de recubrimiento	0.05	24.00	1.00	1.00	1.200
Caseton de guadua					0.150
Viguetas	0.10	24.00	0.41	1.00	0.984
			1.00		
Plaqueta de cielo raso	0.04	24.00	1.00	1.00	0.960
Baldosa ceramica					0.800
Muros divisorios (B.3.4.3-1)					3.000
Total carga permanente					**7.094**
Carga sobre impuesta					**4.910**
Carga Viva Institucional					**2.000**
Carga Viva Educativos corredores					**5.000**

CARGA PLACA ALIGERADA TANQUES	e	0.50	m		KN/m2
Plaqueta de recubrimiento	0.05	24.00	1.00	1.00	1.200
Caseton de guadua					0.150
Viguetas	0.10	24.00	0.41	1.00	0.984
			1.00		
Plaqueta de cielo raso	0.04	24.00	1.00	1.00	0.960
Baldosa ceramica					0.800
Muros divisorios (B.3.4.3-1)					3.000
Carga tanques					5.000
Total carga permanente					**12.094**
Carga sobre impuesta					**9.910**
Carga Viva Institucional					**2.000**

CARGA PLACA MACIZA ALERO	e	0.12	m		KN/m2
Placa	0.12	24.00	1.00	1.00	2.880
Acabado					1.600
Muro					1.400
Carga sobreimpuesta					**3.000**
Carga viva institucional					**2.000**

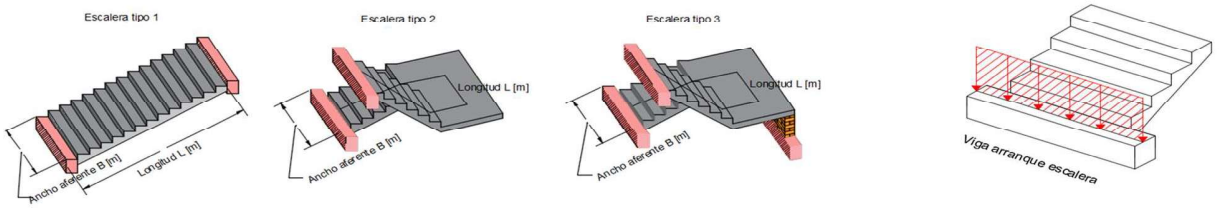
DETERMINACION ESPESOR ESCALERA

Según la tabla C.9.5 (a) / NSR-10 para vigas no preesforzadas o losas en concreto reforzado en una direccion que no soporten muros divisorios y particiones fragiles susceptibles de dañarse debido a deflexiones grandes, se tiene:

Voladizos	L/10		0.0
Simplemente apoyadas	L/20	410	20.5
Un apoyo continuo	L/24		0.0
Dos apoyos continuos	L/28		0.0
Por lo tanto h definitivo		**0.20**	**m**
Pendiente en decimales		0.17 /	0.28 ≈ 0.61
Pendiente en grados		31.26	
Coseno pendiente		0.85	

CARGA ESCALERA	**e**	**0.20**	**m**			**KN/m2**
Peso propio placa	24.00	0.20	1.00	1.00		5.647
		cos	31.26			
De peldaños	0.28	0.17	1.00	24.00		2.040
		2.00		0.28		
De acabado en granito	0.28	0.17	0.04	1.00	22.00	1.414
		0.28				
De afinado inferior en pañete	22.00	0.02	1.00	1.00		0.518
		cos	31.26			
Total carga permanente						**9.619**
Carga Viva						**5.000**

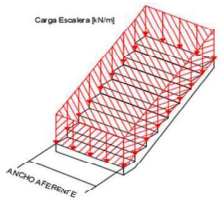
CARGAS DISTRIBUIDAS

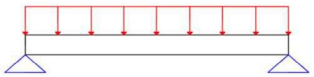


Tipo Escalera	3		**Distribuida**
Longitud L=	8.85		
Ancho B=	1.2		**KN/m**
Carga muerta	9.6		**21.282**
Carga Viva	5.0		**11.063**

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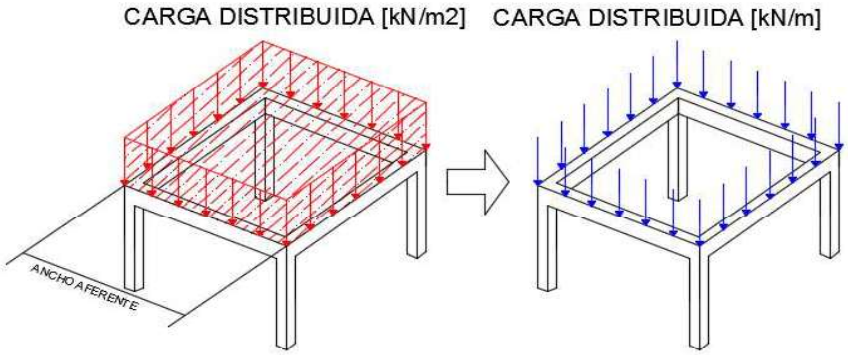
ESCALERA 1





	kN/m^2	A/ aferente	Distribuida KN/m
Carga muerta	9.619	1.20	11.543
Carga Viva	5.000	1.20	6.000

11.3. CARGA CUBIERTA



CARGA CUBIERTA 1	**KN/m2**
Teja Standing Seam cal 26	0.100
Correas metalicas	0.180
Cuchillas	1.000
Iluminarias	0.180
Total carga permanente	**1.460**
Carga Viva (mantenimiento)	**0.500**

VIGA CUBIERTA				
Carga muerta	1.460	4.97		**7.256**
Carga Viva	0.500	4.97		**2.485**

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12. SOFTWARE UTILIZADO.

EngSolutions RCB es un programa estructural para el análisis tridimensional y diseño sísmico de edificios de concreto reforzado, excepcionalmente fácil de utilizar. A través de su interface gráfica es posible crear, analizar y diseñar fácil y muy rápidamente edificios complejos de varios pisos, de acuerdo a los códigos de construcción de varios países. Utilizamos Versión 9.09 (Licencia NºA853-A32561 y Licencia N°B3589-A17693).

La generación de la estructura, asignación de propiedades a elementos, definición de apoyos y aplicación de cargas, son todas operaciones que se realizan en forma interactiva, requiriendo un mínimo ingreso de información. No hay necesidad de crear un archivo de entrada de datos. Todas las operaciones, incluyendo análisis y diseño, se realizan dentro de la interface gráfica del programa.

La generación de cargas está totalmente automatizada dentro del programa, liberando al ingeniero de cálculos manuales tediosos y sobretodo, propensos a error. Cargas verticales de piso pueden ser convertidas automáticamente en cargas distribuidas en vigas y muros adyacentes. Fuerzas de sismo y viento pueden ser generadas automáticamente de acuerdo a numerosos reglamentos internacionales de construcción.

Para el diseño de las correas metálicas se utilizó el software Arquimet 2007 proporcionado por Acerías de Colombia S.A. - Acesco.

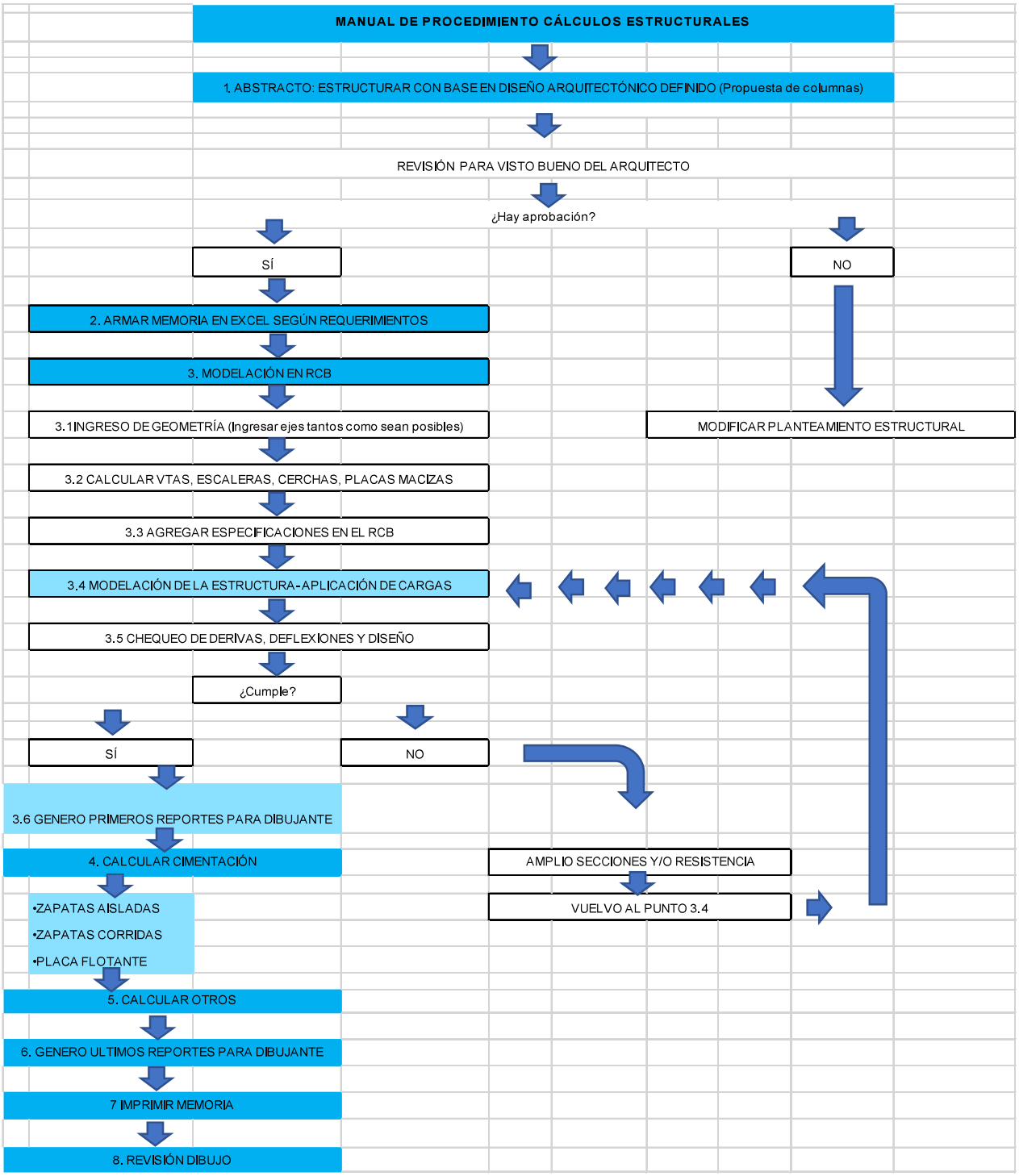
La cimentación y los muros de contención fueron calculados utilizando: Programas de ingeniería civil / Modulo fundaciones / Versión 2.0 del 2005 / del Ing. Fernando Alberto Medina Romero. Y en general, utilizando los conocimientos y bibliografía adquirida durante nuestro ejercicio en la profesión.

El despiece de la mayoría de los elementos en concreto se hizo basándonos en el software **DC-CAD Versión 2010** con el Nº de licencia DDS-2015-05-24-020.

Cálculo
ingeniamos

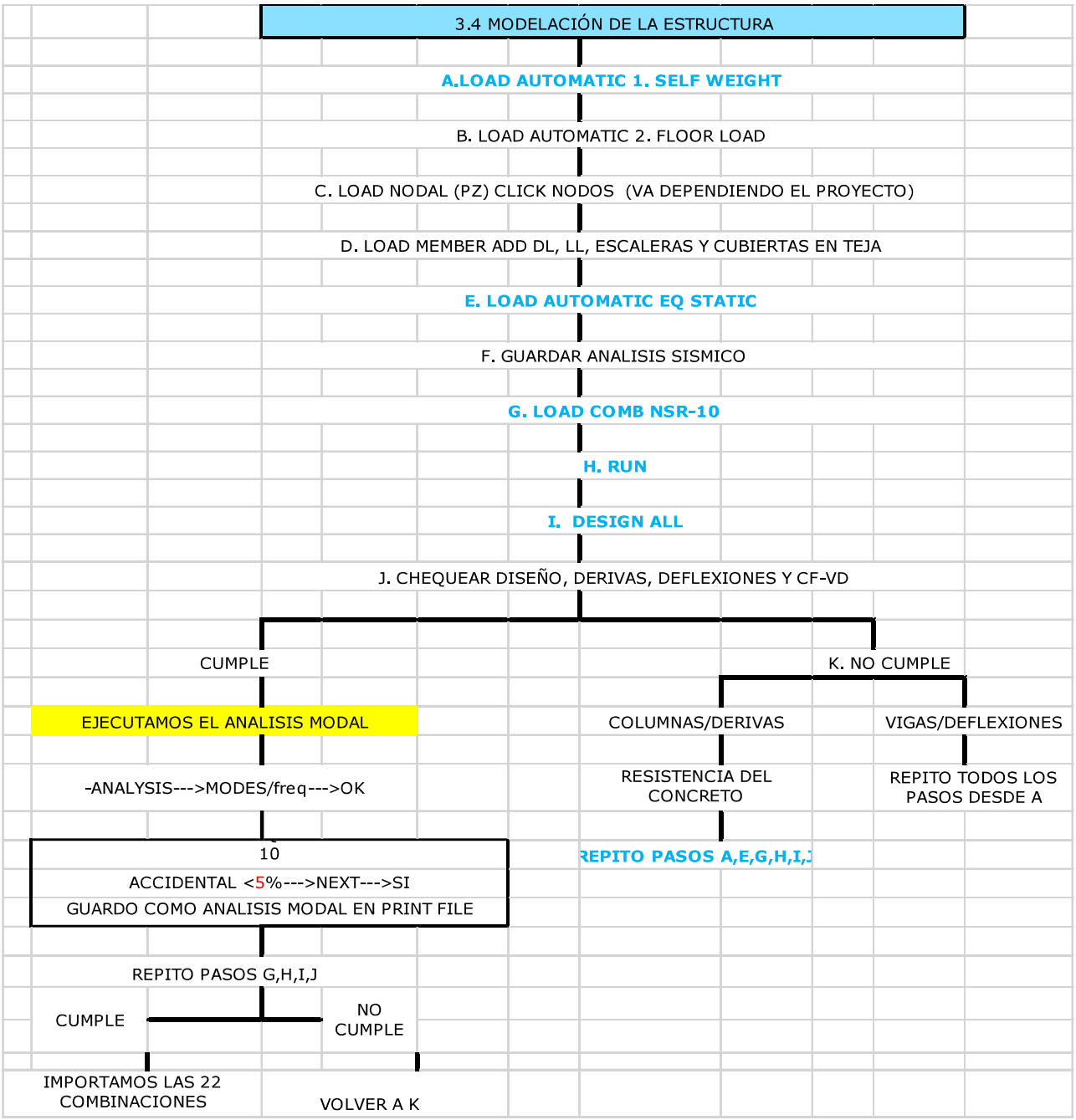


13. PROCEDIMIENTO DE DISEÑO



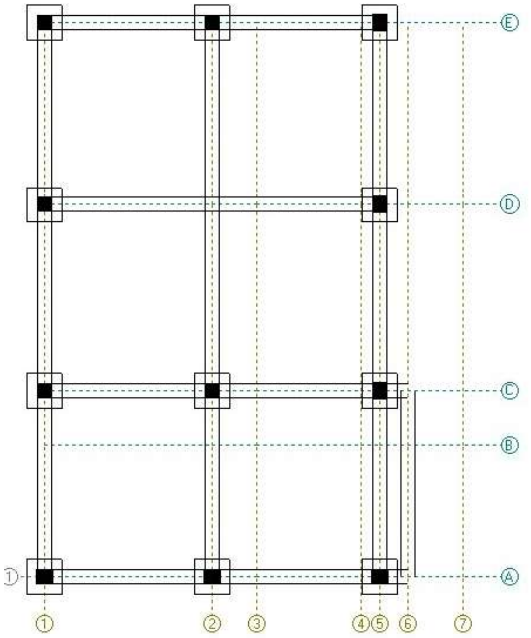
Fuente: elaboración propia

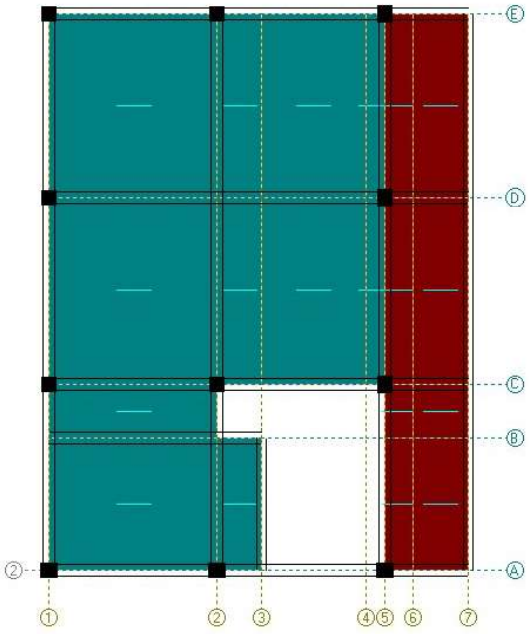
Ampliación punto 3.4

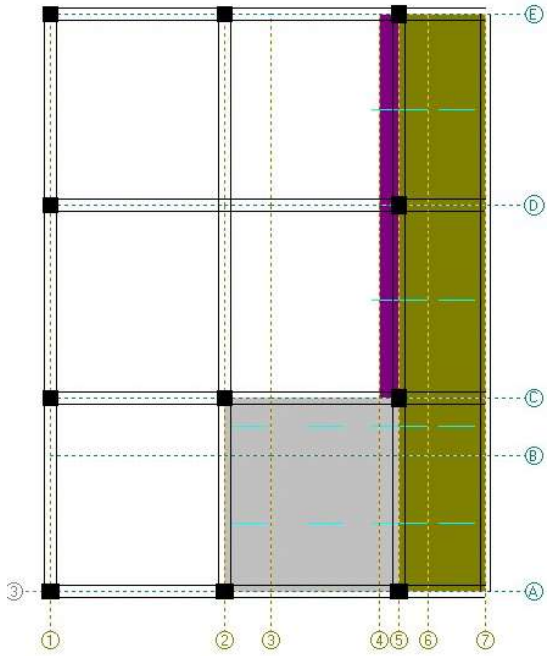


Fuente: elaboración propia

14. PLANTAS ESTRUCTURALES







15. ESPECIFICACIONES PARA DISEÑO DE CIMENTACION

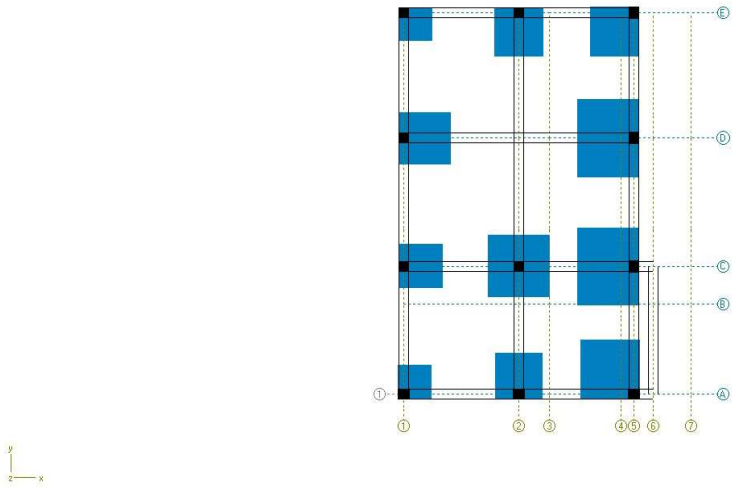
Concretos de limpieza para cimentación F´c = 140 Kg-F/cm^2 ≈ 14 MPa.

Para el predimensionamiento se utilizaron cargas de servicio, ver anexo: RESULTADO DISEÑO DE CIMENTACION.

Capacidad de carga admisible:	96.66 KPa ≈ 9.66 Ton/m^2
Tipo de cimentación:	Zapatas aisladas
Profundidad de cimentación:	1.50 m
Perfil de suelo:	D

Fuente: Estudio de suelos realizado por la Ing. Shirley Peña

El resultado de diseño de la estructura de cimentación, se puede ver en el anexo: DISEÑO DE CIMENTACION



Planta cimentación

16. INDICES DE FLEXIBILIDAD

INDICES DE FLEXIBILIDAD

Indica la susceptibilidad de la estructura a tener deflexiones o derivas excesivas, con respecto a las permitidas por el reglamento.

DERIVAS

Desplazamiento horizontal relativo entre dos puntos colocados en la misma línea vertical, en dos pisos o niveles consecutivos de la edificación.

Fuente: Capitulo A.6/ NSR-10

LIMITES DE LA DERIVA

Tabla A.6.4-1
Derivas máximas como porcentaje de h_{pi}

Estructuras de:	Deriva máxima
concreto reforzado, metálicas, de madera, y de mampostería que cumplen los requisitos de A.6.4.2.2	$1.0\% \left(\Delta^i_{max} \le 0.010 \ h_{pi}\right)$
de mampostería que cumplen los requisitos de A.6.4.2.3	$0.5\% \left(\Delta^i_{max} \le 0.005 \ h_{pi}\right)$

Fuente: Capitulo A.6/ NSR-10

DEFLEXIONES

La deflexión es el grado en el que un elemento estructural se desplaza bajo la aplicación de una fuerza o carga. La deflexión se determina aplicando las leyes que relacionan las fuerzas y desplazamientos, para ello se utilizan dos métodos de cálculo: los geométricos y los de energía.

Fuente: https://www.construmatica.com/construpedia/Deflexion

FORMULA PARA EL CÁLCULO DE LA DEFLEXIÓN INMEDIATA

$$I_e = \left(\frac{M_{cr}}{M_a}\right)^3 I_g + \left[1 - \left(\frac{M_{cr}}{M_a}\right)^3\right] I_{cr} \qquad \text{(C.9-8)}$$

$$M_{cr} = \frac{f_r I_g}{y_t} \qquad \text{(C.9-9)}$$

FORMULA PARA EL CÁLCULO DE LA DEFLEXIÓN A LARGO PLAZO

$$\lambda_\Delta = \frac{\xi}{1 + 50\rho'} \qquad \text{(C.9-11)}$$

ξ ,=factor dependiente del tiempo para cargas sostenidas

TIEMPO	ξ ,
5 años o mas	2.00
12 meses	1.40
6 meses	1.20

Fuente: capitulo 9 titulo c.9.5 control de deflexiones

DEFLEXION MAXIMA ADMISIBLE CALCULADA

Tipo de elemento	Deflexión considerada	Límite de deflexión
Cubiertas planas que no soporten ni estén ligadas a elementos no estructurales susceptibles de sufrir daños debido a deflexiones grandes.	Deflexión inmediata debida a la carga viva, **L**	$\ell/180$ *
Entrepisos que no soporten ni estén ligados a elementos no estructurales susceptibles de sufrir daños debido a deflexiones grandes.	Deflexión inmediata debida a la carga viva, **L**	$\ell/360$
Sistema de entrepiso o cubierta que soporte o esté ligado a elementos no estructurales susceptibles de sufrir daños debido a deflexiones grandes.	La parte de la deflexión total que ocurre después de la unión de los elementos no estructurales (la suma de la deflexión a largo plazo debida a todas las cargas permanentes, y la deflexión inmediata debida a cualquier carga viva adicional)†	$\ell/480$ ‡
Sistema de entrepiso o cubierta que soporte o esté ligado a elementos no estructurales no susceptibles de sufrir daños debido a deflexiones grandes.		$\ell/240$§

* Este límite no tiene por objeto constituirse en un resguardo contra el empozamiento de aguas. Este último se debe verificar mediante cálculos de deflexiones adecuados, incluyendo las deflexiones debidas al agua estancada, y considerando los efectos a largo plazo de todas las cargas permanentes, la contraflecha, las tolerancias de construcción y la confiabilidad en las medidas tomadas para el drenaje.

† Las deflexiones a largo plazo deben determinarse de acuerdo con C.9.5.2.5 ó C.9.5.4.3, pero se pueden reducir en la cantidad de deflexión calculada que ocurra antes de unir los elementos no estructurales. Esta cantidad se determina basándose en datos de ingeniería aceptables correspondiente a las características tiempo-deflexión de elementos similares a los que se están considerando.

‡ Este límite se puede exceder si se toman medidas adecuadas para prevenir daños en elementos apoyados o unidos.

§ Pero no mayor que la tolerancia establecida para los elementos no estructurales. Este límite se puede exceder si se proporciona una contraflecha de modo que la deflexión total menos la contraflecha no exceda dicho límite.

Fuente: Capitulo C.9, Tabla C.9.5(b) / NSR-10

17. DATOS PARA DISEÑO DE ELEMENTOS NO ESTRUCTURALES

17.1. ESPECIFICACIONES DE LA MAMPOSTERIA

Bloque Estructural



Características físicas de la unidad (NSR-10/NTC 4026/ASTM C129)		
	Bloque estructural	NSR 10/NTC 4026
Resistencia a la compresión f'cu	15 MPa	> 6 MPa
Absorción de agua	8%	>12%
Contracción lineal por secado	0,033%	< 0,065%

Dimensiones de la unidad			
	Altura (mm)	Espesor(mm)	Longitud(mm)
Nominal	200	120.150. 200	400
Estándar	190	120.150. 200	390
Tolerancias	<1%	<1%	± 2mm

Fuente: ficha técnica bloque estructural www.concretodo.com.co

17.2. DETERMINACION DE F'M

Rm= (2h/75+3h)f'cu+(50kp/75+3h)f'cp <=0.8f'cu				
Mortero tipo **M** f'cp= Mpa	17.5			
MAMPOSTERIA A UTILIZAR			**RESISTENCIA A LA COMPRESION f'cu**	
Bloque estructural			kg/cm2	150
h=mm	200		Mpa	15
a=mm	120			
L=mm	400			
Kp=	1.4	unidades de concreto		
Kp=	0.8	unidades de arcilla		
Rm=	10.70		F'm= 0.75Rm	
0.8*f'cu=	12		**F'm Mpa**	**8**
Rm<= 0.8*f'cu	**VERDADERO**		**F'm= Kg/cm2**	**80**

18. CONCLUSIONES Y RECOMENDACIONES

- Esta memoria de cálculo contiene volúmenes de concreto y pesos de acero aproximados de diseño, se recomienda realizar la revisión de cantidades directamente de los planos estructurales para así obtener información mas cercana a la realidad.
- Es importante que, para la construcción de esta edificación, el propietario exija el estricto cumplimiento de lo descrito en esta memoria de cálculo y planos estructurales.
- La estructura debe ejecutarla un ingeniero civil idóneo, tal y como lo indica la ley 400 Capitulo IV DIRECTORES DE CONSTRUCCCION.
- El constructor responsable debe conocer lo expuesto en C.3.8. / NSR-10 y complementar este diseño estructural con la información contenida allí, en cuanto a la normatividad aplicable de los materiales empleados en la construcción.
- La interpretación de los resultados, recomendaciones y conclusiones aquí dispuestas, aplican únicamente para el proyecto objeto de estudio, no se recomienda que estos parámetros sean utilizados para otras construcciones, ya que cada estructura tiene requerimientos específicos y particulares.
- Con base en esta memoria de cálculo se dibujaron los planos estructurales. Planos y memorias hacen parte integral de este proyecto.
- Si el constructor observa algún error u omisión, ya sea en planos estructurales o en memoria de cálculo, deberá reportarlo, de lo contrario, será responsabilidad del constructor y no del calculista.

19. BIBLIOGRAFIA

AIS, A. C. de I. S. (2010). Reglamento Colombiano de Diseño y Construcción Sismo Resistente. In *Nsr-10: Vol. Titulo A*. Asocicion Colombiana de Ingenieria Sismica AIS.

Franco, J. I. S. (2011). *Estructuras de Concreto 1 Jorge Ignacio Segura Franco* (Septima Ed).

Rochel Awad, R. (2012). *Analisis Sismico De Edificios. Roberto Rochel Awad.* (F. E. U. EAFIT (ed.); Segunda Ed).

20. LISTADO DE ANEXOS

20.1. CERTIFICADO DE VIGENCIA DE MATRICULA PROFESIONAL.

20.2. DATOS DE ENTRADA.

20.3. RESULTADOS DETALLAMIENTO (IRREGULARIDADES EN PLANTA, ALTURA Y REDUNDANCIA.)

20.4. RESULTADOS FUERZAS SISMICAS.

20.5. RESULTADOS INDICES DE FLEXIBILIDAD

20.6. RESULTADO DISEÑO DE COLUMNAS Y VIGAS.

20.7. RESULTADO DISEÑO DE VIGUETAS Y PLACA MACIZA.

20.8. RESULTADO DISEÑO DE CIMENTACION.

20.9. RESULTADO DISEÑO DE ELEMENTOS NO ESTRUCTURALES.

20.10. RESULTADO DISEÑO DE CORREAS.

ANEXO

CERTIFICADOS DE VIGENCIA DE MATRICULA PROFESIONAL

REPÚBLICA DE COLOMBIA
COPNIA
Consejo Profesional Nacional de Ingeniería

Certificado de vigencia y antecedentes disciplinarios
CVAD-2024-3126230

CONSEJO PROFESIONAL NACIONAL DE INGENIERÍA
COPNIA

EL DIRECTOR GENERAL

CERTIFICA:

1. Que SHIRLEY JOHANA PEÑA MENA, identificado(a) con CEDULA DE CIUDADANIA 1110486632, se encuentra inscrito(a) en el Registro Profesional Nacional que lleva esta entidad, en la profesión de INGENIERIA CIVIL con MATRICULA PROFESIONAL 70202-393373 desde el 13 de Julio de 2018, otorgado(a) mediante Resolución Nacional 959.

2. Que el(la) MATRICULA PROFESIONAL es la autorización que expide el Estado para que el titular ejerza su profesión en todo el territorio de la República de Colombia, de conformidad con lo dispuesto en la Ley 842 de 2003.

3. Que el(la) referido(a) MATRICULA PROFESIONAL se encuentra **VIGENTE**

4. Que el profesional no tiene antecedentes disciplinarios ético-profesionales.

5. Que la presente certificación se expide en Bogotá, D.C., a los cinco (05) días del mes de Noviembre del año dos mil veinticuatro (2024).

Rubén Dario Ochoa Arbeláez

Firmal del titular (*)

(*)Con el fin de verificar que el titular autoriza su participación en procesos estatales de selección de contratistas. La falta de firma del titular no invalida el Certificado
El presente es un documento público expedido electrónicamente con firma digital que garantiza su plena validez jurídica y probatoria según lo establecido en la Ley 527 de 1999. Para verificar la firma digital, consulte las propiedades del documento original en formato .pdf.
Para verificar la integridad e inalterabilidad del presente documento consulte en el sitio web https://tramites.copnia.gov.co/Copnia_Microsite/CertificateOfGoodStanding/CertificateOfGoodStandingStart indicado el número del certificado que se encuentra en la esquina superior derecha de este documento.

ANEXO
DATOS DE ENTRADA

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:56:05 p. m. 7/02/2025

GENERAL INPUT DATA

Structure type: Three-Dimensional Frame Structure
Number of Floor Grids . . . . = 1
Building total length . . . . = 11.16 m
Building total width . . . . . = 14.81 m

STORY INFORMATION

Number of Stories . . . . = 2
Total Frame Height . . . . = 7.2 m

Floor	Story Height	Grid No
1	3.60	1
2	3.60	1
3	-	1

* Story Height in (m)

STRUCTURAL GRID INFORMATION

GRID No 1

Grid Point	X	Y
A-1	0.00	0.00
B-1	0.00	3.50
C-1	0.00	4.97
D-1	0.00	9.94
E-1	0.00	14.81
A-2	4.47	0.00
B-2	4.47	3.50
C-2	4.47	4.97
D-2	4.47	9.94
E-2	4.47	14.81
A-3	5.66	0.00
B-3	5.66	3.50
C-3	5.66	4.97
D-3	5.66	9.94
E-3	5.66	14.81
A-4	8.43	0.00
B-4	8.43	3.50
C-4	8.43	4.97
D-4	8.43	9.94
E-4	8.43	14.81
A-5	8.94	0.00
B-5	8.94	3.50
C-5	8.94	4.97
D-5	8.94	9.94
E-5	8.94	14.81
A-6	9.68	0.00
B-6	9.68	3.50
C-6	9.68	4.97
D-6	9.68	9.94
E-6	9.68	14.81
A-7	11.16	0.00
B-7	11.16	3.50
C-7	11.16	4.97
D-7	11.16	9.94
E-7	11.16	14.81

* Coordinates X & Y are in (m)

N O D E D A T A

Axis	Floor	X	Y	Z	Axis	Floor	X	Y	Z
A-1	1	0.00	0.00	0.00	B-1	1	0.00	3.50	0.00
C-1	1	0.00	4.97	0.00	D-1	1	0.00	9.94	0.00
E-1	1	0.00	14.81	0.00	A-2	1	4.47	0.00	0.00
B-2	1	4.47	3.50	0.00	C-2	1	4.47	4.97	0.00
D-2	1	4.47	9.94	0.00	E-2	1	4.47	14.81	0.00
A-3	1	5.66	0.00	0.00	C-3	1	5.66	4.97	0.00
D-3	1	5.66	9.94	0.00	E-3	1	5.66	14.81	0.00
A-4	1	8.43	0.00	0.00	C-4	1	8.43	4.97	0.00
D-4	1	8.43	9.94	0.00	E-4	1	8.43	14.81	0.00
A-5	1	8.94	0.00	0.00	B-5	1	8.94	3.50	0.00
C-5	1	8.94	4.97	0.00	D-5	1	8.94	9.94	0.00
E-5	1	8.94	14.81	0.00	A-6	1	9.68	0.00	0.00
B-6	1	9.68	3.50	0.00	C-6	1	9.68	4.97	0.00
A-1	2	0.00	0.00	3.60	B-1	2	0.00	3.50	3.60
C-1	2	0.00	4.97	3.60	D-1	2	0.00	9.94	3.60
E-1	2	0.00	14.81	3.60	A-2	2	4.47	0.00	3.60
B-2	2	4.47	3.50	3.60	C-2	2	4.47	4.97	3.60
D-2	2	4.47	9.94	3.60	E-2	2	4.47	14.81	3.60
A-3	2	5.66	0.00	3.60	B-3	2	5.66	3.50	3.60
C-3	2	5.66	4.97	3.60	D-3	2	5.66	9.94	3.60
E-3	2	5.66	14.81	3.60	A-4	2	8.43	0.00	3.60
C-4	2	8.43	4.97	3.60	D-4	2	8.43	9.94	3.60
E-4	2	8.43	14.81	3.60	A-5	2	8.94	0.00	3.60
B-5	2	8.94	3.50	3.60	C-5	2	8.94	4.97	3.60
D-5	2	8.94	9.94	3.60	E-5	2	8.94	14.81	3.60
A-6	2	9.68	0.00	3.60	C-6	2	9.68	4.97	3.60
D-6	2	9.68	9.94	3.60	E-6	2	9.68	14.81	3.60
A-7	2	11.16	0.00	3.60	B-7	2	11.16	3.50	3.60
C-7	2	11.16	4.97	3.60	D-7	2	11.16	9.94	3.60
E-7	2	11.16	14.81	3.60					
A-1	3	0.00	0.00	7.20	B-1	3	0.00	3.50	7.20
C-1	3	0.00	4.97	7.20	D-1	3	0.00	9.94	7.20
E-1	3	0.00	14.81	7.20	A-2	3	4.47	0.00	7.20
B-2	3	4.47	3.50	7.20	C-2	3	4.47	4.97	7.20
D-2	3	4.47	9.94	7.20	E-2	3	4.47	14.81	7.20
A-3	3	5.66	0.00	7.20	C-3	3	5.66	4.97	7.20
D-3	3	5.66	9.94	7.20	E-3	3	5.66	14.81	7.20
A-4	3	8.43	0.00	7.20	C-4	3	8.43	4.97	7.20
D-4	3	8.43	9.94	7.20	E-4	3	8.43	14.81	7.20
A-5	3	8.94	0.00	7.20	B-5	3	8.94	3.50	7.20
C-5	3	8.94	4.97	7.20	D-5	3	8.94	9.94	7.20
E-5	3	8.94	14.81	7.20	A-6	3	9.68	0.00	7.20
C-6	3	9.68	4.97	7.20	D-6	3	9.68	9.94	7.20
E-6	3	9.68	14.81	7.20	A-7	3	11.16	0.00	7.20
B-7	3	11.16	3.50	7.20	C-7	3	11.16	4.97	7.20
D-7	3	11.16	9.94	7.20	E-7	3	11.16	14.81	7.20

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

MEMBER DATA

Total number of members..... = 105
Number of columns..... = 22
Number of beams ..... = 115
Number of braces ..... = 0

COLUMN SECTIONS

Number of prismatic sections = 2

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	40X40	Rectang	400	400	-	-	-	-	160000	2.13E+09	2.13E+09	3.16E+09
2	40X45	Rectang	400	450	-	-	-	-	180000	3.04E+09	2.40E+09	4.22E+09

COLUMNS

Column	Story	L (m)	Lu (m)	a (m)	c (m)	Theta (o)	Sec -	Mat -	System -
E-5	2	3.60	3.10	0.08	0.43	0.0	2	1	G&L
E-5	1	3.60	3.18	0.00	0.43	0.0	2	1	G&L
D-5	2	3.60	3.10	0.08	0.43	0.0	2	1	G&L
D-5	1	3.60	3.18	0.00	0.43	0.0	2	1	G&L
C-5	2	3.60	3.10	0.08	0.43	0.0	2	1	G&L
C-5	1	3.60	3.18	0.00	0.43	0.0	2	1	G&L
A-5	2	3.60	3.10	0.08	0.43	90.0	2	1	G&L
A-5	1	3.60	3.18	0.00	0.43	90.0	2	1	G&L
E-2	2	3.60	3.10	0.08	0.43	90.0	1	1	G&L
E-2	1	3.60	3.18	0.00	0.43	90.0	1	1	G&L
C-2	2	3.60	3.10	0.08	0.43	90.0	1	1	G&L
C-2	1	3.60	3.18	0.00	0.43	90.0	1	1	G&L
A-2	2	3.60	3.10	0.08	0.43	90.0	2	1	G&L
A-2	1	3.60	3.18	0.00	0.43	90.0	2	1	G&L
E-1	2	3.60	3.10	0.08	0.43	90.0	1	1	G&L
E-1	1	3.60	3.18	0.00	0.43	90.0	1	1	G&L
D-1	2	3.60	3.10	0.08	0.43	90.0	1	1	G&L
D-1	1	3.60	3.18	0.00	0.43	90.0	1	1	G&L
C-1	2	3.60	3.10	0.08	0.43	90.0	1	1	G&L
C-1	1	3.60	3.18	0.00	0.43	90.0	1	1	G&L
A-1	2	3.60	3.10	0.08	0.43	90.0	2	1	G&L
A-1	1	3.60	3.18	0.00	0.43	90.0	2	1	G&L

BEAM SECTIONS

Number of prismatic sections = 2

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	50X50	Rectang	500	500	-	-	-	-	250000	5.21E+09	5.21E+09	7.71E+09
2	30X50	Rectang	300	500	-	-	-	-	150000	3.13E+09	1.13E+09	2.80E+09

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:56:05 p. m. 7/02/2025

BEAMS

Beam	Floor	L (m)	Lu (m)	a (m)	c (m)	Sec -	Mat -	System -
A(1-2)	1	4.47	4.02	0.23	0.23	1	1	G&L
A(2-3)	1	1.19	0.97	0.23	0.00	1	1	G&L
A(3-4)	1	2.77	2.77	0.00	0.00	1	1	G&L
A(4-5)	1	0.51	0.28	0.00	0.23	1	1	G&L
A(5-6)	1	0.74	0.52	0.23	0.00	1	1	G&L
C(1-2)	1	4.47	4.07	0.20	0.20	1	1	G&L
C(2-3)	1	1.19	0.99	0.20	0.00	1	1	G&L
C(3-4)	1	2.77	2.77	0.00	0.00	1	1	G&L
C(4-5)	1	0.51	0.31	0.00	0.20	1	1	G&L
C(5-6)	1	0.74	0.54	0.20	0.00	1	1	G&L
D(1-2)	1	4.47	4.02	0.20	0.25	1	1	G&L
D(2-3)	1	1.19	0.94	0.25	0.00	1	1	G&L
D(3-4)	1	2.77	2.77	0.00	0.00	1	1	G&L
D(4-5)	1	0.51	0.31	0.00	0.20	1	1	G&L
E(1-2)	1	4.47	4.07	0.20	0.20	1	1	G&L
E(2-3)	1	1.19	0.99	0.20	0.00	1	1	G&L
E(3-4)	1	2.77	2.77	0.00	0.00	1	1	G&L
E(4-5)	1	0.51	0.31	0.00	0.20	1	1	G&L
A(1-2)	2	4.47	4.02	0.23	0.23	2	1	G&L
A(2-3)	2	1.19	0.97	0.23	0.00	2	1	G&L
A(3-4)	2	2.77	2.77	0.00	0.00	2	1	G&L
A(4-5)	2	0.51	0.28	0.00	0.23	2	1	G&L
A(5-6)	2	0.74	0.52	0.23	0.00	2	1	G&L
A(6-7)	2	1.48	1.48	0.00	0.00	2	1	G&L
B(1-2)	2	4.47	4.17	0.15	0.15	2	1	G&L
B(2-3)	2	1.19	1.04	0.15	0.00	2	1	G&L
C(1-2)	2	4.47	4.07	0.20	0.20	2	1	G&L
C(2-3)	2	1.19	0.99	0.20	0.00	2	1	G&L
C(3-4)	2	2.77	2.77	0.00	0.00	2	1	G&L
C(4-5)	2	0.51	0.31	0.00	0.20	2	1	G&L
C(5-6)	2	0.74	0.54	0.20	0.00	2	1	G&L
C(6-7)	2	1.48	1.48	0.00	0.00	2	1	G&L
D(1-2)	2	4.47	4.12	0.20	0.15	2	1	G&L
D(2-3)	2	1.19	1.04	0.15	0.00	2	1	G&L
D(3-4)	2	2.77	2.77	0.00	0.00	2	1	G&L
D(4-5)	2	0.51	0.31	0.00	0.20	2	1	G&L
D(5-6)	2	0.74	0.54	0.20	0.00	2	1	G&L
D(6-7)	2	1.48	1.48	0.00	0.00	2	1	G&L
E(1-2)	2	4.47	4.07	0.20	0.20	2	1	G&L
E(2-3)	2	1.19	0.99	0.20	0.00	2	1	G&L
E(3-4)	2	2.77	2.77	0.00	0.00	2	1	G&L
E(4-5)	2	0.51	0.31	0.00	0.20	2	1	G&L
E(5-6)	2	0.74	0.54	0.20	0.00	2	1	G&L
E(6-7)	2	1.48	1.48	0.00	0.00	2	1	G&L
A(1-2)	3	4.47	4.02	0.23	0.23	2	1	G&L
A(2-3)	3	1.19	0.97	0.23	0.00	2	1	G&L
A(3-4)	3	2.77	2.77	0.00	0.00	2	1	G&L
A(4-5)	3	0.51	0.28	0.00	0.23	2	1	G&L
A(5-6)	3	0.74	0.52	0.23	0.00	2	1	G&L
A(6-7)	3	1.48	1.48	0.00	0.00	2	1	G&L
C(1-2)	3	4.47	4.07	0.20	0.20	2	1	G&L
C(2-3)	3	1.19	0.99	0.20	0.00	2	1	G&L
C(3-4)	3	2.77	2.77	0.00	0.00	2	1	G&L
C(4-5)	3	0.51	0.31	0.00	0.20	2	1	G&L
C(5-6)	3	0.74	0.54	0.20	0.00	2	1	G&L
C(6-7)	3	1.48	1.48	0.00	0.00	2	1	G&L
D(1-2)	3	4.47	4.12	0.20	0.15	2	1	G&L
D(2-3)	3	1.19	1.04	0.15	0.00	2	1	G&L
D(3-4)	3	2.77	2.77	0.00	0.00	2	1	G&L
D(4-5)	3	0.51	0.31	0.00	0.20	2	1	G&L
D(5-6)	3	0.74	0.54	0.20	0.00	2	1	G&L
D(6-7)	3	1.48	1.48	0.00	0.00	2	1	G&L
E(1-2)	3	4.47	4.07	0.20	0.20	2	1	G&L
E(2-3)	3	1.19	0.99	0.20	0.00	2	1	G&L
E(3-4)	3	2.77	2.77	0.00	0.00	2	1	G&L
E(4-5)	3	0.51	0.31	0.00	0.20	2	1	G&L
E(5-6)	3	0.74	0.54	0.20	0.00	2	1	G&L
E(6-7)	3	1.48	1.48	0.00	0.00	2	1	G&L

Beam	Floor	L	Lu	a	c	Sec	Mat	System
1(A-B)	1	3.50	3.30	0.20	0.00	1	1	G&L
1(B-C)	1	1.47	1.27	0.00	0.20	1	1	G&L
1(C-D)	1	4.97	4.57	0.20	0.20	1	1	G&L
1(D-E)	1	4.87	4.47	0.20	0.20	1	1	G&L
2(A-B)	1	3.50	3.30	0.20	0.00	1	1	G&L
2(B-C)	1	1.47	1.27	0.00	0.20	1	1	G&L
2(C-D)	1	4.97	4.52	0.20	0.25	1	1	G&L
2(D-E)	1	4.87	4.42	0.25	0.20	1	1	G&L
5(A-B)	1	3.50	3.30	0.20	0.00	1	1	G&L
5(B-C)	1	1.47	1.25	0.00	0.23	1	1	G&L
5(C-D)	1	4.97	4.52	0.23	0.23	1	1	G&L
5(D-E)	1	4.87	4.42	0.23	0.23	1	1	G&L
6(A-B)	1	3.50	3.25	0.25	0.00	1	1	G&L
6(B-C)	1	1.47	1.22	0.00	0.25	1	1	G&L
1(A-B)	2	3.50	3.30	0.20	0.00	2	1	G&L
1(B-C)	2	1.47	1.27	0.00	0.20	2	1	G&L
1(C-D)	2	4.97	4.57	0.20	0.20	2	1	G&L
1(D-E)	2	4.87	4.47	0.20	0.20	2	1	G&L
2(A-B)	2	3.50	3.30	0.20	0.00	2	1	G&L
2(B-C)	2	1.47	1.27	0.00	0.20	2	1	G&L
2(C-D)	2	4.97	4.62	0.20	0.15	2	1	G&L
2(D-E)	2	4.87	4.52	0.15	0.20	2	1	G&L
3(A-B)	2	3.50	3.35	0.15	0.00	2	1	G&L
5(A-B)	2	3.50	3.30	0.20	0.00	2	1	G&L
5(B-C)	2	1.47	1.25	0.00	0.23	2	1	G&L
5(C-D)	2	4.97	4.52	0.23	0.23	2	1	G&L
5(D-E)	2	4.87	4.42	0.23	0.23	2	1	G&L
7(A-B)	2	3.50	3.35	0.15	0.00	2	1	G&L
7(B-C)	2	1.47	1.32	0.00	0.15	2	1	G&L
7(C-D)	2	4.97	4.67	0.15	0.15	2	1	G&L
7(D-E)	2	4.87	4.57	0.15	0.15	2	1	G&L
1(A-B)	3	3.50	3.30	0.20	0.00	2	1	G&L
1(B-C)	3	1.47	1.27	0.00	0.20	2	1	G&L
1(C-D)	3	4.97	4.57	0.20	0.20	2	1	G&L
1(D-E)	3	4.87	4.47	0.20	0.20	2	1	G&L
2(A-B)	3	3.50	3.30	0.20	0.00	2	1	G&L
2(B-C)	3	1.47	1.27	0.00	0.20	2	1	G&L
2(C-D)	3	4.97	4.62	0.20	0.15	2	1	G&L
2(D-E)	3	4.87	4.52	0.15	0.20	2	1	G&L
5(A-B)	3	3.50	3.30	0.20	0.00	2	1	G&L
5(B-C)	3	1.47	1.25	0.00	0.23	2	1	G&L
5(C-D)	3	4.97	4.52	0.23	0.23	2	1	G&L
5(D-E)	3	4.87	4.42	0.23	0.23	2	1	G&L
7(A-B)	3	3.50	3.35	0.15	0.00	2	1	G&L
7(B-C)	3	1.47	1.32	0.00	0.15	2	1	G&L
7(C-D)	3	4.97	4.67	0.15	0.15	2	1	G&L
7(D-E)	3	4.87	4.57	0.15	0.15	2	1	G&L

SLAB PROPERTIES AND FLOOR LOAD DATA

Number of slab sections = 5

Floor Type:

1: One-way joist slab
2: One-way flat slab
3: Two-way joist slab
4: Two-way flat slab
5: One-way deck on secondary beams

No	Name	Type	tv (mm)	γ (N/m3)	Sup.DL (Pa)	LL1 (Pa)	LL2 (mm)	h (mm)	hf (mm)	bw (mm)	S
1	AULAS	1	95	23500	4910	2000	0	500	50	100	1000
2	PASILLOS	1	95	23500	4910	5000	0	500	50	100	1000
3	CANAL	2	100	23500	500	2000	0	-	-	-	-
4	ALERO	2	120	23500	3000	2000	0	-	-	-	-
5	TANQUES	1	95	23500	9910	2000	0	500	50	100	1000

FOUNDATION SOIL PROPERTIES

Number of soil properties = 1

Soil	Name	Pressure Distribution	Allowable gross pres. Pa KPa	Increase Pa Combinations incl.EQ & WL (%)	MODULUS OF SUBGRADE REACTION Gravity load Analysis, Kg KN/m3	Lateral load Analysis, Ks KN/m3
1	D	Linear	96.7	33	4000.0	4000.0

* Values of subgrade reaction are used only on footings with rotations and/or vert-displac. permitted.

FOUNDATION BEAM DATA

Number of foundation beams = 32

FOUNDATION BEAMS

Beam	Floor	L (ft)	Lu (ft)	a (ft)	c (ft)	TWidth (ft)	Sec -	Mat -	Soil -	System -
A(1-2)	1	4.47	4.02	0.23	0.23	0.50	1	1	1	G&L
A(2-3)	1	1.19	0.97	0.23	0.00	0.50	1	1	1	G&L
A(3-4)	1	2.77	2.77	0.00	0.00	0.50	1	1	1	G&L
A(4-5)	1	0.51	0.28	0.00	0.23	0.50	1	1	1	G&L
A(5-6)	1	0.74	0.52	0.23	0.00	0.50	1	1	1	G&L
C(1-2)	1	4.47	4.07	0.20	0.20	0.50	1	1	1	G&L
C(2-3)	1	1.19	0.99	0.20	0.00	0.50	1	1	1	G&L
C(3-4)	1	2.77	2.77	0.00	0.00	0.50	1	1	1	G&L
C(4-5)	1	0.51	0.31	0.00	0.20	0.50	1	1	1	G&L
C(5-6)	1	0.74	0.54	0.20	0.00	0.50	1	1	1	G&L
D(1-2)	1	4.47	4.02	0.20	0.25	0.50	1	1	1	G&L
D(2-3)	1	1.19	0.94	0.25	0.00	0.50	1	1	1	G&L
D(3-4)	1	2.77	2.77	0.00	0.00	0.50	1	1	1	G&L
D(4-5)	1	0.51	0.31	0.00	0.20	0.50	1	1	1	G&L
E(1-2)	1	4.47	4.07	0.20	0.20	0.50	1	1	1	G&L
E(2-3)	1	1.19	0.99	0.20	0.00	0.50	1	1	1	G&L
E(3-4)	1	2.77	2.77	0.00	0.00	0.50	1	1	1	G&L
E(4-5)	1	0.51	0.31	0.00	0.20	0.50	1	1	1	G&L
1(A-B)	1	3.50	3.30	0.20	0.00	0.50	1	1	1	G&L
1(B-C)	1	1.47	1.27	0.00	0.20	0.50	1	1	1	G&L
1(C-D)	1	4.97	4.57	0.20	0.20	0.50	1	1	1	G&L
1(D-E)	1	4.87	4.47	0.20	0.20	0.50	1	1	1	G&L
2(A-B)	1	3.50	3.30	0.20	0.00	0.50	1	1	1	G&L
2(B-C)	1	1.47	1.27	0.00	0.20	0.50	1	1	1	G&L
2(C-D)	1	4.97	4.52	0.20	0.25	0.50	1	1	1	G&L
2(D-E)	1	4.87	4.42	0.25	0.20	0.50	1	1	1	G&L
5(A-B)	1	3.50	3.30	0.20	0.00	0.50	1	1	1	G&L
5(B-C)	1	1.47	1.25	0.00	0.23	0.50	1	1	1	G&L
5(C-D)	1	4.97	4.52	0.23	0.23	0.50	1	1	1	G&L
5(D-E)	1	4.87	4.42	0.23	0.23	0.50	1	1	1	G&L
6(A-B)	1	3.50	3.25	0.25	0.00	0.50	1	1	1	G&L
6(B-C)	1	1.47	1.22	0.00	0.25	0.50	1	1	1	G&L

GROUND SUPPORT DATA

Total number of ground supports = 11

K = Spring constant(kN/mm)

Characteristics for All Degrees of Freedom
Value = K Dash = free C = constrained

Support	Floor	Type	Ux	Uy	Uz	TetX	TetY	TetZ
A-1	1	Fixed	C	C	C	C	C	C
C-1	1	Fixed	C	C	C	C	C	C

Support	Floor	Type	Ux	Uy	Uz	TetX	TetY	TetZ
D-1	1	Fixed	C	C	C	C	C	C
E-1	1	Fixed	C	C	C	C	C	C
A-2	1	Fixed	C	C	C	C	C	C
C-2	1	Fixed	C	C	C	C	C	C
E-2	1	Fixed	C	C	C	C	C	C
A-5	1	Fixed	C	C	C	C	C	C
C-5	1	Fixed	C	C	C	C	C	C
D-5	1	Fixed	C	C	C	C	C	C
E-5	1	Fixed	C	C	C	C	C	C

SUMMARY OF TOTAL FLOOR LOADS

LOAD CASE 1 : SELFW (D0)

	Force (kN)			Moment (kN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
3	0.00	0.00	513.84	0.0	0.0	0.0
2	0.00	0.00	550.20	0.0	0.0	0.0
1	0.00	0.00	519.84	0.0	0.0	0.0
Total	0.00	0.00	1583.88	0.0	0.0	0.0

LOAD CASE 2 : DEAD (DL)

	Force (kN)			Moment (kN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
3	0.00	0.00	475.41	0.0	0.0	0.0
2	0.00	0.00	1051.58	0.0	0.0	0.0
1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	0.00	1527.00	0.0	0.0	0.0

LOAD CASE 3 : LIVE (LL)

	Force (kN)			Moment (kN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
3	0.00	0.00	120.22	0.0	0.0	0.0
2	0.00	0.00	393.10	0.0	0.0	0.0
1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	0.00	513.32	0.0	0.0	0.0

LOAD CASE 4 : EQUAKE X (EQX) - TYPE : EQUIVALENT STATIC

	Force (kN)			Acc. Tors. Mom. (kN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
3	2142.00	0.00	0.00	0.0	0.0	1595.0
2	1268.80	0.00	0.00	0.0	0.0	939.6
1	0.00	0.00	0.00	0.0	0.0	0.0
Total	3410.80	0.00	0.00	0.0	0.0	2534.6

LOAD CASE 5 : EQUAKE Y (EQY) - TYPE : EQUIVALENT STATIC

	Force (kN)			Acc. Tors. Mom. (kN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
3	0.00	2142.00	0.00	0.0	0.0	1204.0
2	0.00	1268.80	0.00	0.0	0.0	716.7
1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	3410.80	0.00	0.0	0.0	1920.7

L O A D S

Total number of load cases = 5

LOAD CASE 1 : SELFW (D0)

Number of nodal loads .... = 0
Number of column loads ... = 22
Number of beam loads ..... = 115

Column Loads (D0)

Class = F: Force M: Moment
System = L: Local Force/Moment referred to local coordinates (1, 2, 3)
G: Global Force/Moment referred to global coordinates (X, Y, Z)
Axis = (1, 2, 3) if System = L, or (X, Y, Z) if System = G
Units = Distributed Force: (kN/m), Distributed Moment: (kN-m/m)
Concentrated Force: (kN), Concentrated Moment: (kN-m)

		Distributed Force/Moment							Concentrated Force/Moment					
Column	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
A-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.7
A-1	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.4
C-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	12.2
C-1	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	11.9
D-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	12.2
D-1	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	11.9
E-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	12.2
E-1	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	11.9
A-2	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.7
A-2	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.4
C-2	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	12.2
C-2	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	11.9
E-2	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	12.2
E-2	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	11.9
A-5	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.7
A-5	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.4
C-5	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.7
C-5	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.4
D-5	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.7
D-5	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.4
E-5	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.7
E-5	2	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	13.4

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:56:05 p. m. 7/02/2025

Beam Loads (D0)

Class = F: Force M: Moment
System = L: Local Force/Moment referred to local coordinates (1, 2, 3)
G: Global Force/Moment referred to global coordinates (X, Y, Z)
Axis = (1, 2, 3) if System = L, or (X, Y, Z) if System = G
Units = Distributed Force: (kN/m), Distributed Moment: (kN-m/m)
Concentrated Force: (kN), Concentrated Moment: (kN-m)

		Distributed Force/Moment							Concentrated Force/Moment					
Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
A(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(2-3)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(4-5)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(5-6)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
C(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
C(2-3)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
C(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
C(4-5)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
C(5-6)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
D(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
D(2-3)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
D(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
D(4-5)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
E(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
E(2-3)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
E(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
E(4-5)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(1-2)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(2-3)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(3-4)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(4-5)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(5-6)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(6-7)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
B(1-2)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
B(2-3)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(1-2)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(2-3)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(3-4)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(4-5)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(5-6)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(6-7)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(1-2)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(2-3)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(3-4)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(4-5)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(5-6)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(6-7)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(1-2)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(2-3)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(3-4)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(4-5)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(5-6)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(6-7)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(1-2)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(2-3)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(3-4)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(4-5)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(5-6)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
A(6-7)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(1-2)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(2-3)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(3-4)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(4-5)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(5-6)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
C(6-7)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(1-2)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(2-3)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(3-4)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(4-5)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(5-6)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
D(6-7)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(1-2)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(2-3)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:56:05 p. m. 7/02/2025

Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
E(3-4)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(4-5)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(5-6)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
E(6-7)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
1(A-B)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(B-C)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(C-D)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(D-E)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
2(A-B)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
2(B-C)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
2(C-D)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
2(D-E)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
5(A-B)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
5(B-C)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
5(C-D)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
5(D-E)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
6(A-B)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
6(B-C)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(A-B)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
1(B-C)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
1(C-D)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
1(D-E)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
2(A-B)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
2(B-C)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
2(C-D)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
2(D-E)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
3(A-B)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
5(A-B)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
5(B-C)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
5(C-D)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
5(D-E)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
7(A-B)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
7(B-C)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
7(C-D)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
7(D-E)	2	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
1(A-B)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
1(B-C)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
1(C-D)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
1(D-E)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
2(A-B)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
2(B-C)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
2(C-D)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
2(D-E)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
5(A-B)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
5(B-C)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
5(C-D)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
5(D-E)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
7(A-B)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
7(B-C)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
7(C-D)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-
7(D-E)	3	F	G	Z	0.00	1.00	3.6	3.6	-	-	-	-	-	-

LOAD CASE 2 : DEAD (DL)

Number of nodal loads .... = 0
Number of column loads ... = 0
Number of beam loads ..... = 76

Beam Loads (DL)

Class = F: Force M: Moment
System = L: Local Force/Moment referred to local coordinates (1, 2, 3)
G: Global Force/Moment referred to global coordinates (X, Y, Z)
Axis = (1, 2, 3) if System = L, or (X, Y, Z) if System = G
Units = Distributed Force: (kN/m), Distributed Moment: (kN-m/m)
Concentrated Force: (kN), Concentrated Moment: (kN-m)

		Distributed Force/Moment							Concentrated Force/Moment					
Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:56:05 p. m. 7/02/2025

Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
A(1-2)	2	F	G	Z	0.00	1.00	3.1	3.1	-	-	-	-	-	-
A(2-3)	2	F	G	Z	0.00	1.00	3.1	3.1	-	-	-	-	-	-
A(3-4)	2	F	G	Z	0.00	1.00	3.0	3.0	-	-	-	-	-	-
A(4-5)	2	F	G	Z	0.00	1.00	3.0	3.0	-	-	-	-	-	-
A(5-6)	2	F	G	Z	0.00	1.00	3.1	3.1	-	-	-	-	-	-
A(6-7)	2	F	G	Z	0.00	1.00	3.1	3.1	-	-	-	-	-	-
B(1-2)	2	F	G	Z	0.00	1.00	8.4	8.4	-	-	-	-	-	-
B(2-3)	2	F	G	Z	0.00	1.00	3.1	3.1	-	-	-	-	-	-
C(1-2)	2	F	G	Z	0.00	1.00	11.2	11.2	-	-	-	-	-	-
C(2-3)	2	F	G	Z	0.00	1.00	5.9	5.9	-	-	-	-	-	-
C(3-4)	2	F	G	Z	0.00	1.00	5.9	5.9	-	-	-	-	-	-
C(4-5)	2	F	G	Z	0.00	1.00	5.9	5.9	-	-	-	-	-	-
C(5-6)	2	F	G	Z	0.00	1.00	11.2	11.2	-	-	-	-	-	-
C(6-7)	2	F	G	Z	0.00	1.00	10.5	10.5	-	-	-	-	-	-
D(1-2)	2	F	G	Z	0.00	1.00	10.3	10.3	-	-	-	-	-	-
D(2-3)	2	F	G	Z	0.00	1.00	9.4	9.4	-	-	-	-	-	-
D(3-4)	2	F	G	Z	0.00	1.00	9.4	9.4	-	-	-	-	-	-
D(4-5)	2	F	G	Z	0.00	1.00	9.4	9.4	-	-	-	-	-	-
D(5-6)	2	F	G	Z	0.00	1.00	9.4	9.4	-	-	-	-	-	-
D(6-7)	2	F	G	Z	0.00	1.00	9.4	9.4	-	-	-	-	-	-
E(1-2)	2	F	G	Z	0.00	1.00	4.3	4.3	-	-	-	-	-	-
E(2-3)	2	F	G	Z	0.00	1.00	3.5	3.5	-	-	-	-	-	-
E(3-4)	2	F	G	Z	0.00	1.00	3.5	3.5	-	-	-	-	-	-
E(4-5)	2	F	G	Z	0.00	1.00	3.5	3.5	-	-	-	-	-	-
E(5-6)	2	F	G	Z	0.00	1.00	3.5	3.5	-	-	-	-	-	-
E(6-7)	2	F	G	Z	0.00	1.00	3.5	3.5	-	-	-	-	-	-
A(1-2)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
A(2-3)	3	F	G	Z	0.00	1.00	5.3	5.3	-	-	-	-	-	-
A(3-4)	3	F	G	Z	0.00	1.00	5.3	5.3	-	-	-	-	-	-
A(4-5)	3	F	G	Z	0.00	1.00	5.3	5.3	-	-	-	-	-	-
C(1-2)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
C(2-3)	3	F	G	Z	0.00	1.00	16.2	16.2	-	-	-	-	-	-
C(3-4)	3	F	G	Z	0.00	1.00	16.2	16.2	-	-	-	-	-	-
C(4-5)	3	F	G	Z	0.00	1.00	8.9	8.9	-	-	-	-	-	-
C(6-7)	3	F	G	Z	0.00	1.00	1.1	1.1	-	-	-	-	-	-
D(1-2)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
D(2-3)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
D(3-4)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
E(1-2)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
E(2-3)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
E(3-4)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
E(4-5)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
E(5-6)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
E(6-7)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
6(A-B)	1	F	G	Z	0.00	1.00	21.3	21.3	-	-	-	-	-	-
1(A-B)	2	F	G	Z	0.00	1.00	12.0	12.0	-	-	-	-	-	-
1(C-D)	2	F	G	Z	0.00	1.00	10.6	10.6	-	-	-	-	-	-
1(D-E)	2	F	G	Z	0.00	1.00	12.0	12.0	-	-	-	-	-	-
2(A-B)	2	F	G	Z	0.00	1.00	15.2	15.2	-	-	-	-	-	-
2(C-D)	2	F	G	Z	0.00	1.00	20.7	20.7	-	-	-	-	-	-
2(D-E)	2	F	G	Z	0.00	1.00	24.0	24.0	-	-	-	-	-	-
3(A-B)	2	F	G	Z	0.00	1.00	3.2	3.2	-	-	-	-	-	-
5(A-B)	2	F	G	Z	0.00	1.00	28.2	28.2	-	-	-	-	-	-
5(B-C)	2	F	G	Z	0.00	1.00	4.0	4.0	-	-	-	-	-	-
5(C-D)	2	F	G	Z	0.00	1.00	16.5	16.5	-	-	-	-	-	-
5(D-E)	2	F	G	Z	0.00	1.00	19.8	19.8	-	-	-	-	-	-
7(A-B)	2	F	G	Z	0.00	1.00	6.9	6.9	-	-	-	-	-	-
7(B-C)	2	F	G	Z	0.00	1.00	4.6	4.6	-	-	-	-	-	-
7(C-D)	2	F	G	Z	0.00	1.00	5.3	5.3	-	-	-	-	-	-
7(D-E)	2	F	G	Z	0.00	1.00	6.3	6.3	-	-	-	-	-	-
1(A-B)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
1(B-C)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
1(C-D)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
1(D-E)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
2(A-B)	3	F	G	Z	0.00	1.00	29.7	29.7	-	-	-	-	-	-
2(B-C)	3	F	G	Z	0.00	1.00	20.1	20.1	-	-	-	-	-	-
2(C-D)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
2(D-E)	3	F	G	Z	0.00	1.00	7.3	7.3	-	-	-	-	-	-
5(A-B)	3	F	G	Z	0.00	1.00	31.5	31.5	-	-	-	-	-	-
5(B-C)	3	F	G	Z	0.00	1.00	20.3	20.3	-	-	-	-	-	-
5(C-D)	3	F	G	Z	0.00	1.00	7.9	7.9	-	-	-	-	-	-
5(D-E)	3	F	G	Z	0.00	1.00	7.9	7.9	-	-	-	-	-	-
7(A-B)	3	F	G	Z	0.00	1.00	6.5	6.5	-	-	-	-	-	-
7(B-C)	3	F	G	Z	0.00	1.00	5.9	5.9	-	-	-	-	-	-
7(C-D)	3	F	G	Z	0.00	1.00	6.5	6.5	-	-	-	-	-	-

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAİTAN 3:56:05 p. m. 7/02/2025

Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
7(D-E)	3	F	G	Z	0.00	1.00	6.5	6.5	-	-	-	-	-	-

LOAD CASE 3 : LIVE (LL)

Number of nodal loads .... = 0
Number of column loads ... = 0
Number of beam loads ..... = 71

Beam Loads (LL)

Class = F: Force M: Moment
System = L: Local Force/Moment referred to local coordinates (1, 2, 3)
G: Global Force/Moment referred to global coordinates (X, Y, Z)
Axis = (1, 2, 3) if System = L, or (X, Y, Z) if System = G
Units = Distributed Force: (kN/m), Distributed Moment: (kN-m/m)
Concentrated Force: (kN), Concentrated Moment: (kN-m)

		Distributed Force/Moment							Concentrated Force/Moment					
Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
A(1-2)	2	F	G	Z	0.00	1.00	0.9	0.9	-	-	-	-	-	-
A(2-3)	2	F	G	Z	0.00	1.00	0.9	0.9	-	-	-	-	-	-
A(5-6)	2	F	G	Z	0.00	1.00	2.2	2.2	-	-	-	-	-	-
A(6-7)	2	F	G	Z	0.00	1.00	2.2	2.2	-	-	-	-	-	-
B(1-2)	2	F	G	Z	0.00	1.00	2.3	2.3	-	-	-	-	-	-
B(2-3)	2	F	G	Z	0.00	1.00	0.9	0.9	-	-	-	-	-	-
C(1-2)	2	F	G	Z	0.00	1.00	3.1	3.1	-	-	-	-	-	-
C(2-3)	2	F	G	Z	0.00	1.00	1.7	1.7	-	-	-	-	-	-
C(3-4)	2	F	G	Z	0.00	1.00	1.7	1.7	-	-	-	-	-	-
C(4-5)	2	F	G	Z	0.00	1.00	1.7	1.7	-	-	-	-	-	-
C(5-6)	2	F	G	Z	0.00	1.00	7.8	7.8	-	-	-	-	-	-
C(6-7)	2	F	G	Z	0.00	1.00	7.4	7.4	-	-	-	-	-	-
D(1-2)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
D(2-3)	2	F	G	Z	0.00	1.00	2.6	2.6	-	-	-	-	-	-
D(3-4)	2	F	G	Z	0.00	1.00	2.6	2.6	-	-	-	-	-	-
D(4-5)	2	F	G	Z	0.00	1.00	2.6	2.6	-	-	-	-	-	-
D(5-6)	2	F	G	Z	0.00	1.00	6.6	6.6	-	-	-	-	-	-
D(6-7)	2	F	G	Z	0.00	1.00	6.6	6.6	-	-	-	-	-	-
E(1-2)	2	F	G	Z	0.00	1.00	1.2	1.2	-	-	-	-	-	-
E(2-3)	2	F	G	Z	0.00	1.00	1.0	1.0	-	-	-	-	-	-
E(3-4)	2	F	G	Z	0.00	1.00	1.0	1.0	-	-	-	-	-	-
E(4-5)	2	F	G	Z	0.00	1.00	1.0	1.0	-	-	-	-	-	-
E(5-6)	2	F	G	Z	0.00	1.00	2.4	2.4	-	-	-	-	-	-
E(6-7)	2	F	G	Z	0.00	1.00	2.4	2.4	-	-	-	-	-	-
A(1-2)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
A(2-3)	3	F	G	Z	0.00	1.00	0.9	0.9	-	-	-	-	-	-
A(3-4)	3	F	G	Z	0.00	1.00	0.9	0.9	-	-	-	-	-	-
A(4-5)	3	F	G	Z	0.00	1.00	0.9	0.9	-	-	-	-	-	-
C(1-2)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
C(2-3)	3	F	G	Z	0.00	1.00	4.0	4.0	-	-	-	-	-	-
C(3-4)	3	F	G	Z	0.00	1.00	4.0	4.0	-	-	-	-	-	-
C(4-5)	3	F	G	Z	0.00	1.00	1.5	1.5	-	-	-	-	-	-
C(6-7)	3	F	G	Z	0.00	1.00	0.4	0.4	-	-	-	-	-	-
D(1-2)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
D(2-3)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
D(3-4)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
E(1-2)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
E(2-3)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
E(3-4)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
6(A-B)	1	F	G	Z	0.00	1.00	11.1	11.1	-	-	-	-	-	-
1(A-B)	2	F	G	Z	0.00	1.00	3.4	3.4	-	-	-	-	-	-
1(C-D)	2	F	G	Z	0.00	1.00	3.0	3.0	-	-	-	-	-	-
1(D-E)	2	F	G	Z	0.00	1.00	3.4	3.4	-	-	-	-	-	-
2(A-B)	2	F	G	Z	0.00	1.00	4.2	4.2	-	-	-	-	-	-
2(C-D)	2	F	G	Z	0.00	1.00	5.8	5.8	-	-	-	-	-	-
2(D-E)	2	F	G	Z	0.00	1.00	6.7	6.7	-	-	-	-	-	-
3(A-B)	2	F	G	Z	0.00	1.00	0.9	0.9	-	-	-	-	-	-
5(A-B)	2	F	G	Z	0.00	1.00	15.9	15.9	-	-	-	-	-	-
5(B-C)	2	F	G	Z	0.00	1.00	2.8	2.8	-	-	-	-	-	-
5(C-D)	2	F	G	Z	0.00	1.00	6.8	6.8	-	-	-	-	-	-

Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
5(D-E)	2	F	G	Z	0.00	1.00	8.2	8.2	-	-	-	-	-	-
7(A-B)	2	F	G	Z	0.00	1.00	4.9	4.9	-	-	-	-	-	-
7(B-C)	2	F	G	Z	0.00	1.00	3.2	3.2	-	-	-	-	-	-
7(C-D)	2	F	G	Z	0.00	1.00	3.7	3.7	-	-	-	-	-	-
7(D-E)	2	F	G	Z	0.00	1.00	4.4	4.4	-	-	-	-	-	-
1(A-B)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
1(B-C)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
1(C-D)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
1(D-E)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
2(A-B)	3	F	G	Z	0.00	1.00	6.2	6.2	-	-	-	-	-	-
2(B-C)	3	F	G	Z	0.00	1.00	4.6	4.6	-	-	-	-	-	-
2(C-D)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
2(D-E)	3	F	G	Z	0.00	1.00	2.5	2.5	-	-	-	-	-	-
5(A-B)	3	F	G	Z	0.00	1.00	6.3	6.3	-	-	-	-	-	-
5(B-C)	3	F	G	Z	0.00	1.00	4.4	4.4	-	-	-	-	-	-
5(C-D)	3	F	G	Z	0.00	1.00	5.7	5.7	-	-	-	-	-	-
5(D-E)	3	F	G	Z	0.00	1.00	5.7	5.7	-	-	-	-	-	-
7(A-B)	3	F	G	Z	0.00	1.00	2.2	2.2	-	-	-	-	-	-
7(B-C)	3	F	G	Z	0.00	1.00	2.0	2.0	-	-	-	-	-	-
7(C-D)	3	F	G	Z	0.00	1.00	2.2	2.2	-	-	-	-	-	-
7(D-E)	3	F	G	Z	0.00	1.00	2.2	2.2	-	-	-	-	-	-

LOAD CASE 4 : EQUAKE X (EQX) - TYPE : EQUIVALENT STATIC

Number of nodal loads .... = 65
Number of column loads ... = 0
Number of beam loads ..... = 0

Nodal Loads (EQX)

Axis	Floor	Force (kN) Px	Py	Pz	Moment (kN-m) Mx	My	Mz
A-1	2	42.15	0.00	0.00	0.0	0.0	0.0
B-1	2	40.62	0.00	0.00	0.0	0.0	0.0
C-1	2	61.66	0.00	0.00	0.0	0.0	0.0
D-1	2	86.53	0.00	0.00	0.0	0.0	0.0
E-1	2	49.93	0.00	0.00	0.0	0.0	0.0
A-2	2	50.08	0.00	0.00	0.0	0.0	0.0
B-2	2	47.89	0.00	0.00	0.0	0.0	0.0
C-2	2	85.92	0.00	0.00	0.0	0.0	0.0
D-2	2	124.10	0.00	0.00	0.0	0.0	0.0
E-2	2	76.29	0.00	0.00	0.0	0.0	0.0
A-3	2	17.88	0.00	0.00	0.0	0.0	0.0
B-3	2	10.86	0.00	0.00	0.0	0.0	0.0
C-3	2	13.20	0.00	0.00	0.0	0.0	0.0
D-3	2	18.39	0.00	0.00	0.0	0.0	0.0
E-3	2	9.74	0.00	0.00	0.0	0.0	0.0
A-4	2	7.13	0.00	0.00	0.0	0.0	0.0
C-4	2	10.81	0.00	0.00	0.0	0.0	0.0
D-4	2	14.87	0.00	0.00	0.0	0.0	0.0
E-4	2	7.97	0.00	0.00	0.0	0.0	0.0
A-5	2	60.73	0.00	0.00	0.0	0.0	0.0
B-5	2	45.41	0.00	0.00	0.0	0.0	0.0
C-5	2	61.04	0.00	0.00	0.0	0.0	0.0
D-5	2	100.20	0.00	0.00	0.0	0.0	0.0
E-5	2	57.94	0.00	0.00	0.0	0.0	0.0
A-6	2	5.13	0.00	0.00	0.0	0.0	0.0
C-6	2	11.54	0.00	0.00	0.0	0.0	0.0
D-6	2	10.46	0.00	0.00	0.0	0.0	0.0
E-6	2	5.49	0.00	0.00	0.0	0.0	0.0
A-7	2	18.97	0.00	0.00	0.0	0.0	0.0
B-7	2	18.14	0.00	0.00	0.0	0.0	0.0
C-7	2	30.76	0.00	0.00	0.0	0.0	0.0
D-7	2	43.93	0.00	0.00	0.0	0.0	0.0
E-7	2	23.06	0.00	0.00	0.0	0.0	0.0
A-1	3	85.35	0.00	0.00	0.0	0.0	0.0
B-1	3	37.14	0.00	0.00	0.0	0.0	0.0

Axis	Floor	Px	Py	Pz	Mx	My	Mz
C-1	3	107.10	0.00	0.00	0.0	0.0	0.0
D-1	3	133.50	0.00	0.00	0.0	0.0	0.0
E-1	3	92.75	0.00	0.00	0.0	0.0	0.0
A-2	3	155.70	0.00	0.00	0.0	0.0	0.0
B-2	3	103.70	0.00	0.00	0.0	0.0	0.0
C-2	3	143.80	0.00	0.00	0.0	0.0	0.0
D-2	3	126.00	0.00	0.00	0.0	0.0	0.0
E-2	3	104.40	0.00	0.00	0.0	0.0	0.0
A-3	3	24.13	0.00	0.00	0.0	0.0	0.0
C-3	3	55.28	0.00	0.00	0.0	0.0	0.0
D-3	3	30.96	0.00	0.00	0.0	0.0	0.0
E-3	3	30.56	0.00	0.00	0.0	0.0	0.0
A-4	3	19.74	0.00	0.00	0.0	0.0	0.0
C-4	3	43.55	0.00	0.00	0.0	0.0	0.0
D-4	3	23.30	0.00	0.00	0.0	0.0	0.0
E-4	3	24.89	0.00	0.00	0.0	0.0	0.0
A-5	3	122.20	0.00	0.00	0.0	0.0	0.0
B-5	3	107.70	0.00	0.00	0.0	0.0	0.0
C-5	3	103.30	0.00	0.00	0.0	0.0	0.0
D-5	3	113.30	0.00	0.00	0.0	0.0	0.0
E-5	3	76.26	0.00	0.00	0.0	0.0	0.0
A-6	3	5.08	0.00	0.00	0.0	0.0	0.0
C-6	3	6.36	0.00	0.00	0.0	0.0	0.0
D-6	3	5.15	0.00	0.00	0.0	0.0	0.0
E-6	3	15.52	0.00	0.00	0.0	0.0	0.0
A-7	3	31.19	0.00	0.00	0.0	0.0	0.0
B-7	3	34.47	0.00	0.00	0.0	0.0	0.0
C-7	3	53.74	0.00	0.00	0.0	0.0	0.0
D-7	3	77.68	0.00	0.00	0.0	0.0	0.0
E-7	3	47.95	0.00	0.00	0.0	0.0	0.0

LOAD CASE 5 : EQUAKE Y (EQY) - TYPE : EQUIVALENT STATIC

Number of nodal loads .... = 65
Number of column loads ... = 0
Number of beam loads ..... = 0

Nodal Loads (EQY)

		Force (kN)			Moment (kN-m)		
Axis	Floor	Px	Py	Pz	Mx	My	Mz
A-1	2	0.00	42.15	0.00	0.0	0.0	0.0
B-1	2	0.00	40.62	0.00	0.0	0.0	0.0
C-1	2	0.00	61.66	0.00	0.0	0.0	0.0
D-1	2	0.00	86.53	0.00	0.0	0.0	0.0
E-1	2	0.00	49.93	0.00	0.0	0.0	0.0
A-2	2	0.00	50.08	0.00	0.0	0.0	0.0
B-2	2	0.00	47.89	0.00	0.0	0.0	0.0
C-2	2	0.00	85.92	0.00	0.0	0.0	0.0
D-2	2	0.00	124.10	0.00	0.0	0.0	0.0
E-2	2	0.00	76.29	0.00	0.0	0.0	0.0
A-3	2	0.00	17.88	0.00	0.0	0.0	0.0
B-3	2	0.00	10.86	0.00	0.0	0.0	0.0
C-3	2	0.00	13.20	0.00	0.0	0.0	0.0
D-3	2	0.00	18.39	0.00	0.0	0.0	0.0
E-3	2	0.00	9.74	0.00	0.0	0.0	0.0
A-4	2	0.00	7.13	0.00	0.0	0.0	0.0
C-4	2	0.00	10.81	0.00	0.0	0.0	0.0
D-4	2	0.00	14.87	0.00	0.0	0.0	0.0
E-4	2	0.00	7.97	0.00	0.0	0.0	0.0
A-5	2	0.00	60.73	0.00	0.0	0.0	0.0
B-5	2	0.00	45.41	0.00	0.0	0.0	0.0
C-5	2	0.00	61.04	0.00	0.0	0.0	0.0
D-5	2	0.00	100.20	0.00	0.0	0.0	0.0
E-5	2	0.00	57.94	0.00	0.0	0.0	0.0
A-6	2	0.00	5.13	0.00	0.0	0.0	0.0
C-6	2	0.00	11.54	0.00	0.0	0.0	0.0
D-6	2	0.00	10.46	0.00	0.0	0.0	0.0

Axis	Floor	Px	Py	Pz	Mx	My	Mz
E-6	2	0.00	5.49	0.00	0.0	0.0	0.0
A-7	2	0.00	18.97	0.00	0.0	0.0	0.0
B-7	2	0.00	18.14	0.00	0.0	0.0	0.0
C-7	2	0.00	30.76	0.00	0.0	0.0	0.0
D-7	2	0.00	43.93	0.00	0.0	0.0	0.0
E-7	2	0.00	23.06	0.00	0.0	0.0	0.0
A-1	3	0.00	85.35	0.00	0.0	0.0	0.0
B-1	3	0.00	37.14	0.00	0.0	0.0	0.0
C-1	3	0.00	107.10	0.00	0.0	0.0	0.0
D-1	3	0.00	133.50	0.00	0.0	0.0	0.0
E-1	3	0.00	92.75	0.00	0.0	0.0	0.0
A-2	3	0.00	155.70	0.00	0.0	0.0	0.0
B-2	3	0.00	103.70	0.00	0.0	0.0	0.0
C-2	3	0.00	143.80	0.00	0.0	0.0	0.0
D-2	3	0.00	126.00	0.00	0.0	0.0	0.0
E-2	3	0.00	104.40	0.00	0.0	0.0	0.0
A-3	3	0.00	24.13	0.00	0.0	0.0	0.0
C-3	3	0.00	55.28	0.00	0.0	0.0	0.0
D-3	3	0.00	30.96	0.00	0.0	0.0	0.0
E-3	3	0.00	30.56	0.00	0.0	0.0	0.0
A-4	3	0.00	19.74	0.00	0.0	0.0	0.0
C-4	3	0.00	43.55	0.00	0.0	0.0	0.0
D-4	3	0.00	23.30	0.00	0.0	0.0	0.0
E-4	3	0.00	24.89	0.00	0.0	0.0	0.0
A-5	3	0.00	122.20	0.00	0.0	0.0	0.0
B-5	3	0.00	107.70	0.00	0.0	0.0	0.0
C-5	3	0.00	103.30	0.00	0.0	0.0	0.0
D-5	3	0.00	113.30	0.00	0.0	0.0	0.0
E-5	3	0.00	76.26	0.00	0.0	0.0	0.0
A-6	3	0.00	5.08	0.00	0.0	0.0	0.0
C-6	3	0.00	6.36	0.00	0.0	0.0	0.0
D-6	3	0.00	5.15	0.00	0.0	0.0	0.0
E-6	3	0.00	15.52	0.00	0.0	0.0	0.0
A-7	3	0.00	31.19	0.00	0.0	0.0	0.0
B-7	3	0.00	34.47	0.00	0.0	0.0	0.0
C-7	3	0.00	53.74	0.00	0.0	0.0	0.0
D-7	3	0.00	77.68	0.00	0.0	0.0	0.0
E-7	3	0.00	47.95	0.00	0.0	0.0	0.0

SUMMARY QUANTITY OF MATERIALS

COLUMNS

Item -	Section -	Material -	Length m	Weight/Len kN/m	Total Weight kN
1	40X40	21MPA	31.38	3.840	120.48
2	40X45	21MPA	37.65	4.320	162.65
				TOTAL =	283.13

BEAMS

Item -	Section -	Material -	Length m	Weight/Len kN/m	Total Weight kN
1	30X50	21MPA	208.07	3.600	749.05
				TOTAL =	749.05

FOUNDATION BEAMS

Item -	Section -	Material -	Length m	Weight/Len kN/m	Total Weight kN
1	50X50	21MPA	82.57	6.000	495.39
				TOTAL =	495.39

S L A B S

Item -	Section -	Material -	Area m²	Weight/Area kN/m²	Total Weight kN
1	AULAS	w =23.5	114.35	2.233	255.29
2	PASILLOS	w =23.5	32.88	2.233	73.40
3	CANAL	w =23.5	5.02	2.350	11.79
4	ALERO	w =23.5	32.88	2.820	92.72
5	TANQUES	w =23.5	22.22	2.233	49.60
				TOTAL =	482.79

ANEXO

RESULTADO DETALLAMIENTO

(IRREGULARIDADES EN PLANTA, ALTURA Y REDUNDANCIA)

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:38:03 p. m. 27/12/2024

PLAN TORSIONAL IRREGULARITY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Level	Δ/h max	Δ/h avg	max/avg Δ/h	Irregular	Δ/h max	Δ/h avg	max/avg Δ/h	Irregular
3	0.0071	0.0062	1.1400	NO	0.0070	0.0065	1.0655	NO
2	0.0077	0.0067	1.1603	NO	0.0072	0.0064	1.1214	NO

Torsional irregularity is considered to exist if Δ/h max > 1.2 Δ/h ave
EXTreme torsional irregularity is considered to exist if Δ/h max > 1.4 Δ/h ave

Torsional irregularities do NOT exist.

Accidental torsion does not have to be amplified

Notes:
The determination of torsional irregularities (plan structural irregularity type 1) and computation of amplification factors for accidental torsion Ax, is conducted according to FEMA's NEHRP Recommended Provitions for Seismic Regulations for New Buildings and other Structures, Provisions and Commentary ed. 1994, 1997, 2000, 2003, 2009, which is applicable to the following building codes derived from the above documents: (USA) IBC-03/06, ASCE 7-05/10, CBC-01/07, UBC-97, (COLOMBIA) NSR-10, and (PAN) REP-2004,(Dom) R-001, (GUA)

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:35:36 p. m. 27/12/2024

DRIFT-BASED FLEXIBLE-STORY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Δcm*	Δcm/h	Δn/Δn+1	Irregular	Δcm*	Δcm/h	Δn/Δn+1	Irregular
2	22.4626	0.0062	-	-	23.5630	0.0065	-	-
1	24.0372	0.0067	1.0701	NO	23.1104	0.0064	0.9808	NO

* Δcm: Story drift at center of mass (mm)
n/n+1 Δ/h: (Δcm/h)n/(Δcm/h)n+1: Ratio between drift ratio at CM of a stotry and that of story above

Vertical irregularities type 1a, 1b, 2 and 3 do not apply if drift ratio of each story is less than 1.3 that of next story above (i.e. n/n+1 Δ/h < 1.3). Story drift ratio of top two stories are not considered

Stiffness-based flexible story check is not required!
It can be considered that vertical irregularities type 1aA, 1bA, 2A and 3A DO NOT EXIST !

Use: Øa = 1

DESIGN-SHEAR BASED STORY STIFFNESS

	X - DIRECTION			Y - DIRECTION		
Story	Shear X	Δcm X	Kx	Shear Y	Δcm Y	Ky
2	2129.1	22.4626	94.8	2129.1	23.5630	90.4
1	3390.3	24.0372	141.0	3390.3	23.1104	146.7

Shear: Design Shear, in kN
Δcm: Drift at center of mass, in mm
K: Story stiffness, in kN/mm

STIFFNESS-BASED FLEXIBLE-STORY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Kn	Kn/Kn+1	Kn/Kavg3	Irregular	Kn	Kn/Kn+1	Kn/Kavg3	Irregular
2	94.8	-	-	-	90.4	-	-	-
1	141.0	1.488	-	NO	146.7	1.624	-	NO

Kn: Stiffness of story n, in kN/mm
Kn/Kn+1: Ratio between stiffness of story n and that of store above n
Kn/Kavg3: Ratio between stiffness of story n and average stiffness of three stories above n

Stiffness-soft story irregularity is considered to exist if Kn/Kn+1 < 0.7 or Kn/Kavg3 < 0.8
Stiffness-EXTreme soft story irregularity is considered to exist if Kn/Kn+1 < 0.6 or Kn/Kavg3 < 0.7

Stiffness-flexible story irregularity types 1aA and 1bA do NOT exist.

Notes:
The determination stiffness-soft story irregularity (vertical structural irregularity types 1a and 1b) is conducted based on story-stiffness computed for the design seismic shear distribution, according to FEMA's NEHRP Recommended Provitions for Seismic Regulations for New Buildings and other Structures, Provisions and Commentary ed. 1994, 1997, 2000, 2003, 2009, which is applicable to the following building codes derived from the above documents: (USA) IBC-03/06, ASCE 7-05/10, CBC-01/07, UBC-97, (COLOMBIA) NSR-10, (PAN) REP-2004,(DOM) R-001, (GUA) NSE

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:35:36 p. m. 27/12/2024

WEIGHT (MASS) IRREGULARITY CHECK

Floor	Wn	Wn/Wn+1	Wn/Wn-1	Irregular
3	1504.6	-	0.844	-
2	1783.1	-	-	-

Wn: Effective weight of floor n, in kN
Wn/Wn+1: Ratio between weight of floor n and weight of floor above n
Wn/Wn-1: Ratio between weight of floor n and weight of floor below n

Weight (mass) irregularity is considered to exist if effective weight of any floory is more than 1.5 times the effective weight of an adjacent floor. That is, if Wn/Wn+1 > 1.5 or Wn/Wn-1 > 1.5.
A roof that is lighter than the floor below is not considered.

Weight (mass) irregularity (2A) does NOT exist.

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAİTAN 3:37:52 p. m. 27/12/2024

REDUNDANCY ANALYSIS

STORY-STRENGTH REDUCTION DUE TO REMOVAL OF CRITICAL ELEMENT

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Vi	Vi/Vb	Crit.Element	Ve/Vi	Vi	Vi/Vb	Crit.Element	Ve/Vi
2	380.2	0.63	BEM:A(1-2)	0.21	380.2	0.63	BEM:5(C-D)	0.24
1	605.4	1.00	BEM:A(1-2)	0.20	605.4	1.00	BEM:5(D-E)	0.20
MAXIMA				0.21				0.24

NOTE: Shear values are divided by R

Removal of any critial element on any story supporting more than 35% Vb (Base Shear) would not reduce
the story strength by more than 33%. Thus SEISMIC FORCE-RESISTING SYSTEM SEEMS REDUNDANT!!
It should be investigated if removal of critical element would induce Extreme Torsional Irregularity (1bP)

Proposed Reduction Factor for Lack of Redundancy: Ørx = 1 Øry = 1

Cálculo ingeniamos

ANEXO

FUERZAS SISMICAS

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:55:52 p. m. 7/02/2025

S E I S M I C D E S I G N C O D E : COL NSR-10

```
============================================================
 S E I S M I C   B A S E   L E V E L :  1
============================================================


S E I S M I C   F O R C E   R E S I S T I N G   S Y S T E M

System X-Direction:   C: Moment Res.Frame
System Y-Direction:   C: Moment Res.Frame
------------------------------------------------------------
Energy dissip capacity: 3: Special-DES
------------------------------------------------------------
```

EQUIVALENT STATIC EARTHQUAKE FORCES COL NSR-10

Base Shear

$V = Sa\ W$

$Sa = 1.2\ Av\ Fv\ I/\ T,\ \ Sa = 1.2\ Av\ Fv\ Tl/T^2$ for $T > Tl$

$Sa = 2.5\ Aa\ Fa\ I$ for $T < Tc$, where $Tc = 0.48\ AvFv/AaFa$

```
S E I S M I C   P A R A M E T E R S

Eff. peak acceleration & veloc., Aa =   0.25     Av =   0.20

   Region:      10    9     8     7     6     5     4     3     2     1
   Aa or Av    0.50  0.45  0.40  0.35  0.30  0.25  0.20  0.15  0.10  0.05

   LOCATION                                          Aa     Av     Menace
   Barranquilla, Cartagena, San Andres, Valledupar  0.10   0.10    Low
   Bogota, Medellin                                 0.15   0.20    Interm
   Armenia, Bucaramanga, Cali, Manizalez, Pereira   0.25   0.25    High
   Cucuta, Villavicencio                            0.35   0.30    High
   Quibdo                                           0.35   0.35    High

Importance coefficient, I ........ =    1.25

   GROUP                                          COEFFICIENT
   IV - Essential facilities                          1.50
   III- Public assistance facilities                  1.25
   II - Especial occupancy buildings                  1.10
   I  - Normal occupancy buildings                    1.00

Site profile type, S ............ =      D

   TYPE   SOIL PROFILE TYPE          Shear Wave Velocity
    A     Hard Rock                        > 1500 m/s
    B     Rock                        1500 - 760 m/s
    C     Very Dense Soil & Soft Rock  760 - 360 m/s
    D     Stiff Soil Profile           360 - 180 m/s
    E     Soft Soil Profile                < 180 m/s
    F     Soils requiring site-specific evaluations

                                   X-direction   Y-direction
                                   -----------   -----------
Seismic Force-resisting system     = C: Moment     C: Moment
Energy Dissipation Coefficient, Ro =    7             7

Computed fundamental period (sec)  =     .405        .409
          T = 0.1 N ............. =     .2           .2
         Ta = Ct (Hn)^x ......... =  0.047 H^0.9   0.047 H^0.9
                                   =    .28          .28
        *Tmax: 1.7 Ta  .......... =    .48          .48
        *Tmax = Cu Ta
                Cu = 1.75 - 1.2 Av Fv  >= 1.2

Fundamental period, T ............ =     .405          .409
```

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:55:53 p. m. 7/02/2025

DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS

	Short Periods	Long Periods
Effect. peak acceleration & velc.,	Aa = 0.25	Av = 0.20
Site coefficients (Tables below),	Fa = 1.30	Fv = 2.00

Design response parameters, Aa Fa = 0.33 Av Fv= 0.40

Long-period transition period, Tl sec = 4.80 (2.4 Fv)

Site Coefficient Fa

Site Class	Aa<=0.1	Aa=0.2	Aa=0.3	Aa=0.4	Ss>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	a	a	a	a	a

Site Coefficient Fv

Site Class	Av<=0.1	Av=0.2	Av=0.3	Av=0.4	Av>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	a	a	a	a	a

a: Site-specific geotechnical investigation required

VERIFYING UPPER LIMIT ON FUNDAMENTAL PERIOD

Tmax = Cu Ta
Cu = 1.75 - 1.2 Av Fv >= 1.2

Av Fv ..... = 0.4
Cu ..... = 1.27

	X-direction	Y-direction
Fundamental period (sec) . . . . . =	.405	.409
Ta (sec). . . . . =	0.28	0.28
Tmax = Cu Ta (sec). . . . . =	0.3586	0.3586
Adjusted fundamental period, T ... =	0.3586	0.3586

Reduction in R for Irregularity and Lack of Redundancy:

PLAN IRREGULARITIES			ELEVATION IRREGULARITIES		
Type	Description	Øp	Type	Description	Øa
1aP	Torsional	0.9	1aA	Flexible	0.9
1bP	Torsional Extrme	0.8	1bA	Flexible Extrme	0.8
2P	Reentrant corners	0.9	2A	Mass	0.9
3P	Diaph. discontin.	0.9	3A	Geometrical	0.9
4P	Plane shifting	0.8	4A	Plane shifting	0.8
5P	Unparallel grid	0.9	5aA	Weak Story	0.9
			5bA	Weak Story Extr	0.8

NOTE: EngSolutions RCB assumes irregular building.
For regular buildings make (Øp . Øa)= 1.0

	X - D I R E C T I O N	Y - D I R E C T I O N
Reduct. factor, (Øp.Øa) =	0.8	0.8
Redundancy factor, Ør =	1	1

R = (Øp Øa) Ør Ro

T O T A L B A S E S H E A R

Building Weight, W, (kN) = 3307.55

Peak Acceleration Coeffi., Fa Aa = .33
Peak Velocity coefficient, Fv Av = .4
Transition period, Tc . . . . . = .58
Importance factor, I . . . . . = 1.25
Site class, S . . . . . = D

	X-direction	Y-direction
Energ-disspat coeff, R =	5.6	5.6
Period, T, (sec) . . . =	.3586	.3586
1.2 Av Fv I / T =	1.673	1.673
2.5 Aa Fa I =	1.031	1.031
Sa =	1.031	1.031
Total Base Shear, V, (kN) =	3410.91	3410.91

A C C I D E N T A L T O R S I O N

	X-direction	Y-direction
Accidental eccentricity as a percentage of building dimension, (%)=	5	5

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A C C I D E N T A L E C C E N T R I C I T Y:

Level	X - D I R E C T I O N (EQY)			Y - D I R E C T I O N (EQX)		
-	δεxo (m)	Ax -	δεx (m)	δεyo (m)	Ax -	δεy (m)
3	0.56	1.00	0.56	0.74	1.00	0.74
2	0.56	1.00	0.56	0.74	1.00	0.74

Ax: Amplification factor for accidental eccentricity

EQY: Envelope (1) Ex = εx
(2) Ex = εx + δεx
(3) Ex = εx - δεx

EQX: Envelope (1) Ey = εy
(2) Ey = εy + δεy
(3) Ey = εy - δεy

D E S I G N E C C E N T R I C I T Y : E = ε + δε

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
-	Center Mass CMx	Inherent Eccent. εx*	Accident Eccent. δεx	Design Eccent. Ex	Center Mass CMy	Inherent Eccent. εy*	Accident Eccent. δεy	Design Eccent. Ey
3	5.74	0.82	0.56	1.3838	6.73	0.17	0.74	0.9191
2	5.66	0.75	0.56	1.3131	7.34	0.78	0.74	1.5252

Note: * Inherent eccentricity: εx = CMx - CRx and εy = CMy - CRy
All values are in meters

D E S I G N E C C E N T R I C I T Y : E = ε - δε

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
-	Center Mass CMx	Inherent Eccent. εx*	Accident Eccent. δεx	Design Eccent. Ex	Center Mass CMy	Inherent Eccent. εy*	Accident Eccent. δεy	Design Eccent. Ey
3	5.74	0.82	0.56	0.2626	6.73	0.17	0.74	-0.577
2	5.66	0.75	0.56	0.1919	7.34	0.78	0.74	0.0404

Note: * Inherent eccentricity: εx = CMx - CRx and εy = CMy - CRy
All values are in meters

Equivalent Forces

Fi = (Wi Hi^n /∑Wj Hj^n) V
V =∑Fi
V = Sa W

E Q U I V A L E N T F O R C E S: X - D I R E C T I O N (EQUAKE X)

Floor i -	Height Hi (m)	Weigth Wi (KN)	Wi Hi^n ------ ∑Wj Hj^n	Force Fi (KN)	Shear Vi (KN)	Torsion Ti=Fi(εy-εy) (kN-m)
3	7.19	1513	0.628	2142.00	2142.0	1595.4
2	3.59	1794	0.372	1268.8	3410.9	939.70
∑		3307.55		3410.9		

n = 1

E Q U I V A L E N T F O R C E S: Y - D I R E C T I O N (EQUAKE Y)

Floor i -	Height Hi (m)	Weigth Wi (KN)	Wi Hi^n ------ ∑Wj Hj^n	Force Fi (KN)	Shear Vi (KN)	Torsion Ti=Fi(εx-ex) (kN-m)
3	7.19	1513	0.628	2142.00	2142.0	1203.8
2	3.59	1794	0.372	1268.8	3410.9	716.71
∑		3307.55		3410.9		

n = 1

ACCELERATIONS ON NON-STRUCTURAL ELEMENTS- NSR-10

F L O O R A C C E L E R A T I O N S

Level	hx	hx/heq	ax
3	7.19	1.33	1.375
2	3.59	0.67	0.825

Seismic base level . . . . . = 1
Height above seismic base, hn . . . . . = 7.20 m
Equivalent height, heq = 0.75 hn . . . . . = 5.40 m
Ground acceleration, As = Aa Fa I . . . . . = 0.413
Spectral acceleration, Sa . . . . . = 1.031

ax = Sa hx/heq for hx > heq
ax = As + (Sa -As) hx/heq for hx < heq

Force on structural non-seismic element : Fp = ax Wp / Ro
Force on nonstructural element : Fp = ax ap Wp / Rp
> 0.5 Aa I Wp

ap : component amplification factor

ANEXO
RESULTADOS INDICES DE FLEXIBILIDAD
(DERIVAS Y DEFLEXIONES)

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P-DELTA ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, Δ/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio			
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR	Axis
2	0.0063	0.0066	0.0066	0.0072	0.0070	0.0072	E-5
1	0.0067	0.0065	0.0067	0.0078	0.0073	0.0078	E-1
Maxima	0.0067	0.0066	0.0067	0.0078	0.0073	0.0078	

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

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P-DELTA ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, Δ/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio			
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR	Axis
2	0.0063	0.0066	0.0066	0.0072	0.0070	0.0072	E-5
1	0.0067	0.0065	0.0067	0.0078	0.0073	0.0078	E-1
Maxima	0.0067	0.0066	0.0067	0.0078	0.0073	0.0078	

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

P-DELTA ANALYSIS - DETAILED MAXIMUM STORY DRIFT RATIO, δ/h

Story	ColAxis	$(\delta x/h)max$	$(\delta y/h)max$	$([(\delta x/h)^2 + (\delta y/h)^2]^{1/2})max$
2	A-1	0.0066	0.0047	0.0066
	C-1	0.0063	0.0047	0.0063
	D-1	0.0066	0.0047	0.0066
	E-1	0.0071	0.0047	0.0071
	A-2	0.0066	0.0066	0.0066
	C-2	0.0063	0.0066	0.0066
	E-2	0.0071	0.0066	0.0071
	A-5	0.0066	0.0070	0.0071
	C-5	0.0063	0.0070	0.0070
	D-5	0.0066	0.0070	0.0070
	E-5	0.0072	0.0070	0.0072
1	A-1	0.0070	0.0063	0.0070
	C-1	0.0067	0.0063	0.0067
	D-1	0.0071	0.0063	0.0071
	E-1	0.0078	0.0063	0.0078
	A-2	0.0070	0.0065	0.0070
	C-2	0.0067	0.0065	0.0067
	E-2	0.0078	0.0065	0.0078
	A-5	0.0070	0.0073	0.0074
	C-5	0.0067	0.0073	0.0073
	D-5	0.0071	0.0073	0.0073
	E-5	0.0078	0.0073	0.0078

Note: Drift amplification factor, D: .8 in X; .8 in Y
MAXIMA DRIFT: $(\delta/h)x$ =0.0078; $(\delta/h)y$ =0.0073; $(\delta/h)r$ =0.0078

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LONG-TERM BEAM DEFLECTIONS

PERMISSIBLE DEFLECTIONS
Immediate deflection due to Live Load . . . . . = L/360
Long-term deflection due to Sustained loads . . = L/480

TYPE OF DEFLECTION	LOAD COMBINATION
Immediate due to Dead load (DLs)	D0 + DL
Immediate due to Live load (LLs)*	LL
Immediate due to Sus. load (SLds)	D0 + DL + LL
Long-term due to Sus. load (SLds)	D0 + DL + LL

* Computed as Defl(DLS + LLs) - Defl(DLs)

Units: Defl: Max. deflection (mm), L: Beam length (m), h: Beam depth (mm)

						IMMEDIATE DEFLECTIONS			ADDITIONAL LONG-TERM DEFLEC. Sus.Lds		
Beam	Floor	h	L	L/h	Beam Type	DLs Deflc	Live Deflc	Sut.Lds Deflc	6 months Deflc	1-year Deflc	5-years Deflc
A(1-2)	1	500	4.47	9	BothEndCnt	0.04	0.00	0.04	0.04	0.04	0.06
A(2-5)	1	500	4.47	9	BothEndCnt	0.04	0.00	0.04	0.04	0.05	0.07
A(5-6)	1	500	.74	1	Cantilever	0.01	0.00	0.01	0.01	0.01	0.02
C(1-2)	1	500	4.47	9	BothEndCnt	0.04	0.00	0.04	0.04	0.05	0.07
C(2-5)	1	500	4.47	9	BothEndCnt	0.04	0.00	0.04	0.04	0.05	0.07
C(5-6)	1	500	.74	1	Cantilever	0.01	0.00	0.01	0.01	0.01	0.02
D(1-2)	1	500	4.47	9	BothEndCnt	0.70	0.00	0.70	0.72	0.84	1.20
D(2-5)	1	500	4.47	9	BothEndCnt	0.70	0.00	0.70	0.72	0.84	1.20
E(1-2)	1	500	4.47	9	BothEndCnt	0.04	0.00	0.04	0.04	0.05	0.07
E(2-5)	1	500	4.47	9	BothEndCnt	0.04	0.00	0.04	0.04	0.05	0.07
A(1-2)	2	500	4.47	9	EndJContin	0.12	0.02	0.13	0.13	0.16	0.22
A(2-5)	2	500	4.47	9	BothEndCnt	0.07	0.00	0.07	0.08	0.09	0.13
A(5-7)	2	500	2.22	4	Cantilever	0.79	0.07	0.86	0.88	1.03	1.47
B(1-2)	2	500	4.47	9	EndJContin	0.50	0.12	0.62	0.64	0.75	1.07
B(2-3)	2	500	1.19	2	Cantilever	0.00	0.00	0.00	0.00	0.00	0.00
C(1-2)	2	500	4.47	9	EndJContin	0.29	0.06	0.35	0.36	0.42	0.60
C(2-5)	2	500	4.47	9	BothEndCnt	0.02	0.00	0.02	0.02	0.02	0.03
C(5-7)	2	500	2.22	4	Cantilever	2.41	0.27	2.69	2.77	3.23	4.61
D(1-2)	2	500	4.47	9	EndJContin	0.28	0.28	0.56	0.58	0.68	0.97
D(2-5)	2	500	4.47	9	BothEndCnt	2.43	2.84	5.27	4.88	5.70	8.14
D(5-7)	2	500	2.22	4	Cantilever	2.40	0.16	2.56	2.64	3.08	4.40
E(1-2)	2	500	4.47	9	EndJContin	0.16	0.02	0.18	0.19	0.22	0.31
E(2-5)	2	500	4.47	9	BothEndCnt	0.05	0.01	0.06	0.06	0.07	0.11
E(5-7)	2	500	2.22	4	Cantilever	0.76	0.03	0.80	0.82	0.96	1.37
A(1-2)	3	500	4.47	9	EndJContin	0.10	0.02	0.12	0.13	0.15	0.21
A(2-5)	3	500	4.47	9	BothEndCnt	0.11	0.02	0.13	0.13	0.15	0.22
A(5-7)	3	500	2.22	4	Cantilever	0.66	0.01	0.65	0.67	0.78	1.12
C(1-2)	3	500	4.47	9	EndJContin	0.14	0.03	0.17	0.18	0.21	0.29
C(2-5)	3	500	4.47	9	BothEndCnt	0.13	0.03	0.17	0.17	0.20	0.29
C(5-7)	3	500	2.22	4	Cantilever	2.38	0.12	2.49	2.57	3.00	4.29
D(1-2)	3	500	4.47	9	EndJContin	0.11	0.01	0.10	0.10	0.12	0.17
D(2-5)	3	500	4.47	9	BothEndCnt	0.76	0.12	0.64	0.66	0.77	1.10
D(5-7)	3	500	2.22	4	Cantilever	2.39	0.02	2.41	2.48	2.89	4.13
E(1-2)	3	500	4.47	9	EndJContin	0.10	0.00	0.10	0.10	0.12	0.17
E(2-5)	3	500	4.47	9	BothEndCnt	0.01	0.00	0.01	0.01	0.01	0.02
E(5-7)	3	500	2.22	4	Cantilever	0.89	0.02	0.91	0.94	1.10	1.57
1(A-C)	1	500	4.97	10	BothEndCnt	0.07	0.00	0.07	0.07	0.08	0.11
1(C-D)	1	500	4.97	10	BothEndCnt	0.06	0.00	0.06	0.06	0.07	0.10
1(D-E)	1	500	4.87	10	BothEndCnt	0.06	0.00	0.06	0.06	0.07	0.10
2(A-C)	1	500	4.97	10	BothEndCnt	0.07	0.00	0.07	0.07	0.08	0.11
2(C-D)	1	500	4.97	10	BothEndCnt	0.70	0.00	0.70	0.72	0.84	1.20
2(D-E)	1	500	4.87	10	BothEndCnt	0.70	0.00	0.70	0.72	0.84	1.20
5(A-C)	1	500	4.97	10	BothEndCnt	0.06	0.00	0.06	0.07	0.08	0.11
5(C-D)	1	500	4.97	10	BothEndCnt	0.06	0.00	0.06	0.06	0.07	0.10
5(D-E)	1	500	4.87	10	BothEndCnt	0.05	0.00	0.05	0.05	0.06	0.09
6(A-C)	1	500	4.97	10	SimpSupprt	0.27	0.00	0.27	0.28	0.33	0.47
1(A-C)	2	500	4.97	10	EndJContin	0.52	0.11	0.63	0.65	0.76	1.08
1(C-D)	2	500	4.97	10	BothEndCnt	0.18	0.04	0.22	0.22	0.26	0.37
1(D-E)	2	500	4.87	10	EndIContin	0.36	0.08	0.44	0.45	0.52	0.75
2(A-C)	2	500	4.97	10	EndJContin	0.69	0.11	0.80	0.82	0.96	1.37
2(C-D)	2	500	4.97	10	BothEndCnt	2.50	3.41	5.91	5.70	6.65	9.49
2(D-E)	2	500	4.87	10	EndIContin	2.27	0.83	3.09	3.04	3.55	5.07
3(A-B)	2	500	3.50	7	Cantilever	0.39	0.02	0.41	0.42	0.49	0.71
5(A-C)	2	500	4.97	10	EndJContin	0.09	0.08	0.17	0.18	0.21	0.30
5(C-D)	2	500	4.97	10	BothEndCnt	0.39	0.12	0.51	0.53	0.62	0.88
5(D-E)	2	500	4.87	10	EndIContin	0.45	0.16	0.62	0.64	0.74	1.06
7(A-C)	2	500	4.97	10	EndJContin	0.20	0.02	0.22	0.23	0.27	0.39
7(C-D)	2	500	4.97	10	BothEndCnt	0.08	0.28	0.37	0.38	0.44	0.63

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Beam	Floor	h	L	L/h	Beam Type	Deflc	Deflc	Deflc	Deflc	Deflc	Deflc
7(D-E)	2	500	4.87	10	EndIContin	0.49	0.08	0.41	0.42	0.49	0.70
1(A-C)	3	500	4.97	10	EndJContin	0.05	0.01	0.04	0.04	0.04	0.06
1(C-D)	3	500	4.97	10	BothEndCnt	0.09	0.01	0.09	0.10	0.11	0.16
1(D-E)	3	500	4.87	10	EndIContin	0.05	0.02	0.04	0.04	0.04	0.06
2(A-C)	3	500	4.97	10	EndJContin	0.76	0.13	0.89	0.92	1.07	1.53
2(C-D)	3	500	4.97	10	BothEndCnt	0.69	0.11	0.58	0.60	0.70	1.00
2(D-E)	3	500	4.87	10	EndIContin	0.87	0.08	0.79	0.81	0.95	1.36
5(A-C)	3	500	4.97	10	EndJContin	1.68	1.04	2.73	2.81	3.28	4.68
5(C-D)	3	500	4.97	10	BothEndCnt	0.03	0.00	0.03	0.03	0.03	0.05
5(D-E)	3	500	4.87	10	EndIContin	0.15	0.03	0.18	0.19	0.22	0.31
7(A-C)	3	500	4.97	10	EndJContin	0.80	0.04	0.84	0.86	1.01	1.44
7(C-D)	3	500	4.97	10	BothEndCnt	0.11	0.00	0.11	0.12	0.14	0.19
7(D-E)	3	500	4.87	10	EndIContin	0.69	0.07	0.76	0.78	0.91	1.31

NOTE: All beam deflections are smaller than maximum permissible deflection
Depth, H, of all beams is larger than that recomemenden in Table 9.5(a)

Immediate deflections are computed according to 9.5.2.3 with:
Effective stiffness: $E\ I = Ec\ .\ Ie$

$$Ie = (Mcr/Ma)^3\ Ig + [1 - (Mcr/Ma)^3]\ Icr$$

$$Mcr = fr\ Ig/Yt$$

$$Icr = b(kd)^3/3 + n\ As(d-kd)^1 + (n-1)A's(kd-d')^2$$

$$n = Es/Ec$$

Long-term deflections are computed according to 9.5.2.5

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STORY STABILITY INDEX, Q

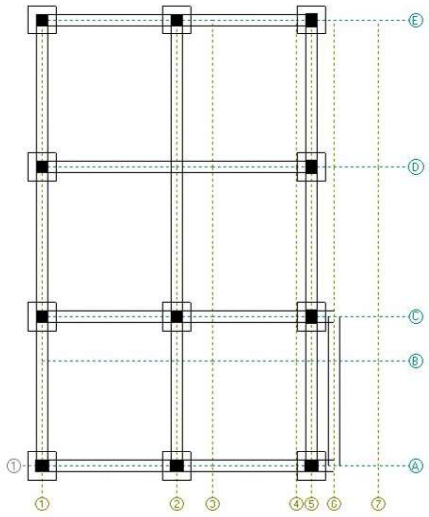
			X - DIRECTION			Y - DIRECTION		
Story	h	P	Shear X	ΔcmX	Qx	Shear Y	ΔcmY	Qy
2	3.6	1733.4	2142.0	22.5993	0.0064	2142.0	23.7068	0.0067
1	3.6	3851.4	3410.8	24.1837	0.0095	3410.8	23.2461	0.0091

h: Story height, m
P: Gravity load, kN :(D0 + DL + LL)
V: Shear: Design shear force, kN
Δcm: Drift at center of mass, mm
Q: Story Stability Index: P. Δcm /(V . h)

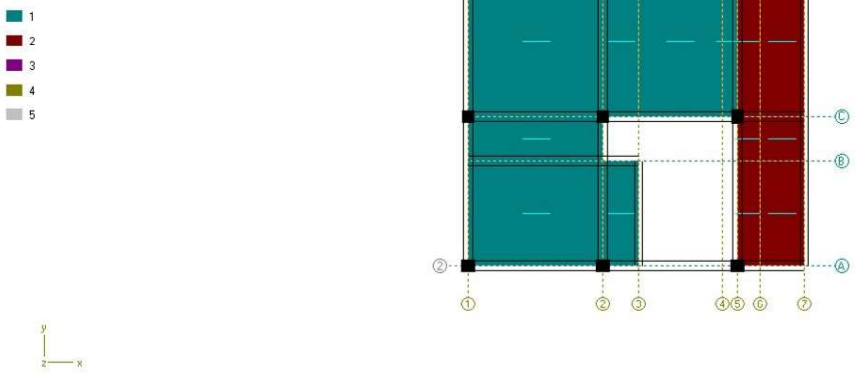
NOTE: P-Δ effects are negligible

Cálculo ingeniamos

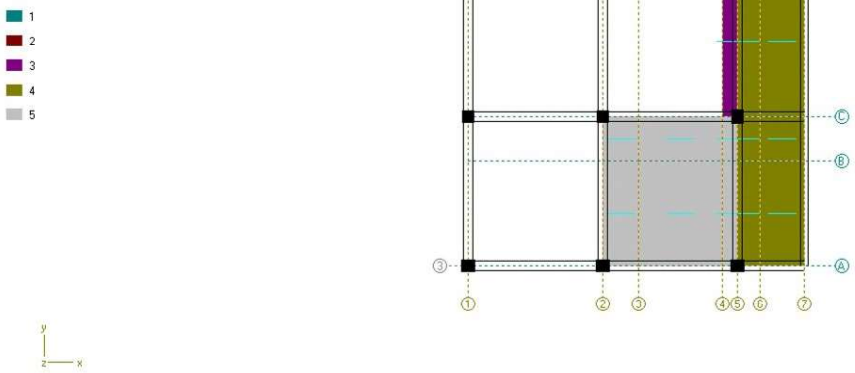
ANEXO
RESULTADO DE DISEÑOS DE COLUMNAS Y VIGAS


E
D
C
B
A
1
1
2
3
4
5
6
7


y
z
x


1
2
3
4
5
E
D
C
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y
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7

y
z
x

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:55 p. m. 7/02/2025

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + LL + EQX + .3EQY
4	1.2D0 + 1.2DL + LL - EQX - .3EQY
5	1.2D0 + 1.2DL + LL + EQX - .3EQY
6	1.2D0 + 1.2DL + LL - EQX + .3EQY
7	1.2D0 + 1.2DL + LL + .3EQX + EQY
8	1.2D0 + 1.2DL + LL - .3EQX - EQY
9	1.2D0 + 1.2DL + LL - .3EQX + EQY
10	1.2D0 + 1.2DL + LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

COLUMN SECTIONS

Number of prismatic sections = 2

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	40X40	Rectang	400	400	-	-	-	-	160000	2.13E+09	2.13E+09	3.16E+09
2	40X45	Rectang	400	450	-	-	-	-	180000	3.04E+09	2.40E+09	4.22E+09

Design Results - Columns (DES)

Column	Story	L (m)	Lu (m)	Sec Mat	bxh (mm)	TRANSVERSE REINFORCEMENT TIES	TRANSVERSE REINFORCEMENT XTIES	Sec	LdCmb critc	Pu (KN)	Mu2 (KN-m)	Mu3 (KN-m)	RHO -	As (mm2)
E-5	2	3.60	3.10	2	400x450	8 #3 @ 70 mm (end)	1 (b)	Top	5	151.38	52.30	72.79	0.0100	1800
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	5	151.38	57.61	56.55	0.0100	1800

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:55 p. m. 7/02/2025

Column	Story	L	Lu	Sec	bxh	TIES	XTIES	Sec	LdCmb	Pu	Mu2	Mu3	RHO	As
E-5	1	3.60	3.18	2	400x450	9 #3 @ 70 mm (end)	1 (b)	Top	5	310.14	63.59	108.43	0.0100	1800
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	17	171.64	156.04	78.60	0.0177	3192
D-5	2	3.60	3.10	2	400x450	8 #3 @ 70 mm (end)	1 (b)	Top	17	175.22	115.73	10.78	0.0100	1800
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	17	175.22	118.11	18.39	0.0100	1800
D-5	1	3.60	3.18	2	400x450	9 #3 @ 70 mm (end)	1 (b)	Top	9	750.80	145.88	32.85	0.0101	1821
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	9	750.80	199.38	68.91	0.0254	4563
C-5	2	3.60	3.10	2	400x450	8 #3 @ 70 mm (end)	1 (b)	Top	10	333.68	133.79	55.53	0.0101	1821
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	10	333.68	129.05	74.46	0.0119	2138
C-5	1	3.60	3.18	2	400x450	9 #3 @ 70 mm (end)	1 (b)	Top	7	660.61	126.25	86.39	0.0148	2665
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	7	660.61	182.94	61.57	0.0195	3509
A-5	2	3.60	3.10	2	400x450	8 #3 @ 70 mm (end)	1 (b)	Top	7	227.43	38.65	122.89	0.0107	1927
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	7	227.43	27.74	119.94	0.0100	1800
A-5	1	3.60	3.18	2	400x450	9 #3 @ 70 mm (end)	1 (b)	Top	7	498.52	69.76	113.74	0.0107	1927
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	7	498.52	71.79	153.12	0.0166	2981
E-2	2	3.60	3.10	1	400x400	8 #3 @ 70 mm (end)	1 (b)	Top	4	144.51	138.43	78.37	0.0218	3494
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	4	144.51	155.27	116.07	0.0318	5088
E-2	1	3.60	3.18	1	400x400	9 #3 @ 70 mm (end)	1 (b)	Top	4	348.74	143.67	107.83	0.0277	4431
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	4	348.74	176.60	81.48	0.0300	4806
C-2	2	3.60	3.10	1	400x400	8 #3 @ 70 mm (end)	1 (b)	Top	6	266.94	120.52	30.12	0.0113	1806
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	6	266.94	144.05	55.16	0.0177	2838
C-2	1	3.60	3.18	1	400x400	9 #3 @ 70 mm (end)	1 (b)	Top	6	570.83	140.76	70.37	0.0230	3681
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	6	570.83	165.56	61.87	0.0277	4431
A-2	2	3.60	3.10	2	400x450	8 #3 @ 70 mm (end)	1 (b)	Top	6	187.22	149.55	70.26	0.0154	2770
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	6	187.22	158.58	59.22	0.0154	2770
A-2	1	3.60	3.18	2	400x450	9 #3 @ 70 mm (end)	1 (b)	Top	12	182.55	157.20	9.66	0.0119	2138
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	4	284.57	225.08	25.15	0.0189	3403
E-1	2	3.60	3.10	1	400x400	8 #3 @ 70 mm (end)	1 (b)	Top	4	49.09	62.20	34.60	0.0100	1600
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	4	49.09	62.53	34.28	0.0100	1600
E-1	1	3.60	3.18	1	400x400	9 #3 @ 70 mm (end)	1 (b)	Top	4	86.97	78.42	45.48	0.0100	1600
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	4	86.97	139.52	52.88	0.0189	3025
D-1	2	3.60	3.10	1	400x400	8 #3 @ 70 mm (end)	1 (b)	Top	7	167.71	71.95	60.97	0.0100	1600
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	7	167.71	99.89	62.37	0.0130	2088
D-1	1	3.60	3.18	1	400x400	9 #3 @ 70 mm (end)	1 (b)	Top	7	417.58	98.48	107.71	0.0177	2838
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	3	428.00	138.22	54.22	0.0166	2650
C-1	2	3.60	3.10	1	400x400	8 #3 @ 70 mm (end)	1 (b)	Top	12	50.60	51.91	24.39	0.0100	1600
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	16	72.00	11.72	60.07	0.0100	1600
C-1	1	3.60	3.18	1	400x400	9 #3 @ 70 mm (end)	1 (b)	Top	15	192.54	31.32	99.72	0.0100	1600
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	12	108.97	117.97	52.00	0.0154	2463
A-1	2	3.60	3.10	2	400x450	8 #3 @ 70 mm (end)	1 (b)	Top	4	36.19	70.66	4.69	0.0100	1800
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	6	47.32	61.68	35.28	0.0100	1800
A-1	1	3.60	3.18	2	400x450	9 #3 @ 70 mm (end)	1 (b)	Top	12	-6.19	94.64	15.48	0.0100	1800
				1		14 #3 @ 140 mm (ctr)	1 (h)	Bot	4	44.68	186.44	34.68	0.0183	3298

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:44 p. m. 7/02/2025

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + LL + EQX + .3EQY
4	1.2D0 + 1.2DL + LL - EQX - .3EQY
5	1.2D0 + 1.2DL + LL + EQX - .3EQY
6	1.2D0 + 1.2DL + LL - EQX + .3EQY
7	1.2D0 + 1.2DL + LL + .3EQX + EQY
8	1.2D0 + 1.2DL + LL - .3EQX - EQY
9	1.2D0 + 1.2DL + LL - .3EQX + EQY
10	1.2D0 + 1.2DL + LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

BEAM SECTIONS

Number of prismatic sections = 3

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	50X50	Rectang	500	500	-	-	-	-	250000	5.21E+09	5.21E+09	7.71E+09
2	30X50	Rectang	300	500	-	-	-	-	150000	3.13E+09	1.13E+09	2.80E+09
3	25X50	Rectang	250	500	-	-	-	-	125000	2.60E+09	6.51E+08	1.78E+09

Design Results - Beams (DES)

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:44 p. m. 7/02/2025

BEAM: A(1-2) FLOOR: 1

Length: L = 4.47 m a = 0.23 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.02 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.63	1.03	1.43	1.83	2.24	2.64	3.04	3.44	3.84	4.25
Mu(-), kN-m:	-131.05	-107.26	-84.10	-61.73	-40.11	-19.25	-1.94	-17.87	-44.46	-73.58	-103.17
Mu(+), kN-m:	153.93	132.39	110.14	86.89	62.65	37.44	11.89	21.23	38.60	56.53	74.14
As(-), mm2:	824	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	976	833	723	723	723	723	723	723	723	723	723
Vu, kN:	58.44	58.44	56.85	59.20	61.70	64.08	66.54	68.88	71.20	73.28	73.28
Tu, kN-m:	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-1 11 #3+1r @ 100 9 #3 @ 200 11 #3+1r @ 100 A-2

BEAM: A(2-5) FLOOR: 1

Length: L = 4.47 m a = 0.23 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.02 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.63	1.03	1.43	1.83	2.24	2.64	3.04	3.44	3.84	4.25
Mu(-), kN-m:	-21.73	-24.25	-33.87	-58.05	-97.58	-150.27	-203.57	-257.02	-310.44	-363.74	-416.54
Mu(+), kN-m:	109.07	59.50	19.11	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	723	723	723	723	723	952	1317	1700	2103	2529	2979
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	128.01	128.01	128.91	129.72	131.30	132.55	132.72	132.89	132.33	132.02	132.02
Tu, kN-m:	3.82	3.82	3.82	3.82	3.82	3.82	3.82	3.82	3.82	3.82	3.82
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-2 11 #3+1r @ 100 9 #3 @ 200 11 #3+1r @ 100 A-5

BEAM: A(5-6) FLOOR: 1

Length: L = 0.74 m a = 0.23 m Section: b = 500.00 mm Sec: 50X50
Lu = 0.52 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.28	0.33	0.38	0.43	0.48	0.53	0.59	0.64	0.69	0.74
Mu(-), kN-m:	-38.11	-34.50	-30.89	-27.27	-23.65	-20.02	-16.37	-12.71	-9.03	-5.39	-1.80
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	1207	1207	1207	1207	1207	1207	1207	1207	1207	1207	1207
As(+), mm2:	1207	1207	1207	1207	1207	1207	1207	1207	1207	1207	1207
Vu, kN:	69.26	69.26	69.26	69.26	69.26	69.26	69.26	69.26	69.26	69.51	70.36
Tu, kN-m:	53.62	53.62	53.62	53.62	53.62	53.62	53.62	53.62	53.62	53.62	53.62
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	175	175	175	175	175	175	175	175	175	175	175

DESIGN

A-5 4 #3 @ 175 A-6

BEAM: C(1-2) FLOOR: 1

	Length:	L = 4.47 m	a = 0.20 m	Section:	b = 500.00 mm	Sec:	50X50				
		Lu = 4.07 m	c = 0.20 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-179.76	-148.97	-119.32	-90.87	-63.62	-37.57	-12.96	-8.87	-18.30	-31.49	-45.63
Mu(+), kN-m:	55.96	49.77	42.77	34.90	26.14	16.51	5.83	13.57	32.76	53.61	73.41
As(-), mm2:	1152	943	747	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	73.98	73.98	71.23	68.24	65.24	62.22	59.22	56.20	53.17	50.40	50.40
Tu, kN-m:	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-1 11 #3+1r @ 100 9 #3 @ 200 11 #3+1r @ 100 C-2

BEAM: C(2-5) FLOOR: 1

	Length:	L = 4.47 m	a = 0.20 m	Section:	b = 500.00 mm	Sec:	50X50				
		Lu = 4.07 m	c = 0.20 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	0.00	-3.49	-18.55	-52.67	-105.61	-169.48	-234.77	-301.06	-368.29	-436.23	-504.56
Mu(+), kN-m:	137.11	78.49	26.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	723	723	723	723	723	1082	1538	2031	2567	3116	3592
As(+), mm2:	864	723	723	723	723	723	723	723	723	723	723
Vu, kN:	145.73	145.73	148.52	151.95	155.43	158.77	161.66	164.06	165.96	167.75	167.75
Tu, kN-m:	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-2 11 #3+1r @ 100 9 #3 @ 200 11 #3+1r @ 100 C-5

BEAM: C(5-6) FLOOR: 1

	Length:	L = 0.74 m	a = 0.20 m	Section:	b = 500.00 mm	Sec:	50X50				
		Lu = 0.54 m	c = 0.00 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.20	0.25	0.31	0.36	0.42	0.47	0.52	0.58	0.63	0.69	0.74
Mu(-), kN-m:	-10.36	-9.24	-8.07	-6.90	-5.73	-4.54	-3.35	-2.14	-1.00	-0.22	0.00
Mu(+), kN-m:	3.28	2.86	2.50	2.15	1.81	1.49	1.18	0.90	0.73	0.96	1.80
As(-), mm2:	852	852	852	852	852	852	852	852	852	852	852
As(+), mm2:	852	852	852	852	852	852	852	852	852	852	852
Vu, kN:	20.93	20.93	20.93	20.93	20.93	20.93	20.93	20.93	20.93	21.23	22.00
Tu, kN-m:	14.39	14.39	14.39	14.39	14.39	14.39	14.39	14.39	14.39	14.39	14.39
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

C-5 4 #3 @ 200 C-6

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:44 p. m. 7/02/2025

BEAM: D(1-2) FLOOR: 1

Length: L = 4.47 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.02 m c = 0.25 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.60	1.00	1.41	1.81	2.21	2.61	3.01	3.42	3.82	4.22
Mu(-), kN-m:	-188.85	-164.47	-141.37	-119.50	-98.93	-79.94	-62.60	-47.48	-34.27	-23.14	-18.00
Mu(+), kN-m:	0.00	0.00	0.00	0.15	1.12	2.93	3.63	3.92	3.36	2.02	2.56
As(-), mm2:	1214	1048	893	748	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	58.01	58.01	55.25	52.05	48.58	44.92	41.08	36.84	32.69	28.49	28.49
Tu, kN-m:	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-1 11 #3+1r @ 100 9 #3 @ 200 11 #3+1r @ 100 D-2

BEAM: D(2-5) FLOOR: 1

Length: L = 4.47 m a = 0.25 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.02 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.25	0.65	1.05	1.46	1.86	2.26	2.66	3.06	3.47	3.87	4.27
Mu(-), kN-m:	-31.42	-58.21	-88.83	-121.43	-156.12	-193.47	-232.93	-273.86	-316.05	-359.13	-402.64
Mu(+), kN-m:	1.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	723	723	723	761	991	1246	1525	1825	2147	2491	2858
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	74.40	74.40	79.28	85.87	91.22	95.93	100.18	103.47	106.04	107.85	107.85
Tu, kN-m:	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-2 11 #3+1r @ 100 9 #3 @ 200 11 #3+1r @ 100 D-5

BEAM: E(1-2) FLOOR: 1

Length: L = 4.47 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-155.43	-125.34	-96.46	-69.73	-44.39	-19.80	-1.77	0.00	-11.52	-27.59	-44.34
Mu(+), kN-m:	97.45	86.28	75.02	64.10	52.83	40.65	27.42	37.68	59.05	81.96	104.87
As(-), mm2:	987	787	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	73.21	73.21	70.77	68.18	65.74	63.52	61.26	59.24	57.41	55.66	55.66
Tu, kN-m:	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

E-1 11 #3+1r @ 100 9 #3 @ 200 11 #3+1r @ 100 E-2

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:44 p. m. 7/02/2025

BEAM: E(2-5) FLOOR: 1

Length: L = 4.47 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	0.00	0.00	-2.20	-16.26	-58.90	-115.90	-173.70	-232.17	-291.38	-351.25	-411.55
Mu(+), kN-m:	162.64	108.22	55.48	13.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	723	723	723	723	723	725	1110	1519	1957	2427	2935
As(+), mm2:	1035	723	723	723	723	723	723	723	723	723	723
Vu, kN:	135.66	135.66	136.59	137.36	139.28	141.19	142.74	144.48	146.05	147.65	147.65
Tu, kN-m:	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

E-2 11 #3+1r @ 100 9 #3 @ 200 11 #3+1r @ 100 E-5

BEAM: 1(A-C) FLOOR: 1

Length: L = 4.97 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-154.76	-126.75	-100.42	-75.79	-52.79	-31.64	-18.57	-19.13	-30.02	-45.57	-62.97
Mu(+), kN-m:	56.94	50.25	42.53	33.65	23.68	12.92	7.03	12.30	25.13	40.08	54.50
As(-), mm2:	982	796	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	59.64	59.49	55.82	52.20	48.63	45.10	41.61	38.16	35.56	36.71	36.84
Tu, kN-m:	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-1 11 #3+1r @ 100 12 #3 @ 200 11 #3+1r @ 100 C-1

BEAM: 1(C-D) FLOOR: 1

Length: L = 4.97 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-73.12	-53.34	-34.50	-17.26	-3.49	0.00	0.00	0.00	-3.99	-10.03	-16.67
Mu(+), kN-m:	19.26	18.81	18.34	17.47	17.68	21.37	32.07	45.16	57.85	69.88	82.52
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	42.88	42.76	39.82	36.95	34.25	32.26	30.28	28.60	27.26	25.69	25.67
Tu, kN-m:	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-1 11 #3+1r @ 100 12 #3 @ 200 11 #3+1r @ 100 D-1

BEAM: 1(D-E) FLOOR: 1

Length: L = 4.87 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.47 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.65	1.09	1.54	1.99	2.44	2.88	3.33	3.78	4.22	4.67
Mu(-), kN-m:	-34.49	-23.32	-12.60	-4.09	-4.01	-23.93	-50.70	-78.73	-108.10	-138.88	-170.96
Mu(+), kN-m:	93.38	71.28	49.03	27.24	12.01	14.83	22.00	28.23	33.46	37.68	41.03
As(-), mm2:	723	723	723	723	723	723	723	723	723	876	1092
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	49.15	49.20	51.29	53.64	56.04	58.55	61.27	64.23	67.35	70.63	70.68
Tu, kN-m:	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-1 11 #3+1r @ 100 11 #3 @ 200 11 #3+1r @ 100 E-1

BEAM: 2(A-C) FLOOR: 1

Length: L = 4.97 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-260.33	-215.85	-172.81	-131.36	-91.50	-53.21	-21.17	-12.33	-14.82	-20.64	-27.78
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.60	20.68	50.94	82.22	112.21
As(-), mm2:	1724	1403	1104	826	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	95.96	95.83	92.47	88.99	85.41	81.73	77.93	74.02	70.51	67.25	67.13
Tu, kN-m:	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-2 11 #3+1r @ 100 12 #3 @ 200 11 #3+1r @ 100 C-2

BEAM: 2(C-D) FLOOR: 1

Length: L = 4.97 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.52 m c = 0.25 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.65	1.10	1.56	2.01	2.46	2.91	3.36	3.82	4.27	4.72
Mu(-), kN-m:	-4.45	-1.23	0.00	0.00	-0.01	-0.25	-3.65	-12.18	-23.32	-37.99	-57.07
Mu(+), kN-m:	53.22	50.93	47.13	41.81	34.89	26.10	15.53	6.75	1.48	0.00	0.00
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	7.22	7.30	10.64	14.13	17.85	21.73	25.75	30.09	34.43	39.02	39.13
Tu, kN-m:	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-2 11 #3+1r @ 100 12 #3 @ 200 11 #3+1r @ 100 D-2

BEAM: 2(D-E) FLOOR: 1

Length: L = 4.87 m a = 0.25 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.42 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.25	0.69	1.13	1.58	2.02	2.46	2.90	3.34	3.79	4.23	4.67
Mu(-), kN-m:	-65.32	-60.91	-62.37	-69.27	-78.45	-89.80	-103.39	-119.12	-136.67	-155.91	-177.22
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	723	723	723	723	723	723	723	746	861	990	1134
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	15.82	15.81	13.00	17.82	22.73	27.80	32.49	36.87	40.85	44.69	44.71
Tu, kN-m:	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-2 11 #3+1r @ 100 11 #3 @ 200 11 #3+1r @ 100 E-2

BEAM: 5(A-C) FLOOR: 1

Length: L = 4.97 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.55 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.65	1.11	1.56	2.02	2.47	2.93	3.38	3.84	4.29	4.75
Mu(-), kN-m:	-372.23	-325.50	-276.24	-226.57	-176.59	-127.19	-83.66	-48.91	-28.02	-20.39	-16.74
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.21	31.27	78.28	130.87
As(-), mm2:	2599	2221	1842	1479	1130	799	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	823
Vu, kN:	105.30	105.37	106.47	107.42	108.26	108.94	109.71	110.44	115.04	116.05	116.05
Tu, kN-m:	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-5 11 #3+1r @ 100 12 #3 @ 200 11 #3+1r @ 100 C-5

BEAM: 5(C-D) FLOOR: 1

Length: L = 4.97 m a = 0.23 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.52 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.68	1.13	1.58	2.03	2.49	2.94	3.39	3.84	4.29	4.75
Mu(-), kN-m:	-47.36	-36.37	-23.72	-11.13	0.00	0.00	0.00	-3.17	-11.14	-20.21	-27.59
Mu(+), kN-m:	83.08	67.20	55.78	45.30	35.84	28.44	39.76	54.69	70.84	87.94	109.57
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	27.75	27.74	27.95	27.96	28.97	30.77	31.90	34.06	36.52	38.17	38.24
Tu, kN-m:	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-5 11 #3+1r @ 100 12 #3 @ 200 11 #3+1r @ 100 D-5

BEAM: 5(D-E) FLOOR: 1

Length: L = 4.87 m a = 0.23 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.42 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.67	1.11	1.55	1.99	2.44	2.88	3.32	3.76	4.20	4.65
Mu(-), kN-m:	-9.88	-11.77	-13.75	-22.96	-53.38	-100.10	-151.53	-203.26	-255.36	-307.91	-359.44
Mu(+), kN-m:	157.57	104.28	54.10	12.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	723	723	723	723	723	723	960	1315	1688	2083	2494
As(+), mm2:	1001	723	723	723	723	723	723	723	723	723	723
Vu, kN:	115.94	115.95	115.96	116.13	116.38	116.38	116.62	117.44	118.50	119.45	119.46
Tu, kN-m:	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-5 11 #3+1r @ 100 11 #3 @ 200 11 #3+1r @ 100 E-5

BEAM: 6(A-C) FLOOR: 1

Length: L = 4.97 m a = 0.25 m Section: b = 500.00 mm Sec: 50X50
Lu = 4.47 m c = 0.25 m h = 500.00 mm Mat: 21MPA

X, m:	0.25	0.70	1.14	1.59	2.04	2.49	2.93	3.38	3.83	4.27	4.72
Mu(-), kN-m:	-46.08	-31.47	-18.64	-12.70	-8.94	-6.74	-6.37	-7.27	-9.20	-11.85	-13.76
Mu(+), kN-m:	0.44	5.17	16.39	29.48	37.32	39.74	35.64	26.80	14.20	4.15	0.22
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	46.61	46.38	32.35	19.46	6.90	8.32	19.28	30.38	25.78	23.12	23.09
Tu, kN-m:	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Stirrup:	#3+1r	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-6 11 #3+1r @ 100 11 #3 @ 200 11 #3+1r @ 100 C-6

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:18 p. m. 7/02/2025

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + LL + EQX + .3EQY
4	1.2D0 + 1.2DL + LL - EQX - .3EQY
5	1.2D0 + 1.2DL + LL + EQX - .3EQY
6	1.2D0 + 1.2DL + LL - EQX + .3EQY
7	1.2D0 + 1.2DL + LL + .3EQX + EQY
8	1.2D0 + 1.2DL + LL - .3EQX - EQY
9	1.2D0 + 1.2DL + LL - .3EQX + EQY
10	1.2D0 + 1.2DL + LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

BEAM SECTIONS

Number of prismatic sections = 2

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	50X50	Rectang	500	500	-	-	-	-	250000	5.21E+09	5.21E+09	7.71E+09
2	30X50	Rectang	300	500	-	-	-	-	150000	3.13E+09	1.13E+09	2.80E+09

Design Results - Beams (DES)

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:18 p. m. 7/02/2025

BEAM: A(1-2) FLOOR: 2

Length: L = 4.47 m a = 0.23 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.02 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.63	1.03	1.43	1.83	2.24	2.64	3.04	3.44	3.84	4.25
Mu(-), kN-m:	-127.43	-100.74	-74.94	-50.10	-39.67	-39.67	-39.67	-49.55	-84.54	-120.94	-158.67
Mu(+), kN-m:	154.29	129.42	103.24	75.63	46.62	39.67	39.67	39.67	59.11	78.00	95.99
As(-), mm2:	827	642	470	434	434	434	434	434	534	782	1053
As(+), mm2:	1020	841	659	475	434	434	434	434	434	490	610
Vu, kN:	109.52	109.52	112.45	115.68	118.91	122.15	125.38	128.61	131.85	134.78	134.78
Tu, kN-m:	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	150	150	150	150	150	100	100	100

DESIGN

A-1 11 #3 @ 100 12 #3 @ 150 11 #3 @ 100 A-2

BEAM: A(2-5) FLOOR: 2

Length: L = 4.47 m a = 0.23 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.02 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.63	1.03	1.43	1.83	2.24	2.64	3.04	3.44	3.84	4.25
Mu(-), kN-m:	-113.60	-84.43	-56.85	-49.83	-49.83	-49.83	-49.83	-80.44	-118.84	-158.45	-199.32
Mu(+), kN-m:	136.47	113.61	88.65	60.02	49.83	49.83	49.83	49.83	66.87	83.78	99.75
As(-), mm2:	731	533	434	434	434	434	434	506	767	1051	1364
As(+), mm2:	891	731	561	434	434	434	434	434	434	529	636
Vu, kN:	120.47	120.47	117.83	133.20	136.38	139.57	142.75	145.94	149.12	152.00	152.00
Tu, kN-m:	3.63	3.63	3.63	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	150	125	125	125	125	100	100	100

DESIGN

A-2 11 #3 @ 100 1 #3 @ 150 13 #3 @ 125 11 #3 @ 100 A-5

BEAM: A(5-7) FLOOR: 2

Length: L = 2.22 m a = 0.23 m Section: b = 300.00 mm Sec: 30X50
Lu = 2.00 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.42	0.62	0.82	1.02	1.22	1.42	1.62	1.82	2.02	2.22
Mu(-), kN-m:	-113.70	-100.39	-87.54	-75.15	-63.23	-51.74	-40.71	-30.14	-20.01	-10.37	-1.13
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	731	640	554	472	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	62.87	62.87	62.87	61.04	58.73	56.42	54.11	51.81	49.50	47.19	44.88
Tu, kN-m:	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

A-5 11 #3 @ 200 A-7

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:18 p. m. 7/02/2025

BEAM: B(1-2) FLOOR: 2

Length: L = 4.47 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.17 m c = 0.15 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.57	0.98	1.40	1.82	2.24	2.65	3.07	3.49	3.90	4.32
Mu(-), kN-m:	-5.71	-5.71	-5.71	-5.71	-5.71	-5.71	-5.71	-5.71	-5.71	-7.99	-22.83
Mu(+), kN-m:	6.90	16.82	24.30	29.51	31.84	31.04	26.67	19.17	8.97	5.71	11.41
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	27.53	27.53	21.38	14.88	8.70	13.53	20.04	26.54	33.04	39.18	39.18
Tu, kN-m:	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

B-1 11 #3 @ 100 10 #3 @ 200 11 #3 @ 100 B-2

BEAM: B(2-3) FLOOR: 2

Length: L = 1.19 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 1.04 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.25	0.36	0.46	0.57	0.67	0.77	0.88	0.98	1.09	1.19
Mu(-), kN-m:	-22.62	-19.90	-17.28	-14.80	-12.43	-10.15	-7.97	-5.88	-3.91	-2.08	-0.38
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.15
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	22.33	22.33	22.33	22.33	22.33	21.57	20.62	19.69	18.76	17.83	16.90
Tu, kN-m:	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

B-2 6 #3 @ 200 B-3

BEAM: C(1-2) FLOOR: 2

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-109.84	-82.41	-57.23	-34.21	-33.63	-33.63	-33.63	-33.63	-58.60	-94.77	-134.52
Mu(+), kN-m:	109.62	100.36	88.18	72.61	53.65	33.63	33.63	37.75	47.57	56.74	67.26
As(-), mm2:	705	520	434	434	434	434	434	434	434	602	877
As(+), mm2:	703	640	558	455	434	434	434	434	434	434	434
Vu, kN:	102.81	102.81	95.71	87.98	86.37	94.10	101.82	109.55	117.27	124.37	124.37
Tu, kN-m:	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	175	175	100	100	100

DESIGN

C-1 11 #3 @ 100 6 #3 @ 200 4 #3 @ 175 11 #3 @ 100 C-2

BEAM: C(2-5) FLOOR: 2

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-84.72	-63.65	-52.28	-52.28	-52.28	-52.28	-52.74	-88.51	-126.64	-166.81	-209.12
Mu(+), kN-m:	116.71	93.88	68.89	52.28	52.28	52.28	52.28	52.28	52.28	53.84	104.56
As(-), mm2:	535	434	434	434	434	434	434	560	822	1113	1443
As(+), mm2:	752	596	434	434	434	434	434	434	434	434	669
Vu, kN:	120.10	120.10	124.17	129.11	134.43	139.75	145.07	150.39	155.72	160.61	160.61
Tu, kN-m:	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	150	125	125	125	125	100	100	100

DESIGN

C-2 11 #3 @ 100 3 #3 @ 150 25 #3 @ 100 C-5

BEAM: C(5-7) FLOOR: 2

Length: L = 2.22 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 2.02 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.40	0.60	0.81	1.01	1.21	1.41	1.61	1.82	2.02	2.22
Mu(-), kN-m:	-231.65	-203.02	-175.62	-149.42	-124.44	-100.59	-77.88	-56.37	-35.95	-16.91	0.00
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	1.33
As(-), mm2:	1629	1394	1180	985	806	641	490	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	131.70	131.70	131.70	126.79	120.99	115.19	109.39	103.59	97.80	92.00	86.20
Tu, kN-m:	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

C-5 11 #3 @ 200 C-7

BEAM: D(1-2) FLOOR: 2

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.12 m c = 0.15 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.02	1.44	1.85	2.26	2.67	3.08	3.50	3.91	4.32
Mu(-), kN-m:	-218.44	-166.96	-118.52	-74.41	-54.61	-54.61	-54.61	-54.61	-54.61	-54.61	-54.61
Mu(+), kN-m:	109.22	54.61	54.61	54.61	62.84	86.29	106.40	122.85	136.03	149.66	164.01
As(-), mm2:	1519	1115	765	467	434	434	434	434	434	434	434
As(+), mm2:	700	434	434	434	434	545	681	795	888	987	1092
Vu, kN:	160.68	160.68	153.77	146.36	138.96	131.55	124.14	116.73	109.32	102.41	102.41
Tu, kN-m:	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-1 11 #3 @ 100 10 #3 @ 200 11 #3 @ 100 D-2

BEAM: D(2-5) FLOOR: 2

Length: L = 4.47 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.12 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.56	0.97	1.39	1.80	2.21	2.62	3.03	3.45	3.86	4.27
Mu(-), kN-m:	-77.36	-77.36	-77.36	-77.36	-77.36	-77.36	-89.86	-140.00	-193.51	-249.96	-309.43
Mu(+), kN-m:	160.83	136.48	114.56	92.01	77.36	77.36	77.36	77.36	77.36	77.36	154.71
As(-), mm2:	486	486	486	486	486	486	569	917	1318	1788	2224
As(+), mm2:	1069	891	737	584	486	486	486	486	486	486	1024
Vu, kN:	138.80	138.80	144.92	151.93	159.44	166.95	174.46	181.96	189.47	196.47	196.47
Tu, kN-m:	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	175	100	100	100

DESIGN

D-2 11 #3 @ 100 7 #3 @ 200 3 #3 @ 175 11 #3 @ 100 D-5

BEAM: D(5-7) FLOOR: 2

Length: L = 2.22 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 2.02 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.40	0.60	0.81	1.01	1.21	1.41	1.61	1.82	2.02	2.22
Mu(-), kN-m:	-254.32	-224.06	-194.86	-166.70	-139.64	-113.61	-88.61	-64.71	-41.80	-20.10	0.00
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.79
As(-), mm2:	1818	1566	1329	1113	914	731	561	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	141.15	141.15	141.15	136.81	131.54	126.26	120.99	115.71	110.43	105.16	99.88
Tu, kN-m:	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

D-5 11 #3 @ 200 D-7

BEAM: E(1-2) FLOOR: 2

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-121.93	-95.91	-70.98	-47.22	-37.42	-37.42	-37.42	-41.63	-75.78	-111.92	-149.68
Mu(+), kN-m:	148.69	126.78	103.24	77.96	50.92	37.42	37.42	37.42	53.45	70.00	85.47
As(-), mm2:	788	610	444	434	434	434	434	434	476	719	987
As(+), mm2:	979	823	660	490	434	434	434	434	434	438	540
Vu, kN:	103.42	103.42	103.88	107.87	111.85	115.84	119.82	123.81	127.80	131.46	131.46
Tu, kN-m:	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	175	175	150	150	150	100	100	100

DESIGN

E-1 11 #3 @ 100 5 #3 @ 175 7 #3 @ 150 11 #3 @ 100 E-2

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:18 p. m. 7/02/2025

BEAM: E(2-5) FLOOR: 2

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-101.56	-76.71	-52.91	-50.77	-50.77	-50.77	-50.77	-84.52	-122.54	-162.04	-203.08
Mu(+), kN-m:	136.94	110.00	81.50	51.43	50.77	50.77	50.77	50.77	67.67	84.07	101.54
As(-), mm2:	648	482	434	434	434	434	434	534	793	1078	1394
As(+), mm2:	895	706	514	434	434	434	434	434	434	531	648
Vu, kN:	123.81	123.81	126.75	130.32	134.18	138.03	141.89	145.74	149.59	153.13	153.13
Tu, kN-m:	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	150	150	125	125	125	100	100	100

DESIGN

E-2 11 #3 @ 100 3 #3 @ 150 11 #3 @ 125 11 #3 @ 100 E-5

BEAM: E(5-7) FLOOR: 2

Length: L = 2.22 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 2.02 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.40	0.60	0.81	1.01	1.21	1.41	1.61	1.82	2.02	2.22
Mu(-), kN-m:	-102.52	-90.11	-78.21	-66.80	-55.92	-45.52	-35.61	-26.22	-17.30	-8.93	-1.00
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	655	571	492	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	57.30	57.30	57.30	55.25	52.74	50.24	47.74	45.24	42.73	40.23	37.73
Tu, kN-m:	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

E-5 11 #3 @ 200 E-7

BEAM: 1(A-C) FLOOR: 2

Length: L = 4.97 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-131.44	-92.26	-58.56	-32.86	-32.86	-32.86	-32.86	-32.86	-47.87	-88.18	-131.21
Mu(+), kN-m:	72.22	68.42	63.30	57.75	48.30	35.43	38.65	49.63	48.63	48.74	65.60
As(-), mm2:	856	585	434	434	434	434	434	434	434	558	854
As(+), mm2:	452	434	434	434	434	434	434	434	434	434	434
Vu, kN:	101.37	101.01	91.52	82.02	72.53	63.03	70.12	79.62	114.57	116.28	116.34
Tu, kN-m:	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	2.47	2.47	2.47
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-1 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 C-1

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:18 p. m. 7/02/2025

BEAM: 1(C-D) FLOOR: 2

Length: L = 4.97 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-110.36	-77.14	-48.09	-27.59	-27.59	-27.59	-27.59	-27.59	-43.20	-70.31	-101.88
Mu(+), kN-m:	55.18	40.80	37.44	32.66	27.59	27.59	27.91	35.79	40.88	45.08	50.94
As(-), mm2:	708	485	434	434	434	434	434	434	434	440	650
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	84.89	84.57	76.14	67.71	59.27	50.84	55.64	64.07	72.51	80.94	81.26
Tu, kN-m:	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-1 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 D-1

BEAM: 1(D-E) FLOOR: 2

Length: L = 4.87 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.47 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.65	1.09	1.54	1.99	2.44	2.88	3.33	3.78	4.22	4.67
Mu(-), kN-m:	-119.79	-81.76	-48.62	-30.63	-30.63	-30.63	-30.63	-31.60	-55.63	-86.46	-122.52
Mu(+), kN-m:	59.89	52.61	46.51	39.96	31.26	30.63	44.10	55.63	62.81	69.70	75.25
As(-), mm2:	774	515	434	434	434	434	434	434	434	546	793
As(+), mm2:	434	434	434	434	434	434	434	434	434	436	472
Vu, kN:	98.98	98.84	89.80	80.75	71.71	62.67	67.58	76.62	85.66	94.70	94.85
Tu, kN-m:	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-1 11 #3 @ 100 11 #3 @ 200 11 #3 @ 100 E-1

BEAM: 2(A-C) FLOOR: 2

Length: L = 4.97 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-151.53	-105.90	-66.57	-52.97	-52.97	-52.97	-52.97	-52.97	-79.28	-144.25	-211.88
Mu(+), kN-m:	79.56	74.86	68.23	61.12	52.97	52.97	52.97	53.49	52.97	52.97	105.94
As(-), mm2:	1000	678	434	434	434	434	434	434	499	947	1465
As(+), mm2:	501	470	434	434	434	434	434	434	434	434	678
Vu, kN:	133.86	133.43	121.91	110.38	98.85	89.83	101.36	112.89	186.30	188.00	188.06
Tu, kN-m:	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	2.14	2.14	2.14
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-2 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 C-2

BEAM: 2(C-D) FLOOR: 2

Length: L = 4.97 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.62 m c = 0.15 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.12	1.59	2.05	2.51	2.97	3.43	3.90	4.36	4.82
Mu(-), kN-m:	-227.92	-165.67	-110.25	-62.54	-56.98	-56.98	-56.98	-56.98	-56.98	-56.98	-56.98
Mu(+), kN-m:	113.96	56.98	56.98	56.98	56.98	60.45	77.25	85.87	87.13	81.17	70.56
As(-), mm2:	1598	1105	708	434	434	434	434	434	434	434	434
As(+), mm2:	733	434	434	434	434	434	485	542	551	511	442
Vu, kN:	157.08	156.37	141.35	126.34	111.32	96.31	81.29	66.27	51.26	51.13	51.84
Tu, kN-m:	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-2 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 D-2

BEAM: 2(D-E) FLOOR: 2

Length: L = 4.87 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.60	1.05	1.51	1.96	2.41	2.86	3.31	3.77	4.22	4.67
Mu(-), kN-m:	-57.56	-57.56	-57.56	-57.56	-57.56	-57.56	-57.56	-57.56	-105.66	-164.21	-230.22
Mu(+), kN-m:	72.26	88.04	98.80	103.23	99.59	87.00	65.99	57.56	57.56	57.56	115.11
As(-), mm2:	434	434	434	434	434	434	434	434	676	1094	1617
As(+), mm2:	453	557	629	659	635	550	434	434	434	434	741
Vu, kN:	61.53	61.08	46.28	60.94	77.69	94.43	111.17	127.92	144.66	161.40	161.85
Tu, kN-m:	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-2 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 E-2

BEAM: 3(A-B) FLOOR: 2

Length: L = 3.50 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 3.35 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.49	0.82	1.16	1.49	1.83	2.16	2.50	2.83	3.17	3.50
Mu(-), kN-m:	-3.16	-0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.37
Mu(+), kN-m:	6.37	10.28	13.25	15.22	16.17	16.11	15.05	13.00	9.95	5.88	0.81
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	11.79	11.79	9.71	6.69	3.66	1.79	4.78	7.81	10.84	13.87	16.89
Tu, kN-m:	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

A-3 18 #3 @ 200 B-3

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:18 p. m. 7/02/2025

BEAM: 5(A-C) FLOOR: 2

Length:	L = 4.97 m		a = 0.20 m	Section:	b = 300.00 mm		Sec:	30X50			
	Lu = 4.55 m		c = 0.23 m		h = 500.00 mm		Mat:	21MPA			
X, m:	0.20	0.65	1.11	1.56	2.02	2.47	2.93	3.38	3.84	4.29	4.75
Mu(-), kN-m:	-198.39	-129.33	-74.24	-49.60	-49.60	-49.60	-49.60	-49.60	-77.84	-131.40	-189.49
Mu(+), kN-m:	99.19	84.81	85.05	84.76	75.03	59.25	59.98	62.35	63.98	68.90	94.75
As(-), mm2:	1357	841	466	434	434	434	434	434	489	855	1287
As(+), mm2:	632	535	537	535	471	434	434	434	434	434	602
Vu, kN:	172.21	171.47	148.28	125.10	101.91	100.43	123.61	146.79	156.21	160.77	160.92
Tu, kN-m:	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	150	175	200	150	125	100	100	100
DESIGN	A-5			11 #3 @ 100		12 #3 @ 150		16 #3 @ 100			C-5

BEAM: 5(C-D) FLOOR: 2

Length:	L = 4.97 m		a = 0.23 m	Section:	b = 300.00 mm		Sec:	30X50			
	Lu = 4.52 m		c = 0.23 m		h = 500.00 mm		Mat:	21MPA			
X, m:	0.23	0.68	1.13	1.58	2.03	2.49	2.94	3.39	3.84	4.29	4.75
Mu(-), kN-m:	-165.25	-115.18	-71.53	-41.31	-41.31	-41.31	-41.31	-41.31	-67.27	-109.02	-157.76
Mu(+), kN-m:	82.62	69.25	61.91	52.98	42.58	41.31	43.16	54.81	62.81	69.97	78.88
As(-), mm2:	1102	742	448	434	434	434	434	434	434	699	1046
As(+), mm2:	521	434	434	434	434	434	434	434	434	438	496
Vu, kN:	127.75	127.41	114.68	101.95	89.22	76.49	86.27	99.00	111.73	124.47	124.80
Tu, kN-m:	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	175	200	200	200	200	100	100	100
DESIGN	C-5		11 #3 @ 100		2 #3 @ 175		8 #3 @ 200	2 #3 @ 175		11 #3 @ 100	D-5

BEAM: 5(D-E) FLOOR: 2

Length:	L = 4.87 m		a = 0.23 m	Section:	b = 300.00 mm		Sec:	30X50			
	Lu = 4.42 m		c = 0.23 m		h = 500.00 mm		Mat:	21MPA			
X, m:	0.23	0.67	1.11	1.55	1.99	2.44	2.88	3.32	3.76	4.20	4.65
Mu(-), kN-m:	-185.09	-126.28	-75.50	-46.27	-46.27	-46.27	-46.27	-46.27	-78.44	-124.46	-179.37
Mu(+), kN-m:	92.55	76.11	68.06	59.63	48.55	46.27	64.37	80.47	89.61	99.10	107.23
As(-), mm2:	1253	819	474	434	434	434	434	434	493	806	1209
As(+), mm2:	587	478	434	434	434	434	434	507	567	631	687
Vu, kN:	154.47	154.40	139.84	125.27	110.71	96.15	102.13	116.69	131.25	145.81	145.88
Tu, kN-m:	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	150	175	200	175	150	100	100	100
DESIGN	D-5		11 #3 @ 100		5 #3 @ 125		7 #3 @ 175	2 #3 @ 150		11 #3 @ 100	E-5

BEAM: 7(A-C) FLOOR: 2

	Length:	L = 4.97 m	a = 0.15 m	Section:	b = 300.00 mm	Sec:	30X50				
		Lu = 4.67 m	c = 0.15 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.15	0.62	1.08	1.55	2.02	2.49	2.95	3.42	3.89	4.35	4.82
Mu(-), kN-m:	-4.69	-4.69	-4.69	-4.69	-4.69	-4.69	-4.69	-4.69	-4.69	-4.69	-18.75
Mu(+), kN-m:	5.90	21.01	34.06	42.53	46.62	46.46	41.22	31.95	18.60	4.78	9.37
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	32.84	32.28	22.75	13.22	4.54	8.05	15.87	24.92	32.38	39.41	39.81
Tu, kN-m:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-7 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 C-7

BEAM: 7(C-D) FLOOR: 2

	Length:	L = 4.97 m	a = 0.15 m	Section:	b = 300.00 mm	Sec:	30X50				
		Lu = 4.67 m	c = 0.15 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.15	0.62	1.08	1.55	2.02	2.49	2.95	3.42	3.89	4.35	4.82
Mu(-), kN-m:	-20.33	-9.43	-9.43	-9.43	-9.43	-9.43	-9.43	-9.43	-9.43	-20.72	-37.71
Mu(+), kN-m:	10.17	9.43	9.43	12.71	16.59	16.89	13.14	9.43	9.43	9.43	18.86
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	27.72	27.27	20.03	13.73	7.43	8.04	14.34	20.64	27.02	34.68	35.13
Tu, kN-m:	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-7 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 D-7

BEAM: 7(D-E) FLOOR: 2

	Length:	L = 4.87 m	a = 0.15 m	Section:	b = 300.00 mm	Sec:	30X50				
		Lu = 4.57 m	c = 0.15 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.15	0.61	1.06	1.52	1.98	2.44	2.89	3.35	3.81	4.26	4.72
Mu(-), kN-m:	-36.24	-16.43	-9.06	-9.06	-9.06	-9.06	-9.06	-9.06	-9.06	-9.06	-9.06
Mu(+), kN-m:	18.12	9.06	9.06	17.90	28.01	34.19	35.89	33.66	27.48	17.36	9.06
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	43.74	43.42	34.72	26.02	18.66	11.63	4.61	10.39	17.51	26.17	26.50
Tu, kN-m:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-7 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 E-7

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAÌTAN 3:59:29 p. m. 7/02/2025

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + LL + EQX + .3EQY
4	1.2D0 + 1.2DL + LL - EQX - .3EQY
5	1.2D0 + 1.2DL + LL + EQX - .3EQY
6	1.2D0 + 1.2DL + LL - EQX + .3EQY
7	1.2D0 + 1.2DL + LL + .3EQX + EQY
8	1.2D0 + 1.2DL + LL - .3EQX - EQY
9	1.2D0 + 1.2DL + LL - .3EQX + EQY
10	1.2D0 + 1.2DL + LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

M A T E R I A L S

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

B E A M S E C T I O N S

Number of prismatic sections = 2

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	50X50	Rectang	500	500	-	-	-	-	250000	5.21E+09	5.21E+09	7.71E+09
2	30X50	Rectang	300	500	-	-	-	-	150000	3.13E+09	1.13E+09	2.80E+09

Design Results - Beams (DES)

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:30 p. m. 7/02/2025

BEAM: A(1-2) FLOOR: 3

Length: L = 4.47 m a = 0.23 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.02 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.63	1.03	1.43	1.83	2.24	2.64	3.04	3.44	3.84	4.25
Mu(-), kN-m:	-70.21	-52.05	-35.34	-26.73	-26.73	-26.73	-26.73	-26.73	-48.31	-76.47	-106.94
Mu(+), kN-m:	86.03	77.90	67.47	54.59	39.25	26.73	26.73	26.73	31.45	37.00	53.47
As(-), mm2:	439	434	434	434	434	434	434	434	434	480	685
As(+), mm2:	544	490	434	434	434	434	434	434	434	434	434
Vu, kN:	75.87	75.87	70.79	68.16	73.78	79.39	85.01	90.62	96.24	101.32	101.32
Tu, kN-m:	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-1 11 #3 @ 100 9 #3 @ 200 11 #3 @ 100 A-2

BEAM: A(2-5) FLOOR: 3

Length: L = 4.47 m a = 0.23 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.02 m c = 0.23 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.63	1.03	1.43	1.83	2.24	2.64	3.04	3.44	3.84	4.25
Mu(-), kN-m:	-62.21	-46.10	-32.35	-32.35	-32.35	-32.35	-32.35	-48.84	-73.91	-100.75	-129.41
Mu(+), kN-m:	73.42	61.55	47.81	32.35	32.35	32.35	32.35	32.35	32.35	36.10	64.71
As(-), mm2:	434	434	434	434	434	434	434	434	464	643	841
As(+), mm2:	460	434	434	434	434	434	434	434	434	434	434
Vu, kN:	71.89	71.89	71.68	75.98	80.63	85.28	89.93	94.58	99.23	103.44	103.44
Tu, kN-m:	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-2 11 #3 @ 100 9 #3 @ 200 11 #3 @ 100 A-5

BEAM: A(5-7) FLOOR: 3

Length: L = 2.22 m a = 0.23 m Section: b = 300.00 mm Sec: 30X50
Lu = 2.00 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.23	0.42	0.62	0.82	1.02	1.22	1.42	1.62	1.82	2.02	2.22
Mu(-), kN-m:	-75.76	-67.51	-59.43	-51.53	-43.80	-36.23	-28.83	-21.61	-14.54	-7.67	-0.94
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	476	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	39.91	39.91	39.91	39.23	38.36	37.50	36.64	35.78	34.92	34.05	33.19
Tu, kN-m:	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

A-5 11 #3 @ 200 A-7

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:30 p. m. 7/02/2025

BEAM: C(1-2) FLOOR: 3

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-57.01	-41.56	-27.59	-23.07	-23.07	-23.07	-23.07	-23.07	-39.72	-64.83	-92.30
Mu(+), kN-m:	67.85	63.29	56.37	46.93	34.96	23.07	23.07	23.07	23.07	24.40	46.15
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	585
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	65.19	65.19	59.90	55.51	60.91	66.67	72.42	78.18	83.94	89.23	89.23
Tu, kN-m:	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-1 11 #3 @ 100 9 #3 @ 200 11 #3 @ 100 C-2

BEAM: C(2-5) FLOOR: 3

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-50.87	-41.44	-41.44	-41.44	-41.44	-41.44	-41.44	-51.59	-85.53	-123.77	-165.77
Mu(+), kN-m:	55.88	53.72	47.63	41.44	41.44	41.44	41.44	41.44	41.44	41.44	82.88
As(-), mm2:	434	434	434	434	434	434	434	434	540	801	1106
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	523
Vu, kN:	91.23	91.23	82.60	79.13	90.41	101.69	112.96	124.24	135.52	145.89	145.89
Tu, kN-m:	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	175	175	150	100	100	100

DESIGN

C-2 11 #3 @ 100 4 #3 @ 200 7 #3 @ 150 11 #3 @ 100 C-5

BEAM: C(5-7) FLOOR: 3

Length: L = 2.22 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 2.02 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.40	0.60	0.81	1.01	1.21	1.41	1.61	1.82	2.02	2.22
Mu(-), kN-m:	-174.88	-156.31	-137.91	-119.70	-101.72	-83.99	-66.50	-49.27	-32.28	-15.64	0.00
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.95
As(-), mm2:	1174	1035	902	773	649	530	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	90.51	90.51	90.51	89.67	88.42	87.17	85.92	84.67	83.42	82.17	80.92
Tu, kN-m:	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

C-5 11 #3 @ 200 C-7

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:30 p. m. 7/02/2025

BEAM: D(1-2) FLOOR: 3

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.12 m c = 0.15 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.02	1.44	1.85	2.26	2.67	3.08	3.50	3.91	4.32
Mu(-), kN-m:	-109.24	-79.73	-52.65	-29.62	-27.31	-27.31	-27.31	-27.31	-27.31	-27.31	-27.31
Mu(+), kN-m:	54.62	27.31	27.31	34.56	47.28	57.64	65.65	70.79	73.32	74.37	75.24
As(-), mm2:	701	502	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	443	460	467	472
Vu, kN:	84.98	84.98	79.48	73.58	67.68	61.78	55.89	49.99	44.09	38.59	38.59
Tu, kN-m:	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-1 11 #3 @ 100 10 #3 @ 200 11 #3 @ 100 D-2

BEAM: D(2-5) FLOOR: 3

Length: L = 4.47 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.12 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.56	0.97	1.39	1.80	2.21	2.62	3.03	3.45	3.86	4.27
Mu(-), kN-m:	-49.01	-49.01	-49.01	-49.01	-49.01	-49.01	-59.83	-90.06	-123.13	-158.67	-196.02
Mu(+), kN-m:	72.69	63.22	54.24	49.01	49.01	49.01	49.01	49.01	49.01	49.01	98.01
As(-), mm2:	434	434	434	434	434	434	434	571	797	1053	1338
As(+), mm2:	456	434	434	434	434	434	434	434	434	434	624
Vu, kN:	72.33	72.33	77.54	83.51	89.91	96.31	102.71	109.11	115.51	121.47	121.47
Tu, kN-m:	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-2 11 #3 @ 100 10 #3 @ 200 11 #3 @ 100 D-5

BEAM: D(5-7) FLOOR: 3

Length: L = 2.22 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 2.02 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.40	0.60	0.81	1.01	1.21	1.41	1.61	1.82	2.02	2.22
Mu(-), kN-m:	-177.93	-159.28	-140.80	-122.49	-104.37	-86.41	-68.62	-51.02	-33.58	-16.40	0.00
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.78
As(-), mm2:	1198	1057	922	792	667	546	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	90.92	90.92	90.92	90.20	89.33	88.46	87.58	86.71	85.84	84.97	84.09
Tu, kN-m:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

D-5 11 #3 @ 200 D-7

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:30 p. m. 7/02/2025

BEAM: E(1-2) FLOOR: 3

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-61.83	-45.19	-30.02	-25.15	-25.15	-25.15	-25.15	-25.15	-43.23	-70.73	-100.59
Mu(+), kN-m:	83.45	76.50	67.19	55.36	41.00	25.15	25.15	25.15	26.61	30.32	50.29
As(-), mm2:	434	434	434	434	434	434	434	434	434	443	641
As(+), mm2:	526	481	434	434	434	434	434	434	434	434	434
Vu, kN:	71.56	71.56	66.27	65.09	70.85	76.60	82.36	88.12	93.87	99.16	99.16
Tu, kN-m:	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

E-1 11 #3 @ 100 9 #3 @ 200 11 #3 @ 100 E-2

BEAM: E(2-5) FLOOR: 3

Length: L = 4.47 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.07 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.61	1.01	1.42	1.83	2.24	2.64	3.05	3.46	3.86	4.27
Mu(-), kN-m:	-53.97	-38.76	-37.01	-37.01	-37.01	-37.01	-37.01	-55.40	-83.88	-114.78	-148.04
Mu(+), kN-m:	70.69	60.37	47.50	37.01	37.01	37.01	37.01	37.01	37.01	37.01	74.02
As(-), mm2:	434	434	434	434	434	434	434	434	529	739	975
As(+), mm2:	442	434	434	434	434	434	434	434	434	434	464
Vu, kN:	77.22	77.22	76.89	82.76	89.08	95.40	101.72	108.04	114.36	120.17	120.17
Tu, kN-m:	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	175	175	100	100	100

DESIGN

E-2 11 #3 @ 100 6 #3 @ 200 4 #3 @ 175 11 #3 @ 100 E-5

BEAM: E(5-7) FLOOR: 3

Length: L = 2.22 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 2.02 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.40	0.60	0.81	1.01	1.21	1.41	1.61	1.82	2.02	2.22
Mu(-), kN-m:	-91.33	-79.90	-69.00	-58.63	-48.80	-39.48	-30.69	-22.43	-14.68	-7.49	-0.77
Mu(+), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As(-), mm2:	579	503	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	52.55	52.55	52.55	50.08	47.45	44.81	42.18	39.55	36.92	34.28	31.65
Tu, kN-m:	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	200	200	200	200	200	200	200	200	200	200	200

DESIGN

E-5 11 #3 @ 200 E-7

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:30 p. m. 7/02/2025

BEAM: 1(A-C) FLOOR: 3

Length: L = 4.97 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-62.34	-41.45	-24.53	-17.04	-17.04	-17.04	-17.04	-17.04	-24.30	-44.38	-68.15
Mu(+), kN-m:	31.17	31.23	31.13	29.93	25.81	19.04	18.25	19.79	19.94	19.53	34.08
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	53.74	53.49	46.80	40.11	33.42	33.65	40.34	47.03	53.29	59.42	59.65
Tu, kN-m:	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-1 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 C-1

BEAM: 1(C-D) FLOOR: 3

Length: L = 4.97 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-61.82	-40.50	-22.60	-15.46	-15.46	-15.46	-15.46	-15.46	-20.77	-37.90	-58.57
Mu(+), kN-m:	30.91	17.30	18.62	19.26	18.22	15.46	18.84	20.54	19.91	18.86	29.29
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	54.75	54.50	47.98	41.45	34.92	28.40	33.51	40.04	46.56	53.09	53.33
Tu, kN-m:	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-1 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 D-1

BEAM: 1(D-E) FLOOR: 3

Length: L = 4.87 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.47 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.65	1.09	1.54	1.99	2.44	2.88	3.33	3.78	4.22	4.67
Mu(-), kN-m:	-64.06	-41.57	-22.55	-16.01	-16.01	-16.01	-16.01	-16.01	-24.07	-41.05	-61.85
Mu(+), kN-m:	32.03	21.27	21.35	21.20	19.30	18.69	25.55	29.36	30.11	30.41	30.92
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	56.76	56.66	50.29	43.91	37.54	31.17	34.23	40.60	46.97	53.34	53.44
Tu, kN-m:	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-1 11 #3 @ 100 11 #3 @ 200 11 #3 @ 100 E-1

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:30 p. m. 7/02/2025

BEAM: 2(A-C) FLOOR: 3

Length: L = 4.97 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.57 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.11	1.57	2.03	2.49	2.94	3.40	3.86	4.31	4.77
Mu(-), kN-m:	-115.81	-66.41	-35.52	-35.52	-35.52	-35.52	-35.52	-35.52	-42.24	-88.00	-142.06
Mu(+), kN-m:	57.90	46.99	58.90	66.01	64.07	53.84	49.41	42.64	35.52	35.52	71.03
As(-), mm2:	746	434	434	434	434	434	434	434	434	557	931
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	445
Vu, kN:	128.74	128.00	108.10	88.21	68.31	73.13	93.02	112.92	127.48	140.53	141.01
Tu, kN-m:	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-2 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 C-2

BEAM: 2(C-D) FLOOR: 3

Length: L = 4.97 m a = 0.20 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.62 m c = 0.15 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.66	1.12	1.59	2.05	2.51	2.97	3.43	3.90	4.36	4.82
Mu(-), kN-m:	-132.49	-100.32	-71.18	-45.32	-33.12	-33.12	-33.12	-33.12	-33.12	-33.12	-33.12
Mu(+), kN-m:	66.24	33.12	33.12	33.12	33.12	33.12	36.57	43.40	46.95	48.34	47.95
As(-), mm2:	863	640	446	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	84.92	84.61	77.94	71.27	64.60	57.93	51.26	44.58	37.91	31.24	30.93
Tu, kN-m:	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-2 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 D-2

BEAM: 2(D-E) FLOOR: 3

Length: L = 4.87 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.60	1.05	1.51	1.96	2.41	2.86	3.31	3.77	4.22	4.67
Mu(-), kN-m:	-30.11	-30.11	-30.11	-30.11	-30.11	-30.11	-30.11	-38.28	-62.30	-89.91	-120.43
Mu(+), kN-m:	48.50	51.04	52.62	52.53	49.29	42.57	32.57	30.11	30.11	30.11	60.22
As(-), mm2:	434	434	434	434	434	434	434	434	434	570	778
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	25.62	25.63	32.05	38.57	45.08	51.60	58.11	64.63	71.15	77.66	77.83
Tu, kN-m:	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-2 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 E-2

BEAM: 5(A-C) FLOOR: 3

	Length:	L = 4.97 m	a = 0.20 m	Section:	b = 300.00 mm	Sec:	30X50				
		Lu = 4.55 m	c = 0.23 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.20	0.65	1.11	1.56	2.02	2.47	2.93	3.38	3.84	4.29	4.75
Mu(-), kN-m:	-131.68	-76.94	-34.52	-34.44	-34.44	-34.44	-34.44	-34.44	-38.64	-83.72	-137.77
Mu(+), kN-m:	65.84	47.26	58.96	67.42	66.85	57.64	56.50	52.13	41.85	34.44	68.89
As(-), mm2:	857	483	434	434	434	434	434	434	434	528	901
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	137.63	136.96	116.20	95.43	74.66	70.55	91.31	112.08	126.91	139.64	140.05
Tu, kN-m:	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-5 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 C-5

BEAM: 5(C-D) FLOOR: 3

	Length:	L = 4.97 m	a = 0.23 m	Section:	b = 300.00 mm	Sec:	30X50				
		Lu = 4.52 m	c = 0.23 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.23	0.68	1.13	1.58	2.03	2.49	2.94	3.39	3.84	4.29	4.75
Mu(-), kN-m:	-112.58	-80.02	-51.30	-28.14	-28.14	-28.14	-28.14	-28.14	-35.97	-58.63	-85.96
Mu(+), kN-m:	56.29	29.08	28.14	28.14	28.14	28.14	28.14	33.01	38.48	44.07	48.74
As(-), mm2:	724	504	434	434	434	434	434	434	434	434	543
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	87.73	87.52	79.48	71.44	63.40	55.36	51.82	59.86	67.90	75.94	76.15
Tu, kN-m:	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-5 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 D-5

BEAM: 5(D-E) FLOOR: 3

	Length:	L = 4.87 m	a = 0.23 m	Section:	b = 300.00 mm	Sec:	30X50				
		Lu = 4.42 m	c = 0.23 m		h = 500.00 mm	Mat:	21MPA				
X, m:	0.23	0.67	1.11	1.55	1.99	2.44	2.88	3.32	3.76	4.20	4.65
Mu(-), kN-m:	-100.59	-68.49	-40.86	-25.80	-25.80	-25.80	-25.80	-26.97	-46.45	-72.36	-103.21
Mu(+), kN-m:	51.88	46.58	40.40	34.51	27.39	25.80	36.27	45.35	50.69	56.71	62.33
As(-), mm2:	641	434	434	434	434	434	434	434	434	453	659
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	83.94	83.90	76.06	68.21	60.37	52.52	57.71	65.56	73.40	81.25	81.28
Tu, kN-m:	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-5 11 #3 @ 100 11 #3 @ 200 11 #3 @ 100 E-5

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:59:30 p. m. 7/02/2025

BEAM: 7(A-C) FLOOR: 3

Length: L = 4.97 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.67 m c = 0.15 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.62	1.08	1.55	2.02	2.49	2.95	3.42	3.89	4.35	4.82
Mu(-), kN-m:	-5.51	-5.51	-5.51	-5.51	-5.51	-5.51	-5.51	-5.51	-5.51	-6.57	-22.06
Mu(+), kN-m:	5.51	15.82	25.21	31.15	33.74	33.07	28.53	20.89	10.04	5.51	11.03
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	23.97	23.55	16.26	9.53	3.47	8.30	14.69	21.08	27.12	33.93	34.32
Tu, kN-m:	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-7 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 C-7

BEAM: 7(C-D) FLOOR: 3

Length: L = 4.97 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.67 m c = 0.15 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.62	1.08	1.55	2.02	2.49	2.95	3.42	3.89	4.35	4.82
Mu(-), kN-m:	-23.35	-8.95	-6.83	-6.83	-6.83	-6.83	-6.83	-6.83	-6.83	-12.19	-27.30
Mu(+), kN-m:	11.68	6.83	6.83	11.41	16.32	17.84	15.54	9.99	6.83	6.83	13.65
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	28.78	28.36	21.79	15.52	9.25	4.49	10.76	17.03	23.30	30.01	30.44
Tu, kN-m:	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

C-7 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 D-7

BEAM: 7(D-E) FLOOR: 3

Length: L = 4.87 m a = 0.15 m Section: b = 300.00 mm Sec: 30X50
Lu = 4.57 m c = 0.15 m h = 500.00 mm Mat: 21MPA

X, m:	0.15	0.61	1.06	1.52	1.98	2.44	2.89	3.35	3.81	4.26	4.72
Mu(-), kN-m:	-26.45	-10.01	-6.61	-6.61	-6.61	-6.61	-6.61	-6.61	-6.61	-6.61	-6.61
Mu(+), kN-m:	13.22	6.61	6.61	16.83	24.83	29.58	30.67	28.52	23.14	14.52	6.61
As(-), mm2:	434	434	434	434	434	434	434	434	434	434	434
As(+), mm2:	434	434	434	434	434	434	434	434	434	434	434
Vu, kN:	35.22	34.96	27.82	21.02	14.89	8.76	3.66	9.32	15.45	22.17	22.43
Tu, kN-m:	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

D-7 11 #3 @ 100 12 #3 @ 200 11 #3 @ 100 E-7

ANEXO

RESULTADO DISEÑO DE VIGUETAS Y PLACA MACIZA

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: VIGUETAS 3:51:35 p. m. 27/12/2024

LOAD COMBINATIONS

No	Load combination
1	1.4DL
2	1.2DL + 1.6LL

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

BEAM SECTIONS

Number of prismatic sections = 1

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	VTAS	Rectang	100	500	-	-	-	-	50000	1.04E+09	4.17E+07	1.46E+08

Design Results - Beams (DES)

BEAM: A(1-2) FLOOR: 1

Length: L = 4.47 m a = 0.00 m Section: b = 100.00 mm Sec: VTAS
Lu = 4.47 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.45	0.89	1.34	1.79	2.24	2.68	3.13	3.58	4.02	4.47
Mu(-), kN-m:	-6.38	-6.38	-6.38	-6.38	-6.38	-6.38	-6.38	-6.38	-6.38	-12.43	-25.51
Mu(+), kN-m:	6.38	7.98	13.62	16.92	17.88	16.50	12.78	6.72	6.38	6.38	12.76
As(-), mm2:	145	145	145	145	145	145	145	145	145	145	160
As(+), mm2:	145	145	145	145	145	145	145	145	145	145	145
Vu, kN:	21.66	21.59	16.89	12.19	8.37	13.06	17.76	22.46	27.16	31.86	31.94
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-1 11 #3 @ 100 11 #3 @ 200 11 #3 @ 100 A-2

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: VIGUETAS 3:51:35 p. m. 27/12/2024

BEAM: A(2-3) FLOOR: 1

Length: L = 4.47 m a = 0.00 m Section: b = 100.00 mm Sec: VTAS
Lu = 4.47 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.45	0.89	1.34	1.79	2.24	2.68	3.13	3.58	4.02	4.47
Mu(-), kN-m:	-25.51	-13.86	-6.38	-6.38	-6.38	-6.38	-6.38	-6.38	-6.38	-6.38	-14.29
Mu(+), kN-m:	12.76	6.38	6.38	6.38	7.06	9.35	9.30	6.92	6.38	6.38	7.15
As(-), mm2:	160	145	145	145	145	145	145	145	145	145	145
As(+), mm2:	145	145	145	145	145	145	145	145	145	145	145
Vu, kN:	31.35	31.28	26.58	21.88	17.18	12.48	12.51	17.21	21.91	26.61	26.69
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-2 11 #3 @ 100 11 #3 @ 200 11 #3 @ 100 A-3

BEAM: A(3-4) FLOOR: 1

Length: L = 2.22 m a = 0.00 m Section: b = 100.00 mm Sec: VTAS
Lu = 2.22 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.67	0.89	1.11	1.33	1.55	1.78	2.00	2.22
Mu(-), kN-m:	-14.29	-9.20	-5.07	-3.57	-3.57	-3.57	-3.57	-3.57	-3.57	-3.57	-3.57
Mu(+), kN-m:	7.15	3.57	3.57	3.57	3.57	3.57	4.05	4.26	3.65	3.57	3.57
As(-), mm2:	145	145	145	145	145	145	145	145	145	145	145
As(+), mm2:	145	145	145	145	145	145	145	145	145	145	145
Vu, kN:	23.64	23.64	23.59	20.59	17.59	14.59	11.59	9.29	12.29	12.34	12.34
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

A-3 23 #3 @ 100 A-4

BEAM: A(5-6) FLOOR: 1

Length: L = 4.47 m a = 0.00 m Section: b = 100.00 mm Sec: VTAS
Lu = 4.47 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.45	0.89	1.34	1.79	2.24	2.68	3.13	3.58	4.02	4.47
Mu(-), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mu(+), kN-m:	0.00	10.53	18.72	24.57	28.08	29.25	28.08	24.57	18.72	10.53	0.00
As(-), mm2:	145	145	145	145	145	145	145	145	145	145	145
As(+), mm2:	145	145	145	154	177	185	177	154	145	145	145
Vu, kN:	21.02	20.94	15.71	10.47	5.24	0.00	5.24	10.47	15.71	20.94	21.02
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-5 11 #3 @ 100 11 #3 @ 200 11 #3 @ 100 A-6

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: VIGUETAS 3:51:35 p. m. 27/12/2024

BEAM: A(7-8) FLOOR: 1

Length: L = 4.47 m a = 0.00 m Section: b = 100.00 mm Sec: VTAS
Lu = 4.47 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.45	0.89	1.34	1.79	2.24	2.68	3.13	3.58	4.02	4.47
Mu(-), kN-m:	-5.69	-5.69	-5.69	-5.69	-5.69	-5.69	-5.69	-5.69	-5.69	-9.94	-22.75
Mu(+), kN-m:	5.69	8.26	14.17	17.75	18.98	17.88	14.43	8.65	5.69	5.69	11.37
As(-), mm2:	145	145	145	145	145	145	145	145	145	145	145
As(+), mm2:	145	145	145	145	145	145	145	145	145	145	145
Vu, kN:	21.37	21.30	16.60	11.90	7.20	11.64	16.34	21.03	25.73	30.43	30.51
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-7 11 #3 @ 100 11 #3 @ 200 11 #3 @ 100 A-8

BEAM: A(8-9) FLOOR: 1

Length: L = 1.19 m a = 0.00 m Section: b = 100.00 mm Sec: VTAS
Lu = 1.19 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.12	0.24	0.36	0.48	0.60	0.71	0.83	0.95	1.07	1.19
Mu(-), kN-m:	-22.75	-19.73	-16.87	-14.18	-11.66	-9.30	-7.11	-5.69	-5.69	-5.69	-5.69
Mu(+), kN-m:	11.37	5.69	5.69	5.69	5.69	5.69	5.69	5.69	5.69	5.69	5.69
As(-), mm2:	145	145	145	145	145	145	145	145	145	145	145
As(+), mm2:	145	145	145	145	145	145	145	145	145	145	145
Vu, kN:	45.34	45.34	45.34	45.34	44.96	43.71	42.46	42.08	42.08	42.08	42.08
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	100	100	100	100	100	100	100	100

DESIGN

A-8 12 #3 @ 100 A-9

BEAM: A(10-11) FLOOR: 1

Length: L = 2.22 m a = 0.00 m Section: b = 100.00 mm Sec: VTAS
Lu = 2.22 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.67	0.89	1.11	1.33	1.55	1.78	2.00	2.22
Mu(-), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mu(+), kN-m:	0.00	3.66	6.51	8.55	9.77	10.17	9.77	8.55	6.51	3.66	0.00
As(-), mm2:	145	145	145	145	145	145	145	145	145	145	145
As(+), mm2:	145	145	145	145	145	145	145	145	145	145	145
Vu, kN:	11.06	11.06	11.00	7.33	3.67	0.00	3.67	7.33	11.00	11.06	11.06
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

A-10 23 #3 @ 100 A-11

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: VIGUETAS 3:51:35 p. m. 27/12/2024

BEAM: A(12-13) FLOOR: 1

Length: L = 4.47 m a = 0.00 m Section: b = 100.00 mm Sec: VTAS
Lu = 4.47 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.45	0.89	1.34	1.79	2.24	2.68	3.13	3.58	4.02	4.47
Mu(-), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mu(+), kN-m:	0.00	15.93	28.31	37.16	42.47	44.24	42.47	37.16	28.31	15.93	0.00
As(-), mm2:	145	145	145	145	145	145	145	145	145	145	145
As(+), mm2:	145	145	179	239	276	288	276	239	179	145	145
Vu, kN:	31.79	31.67	23.75	15.84	7.92	0.00	7.92	15.84	23.75	31.67	31.79
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	100	100	100	200	200	200	200	200	100	100	100

DESIGN

A-12 11 #3 @ 100 11 #3 @ 200 11 #3 @ 100 A-13

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: PLACA ALERO 3:51:50 p. m. 27/12/2024

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

BEAM SECTIONS

Number of prismatic sections = 1

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	MACIZA	Rectang	1000	120	-	-	-	-	120000	1.44E+08	1.00E+10	5.32E+08

Design Results - Beams (DES)

BEAM: A(1-2) FLOOR: 1

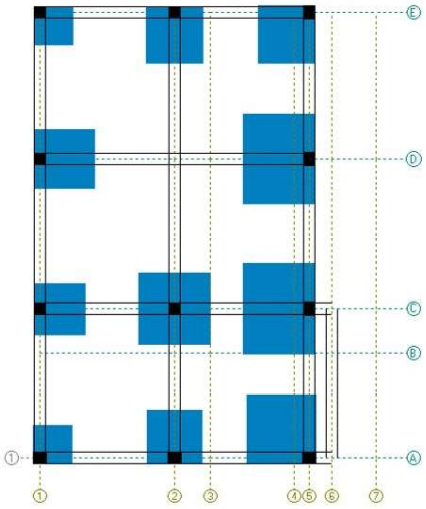
Length: L = 2.22 m a = 0.00 m Section: b = 1000.00 mm Sec: MACIZA
Lu = 2.22 m c = 0.00 m h = 120.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.67	0.89	1.11	1.33	1.55	1.78	2.00	2.22
Mu(-), kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mu(+), kN-m:	0.00	2.27	4.04	5.31	6.07	6.32	6.07	5.31	4.04	2.27	0.00
As(-), mm2:	197	197	197	197	197	197	197	197	197	197	197
As(+), mm2:	197	197	197	246	283	296	283	246	197	197	197
Vu, kN:	10.77	9.11	6.83	4.55	2.28	0.00	2.28	4.55	6.83	9.11	10.77
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3+2r	#3+2r	#3	#3	#3	#3	#3	#3	#3	#3+2r	#3+2r
Spacing, mm:	10	10	30	30	30	30	30	30	30	10	10

DESIGN

A-1 25 #3+2r @ 10 54 #3 @ 30 25 #3+2r @ 10 A-2

ANEXO
RESULTADO DISEÑO DE CIMENTACION


E
D
C
B
A
1
1
2
3
4
5
6
7


y
z
x

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:36:09 p. m. 27/12/2024

P-Delta Analysis- Support Reactions

Support		Load	Force (kN)			Moment (kN-m)		
Axis	Floor	LdCase	Fx	Fy	Fz	Mx	My	Mz
A-1	1	D0	-0.59	1.56	83.30	11.33	-13.58	0.00
		DL	-2.90	5.40	60.42	-6.56	-7.36	0.01
		LL	-2.47	1.23	16.22	-1.35	-5.50	0.00
		EQX	63.96	5.66	91.81	-10.92	130.53	-0.13
		EQY	12.61	49.70	61.17	-97.97	24.51	0.17
C-1	1	D0	-0.31	-0.67	120.30	0.91	-12.69	0.00
		DL	1.17	-0.62	124.63	0.41	-1.67	0.00
		LL	-0.98	-0.41	36.16	0.52	-3.13	0.00
		EQX	47.67	6.28	76.30	-11.16	93.84	-0.10
		EQY	2.26	58.52	-12.01	-103.78	4.34	0.13
D-1	1	D0	2.81	0.15	147.81	-0.72	-38.78	0.00
		DL	20.33	1.37	188.13	-1.89	20.19	0.00
		LL	3.81	0.11	56.20	-0.07	2.26	0.00
		EQX	41.27	6.49	30.95	-11.42	88.92	-0.10
		EQY	-3.16	58.54	16.07	-103.94	-7.29	0.13
E-1	1	D0	-0.55	-1.02	78.47	-11.65	-13.18	0.00
		DL	-1.86	-3.56	59.74	3.79	-5.50	0.00
		LL	-2.06	-1.16	16.34	1.39	-4.61	0.00
		EQX	55.63	5.27	79.98	-9.98	109.03	-0.10
		EQY	-11.93	46.07	-61.25	-89.27	-22.60	0.13
A-2	1	D0	-1.81	2.53	122.66	10.11	-3.95	0.00
		DL	-4.65	2.26	146.72	-3.13	-9.37	0.01
		LL	-4.00	0.95	33.66	-1.16	-7.25	0.00
		EQX	85.62	-0.20	0.81	-0.48	155.58	-0.13
		EQY	16.36	47.55	72.37	-96.87	28.85	0.17
C-2	1	D0	-2.47	-0.28	182.80	23.67	-4.24	0.00
		DL	-7.23	14.02	307.22	-16.59	-11.34	0.00
		LL	-4.67	3.03	80.53	-3.55	-7.37	0.00
		EQX	64.25	0.47	2.21	-0.82	113.37	-0.10
		EQY	3.02	51.52	-56.34	-97.20	5.24	0.13
E-2	1	D0	-2.54	-3.31	134.24	-32.76	-4.54	0.00
		DL	-5.05	-24.22	163.08	27.40	-9.18	0.00
		LL	-4.01	-6.10	48.46	6.96	-6.86	0.00
		EQX	75.14	-0.17	3.21	-0.40	131.80	-0.10
		EQY	-15.60	34.68	-25.06	-77.48	-26.90	0.13
A-5	1	D0	0.42	1.30	145.33	13.86	-2.54	0.00
		DL	2.07	7.59	254.31	-1.78	-35.37	0.01
		LL	2.21	5.80	105.32	-2.88	-17.65	0.00
		EQX	63.48	-4.72	-91.21	9.24	130.40	-0.13
		EQY	12.63	54.41	75.08	-110.08	24.61	0.17
C-5	1	D0	3.30	0.32	200.67	-3.11	1.00	0.00
		DL	7.99	1.57	347.09	-9.16	-11.34	0.01
		LL	7.34	-1.85	152.57	-1.49	-2.72	0.00
		EQX	50.25	-6.90	-79.96	12.75	102.18	-0.13
		EQY	2.58	81.90	-11.88	-154.07	4.95	0.17
D-5	1	D0	1.23	0.31	208.69	-1.20	39.92	0.00
		DL	-10.10	2.47	323.42	-3.73	-15.21	0.01
		LL	3.35	1.08	148.90	-1.48	1.47	0.00
		EQX	45.19	-7.09	-28.67	12.97	98.98	-0.13
		EQY	-5.50	83.11	21.77	-155.49	-10.48	0.17
E-5	1	D0	0.51	-0.90	124.37	-12.19	9.43	0.00
		DL	0.23	-6.29	156.16	6.32	-3.53	0.01
		LL	1.48	-2.68	66.46	2.82	-0.82	0.00
		EQX	59.44	-5.71	-83.66	11.34	119.35	-0.13
		EQY	-13.28	63.88	-80.79	-132.95	-25.32	0.17

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:35:52 p. m. 27/12/2024

P-Delta Analysis- Support Reactions

Support		Load	Force (kN)			Moment (kN-m)		
Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
A-1	1	1	-4.89	9.75	201.21	6.68	-29.32	0.01
		2	-8.14	10.32	198.42	3.56	-33.92	0.02
		3	61.08	30.16	298.85	-35.94	107.25	-0.06
		4	-74.39	-10.99	78.53	44.69	-168.51	0.09
		5	53.52	0.34	262.15	22.84	92.55	-0.17
		6	-66.83	18.83	115.23	-14.09	-153.80	0.20
		7	25.14	60.98	277.40	-96.87	33.04	0.15
		8	-38.45	-41.82	99.97	105.62	-94.30	-0.12
		9	-13.24	57.58	222.32	-90.32	-45.27	0.23
		10	-0.08	-38.42	155.06	99.07	-15.98	-0.20
		11	64.60	26.84	239.51	-36.02	119.03	-0.07
		12	-70.88	-14.31	19.19	44.61	-156.73	0.09
		13	57.03	-2.98	202.81	22.76	104.32	-0.17
		14	-63.31	15.51	55.89	-14.17	-142.02	0.19
		15	28.65	57.67	218.07	-96.95	44.82	0.14
		16	-34.94	-45.13	40.64	105.54	-82.52	-0.13
		17	-9.72	54.27	162.98	-90.40	-33.49	0.22
		18	3.44	-41.73	95.72	98.99	-4.20	-0.20
		19	38.81	12.15	224.21	-4.22	64.93	-0.08
		20	-50.73	4.23	95.68	11.07	-117.81	0.11
		21	2.87	42.98	202.76	-65.16	-9.28	0.13
		22	-14.78	-26.60	117.12	72.00	-43.60	-0.11
C-1	1	1	1.20	-1.81	342.91	1.85	-20.11	0.01
		2	-0.55	-2.20	351.77	2.42	-22.25	0.01
		3	48.39	21.87	402.77	-40.18	74.77	-0.05
		4	-48.31	-25.79	257.38	44.40	-115.51	0.07
		5	47.03	-13.24	409.98	22.08	72.17	-0.13
		6	-46.95	9.32	250.18	-17.87	-112.90	0.15
		7	16.61	58.45	340.96	-105.02	12.12	0.11
		8	-16.52	-62.36	319.20	109.23	-52.86	-0.09
		9	-12.00	54.68	295.18	-98.32	-44.18	0.17
		10	12.08	-58.60	364.98	102.54	3.44	-0.15
		11	49.12	22.67	293.14	-41.10	82.21	-0.05
		12	-47.58	-25.00	147.74	43.48	-108.07	0.07
		13	47.76	-12.44	300.34	21.16	79.61	-0.13
		14	-46.22	10.12	140.54	-18.78	-105.46	0.14
		15	17.33	59.24	231.32	-105.93	19.56	0.11
		16	-15.80	-61.57	209.56	108.31	-45.42	-0.09
		17	-11.27	55.48	185.54	-99.24	-36.74	0.17
		18	12.81	-57.80	255.34	101.62	10.88	-0.15
		19	33.24	2.69	334.50	-5.97	48.19	-0.06
		20	-33.50	-6.09	227.68	9.65	-83.18	0.08
		21	1.46	39.27	272.68	-70.80	-14.46	0.10
		22	-1.71	-42.67	289.50	74.49	-20.53	-0.08
D-1	1	1	32.39	2.13	470.32	-3.65	-26.02	0.01
		2	33.87	2.00	493.06	-3.25	-18.68	0.01
		3	71.91	25.99	495.11	-45.81	66.69	-0.05
		4	-8.75	-22.11	423.57	39.40	-106.77	0.07
		5	73.80	-9.13	485.46	16.56	71.06	-0.13
		6	-10.64	13.01	433.21	-22.97	-111.14	0.15
		7	40.80	62.42	484.70	-110.57	-0.66	0.11
		8	22.35	-58.54	433.98	104.16	-39.42	-0.09
		9	16.04	58.53	466.13	-103.72	-54.01	0.17
		10	47.12	-54.65	452.55	97.31	13.93	-0.15
		11	61.15	25.42	338.12	-44.95	70.00	-0.05
		12	-19.50	-22.68	266.58	40.26	-103.45	0.07
		13	63.05	-9.70	328.48	17.41	74.38	-0.13
		14	-21.40	12.44	276.22	-22.11	-107.83	0.14
		15	30.05	61.85	327.71	-109.72	2.66	0.11
		16	11.60	-59.11	276.99	105.02	-36.11	-0.09
		17	5.29	57.96	309.14	-102.86	-50.69	0.17
		18	36.36	-55.22	295.56	98.17	17.24	-0.15
		19	55.84	6.18	413.81	-10.68	45.92	-0.06
		20	-1.94	-2.91	370.48	5.31	-78.56	0.08
		21	24.74	42.61	403.40	-75.44	-21.43	0.10
		22	29.16	-39.34	380.90	70.08	-11.22	-0.08
E-1	1	1	-3.36	-6.41	193.50	-11.01	-26.15	0.01

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:35:52 p. m. 27/12/2024

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		2	-6.18	-7.35	192.00	-7.21	-29.80	0.01
		3	47.11	12.43	243.80	-44.80	75.22	-0.05
		4	-56.99	-25.74	120.60	28.72	-129.28	0.07
		5	54.27	-15.21	280.55	8.76	88.78	-0.13
		6	-64.15	1.90	83.84	-24.85	-142.84	0.15
		7	-0.18	40.99	144.94	-100.31	-16.93	0.11
		8	-9.70	-54.30	219.46	84.22	-37.14	-0.09
		9	-33.56	37.83	96.95	-94.32	-82.34	0.17
		10	23.68	-51.14	267.44	78.23	28.28	-0.15
		11	49.89	14.97	186.00	-43.83	85.44	-0.05
		12	-54.21	-23.21	62.79	29.68	-119.06	0.07
		13	57.05	-12.67	222.75	9.73	99.00	-0.13
		14	-61.37	4.43	26.04	-23.88	-132.62	0.14
		15	2.60	43.53	87.14	-99.34	-6.71	0.11
		16	-6.92	-51.77	161.66	85.19	-26.92	-0.09
		17	-30.78	40.37	39.15	-93.35	-72.12	0.17
		18	26.46	-48.61	209.64	79.20	38.50	-0.15
		19	34.48	-2.05	210.54	-13.46	53.02	-0.06
		20	-43.40	-9.43	98.57	0.51	-99.62	0.08
		21	-12.81	26.51	111.68	-68.96	-39.12	0.10
		22	3.89	-37.99	197.43	56.02	-7.47	-0.08
A-2	1	1	-9.05	6.71	377.15	9.76	-18.64	0.01
		2	-14.16	7.28	377.12	6.51	-27.58	0.02
		3	78.77	20.77	379.45	-22.34	141.00	-0.06
		4	-102.29	-7.35	334.41	36.75	-187.46	0.09
		5	68.96	-7.76	336.02	35.79	123.69	-0.17
		6	-92.47	21.18	377.83	-21.37	-170.15	0.20
		7	30.29	54.19	429.54	-89.81	52.29	0.15
		8	-53.80	-40.78	284.31	104.22	-98.75	-0.12
		9	-21.09	54.31	429.06	-89.52	-41.05	0.23
		10	-2.43	-40.90	284.80	103.94	-5.41	-0.20
		11	84.71	18.38	264.97	-23.27	152.25	-0.07
		12	-96.35	-9.74	219.93	35.82	-176.22	0.09
		13	74.90	-10.15	221.55	34.86	134.94	-0.17
		14	-86.53	18.78	263.35	-22.30	-158.91	0.19
		15	36.23	51.80	315.07	-90.74	63.54	0.14
		16	-47.86	-43.17	169.83	103.30	-87.51	-0.13
		17	-15.15	51.92	314.58	-90.45	-29.81	0.22
		18	3.51	-43.29	170.32	103.01	5.84	-0.20
		19	49.47	5.60	303.61	5.47	88.34	-0.08
		20	-70.40	5.89	302.48	6.15	-129.47	0.11
		21	0.99	39.03	353.71	-62.00	-0.37	0.13
		22	-21.92	-27.53	252.39	73.62	-40.76	-0.11
C-2	1	1	-13.58	19.23	686.02	9.91	-21.81	0.01
		2	-19.11	21.33	716.86	2.82	-30.48	0.01
		3	48.85	35.43	653.85	-25.04	88.88	-0.05
		4	-81.47	3.59	683.24	34.92	-141.00	0.07
		5	47.03	4.52	687.66	33.28	85.74	-0.13
		6	-79.66	34.50	649.44	-23.39	-137.86	0.15
		7	5.99	71.17	612.87	-92.50	13.19	0.11
		8	-38.61	-32.15	724.22	102.39	-65.31	-0.09
		9	-32.56	70.89	611.54	-92.01	-54.84	0.17
		10	-0.06	-31.87	725.55	101.90	2.72	-0.15
		11	56.43	28.28	426.32	-23.61	100.92	-0.05
		12	-73.89	-3.56	455.71	36.35	-128.96	0.07
		13	54.61	-2.63	460.12	34.71	97.78	-0.13
		14	-72.08	27.35	421.90	-21.97	-125.82	0.14
		15	13.57	64.02	385.34	-91.08	25.23	0.11
		16	-31.03	-39.30	496.69	103.81	-53.26	-0.09
		17	-24.98	63.74	384.01	-90.58	-42.79	0.17
		18	7.52	-39.02	498.02	103.32	14.76	-0.15
		19	30.61	17.09	572.09	2.95	56.41	-0.06
		20	-59.35	16.44	569.00	4.10	-102.30	0.08
		21	-12.25	52.83	531.10	-64.51	-19.28	0.10
		22	-16.49	-19.30	609.98	71.57	-26.61	-0.08
E-2	1	1	-10.63	-38.54	416.25	-7.51	-19.21	0.01
		2	-15.53	-42.80	434.32	4.70	-27.44	0.01
		3	57.33	-28.90	400.94	-23.12	100.40	-0.05
		4	-83.58	-49.37	409.55	24.17	-147.06	0.07
		5	66.69	-49.71	415.97	23.36	116.54	-0.13
		6	-92.94	-28.56	394.51	-22.32	-163.19	0.15
		7	-6.19	-4.51	381.15	-77.07	-10.68	0.11

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		8	-20.06	-73.76	429.33	78.12	-35.97	-0.09
		9	-51.27	-4.41	379.22	-76.83	-89.76	0.17
		10	25.02	-73.87	431.26	77.88	43.11	-0.15
		11	63.62	-14.55	263.28	-28.47	111.38	-0.05
		12	-77.29	-35.01	271.89	18.82	-136.08	0.07
		13	72.98	-35.35	278.32	18.01	127.51	-0.13
		14	-86.66	-14.20	256.86	-27.67	-152.22	0.14
		15	0.10	9.85	243.50	-82.42	0.29	0.11
		16	-13.77	-59.40	291.68	72.77	-24.99	-0.09
		17	-44.98	9.95	241.57	-82.18	-78.79	0.17
		18	31.31	-59.51	293.61	72.53	54.08	-0.15
		19	40.99	-33.75	348.03	1.31	71.67	-0.06
		20	-64.20	-33.51	343.53	1.88	-112.84	0.08
		21	-22.53	-9.36	328.24	-52.64	-39.41	0.10
		22	-0.68	-57.90	363.32	55.83	-1.76	-0.08
A-5	1	1	3.49	12.45	559.50	16.90	-53.07	0.01
		2	6.53	19.94	648.08	9.88	-73.73	0.02
		3	72.47	28.07	516.20	-12.17	74.64	-0.06
		4	-62.06	4.86	653.58	35.39	-200.92	0.09
		5	64.90	-4.57	471.15	53.88	59.87	-0.17
		6	-54.49	37.51	698.62	-30.66	-186.16	0.20
		7	36.88	69.46	632.60	-95.70	0.59	0.15
		8	-26.47	-36.52	537.17	118.92	-126.87	-0.12
		9	-1.21	72.29	687.33	-101.25	-77.65	0.23
		10	11.62	-39.35	482.45	124.46	-48.63	-0.20
		11	69.51	19.61	290.99	-12.91	103.66	-0.07
		12	-65.02	-3.60	428.37	34.65	-171.90	0.09
		13	61.94	-13.04	245.94	53.13	88.90	-0.17
		14	-57.45	29.04	473.41	-31.40	-157.13	0.19
		15	33.92	61.00	407.39	-96.44	29.61	0.14
		16	-29.43	-44.99	311.97	118.18	-97.85	-0.13
		17	-4.17	63.83	462.12	-101.99	-48.63	0.22
		18	8.66	-47.82	257.24	123.72	-19.61	-0.20
		19	49.14	11.39	441.11	15.66	35.72	-0.08
		20	-39.73	17.99	568.81	2.72	-146.84	0.11
		21	13.55	52.77	557.51	-67.86	-38.33	0.13
		22	-4.13	-23.40	452.41	86.25	-72.79	-0.11
C-5	1	1	15.81	2.66	766.86	-17.17	-14.48	0.01
		2	25.29	-0.67	901.42	-17.10	-16.76	0.02
		3	71.91	18.10	726.35	-49.68	88.54	-0.06
		4	-30.13	-17.23	893.40	17.26	-118.80	0.09
		5	70.36	-31.04	733.48	42.77	85.57	-0.17
		6	-28.58	31.91	886.27	-75.18	-115.83	0.20
		7	38.54	80.26	774.01	-166.46	20.47	0.15
		8	3.23	-79.40	845.75	134.04	-50.73	-0.12
		9	8.40	84.41	821.98	-174.11	-40.84	0.23
		10	33.38	-83.54	797.77	141.69	10.58	-0.20
		11	61.18	19.38	409.46	-44.51	94.36	-0.07
		12	-40.86	-15.96	576.51	22.43	-112.97	0.09
		13	59.63	-29.77	416.59	47.93	91.39	-0.17
		14	-39.31	33.18	569.38	-70.01	-110.00	0.19
		15	27.82	81.54	457.11	-161.29	26.29	0.14
		16	-7.49	-78.12	528.85	139.21	-44.91	-0.13
		17	-2.33	85.68	505.09	-168.94	-35.01	0.22
		18	22.65	-82.27	480.88	146.86	16.40	-0.20
		19	53.80	-4.78	644.36	-4.83	58.47	-0.08
		20	-16.54	4.89	756.30	-22.68	-84.59	0.11
		21	20.44	57.39	692.01	-121.61	-9.60	0.13
		22	16.82	-57.28	708.64	94.10	-16.52	-0.11
D-5	1	1	-12.42	3.90	744.96	-6.90	34.59	0.01
		2	-5.28	5.07	876.77	-8.29	31.99	0.02
		3	36.25	22.27	765.30	-41.08	126.95	-0.06
		4	-50.84	-13.42	809.57	26.27	-64.72	0.09
		5	39.55	-27.60	752.23	52.21	133.24	-0.17
		6	-54.14	36.45	822.63	-67.02	-71.01	0.20
		7	0.77	85.41	800.60	-159.00	50.33	0.15
		8	-15.35	-76.55	774.26	144.19	11.90	-0.12
		9	-26.35	89.66	817.80	-166.78	-9.06	0.23
		10	11.77	-80.81	757.06	151.97	71.29	-0.20
		11	35.56	20.35	456.77	-38.12	118.07	-0.07
		12	-51.53	-15.33	501.04	29.24	-73.60	0.09
		13	38.86	-29.52	443.70	55.18	124.36	-0.17

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:35:52 p. m. 27/12/2024

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		14	-54.83	34.53	514.10	-64.05	-79.89	0.19
		15	0.08	83.49	492.07	-156.03	41.45	0.14
		16	-16.04	-78.47	465.73	147.16	3.02	-0.13
		17	-27.04	87.74	509.27	-163.81	-17.94	0.22
		18	11.08	-82.73	448.53	154.94	62.41	-0.20
		19	26.12	-1.10	660.94	2.66	95.46	-0.08
		20	-37.15	8.83	701.08	-15.49	-43.11	0.11
		21	-9.37	62.04	696.25	-115.26	18.84	0.13
		22	-1.67	-54.31	665.77	102.42	33.51	-0.11
E-5	1	1	1.04	-10.07	392.74	-8.23	8.27	0.01
		2	3.26	-12.92	442.97	-2.54	5.77	0.02
		3	57.83	2.14	295.20	-32.77	118.02	-0.06
		4	-53.08	-24.77	510.99	24.31	-105.49	0.09
		5	65.79	-36.18	343.67	47.00	133.22	-0.17
		6	-61.05	13.56	462.52	-55.46	-120.69	0.20
		7	6.93	50.85	297.21	-133.78	16.75	0.15
		8	-2.18	-73.48	508.98	125.32	-4.22	-0.12
		9	-28.74	54.28	347.41	-140.58	-54.87	0.23
		10	33.48	-76.90	458.78	132.12	67.40	-0.20
		11	56.12	6.98	144.58	-33.84	117.07	-0.07
		12	-54.79	-19.93	360.37	23.25	-106.44	0.09
		13	64.09	-31.34	193.06	45.94	132.27	-0.17
		14	-62.75	18.40	311.90	-56.52	-121.64	0.19
		15	5.22	55.69	146.60	-134.84	15.80	0.14
		16	-3.89	-68.64	358.36	124.26	-5.17	-0.13
		17	-30.44	59.12	196.79	-141.65	-55.82	0.22
		18	31.78	-72.06	308.17	131.06	66.45	-0.20
		19	43.83	-13.87	288.43	4.88	88.63	-0.08
		20	-39.38	-5.88	405.55	-10.99	-78.46	0.11
		21	-7.07	34.84	290.44	-96.12	-12.64	0.13
		22	11.52	-54.59	403.54	90.01	22.81	-0.11

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + LL + EQX + .3EQY
4	1.2D0 + 1.2DL + LL - EQX - .3EQY
5	1.2D0 + 1.2DL + LL + EQX - .3EQY
6	1.2D0 + 1.2DL + LL - EQX + .3EQY
7	1.2D0 + 1.2DL + LL + .3EQX + EQY
8	1.2D0 + 1.2DL + LL - .3EQX - EQY
9	1.2D0 + 1.2DL + LL - .3EQX + EQY
10	1.2D0 + 1.2DL + LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

NUDO	REACCIONES EN LOS SOPORTES (MAYORADA) - KN	REACCIONES EN LOS SOPORTES (AREA) - KN	AREA COLUMNA(CM2)			PRESION PRODUCIDA	LA CUAL DEBE SER MENOR QUE	CUMPLE	CAPACIDAD PORTANTE (KPa)	AREA REQUERIDA (M2)	LADO REQUERIDO (M2)	AREA UTILIZADA		L(M)	L(M)	AREA UTILIZADA (M2)	PRESION NETA (KN/M2)
A-1	159.94	159.94	40.00	45.00	1,800.00	0.089	Fb = 2ϕ x 0.85 x F´c	ok	96.66	1.65	1.3	1.69	OK	1.30	1.30	1.69	94.64
C-1	281.09	281.09	40.00	40.00	1,600.00	0.176	Fb = 2 x 0.7 x 0.85 x 0.211	ok		2.91	1.7	3.24	OK	1.80	1.80	3.24	86.76
D-1	392.14	392.14	40.00	40.00	1,600.00	0.245	Fb = 2 x 0.7 x 0.85 x 0.212	ok		4.06	2.0	4.41	OK	2.10	2.10	4.41	88.92
E-1	154.55	154.55	40.00	40.00	1,600.00	0.097		ok		1.60	1.3	1.69	OK	1.30	1.30	1.69	91.45
A-2	303.04	303.04	40.00	45.00	1,800.00	0.168		ok		3.14	1.8	3.24	OK	1.80	1.80	3.24	93.53
C-2	570.55	570.55	40.00	40.00	1,600.00	0.357		ok		5.90	2.4	6.25	OK	2.50	2.50	6.25	91.29
E-2	345.78	345.78	40.00	40.00	1,600.00	0.216		ok		3.58	1.9	3.61	OK	1.90	1.90	3.61	95.78
A-5	504.96	504.96	40.00	45.00	1,800.00	0.281		ok		5.22	2.3	5.29	OK	2.30	2.30	5.29	95.46
C-5	700.33	700.33	40.00	45.00	1,800.00	0.389		ok		7.25	2.7	7.29	OK	2.50	3.00	7.50	93.38
D-5	681.01	681.01	40.00	45.00	1,800.00	0.378		ok		7.05	2.7	7.29	OK	2.40	3.00	7.20	94.58
E-5	346.99	346.99	40.00	45.00	1,800.00	0.193		ok		3.59	1.9	3.61	OK	1.90	1.90	3.61	96.12

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAİTAN 3:35:00 p. m. 27/12/2024

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + LL + EQX + .3EQY
4	1.2D0 + 1.2DL + LL - EQX - .3EQY
5	1.2D0 + 1.2DL + LL + EQX - .3EQY
6	1.2D0 + 1.2DL + LL - EQX + .3EQY
7	1.2D0 + 1.2DL + LL + .3EQX + EQY
8	1.2D0 + 1.2DL + LL - .3EQX - EQY
9	1.2D0 + 1.2DL + LL - .3EQX + EQY
10	1.2D0 + 1.2DL + LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

Design results - Footings

Footing	Floor	Mat	B m	L m	h mm	Vu1/ØVc1 Vu2/ØVc2	Dir -	Reinforcem	As mm2	Mu kN-m
E-5	1	1	1.90	1.90	597	0.64	B	17#4@109 mm	2077.	380.02
						0.64	L	17#4@109 mm	2041.	370.46
D-5	1	1	2.40	3.00	563	0.53	B	25#4@118 mm	3055.	520.76
						0.67	L	20#4@118 mm	2432.	211.66
C-5	1	1	2.50	3.00	606	0.54	B	27#4@109 mm	3338.	621.53
						0.67	L	22#4@111 mm	2726.	232.97
A-5	1	1	2.30	2.30	614	0.57	B	21#4@107 mm	2600.	491.80
						0.63	L	21#4@107 mm	2541.	466.09
E-2	1	1	1.90	1.90	437	0.51	B	12#4@159 mm	1494.	174.68
						0.53	L	12#4@159 mm	1494.	51.42
C-2	1	1	2.50	2.50	373	0.55	B	14#4@180 mm	1677.	150.62
						0.76	L	14#4@180 mm	1677.	150.67
A-2	1	1	1.80	1.80	509	0.60	B	14#4@126 mm	1650.	244.21
						0.58	L	14#4@126 mm	1650.	64.65
E-1	1	1	1.30	1.30	420	0.67	B	8#4@164 mm	983.1	107.92
						0.60	L	8#4@164 mm	983.1	106.30
D-1	1	1	2.10	2.10	472	0.50	B	15#4@139 mm	1786.	67.85
						0.54	L	15#4@139 mm	1786.	235.89
C-1	1	1	1.80	1.80	469	0.56	B	12#4@150 mm	1519.	56.40
						0.56	L	12#4@150 mm	1519.	198.42
A-1	1	1	1.30	1.30	395	0.64	B	8#4@164 mm	924.5	91.71
						0.56	L	8#4@164 mm	924.5	89.42

Cálculo ingeniamos

ANEXO

RESULTADO DISEÑO DE ESCALERA

Company: TRITON DISEÑO & CONSTRUCCIÓN Engineer: SERGIO CARDENAS DELGADILLO
Project: I.E JORGE ELIECER GAITAN 3:35:10 p. m. 27/12/2024

L O A D S

Total number of load cases = 2

LOAD CASE 1 : MUERTA (DL)

Number of nodal loads .... = 0
Number of beam loads ..... = 3

Beam Loads (DL)

Class = F: Force M: Moment
System = L: Local Force/Moment referred to local coordinates (1, 2, 3)
G: Global Force/Moment referred to global coordinates (X, Y, Z)
Axis = (1, 2, 3) if System = L, or (X, Y, Z) if System = G
Units = Distributed Force: (kN/m), Distributed Moment: (kN-m/m)
Concentrated Force: (kN), Concentrated Moment: (kN-m)

		Distributed Force/ Moment							Concentrated Force/ Moment					
Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
A(1-2)	1	F	G	Z	0.00	1.00	11.5	11.5	-	-	-	-	-	-
A(2-3)	1	F	G	Z	0.00	1.00	11.5	11.5	-	-	-	-	-	-
A(3-4)	1	F	G	Z	0.00	1.00	11.5	11.5	-	-	-	-	-	-

LOAD CASE 2 : VIVA (LL)

Number of nodal loads .... = 0
Number of beam loads ..... = 3

Beam Loads (LL)

Class = F: Force M: Moment
System = L: Local Force/Moment referred to local coordinates (1, 2, 3)
G: Global Force/Moment referred to global coordinates (X, Y, Z)
Axis = (1, 2, 3) if System = L, or (X, Y, Z) if System = G
Units = Distributed Force: (kN/m), Distributed Moment: (kN-m/m)
Concentrated Force: (kN), Concentrated Moment: (kN-m)

		Distributed Force/ Moment							Concentrated Force/ Moment					
Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
A(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(2-3)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-

LOAD COMBINATIONS

No	Load combination
1	1.4DL
2	1.2DL + 1.6LL

Company: TRITON DISEÑO & CONSTRUCCIÓN Engineer: SERGIO CARDENAS DELGADILLO
Project: I.E JORGE ELIECER GAITAN 3:35:10 p. m. 27/12/2024

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

BEAM SECTIONS

Number of prismatic sections = 1

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	ESCALERA	Rectang	1200	200	-	-	-	-	240000	8.00E+08	2.88E+10	2.86E+09

Design Results - Beams (DES)

BEAM: A(1-2) FLOOR: 1

Length: L = 4.10 m a = 0.00 m Section: b = 1200.00 mm Sec: ESCALERA
Lu = 4.10 m c = 0.00 m h = 200.00 mm Mat: 21MPA

X, m:	0.00	0.41	0.82	1.23	1.64	2.05	2.46	2.87	3.28	3.69	4.10
Mu(-), kN-m:	-9.00	-9.00	-9.00	-9.00	-9.00	-9.00	-9.00	-9.00	-9.00	-14.67	-36.01
Mu(+), kN-m:	9.00	14.14	24.33	30.59	32.90	31.27	25.70	16.18	9.00	9.00	18.01
As(-), mm2:	552	552	552	552	552	552	552	552	552	552	716
As(+), mm2:	552	552	552	604	651	618	552	552	552	552	552
Vu, kN:	42.68	37.32	29.18	21.04	12.90	19.64	27.77	35.91	44.05	52.19	57.55
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3+3r	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3+3r
Spacing, mm:	30	70	70	70	70	70	70	70	70	70	30

DESIGN

A-1 15 #3+3r @ 30 45 #3 @ 70 15 #3+3r @ 30 A-2

BEAM: A(2-3) FLOOR: 1

Length: L = 2.31 m a = 0.00 m Section: b = 1200.00 mm Sec: ESCALERA
Lu = 2.31 m c = 0.00 m h = 200.00 mm Mat: 21MPA

X, m:	0.00	0.23	0.46	0.69	0.92	1.16	1.39	1.62	1.85	2.08	2.31
Mu(-), kN-m:	-36.01	-27.36	-19.96	-13.80	-9.00	-9.00	-9.00	-9.00	-9.00	-9.00	-9.00
Mu(+), kN-m:	18.01	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
As(-), mm2:	716	552	552	552	552	552	552	552	552	552	552
As(+), mm2:	552	552	552	552	552	552	552	552	552	552	552
Vu, kN:	54.62	52.81	48.23	43.64	39.06	34.47	29.88	25.30	26.07	30.65	32.46
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3+3r	#3+3r	#3	#3	#3	#3	#3	#3	#3	#3+3r	#3+3r
Spacing, mm:	30	30	70	70	70	70	70	70	70	30	30

DESIGN

A-2 15 #3+3r @ 30 19 #3 @ 70 15 #3+3r @ 30 A-3

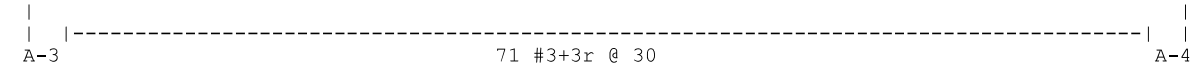
Company: TRITON DISEÑO & CONSTRUCCIÓN Engineer: SERGIO CARDENAS DELGADILLO
Project: I.E JORGE ELIECER GAITAN 3:35:10 p. m. 27/12/2024

BEAM: A(3-4) FLOOR: 1

Length: L = 2.20 m a = 0.00 m Section: b = 1200.00 mm Sec: ESCALERA
Lu = 2.20 m c = 0.00 m h = 200.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.66	0.88	1.10	1.32	1.54	1.76	1.98	2.20
Mu(-), kN-m:	-5.78	-1.44	-1.44	-1.44	-1.44	-1.44	-1.44	-1.44	-1.44	-1.44	-1.44
Mu(+), kN-m:	2.89	1.44	4.46	7.87	10.15	11.30	11.31	10.18	7.92	4.53	1.44
As(-), mm2:	552	552	552	552	552	552	552	552	552	552	552
As(+), mm2:	552	552	552	552	552	552	552	552	552	552	552
Vu, kN:	25.14	23.34	18.97	14.61	10.24	5.87	5.79	10.16	14.53	18.89	20.48
Tu, kN-m:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stirrup:	#3+3r	#3+3r	#3	#3	#3	#3	#3	#3	#3	#3+3r	#3+3r
Spacing, mm:	30	30	70	70	70	70	70	70	70	30	30

DESIGN



ANEXO

RESULTADO DISEÑO DE ELEMENTOS NO ESTRUCTURALES

GEOMETRÍA DEL MURO

Longitud del Muro (m)	**3**
Espesor nominal del Muro, t (m)	**0.12**
Altura Libre del Muro (m)	**1.40**
Muro Simplemente Apoyado	

CONSTANTES DE DISEÑO

Resistencia a Compresión Mampostería f'm (kg/cm2)	**80**
Límite de Fluencia del Acero, Fy (kg/cm2)	**4200**
Factor de Sobrepeso por Revoque del Muro	**1**
Peso Unitario de la Mampostería (kg/m3)	**1300**
Tipo de Mortero	**M**
Módulo de Elasticidad Mampostería, Em (kg/cm2)	**450000**

UBICACIÓN DEL MURO A ANALIZAR

Tipo de Muro según su Ubicación en Planta	**Interior**
Aceleración de Piso, Ax, Considerada	**1.375**

COEF DE CAPAC. DE DISIPACION Rp (mínimo)

Deriva de Piso (cm)	**3.60**
Grado Desempeño Mínimo Req	**Superior**

MATERIAL DEL LADRILLO

Material Bloque o Ladrillo	**Arcilla**

Ecuaciones Básicas NSR-10

Fp(1) = (Ax Ap / Rp) gMp

Fp(2) = (Aa I/2) gMp

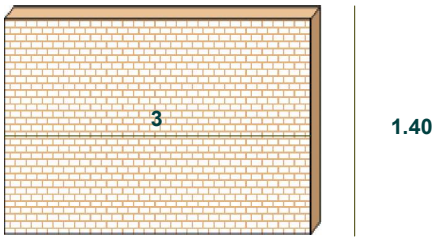
Fp = Máx (Fp(1) , Fp(2))

Simbología

Mp = Masa del Elemento No Estructural
g = Aceleración de la Gravedad
Ax = Aceler Horizl del Elem No Estruct
I = Coeficiente de Importancia
Ap = Coef de Amplific Dinámica del Elem
Rp = Coef Capac Disp de Energ del Elem
Fp = Fuerza Sísmica sobre Elem No Estr

RESULTADOS GENERALES

Peso del Muro =	**0.22 t/m**
Coef de Amplif Dinámica del Elemento No Estr, ap =	**1**
Coef de Disipación de Energía del Elem No Estr, Rp =	**3**
Fuerza Horz Sísmica sobre el Elemento Fp (Ecuac 1) =	**0.1 t/m**
Fuerza Horz Sísmica sobre el Elemento Fp (Ecuac 2) =	**0.03 t/m**
Fuerza Horz Sísmica Fp dominante =	**0.1 t/m**



SOLICITACIONES POR LA FUERZA SÍSMICA Fp

Reacción en el Apoyo Inferior =	**50 kg / m**
Reacción en el Apoyo Superior =	**50 kg / m**
Momento Máx Positivo =	**35 kg-m/m**
Momento Máx Negativo =	**-**
Momento Máx Absoluto =	**35 kg-m/m**

SOLICITACIONES POR LA DERIVA DE PISO

Ángulo del Muro (por desplazam -deriva-) =	**1.5 º**
Fuerza Fpp (por desplazam -deriva-) =	**5.61 kg / m**
Momento Máx (por desplazam -deriva-) =	**2 kg-m / m**
Cortante Máx por Desplazam (Fpp/2) =	**2.81 kg / m**

ENVOLVENTE DE SOLICITACIONES

Momento Máximo =	**37 kg-m / m**
Cortante Máximo =	**52.9 kg / m**

Aa: Coeficiente de Aceleración Pico Efectiva
Desempeño: Comportamiento del Elemento ante ocurr del Sismo
Anclajes Especiales : Rp = 6
Anclajes Dúctiles: Rp = 6
Anclajes No Dúctiles : Rp = 1.5

ESFUERZOS ADMISIBLES : COMPRESIÓN AXIAL

Altura h'	**1.4 m**
Espesor Efectivo, t	**11 cm**
Espesor Equivalente, teq	**6.8 cm**
Coeficiente de Esbeltez, Re =	**0.923**
Módulo Elasticidad Mampostería =	**60000 kg/cm2**
Módulo Elasticidad del Acero =	**2000000 kg/cm2**
Esfuerzo Admisible, Fa =	**14.77 kg/cm2**
Esfuerzo Actuante, fa =	**0.32 kg/cm2**
Revisión del Esfuerzo Adms Fa :	**Fa > fa <OK>**

ESFUERZOS COMBINADOS

fa / Fa + fb / Fb =	**0.261**
Revisión fa/Fa + fb/Fb <= 1.33	**fa/Fa+fb/Fb <=1.33**

ESFUERZOS ADMISIBLES : ACERO

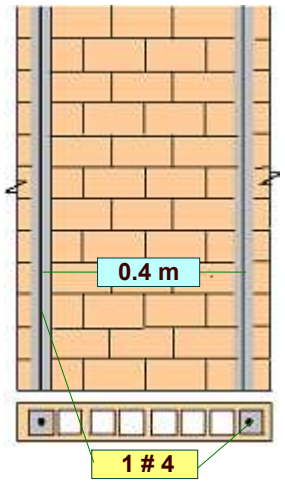
Esfuerzo Admsible Fs =	**2261 kg/cm2 (inc**
Esfuerzo Actuante fs =	**250.57 kg/cm2**
Revisión del Esfuerzo Adms Fs :	**Fs adm > fs act <OK>**

ESFUERZOS ADMISIBLES: COMPRESIÓN POR FLEXIÓN

Ancho b =	**100 cm (1 m)**
Brazo Efect de la Armadura, d =	**5.5 cm**
Área de Acero As =	**3.17 cm2 / m**
n =	**33.33**
Relación de Acero Rho =	**0.0058**
k =	**0.457**
j =	**0.848**
Esfuerzo Admisible, Fb =	**26.4 kg/cm2**
Esfuerzo Actuante fb =	**6.32 kg/cm2**
Revisión del Esfuerzo Adms Fb :	**Fb > fb <OK>**

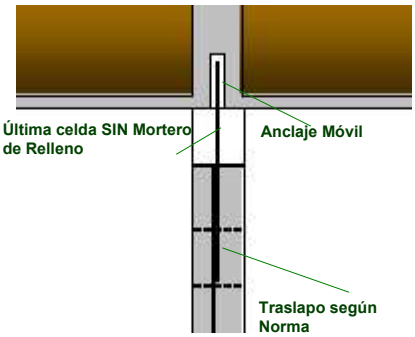
ESFUERZOS ADMISIBLES : CORTANTE

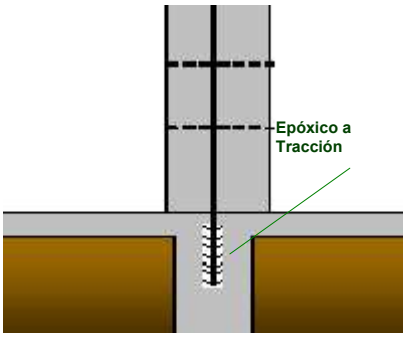
Cortante V =	**52.9 kg/m muro**
Esfuerzo Admsible Fv =	**2.33 kg/cm2**
Esfuerzo Actuante fv =	**0.11 kg/cm2**
Revisión del Esfuerzo Adms Fv :	**Fv > fv <OK>**



ESQUEMAS APROXIMADOS SUGERIDOS

Corte Típico parte SUP Muro





Corte Típico parte INF Muro

GEOMETRÍA DEL MURO

Longitud del Muro (m)	3
Espesor nominal del Muro, t (m)	0.12
Altura Libre del Muro (m)	1.10
Muro en Voladizo	

CONSTANTES DE DISEÑO

Resistencia a Compresión Mampostería f'm (kg/cm2)	80
Límite de Fluencia del Acero, Fy (kg/cm2)	4200
Factor de Sobrepeso por Revoque del Muro	1
Peso Unitario de la Mampostería (kg/m3)	1300
Tipo de Mortero	M
Módulo de Elasticidad Mampostería, Em (kg/cm2)	450000

UBICACIÓN DEL MURO A ANALIZAR

Tipo de Muro según su Ubicación en Planta	Interior
Aceleración de Piso, Ax, Considerada	1.375

RESULTADOS GENERALES

Peso del Muro =	0.17 t/m
Coef de Amplif Dinámica del Elemento No Estr, ap =	2.5
Coef de Disipación de Energía del Elem No Estr, Rp =	3
Fuerza Horz Sísmica sobre el Elemento Fp (Ecuac 1) =	0.2 t/m
Fuerza Horz Sísmica sobre el Elemento Fp (Ecuac 2) =	0.03 t/m
Fuerza Horz Sísmica Fp dominante =	0.2 t/m

SOLICITACIONES POR LA FUERZA SÍSMICA Fp

Reacción en el Apoyo Inferior =	196.6 kg / m
Reacción en el Apoyo Superior =	0 kg / m
Momento Máx Positivo =	-
Momento Máx Negativo =	108.1 kg-m/m
Momento Máx Absoluto =	108.1 kg-m/m

COEF DE CAPAC. DE DISIPACION Rp (mínimo)

Deriva de Piso (cm)	3.60
Grado Desempeño Mínimo Req	Superior

MATERIAL DEL LADRILLO

Material Bloque o Ladrillo	Arcilla

Ecuaciones Básicas NSR-10

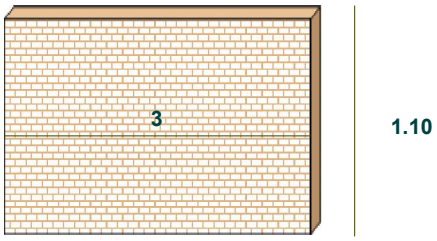
Fp(1) = (Ax Ap / Rp) gMp

Fp(2) = (Aa I/2) gMp

Fp = Máx (Fp(1) , Fp(2))

Simbología

Mp = Masa del Elemento No Estructural
g = Aceleración de la Gravedad
Ax = Aceler Horizl del Elem No Estruct
I = Coeficiente de Importancia
Ap = Coef de Amplific Dinámica del Elem
Rp = Coef Capac Disp de Energ del Elem
Fp = Fuerza Sísmica sobre Elem No Estr



ENVOLVENTE DE SOLICITACIONES

Momento Máximo =	108.1 kg-m / m
Cortante Máximo =	196.6 kg / m

ESFUERZOS ADMISIBLES : COMPRESIÓN AXIAL

Altura h'	1.1 m
Espesor Efectivo, t	11 cm
Espesor Equivalente, teq	6.8 cm
Coeficiente de Esbeltez, Re =	0.952
Módulo Elasticidad Mampostería =	60000 kg/cm2
Módulo Elasticidad del Acero =	2000000 kg/cm2
Esfuerzo Admisible, Fa =	15.24 kg/cm2
Esfuerzo Actuante, fa =	0.25 kg/cm2
Revisión del Esfuerzo Adms Fa :	Fa > fa <OK>

ESFUERZOS COMBINADOS

fa / Fa + fb / Fb =	0.716
Revisión fa/Fa + fb/Fb <= 1.33	fa/Fa+fb/Fb <=1.33

ESFUERZOS ADMISIBLES : ACERO

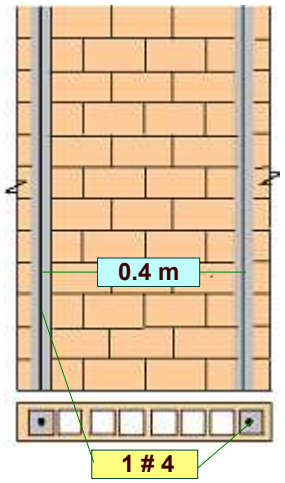
Esfuerzo Admsible Fs =	2261 kg/cm2 (inc
Esfuerzo Actuante fs =	732.36 kg/cm2
Revisión del Esfuerzo Adms Fs :	Fs adm > fs act <OK>

ESFUERZOS ADMISIBLES: COMPRESIÓN POR FLEXIÓN

Ancho b =	100 cm (1 m)
Brazo Efect de la Armadura, d =	5.5 cm
Área de Acero As =	3.17 cm2 / m
n =	33.33
Relación de Acero Rho =	0.0058
k =	0.457
j =	0.848
Esfuerzo Admisible, Fb =	26.4 kg/cm2
Esfuerzo Actuante fb =	18.47 kg/cm2
Revisión del Esfuerzo Adms Fb :	Fb > fb <OK>

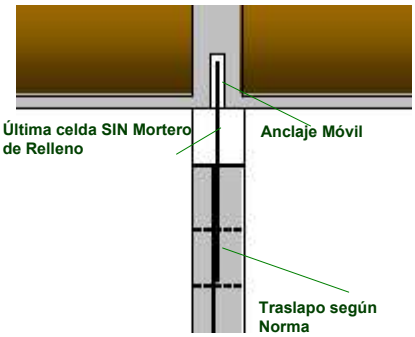
ESFUERZOS ADMISIBLES : CORTANTE

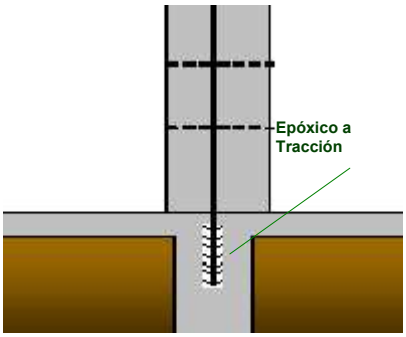
Cortante V =	196.6 kg/m muro
Esfuerzo Admsible Fv =	2.33 kg/cm2
Esfuerzo Actuante fv =	0.42 kg/cm2
Revisión del Esfuerzo Adms Fv :	Fv > fv <OK>



ESQUEMAS APROXIMADOS SUGERIDOS

Corte Típico parte SUP Muro





Corte Típico parte INF Muro

Proyecto: Fecha: 7/02/2025

Reporte: **ANÁLISIS SÍSMICO DE MUROS NO ESTRUCTURALES**

GEOMETRÍA DEL MURO

Longitud del Muro (m)	**3**
Espesor nominal del Muro, t (m)	**0.12**
Altura Libre del Muro (m)	**1.55**
Muro Simplemente Apoyado	

COEF DE CAPAC. DE DISIPACION Rp (mínimo)

Deriva de Piso (cm)	**3.60**
Grado Desempeño Mínimo Req	**Superior**

MATERIAL DEL LADRILLO

Material Bloque o Ladrillo	**Arcilla**

CONSTANTES DE DISEÑO

Resistencia a Compresión Mampostería f'm (kg/cm2)	**80**
Límite de Fluencia del Acero, Fy (kg/cm2)	**4200**
Factor de Sobrepeso por Revoque del Muro	**1**
Peso Unitario de la Mampostería (kg/m3)	**1300**
Tipo de Mortero	**M**
Módulo de Elasticidad Mampostería, Em (kg/cm2)	**450000**

UBICACIÓN DEL MURO A ANALIZAR

Tipo de Muro según su Ubicación en Planta	**de Fachada**
Aceleración de Piso, Ax, Considerada	**1.375**

Ecuaciones Básicas NSR-10

Fp(1) = (Ax Ap / Rp) gMp

Fp(2) = (Aa I/2) gMp

Fp = Máx (Fp(1) , Fp(2))

Simbología

Mp = Masa del Elemento No Estructural

g = Aceleración de la Gravedad

Ax = Aceler Horizl del Elem No Estruct

I = Coeficiente de Importancia

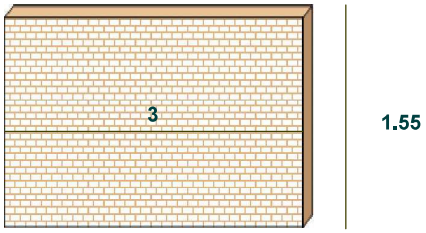
Ap = Coef de Amplific Dinámica del Elem

Rp = Coef Capac Disp de Energ del Elem

Fp = Fuerza Sísmica sobre Elem No Estr

RESULTADOS GENERALES

Peso del Muro =	**0.24 t/m**
Coef de Amplif Dinámica del Elemento No Estr, ap =	**1**
Coef de Disipación de Energía del Elem No Estr, Rp =	**3**
Fuerza Horz Sísmica sobre el Elemento Fp (Ecuac 1) =	**0.11 t/m**
Fuerza Horz Sísmica sobre el Elemento Fp (Ecuac 2) =	**0.04 t/m**
Fuerza Horz Sísmica Fp dominante =	**0.11 t/m**



SOLICITACIONES POR LA FUERZA SÍSMICA Fp

Reacción en el Apoyo Inferior =	**73.7 kg / m**
Reacción en el Apoyo Superior =	**73.7 kg / m**
Momento Máx Positivo =	**57.1 kg-m/m**
Momento Máx Negativo =	**-**
Momento Máx Absoluto =	**57.1 kg-m/m**

SOLICITACIONES POR LA DERIVA DE PISO

Ángulo del Muro (por desplazam -deriva-) =	**1.3 º**
Fuerza Fpp (por desplazam -deriva-) =	**5.61 kg / m**
Momento Máx (por desplazam -deriva-) =	**2.2 kg-m / m**
Cortante Máx por Desplazam (Fpp/2) =	**2.81 kg / m**

ENVOLVENTE DE SOLICITACIONES

Momento Máximo =	**59.3 kg-m / m**
Cortante Máximo =	**76.5 kg / m**

Aa: Coeficiente de Aceleración Pico Efectiva

Desempeño: Comportamiento del Elemento ante ocurr del Sismo

Anclajes Especiales : Rp = 6

Anclajes Dúctiles: Rp = 6

Anclajes No Dúctiles : Rp = 1,5

ESFUERZOS ADMISIBLES : COMPRESIÓN AXIAL

Altura h'	1.55 m
Espesor Efectivo, t	11 cm
Espesor Equivalente, teq	6.8 cm
Coeficiente de Esbeltez, Re =	0.905
Módulo Elasticidad Mampostería =	60000 kg/cm2
Módulo Elasticidad del Acero =	2000000 kg/cm2
Esfuerzo Admisible, Fa =	14.49 kg/cm2
Esfuerzo Actuante, fa =	0.36 kg/cm2
Revisión del Esfuerzo Adms Fa :	Fa > fa <OK>

ESFUERZOS COMBINADOS

fa / Fa + fb / Fb =	0.408
Revisión fa/Fa + fb/Fb <= 1.33	fa/Fa+fb/Fb

ESFUERZOS ADMISIBLES : ACERO

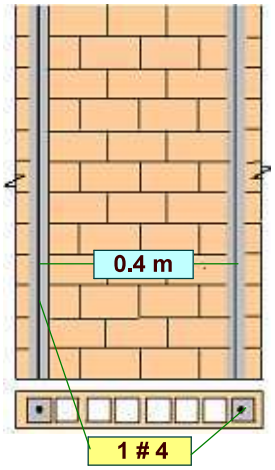
Esfuerzo Admsible Fs =	2261 kg/cm2 (inc
Esfuerzo Actuante fs =	401.53 kg/cm2
Revisión del Esfuerzo Adms Fs :	Fs adm > fs act <OK>

ESFUERZOS ADMISIBLES: COMPRESIÓN POR FLEXIÓN

Ancho b =	100 cm (1 m)
Brazo Efect de la Armadura, d =	5.5 cm
Área de Acero As =	3.17 cm2 / m
n =	33.33
Relación de Acero Rho =	0.0058
k =	0.457
j =	0.848
Esfuerzo Admisible, Fb =	26.4 kg/cm2
Esfuerzo Actuante fb =	10.13 kg/cm2
Revisión del Esfuerzo Adms Fb :	Fb > fb <OK>

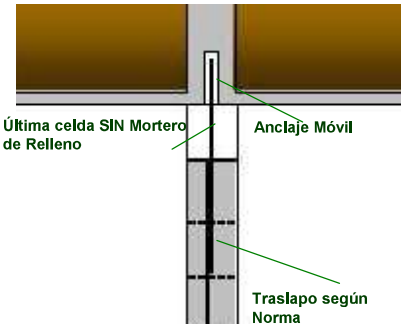
ESFUERZOS ADMISIBLES : CORTANTE

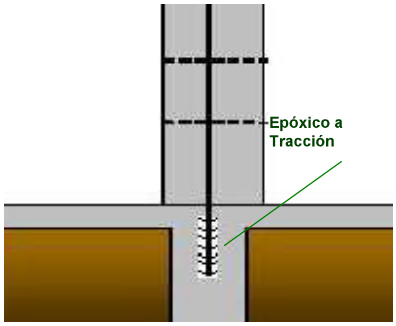
Cortante V =	76.5 kg/m muro
Esfuerzo Admsible Fv =	2.33 kg/cm2
Esfuerzo Actuante fv =	0.16 kg/cm2
Revisión del Esfuerzo Adms Fv :	Fv > fv <OK>



ESQUEMAS APROXIMADOS SUGERIDOS

Corte Típico parte SUP Muro





Corte Típico parte INF Muro

Cálculo ingeniamos

ANEXO
RESULTADO DISEÑO DE CORREAS

Memorias de Cálculo

PROGRAMA DE DISENO Y CALCULO ESTRUCTURAL
ARQUIMET 2.0

Proyecto: _____ Fecha: _____

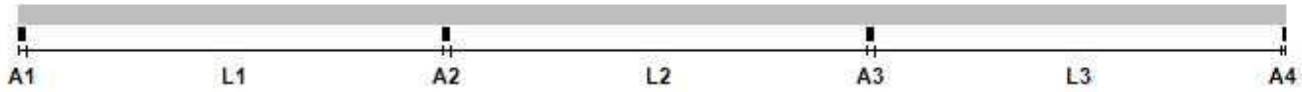
Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR Cajón 120 x 60 x 15 (1.20 mm)
con Fy = 35.15 Kgf/mm² cada 1.20 m sin arriostramiento interior.

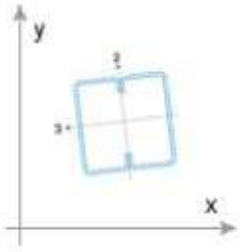
SECCION LONGITUDINAL

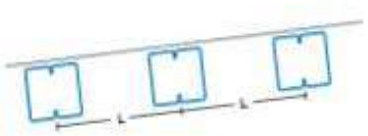


L1	4.97 m
L2	4.97 m
L3	4.87 m
A1	0.10 m
A2	0.10 m
A3	0.10 m
A4	0.05 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.41 KN/m²
Peso propio correa	0.05 KN/m
Carga viva	0.50 KN/m²
Carga granizo	0.10 KN/m²
Viento compresión (Perpendicular)	0.50 KN/m²
Viento succión (Perpendicular)	-0.50 KN/m²
Pendiente sección transversal	6.843° = 12.0000%

SECCION TRANSVERSAL





L = 1.20 m

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTES DE DISEÑO

REPORTE FLEXION				
	Apoyos		Interiores	
Ejes locales	3	2	3	2
Resistente (KN.m)	6.4143	4.4761	6.4143	4.4761
Calculado (KN.m)	4.9157	0.4965	4.9157	0.4965

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	29.9588	44.8965
Calculado (KN)	5.6254	0.5682

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0188	0.0282
Calculado (m)	0.0090	0.0172

REPORTE ARRUGAMIENTO	
No. de Apoyo	0
Resistencia máxima (Kgf)	3.8357
Arrugamiento (Kgf)	7.7165

COMBINACIONES DE CARGA					
No	Muerta	Viva	Granizo	Viento compresión	Viento succión
1	1.4000	0.0000	0.0000	0.0000	0.0000
2	1.2000	0.5000	0.0000	0.0000	0.0000
3	1.2000	0.0000	0.5000	0.0000	0.0000
4	1.2000	1.6000	0.0000	0.5000	0.0000
5	1.2000	0.0000	1.6000	0.5000	0.0000
6	1.2000	1.6000	0.0000	0.0000	0.5000
7	1.2000	0.0000	1.6000	0.0000	0.5000
8	1.2000	0.5000	0.0000	0.0000	1.0000
9	1.2000	0.0000	0.5000	0.0000	1.0000
10	1.2000	0.5000	0.0000	1.0000	0.0000
11	1.2000	0.0000	0.5000	1.0000	0.0000
12	0.9000	0.0000	0.0000	0.0000	1.0000
13	0.9000	0.0000	0.0000	1.0000	0.0000

REACCIONES - EJES GLOBALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1		
Combinacion	Rx	Ry
Muerta	-2.7749E-08	1.0910
Viva de Cub.	3.2088E-09	1.2141
Granizo	6.0464E-10	0.2428
Viento Comp.	-0.1447	1.2055
Viento Succion	0.0000	0.0000
Comb. 1	-5.3558E-08	1.5274
Comb. 2	-2.9392E-08	1.9163
Comb. 3	-3.0973E-08	1.4306
Comb. 4	-0.0723	3.8545
Comb. 5	-0.0723	2.3005
Comb. 6	-3.4703E-08	3.2518
Comb. 7	-3.9315E-08	1.6978
Comb. 8	-2.9392E-08	1.9163
Comb. 9	-3.0973E-08	1.4306
Comb. 10	-0.1447	3.1217
Comb. 11	-0.1447	2.6361
Comb. 12	-2.1483E-08	0.9819
Comb. 13	-0.1447	2.1874

APOYO 2		
Combinacion	Rx	Ry
Muerta	-3.0090E-08	3.0215
Viva de Cub.	7.8935E-09	3.3624
Granizo	-1.2999E-10	0.6725
Viento Comp.	-0.4006	3.3384
Viento Succion	0.0000	0.0000
Comb. 1	-1.3302E-08	4.2301
Comb. 2	1.5648E-09	5.3070
Comb. 3	-5.2405E-08	3.9621
Comb. 4	-0.2003	10.6748
Comb. 5	-0.2003	6.3710
Comb. 6	-2.3478E-08	9.0056
Comb. 7	-4.9985E-08	4.7018
Comb. 8	1.5648E-09	5.3070
Comb. 9	-5.2405E-08	3.9621
Comb. 10	-0.4006	8.6454
Comb. 11	-0.4006	7.3005
Comb. 12	-1.6086E-08	2.7194
Comb. 13	-0.4006	6.0578

APOYO 3		
Combinacion	Rx	Ry
Muerta	5.7603E-10	2.9582
Viva de Cub.	-1.4893E-08	3.2919
Granizo	1.5901E-09	0.6584
Viento Comp.	-0.3922	3.2684
Viento Succion	0.0000	0.0000
Comb. 1	-7.2159E-09	4.1414
Comb. 2	-1.0024E-08	5.1957
Comb. 3	-3.1763E-09	3.8790
Comb. 4	-0.1961	10.4510
Comb. 5	-0.1961	6.2374
Comb. 6	-7.6861E-09	8.8168
Comb. 7	-1.0731E-08	4.6032
Comb. 8	-1.0024E-08	5.1957
Comb. 9	-3.1763E-09	3.8790
Comb. 10	-0.3922	8.4642
Comb. 11	-0.3922	7.1474
Comb. 12	-2.5333E-08	2.6624
Comb. 13	-0.3922	5.9308

APOYO 4		
Combinacion	Rx	Ry
Muerta	-2.1368E-09	1.0628
Viva de Cub.	-2.4684E-08	1.1827
Granizo	-1.7239E-09	0.2365
Viento Comp.	-0.1409	1.1742
Viento Succion	0.0000	0.0000
Comb. 1	-7.0027E-09	1.4879
Comb. 2	-2.0998E-08	1.8667
Comb. 3	-3.9927E-09	1.3936
Comb. 4	-0.0705	3.7547
Comb. 5	-0.0705	2.2409
Comb. 6	-2.6904E-08	3.1676
Comb. 7	-8.7398E-09	1.6538
Comb. 8	-2.0998E-08	1.8667
Comb. 9	-3.9927E-09	1.3936
Comb. 10	-0.1409	3.0409
Comb. 11	-0.1409	2.5678
Comb. 12	3.3514E-09	0.9565
Comb. 13	-0.1409	2.1307

FUERZAS INTERNAS - EJES LOCALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1				
Combinacion	R2	R3	M2	M3
Muerta	0.1300	1.0833	0.0000	7.6614E-08
Viva de Cub.	0.1447	1.2055	-1.9154E-08	0.0000
Granizo	0.0289	0.2411	-4.7884E-09	1.9154E-08
Viento Comp.	0.0000	1.2141	0.0000	7.6614E-08
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.1820	1.5166	0.0000	1.0726E-07
Comb. 2	0.2283	1.9026	-9.5768E-09	9.1937E-08
Comb. 3	0.1705	1.4205	-2.3942E-09	1.0151E-07
Comb. 4	0.3875	3.8357	-3.0646E-08	1.3024E-07
Comb. 5	0.2023	2.2927	-7.6614E-09	1.6089E-07
Comb. 6	0.3875	3.2286	-3.0646E-08	9.1937E-08
Comb. 7	0.2023	1.6857	-7.6614E-09	1.2258E-07
Comb. 8	0.2283	1.9026	-9.5768E-09	9.1937E-08
Comb. 9	0.1705	1.4205	-2.3942E-09	1.0151E-07
Comb. 10	0.2283	3.1167	-9.5768E-09	1.6855E-07
Comb. 11	0.1705	2.6346	-2.3942E-09	1.7813E-07
Comb. 12	0.1170	0.9749	0.0000	6.8953E-08
Comb. 13	0.1170	2.1890	0.0000	1.4557E-07

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.3600	3.0000	0.1666	-1.3883
Viva de Cub.	0.4006	3.3384	0.1854	-1.5449
Granizo	0.0801	0.6677	0.0371	-0.3090
Viento Comp.	0.0000	3.3624	0.0000	-1.5560
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.5040	4.2000	0.2332	-1.9436
Comb. 2	0.6323	5.2692	0.2926	-2.4383
Comb. 3	0.4721	3.9338	0.2185	-1.8204
Comb. 4	1.0730	10.6226	0.4965	-4.9157
Comb. 5	0.5602	6.3495	0.2592	-2.9382
Comb. 6	1.0730	8.9414	0.4965	-4.1377
Comb. 7	0.5602	4.6683	0.2592	-2.1603
Comb. 8	0.6323	5.2692	0.2926	-2.4383
Comb. 9	0.4721	3.9338	0.2185	-1.8204
Comb. 10	0.6323	8.6316	0.2926	-3.9943
Comb. 11	0.4721	7.2962	0.2185	-3.3764
Comb. 12	0.3240	2.7000	0.1499	-1.2494
Comb. 13	0.3240	6.0624	0.1499	-2.8054

APOYO 3				
Combinacion	R2	R3	M2	M3
Muerta	0.3525	2.9371	0.1593	-1.3273
Viva de Cub.	0.3922	3.2684	0.1773	-1.4771
Granizo	0.0784	0.6537	0.0355	-0.2954
Viento Comp.	0.0000	3.2919	0.0000	-1.4877
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.4934	4.1119	0.2230	-1.8583
Comb. 2	0.6191	5.1587	0.2798	-2.3313
Comb. 3	0.4622	3.8514	0.2089	-1.7405
Comb. 4	1.0505	10.3999	0.4747	-4.6999
Comb. 5	0.5485	6.2164	0.2479	-2.8093
Comb. 6	1.0505	8.7540	0.4747	-3.9561
Comb. 7	0.5485	4.5704	0.2479	-2.0655
Comb. 8	0.6191	5.1587	0.2798	-2.3313
Comb. 9	0.4622	3.8514	0.2089	-1.7405
Comb. 10	0.6191	8.4506	0.2798	-3.8190
Comb. 11	0.4622	7.1432	0.2089	-3.2282
Comb. 12	0.3172	2.6434	0.1434	-1.1946
Comb. 13	0.3172	5.9353	0.1434	-2.6823

APOYO 4				
Combinacion	R2	R3	M2	M3
Muerta	0.1266	1.0552	-9.5768E-08	-4.5969E-07
Viva de Cub.	0.1409	1.1742	-3.8307E-08	-1.5323E-07
Granizo	0.0282	0.2348	-4.7884E-09	3.8307E-08
Viento Comp.	0.0000	1.1827	0.0000	-4.5969E-07
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.1773	1.4773	-1.3408E-07	-6.4356E-07
Comb. 2	0.2224	1.8534	-1.3408E-07	-6.2824E-07
Comb. 3	0.1660	1.3837	-1.1732E-07	-5.3247E-07
Comb. 4	0.3774	3.7363	-1.7621E-07	-1.0266E-06
Comb. 5	0.1970	2.2333	-1.2258E-07	-7.2018E-07
Comb. 6	0.3774	3.1450	-1.7621E-07	-7.9679E-07
Comb. 7	0.1970	1.6420	-1.2258E-07	-4.9033E-07
Comb. 8	0.2224	1.8534	-1.3408E-07	-6.2824E-07
Comb. 9	0.1660	1.3837	-1.1732E-07	-5.3247E-07
Comb. 10	0.2224	3.0360	-1.3408E-07	-1.0879E-06
Comb. 11	0.1660	2.5663	-1.1732E-07	-9.9216E-07
Comb. 12	0.1140	0.9497	-8.6191E-08	-4.1372E-07
Comb. 13	0.1140	2.1323	-8.6191E-08	-8.7340E-07

ANEXO
CHEQUEO UMBRAL DE DAÑO

UMBRAL DE DAÑO

A.12.3 — ESPECTRO SÍSMICO PARA EL UMBRAL DE DAÑO

A.12.3.1 — Los parámetros para determinar el espectro de aceleraciones horizontales para el umbral de daño en el campo elástico, para un amortiguamiento crítico de dos por ciento (2%), que se debe utilizar en las verificaciones del umbral de daño, se dan en la figura A.12.3-1. El espectro del umbral de daño se define por medio de la ecuación A.12.3-1, en la cual el valor T es el mismo que se utilizó para obtener el espectro sísmico de diseño de la edificación en el Capítulo A.2 y el valor de $\overline{S}$ es igual a $1.25F_v$, siendo F_v el valor del coeficiente de amplificación que afecta la aceleración en la zona de períodos intermedios debida a los efectos de sitio que se obtiene de acuerdo con la sección A.2.4, empleando allí para A_v el valor de A_d según A.12.2. Además deben cumplirse las limitaciones dadas en A.12.3.2 a A.12.3.4.

$$S_{ad} = \frac{1.5A_d\overline{S}}{T} \qquad \textbf{(A.12.3-1)}$$

A.12.3.2 — Para períodos de vibración menores de 0.25 segundos, el espectro sísmico del umbral de daño puede obtenerse de la ecuación A.12.3-2.

$$S_{ad} = A_d(1.0 + 8T) \qquad \textbf{(A.12.3-2)}$$

A.12.3.3 — Para períodos de vibración mayores de 0.25 segundos y menores de T_{Cd}, calculado de acuerdo con la ecuación A.12.3-3, el valor de S_{ad} puede limitarse al obtenido de la ecuación A.12.3-4.

$$T_{Cd} = 0.5\overline{S} \qquad \textbf{(A.12.3-3)}$$

y

$$S_{ad} = 3.0A_d \qquad \textbf{(A.12.3-4)}$$

A.12.3.4 – Para períodos de vibración mayores de T_{Ld}, calculado de acuerdo con la ecuación A.12.3-5, el valor de S_{ad} puede limitarse al obtenido de la ecuación A.12.3-6.

$$T_{Ld} = 2.4\overline{S} \qquad \textbf{(A.12.3-5)}$$

$$S_{ad} = \frac{1.5A_d\overline{S}T_{Ld}}{T^2} \qquad \textbf{(A.12.3-6)}$$

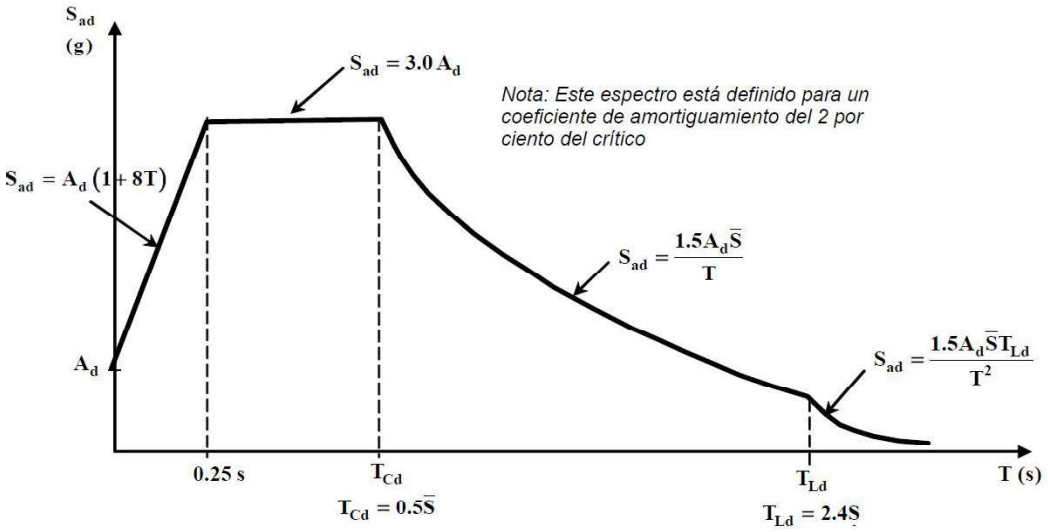


Figura A.12.3-1 — Espectro de aceleraciones horizontales elástico del umbral de daño

DATOS PRELIMINARES

Ad=	0.04	Ataco	según apendice A-4	
Fv=	2			
T=X	0.3586		>0.25	VERDADERO
T=Y	0.3586		>0.25	VERDADERO

Ŝ=1.25 fv				
Ŝ=	2.5			
Tcd= 0.5Ŝ	1.25		T<Tcd	VERDADERO (A.12.3.3)
Sad=3.Ad				
Sad=	0.12			

A.12.4.3.2 — *Fuerzas sísmicas horizontales del umbral de daño* — Las fuerzas sísmicas correspondientes a los movimientos sísmicos del umbral de daño corresponden a la distribución en la altura de la edificación del cortante sísmico en la base, V_{sd}. Este cortante sísmico en la base es equivalente a la totalidad de los efectos inerciales horizontales producidos por los movimientos sísmicos del umbral de daño, en la dirección en estudio, y se obtiene por medio de la siguiente ecuación:

$$V_{sd} = S_{ad}\, g\, M \qquad \text{(A.12.4-1)}$$

Vsd=Sad*g*M

g=	9.8	m/s^2		
M=	3307.55	KN	337270.874	Kg
Vsd=	396.91	KN	SE CAMBIA EN ANALISIS SISMICO	

VERIFICACION DE DERIVAS

Tabla A.12.5-1
Derivas máximas para el umbral de daño como porcentaje de h_{pi}

Estructuras de:	Deriva máxima
concreto reforzado, metálicas, de madera, y de mampostería que cumplen los requisitos de A.12.5.3.1	$0.40\% \left(\Delta^{i}_{max} \le 0.0040\, h_{pi}\right)$
de mampostería que cumplen los requisitos de A.12.5.3.2	$0.20\% \left(\Delta^{i}_{max} \le 0.0020\, h_{pi}\right)$

hpi=	7.2	m
0.0040*hpi=	0.0288	**DERIVA MAXIMA**

SEGÚN REPORTE DE DERIVAS	DX=	0.0008	VERDADERO
	DY=	0.0009	VERDADERO

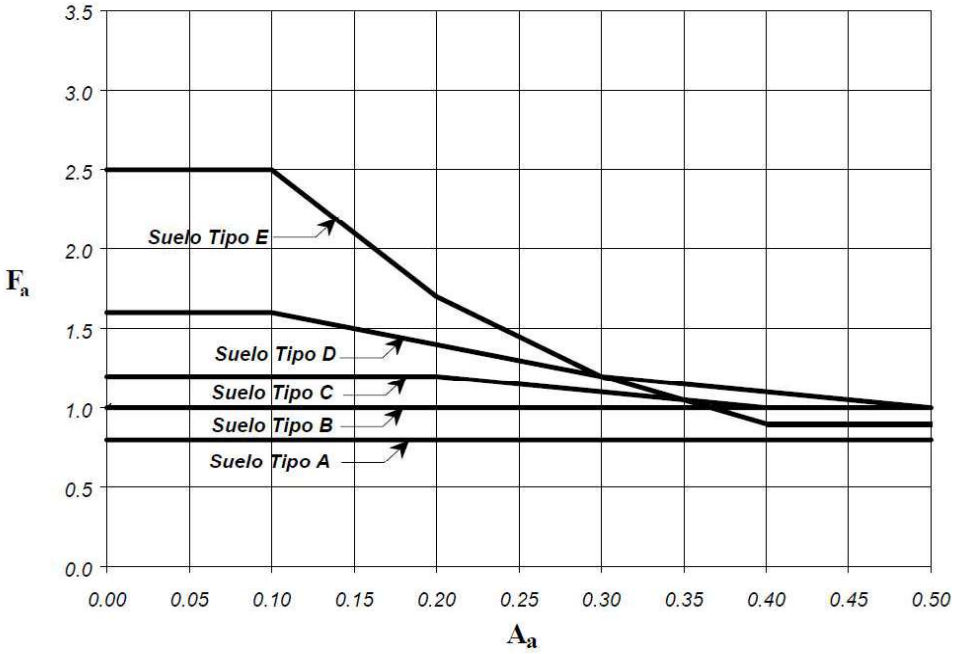


Figura A.2.4-1 - Coeficiente de amplificación F_a del suelo para la zona de períodos cortos del espectro

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S E I S M I C D E S I G N C O D E : COL NSR-10

```
============================================================
 S E I S M I C   B A S E   L E V E L :  1
============================================================


S E I S M I C   F O R C E   R E S I S T I N G   S Y S T E M

System X-Direction:   C: Moment Res.Frame
System Y-Direction:   C: Moment Res.Frame
------------------------------------------------------------
Energy dissip capacity: 3: Special-DES
------------------------------------------------------------
```

EQUIVALENT STATIC EARTHQUAKE FORCES COL NSR-10

Base Shear

V = Sa W
Sa = 1.2 Av Fv I/ T, Sa = 1.2 Av Fv Tl/T² for T >Tl
Sa = 2.5 Aa Fa I for T<Tc, where Tc = 0.48 AvFv/AaFa

```
S E I S M I C   P A R A M E T E R S

Eff. peak acceleration & veloc., Aa =   0.25     Av =   0.20

   Region:      10    9     8     7     6     5     4     3     2     1
   Aa or Av    0.50  0.45  0.40  0.35  0.30  0.25  0.20  0.15  0.10  0.05

   LOCATION                                          Aa     Av     Menace
   Barranquilla, Cartagena, San Andres, Valledupar  0.10   0.10    Low
   Bogota, Medellin                                 0.15   0.20    Interm
   Armenia, Bucaramanga, Cali, Manizalez, Pereira   0.25   0.25    High
   Cucuta, Villavicencio                            0.35   0.30    High
   Quibdo                                           0.35   0.35    High

Importance coefficient, I ........ =     1.25

   GROUP                                          COEFFICIENT
   IV - Essential facilities                          1.50
   III- Public assistance facilities                  1.25
   II - Especial occupancy buildings                  1.10
   I  - Normal occupancy buildings                    1.00

Site profile type, S ............ =      D

   TYPE   SOIL PROFILE TYPE          Shear Wave Velocity
    A     Hard Rock                        > 1500 m/s
    B     Rock                        1500 - 760 m/s
    C     Very Dense Soil & Soft Rock  760 - 360 m/s
    D     Stiff Soil Profile           360 - 180 m/s
    E     Soft Soil Profile                < 180 m/s
    F     Soils requiring site-specific evaluations

                                    X-direction   Y-direction
                                    -----------   -----------
Seismic Force-resisting system     = C: Moment      C: Moment
Energy Dissipation Coefficient, Ro =    7              7

Computed fundamental period (sec)  =     .405         .409
          T = 0.1 N ............. =     .2           .2
         Ta = Ct (Hn)^x ......... =  0.047 H^0.9   0.047 H^0.9
                                    =    .28           .28
        *Tmax: 1.7 Ta  .......... =    .48           .48
        *Tmax = Cu Ta
                Cu = 1.75 - 1.2 Av Fv  >= 1.2

Fundamental period, T ............ =     .405          .409
```

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DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS

	Short Periods	Long Periods
Effect. peak acceleration & velc.,	Aa = 0.25	Av = 0.20
Site coefficients (Tables below),	Fa = 1.30	Fv = 2.00

Design response parameters, Aa Fa = 0.33 Av Fv= 0.40

Long-period transition period, Tl sec = 4.80 (2.4 Fv)

Site Coefficient Fa

Site Class	Aa<=0.1	Aa=0.2	Aa=0.3	Aa=0.4	Ss>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	a	a	a	a	a

Site Coefficient Fv

Site Class	Av<=0.1	Av=0.2	Av=0.3	Av=0.4	Av>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	a	a	a	a	a

a: Site-specific geotechnical investigation required

VERIFYING UPPER LIMIT ON FUNDAMENTAL PERIOD

Tmax = Cu Ta
Cu = 1.75 - 1.2 Av Fv >= 1.2

Av Fv ..... = 0.4
Cu ..... = 1.27

	X-direction	Y-direction
Fundamental period (sec) . . . . . =	.405	.409
Ta (sec). . . . . =	0.28	0.28
Tmax = Cu Ta (sec). . . . . =	0.3586	0.3586
Adjusted fundamental period, T ... =	0.3586	0.3586

Reduction in R for Irregularity and Lack of Redundancy:

PLAN IRREGULARITIES			ELEVATION IRREGULARITIES		
Type	Description	Øp	Type	Description	Øa
1aP	Torsional	0.9	1aA	Flexible	0.9
1bP	Torsional Extrme	0.8	1bA	Flexible Extrme	0.8
2P	Reentrant corners	0.9	2A	Mass	0.9
3P	Diaph. discontin.	0.9	3A	Geometrical	0.9
4P	Plane shifting	0.8	4A	Plane shifting	0.8
5P	Unparallel grid	0.9	5aA	Weak Story	0.9
			5bA	Weak Story Extr	0.8

NOTE: EngSolutions RCB assumes irregular building.
For regular buildings make (Øp . Øa)= 1.0

	X - D I R E C T I O N	Y - D I R E C T I O N
Reduct. factor, (Øp.Øa) =	0.8	0.8
Redundancy factor, Ør =	1	1

R = (Øp Øa) Ør Ro

T O T A L B A S E S H E A R

Building Weight, W, (kN) = 3307.55

Peak Acceleration Coeffi., Fa Aa = .33
Peak Velocity coefficient, Fv Av = .4
Transition period, Tc . . . . . = .58
Importance factor, I . . . . . = 1.25
Site class, S . . . . . = D

	X-direction	Y-direction
Energ-disspat coeff, R =	5.6	5.6
Period, T, (sec) . . . =	.3586	.3586
1.2 Av Fv I / T =	1.673	1.673
2.5 Aa Fa I =	1.031	1.031
Sa =	1.031	1.031
Total Base Shear, V, (kN) =	396.91	396.91

A C C I D E N T A L T O R S I O N

	X-direction	Y-direction
Accidental eccentricity as a percentage of building dimension, (%)=	5	5

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A C C I D E N T A L E C C E N T R I C I T Y:

Level	X - D I R E C T I O N (EQY)			Y - D I R E C T I O N (EQX)		
-	δεxo (m)	Ax -	δεx (m)	δεyo (m)	Ax -	δεy (m)
3	0.56	1.00	0.56	0.74	1.00	0.74
2	0.56	1.00	0.56	0.74	1.00	0.74

Ax: Amplification factor for accidental eccentricity

EQY: Envelope (1) Ex = εx
(2) Ex = εx + δεx
(3) Ex = εx - δεx

EQX: Envelope (1) Ey = εy
(2) Ey = εy + δεy
(3) Ey = εy - δεy

D E S I G N E C C E N T R I C I T Y : E = ε + δε

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
-	Center Mass CMx	Inherent Eccent. εx*	Accident Eccent. δεx	Design Eccent. Ex	Center Mass CMy	Inherent Eccent. εy*	Accident Eccent. δεy	Design Eccent. Ey
3	5.74	0.82	0.56	1.3838	6.73	0.17	0.74	0.9191
2	5.66	0.75	0.56	1.3131	7.34	0.78	0.74	1.5252

Note: * Inherent eccentricity: εx = CMx - CRx and εy = CMy - CRy
All values are in meters

D E S I G N E C C E N T R I C I T Y : E = ε - δε

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
-	Center Mass CMx	Inherent Eccent. εx*	Accident Eccent. δεx	Design Eccent. Ex	Center Mass CMy	Inherent Eccent. εy*	Accident Eccent. δεy	Design Eccent. Ey
3	5.74	0.82	0.56	0.2626	6.73	0.17	0.74	-0.577
2	5.66	0.75	0.56	0.1919	7.34	0.78	0.74	0.0404

Note: * Inherent eccentricity: εx = CMx - CRx and εy = CMy - CRy
All values are in meters

Equivalent Forces

Fi = (Wi Hi^n /∑Wj Hj^n) V
V =∑Fi
V = Sa W

E Q U I V A L E N T F O R C E S: X - D I R E C T I O N (EQUAKE X)

Floor i -	Height Hi (m)	Weigth Wi (KN)	Wi Hi^n / ∑Wj Hj^n	Force Fi (KN)	Shear Vi (KN)	Torsion Ti=Fi(εy-εy) (kN-m)
3	7.19	1513	0.628	249.25	249.25	185.65
2	3.59	1794	0.372	147.65	396.91	109.34
∑		3307.55		396.91		

n = 1

E Q U I V A L E N T F O R C E S: Y - D I R E C T I O N (EQUAKE Y)

Floor i -	Height Hi (m)	Weigth Wi (KN)	Wi Hi^n / ∑Wj Hj^n	Force Fi (KN)	Shear Vi (KN)	Torsion Ti=Fi(εx-ex) (kN-m)
3	7.19	1513	0.628	249.25	249.25	140.08
2	3.59	1794	0.372	147.65	396.91	83.400
∑		3307.55		396.91		

n = 1

A C C E L E R A T I O N S O N N O N - S T R U C T U R A L E L E M E N T S - N S R - 1 0

F L O O R A C C E L E R A T I O N S

Level	hx	hx/heq	ax NSR-10	ax ASCE7-16	ax UBC-97	ax EUROCODE8	ax NZS1170.5
3	7.19	1.33	0.160	1.238	1.650	1.444	1.238
2	3.59	0.67	0.218	0.825	1.031	0.928	1.238

Seismic base level . . . . . = 1
Height above seismic base, hn . . . . . = 7.20 m
Equivalent height, heq = 0.75 hn . . . . . = 5.40 m
Ground acceleration, As = Aa Fa I . . . . . = 0.413
Spectral acceleration, Sa . . . . . = 0.120

NSR-10: ax = Sa hx/heq for hi > heq
ax = As + (Sa -As) hi/heq for hi < heq
ASCE7-16: ax = As (1 + 2 hx/ hn)
UBC-97: ax = As (1 + 3 hx/ hn)
Eurocode 8: ax = As [3/2(1+ hx/hn) - 0.5] for (Ta/T1=0)
NZS 1170.5 ax = As (1 + 2 hx/hl) for hx < hl
ax = 3 As for hx > hl (hl = 0.2 hn)
Note: RCB recommends using ASCE7-16/10 accelerations for this project

Force on structural non-seismic element : Fp = ai Wp / Ro
Force on nonstructural element : Fp = ai ap Wp / Rp
> 0.5 Aa I Wp
ap : component amplification factor

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:56:37 p. m. 7/02/2025

P-DELTA ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, Δ/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio			
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR	Axis
2	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	E-5
1	0.0008	0.0008	0.0008	0.0009	0.0008	0.0009	E-1
Maxima	0.0008	0.0008	0.0008	0.0009	0.0008	0.0009	

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: I.E JORGE ELIECER GAITAN 3:57:06 p. m. 7/02/2025

P-DELTA ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, Δ/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio			
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR	Axis
2	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	E-5
1	0.0008	0.0008	0.0008	0.0009	0.0008	0.0009	E-1
Maxima	0.0008	0.0008	0.0008	0.0009	0.0008	0.0009	

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

P-DELTA ANALYSIS - DETAILED MAXIMUM STORY DRIFT RATIO, δ/h

Story	ColAxis	$(\delta x/h)max$	$(\delta y/h)max$	$([(\delta x/h)^2 + (\delta y/h)^2]^{1/2})max$
2	A-1	0.0008	0.0006	0.0008
	C-1	0.0007	0.0005	0.0007
	D-1	0.0008	0.0005	0.0008
	E-1	0.0008	0.0006	0.0008
	A-2	0.0008	0.0008	0.0008
	C-2	0.0007	0.0008	0.0008
	E-2	0.0008	0.0008	0.0008
	A-5	0.0008	0.0008	0.0008
	C-5	0.0007	0.0008	0.0008
	D-5	0.0008	0.0008	0.0008
	E-5	0.0008	0.0008	0.0008
1	A-1	0.0008	0.0007	0.0008
	C-1	0.0008	0.0007	0.0008
	D-1	0.0008	0.0007	0.0008
	E-1	0.0009	0.0007	0.0009
	A-2	0.0008	0.0008	0.0008
	C-2	0.0008	0.0008	0.0008
	E-2	0.0009	0.0008	0.0009
	A-5	0.0008	0.0008	0.0009
	C-5	0.0008	0.0008	0.0008
	D-5	0.0008	0.0008	0.0008
	E-5	0.0009	0.0008	0.0009

Note: Drift amplification factor, D: .8 in X; .8 in Y
MAXIMA DRIFT: $(\delta/h)x$ =0.0009; $(\delta/h)y$ =0.0008; $(\delta/h)r$ =0.0009

MEMORIA DE CALCULO ESTRUCTURAL

TIPO DE EDIFICACION:	INSTITUCIONAL-EDUCATIVO
DESCRIPCION DEL PROYECTO:	CONSTRUCCION POLIDEPORTIVO JORGE ELIECER GAITAN
SISTEMA ESTRUCTURAL:	Se ha considerado un sistema estructural aporticado, que resiste las cargas verticales y las fuerzas horizontales, construido en concreto siguiendo los requisitos para los materiales de acuerdo a la capacidad especial de disipación de energía (D.E.S.).
N° PISOS:	1
DIRECCION:	COLEGIO JORGE ELIECER GAITAN SEDE POLECITO, VEREDA ANAPE MUNICIPIO DE ATACO-TOLIMA
MATRICULA INMOBILIARIA:	355-52180
FICHA CATASTRAL	730670002000000010166000000000
PROPIETARIO:	MUNICIPIO DE ATACO
RADICACION:	
MODALIDAD:	Obra Nueva.
CODIGO PROYECTO:	N/A
USUARIO CRM:	Diego Delgadillo

DISEÑO ESTRUCTURAL REALIZADO POR:

SHIRLEY JHOANA PEÑA MENA
INGENIERA CIVIL
M.P. 70202-393373 TLM

MEMORIAL DE RESPONSABILIDAD

Yo, **SHIRLEY JHOANA PEÑA MENA**, Ingeniera civil, identificado con Cedula de ciudadanía 1.110.486.632 de Ibagué- Tolima y Matrícula Profesional **70202-393373 TLM**, en mi calidad de **DISEÑADOR ESTRUCTURAL** (de conformidad con lo establecido en el Numeral 13 del Artículo 4 del Título II de la Ley 400 de 1997 "Diseñador Estructural: Es el ingeniero civil, facultado para este fin, bajo cuya responsabilidad se realizan los diseños y planos estructurales de la edificación, y quien los firma y rotula)

CERTIFICO QUE:

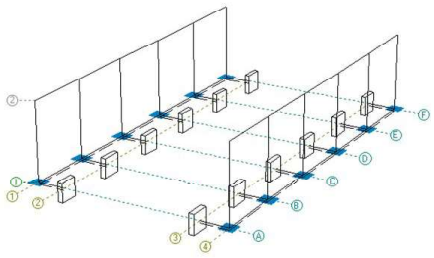
He realizado el **DISEÑO ESTRUCTURAL**, de conformidad con lo establecido en el Reglamento Colombiano de Construcción Sismo Resistente NSR-10, para el proyecto con los siguientes datos (aclarando que, para que este documento tenga validez, planos y memorias deben venir firmados y rotulados y coincidir con la siguiente información):

En consecuencia, asumo la responsabilidad al DISEÑO ESTRUCTURAL de los perjuicios que por causa de ellos pueda deducirse.

TIPO DE EDIFICACION:	INSTITUCIONAL-EDUCATIVO
DESCRIPCION DEL PROYECTO:	CONSTRUCCION POLIDEPORTIVO JORGE ELIECER GAITAN
SISTEMA ESTRUCTURAL:	Se ha considerado un sistema estructural aporticado, que resiste las cargas verticales y las fuerzas horizontales, construido en concreto siguiendo los requisitos para los materiales de acuerdo a la capacidad especial de disipación de energía (D.E.S.).
N° PISOS:	1
DIRECCION:	COLEGIO JORGE ELIECER GAITAN SEDE POLECITO, VEREDA ANAPE MUNICIPIO DE ATACO-TOLIMA
MATRICULA INMOBILIARIA:	355-52180
FICHA CATASTRAL	730670002000000010166000000000
PROPIETARIO:	MUNICIPIO DE ATACO
RADICACION:	
MODALIDAD:	Obra Nueva.
CODIGO PROYECTO:	N/A
USUARIO CRM:	Diego Delgadillo

Atentamente,

SHIRLEY JHOANA PEÑA MENA
INGENIERA CIVIL
M.P. 70202-393373 TLM


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1. INTRODUCCION

En el ejercicio de la construcción, históricamente, el ser humano ha encontrado la forma de adecuar el entorno según sus necesidades, estos factores antrópicos con el paso del tiempo son los que han formado las ciudades como las conocemos hoy.

En la definición de la geometría de las edificaciones se deben tener en cuenta los siguientes aspectos:

- Ubicación
- Clima
- Topografía
- Área del terreno
- Usos o tipo de construcción
- Plan de ordenamiento territorial
- Entre otros

Con base en estos componentes se proyecta un diseño arquitectónico acorde a las necesidades de la edificación y es este el punto de partida, paso seguido, se debe realizar un diseño estructural afín, que siga los lineamientos de la normatividad vigente y que cumpla la función siempre de salvaguardar las vidas humanas.

En este informe se podrá revisar la estructura completa de la edificación objeto de estudio descrita en la portada; para que tenga un orden lógico de lectura, se propone una tabla de contenido donde se encuentran todos los componentes técnicos de la estructura diseñada.

Cabe aclarar que, Ingeniamos cuenta con profesionales idóneos para el desarrollo del trabajo aquí planteado y el diseño realizado es optimo para el uso de la edificación.

2. OBJETIVOS

- Realizar el diseño estructural de la edificación objeto de estudio.
- Representar gráficamente y de manera sencilla resultados de dicho diseño para su posterior ejecución en obra.

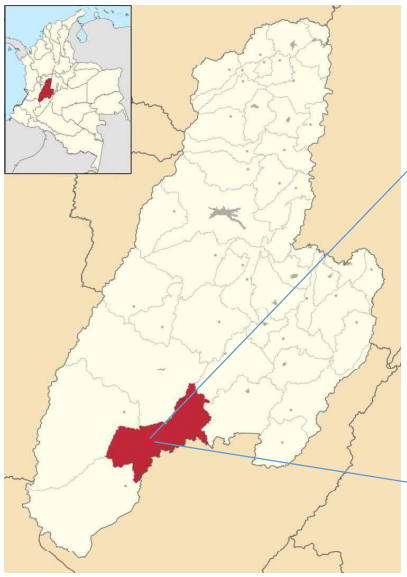
3. MARCO GEOGRAFICO

El proyecto a desarrollar está ubicado en Ataco, un municipio de Colombia situado en el departamento de Tolima. El término municipal limita con los municipios de Chaparral y Coyaima por el norte, con Rioblanco por el oeste, con Natagaima por el este, con Planadas por el suroeste, y por el sur con el departamento de Huila. La cabecera municipal se encuentra en un valle ubicado a orillas del río Saldaña y el oriente de la zona rural colinda con lomas, cerros y montañas de la Cordillera Central. En su totalidad el municipio de Ataco se encuentra al sur del departamento del Tolima, su cabecera municipal está a 143 km de Ibagué.

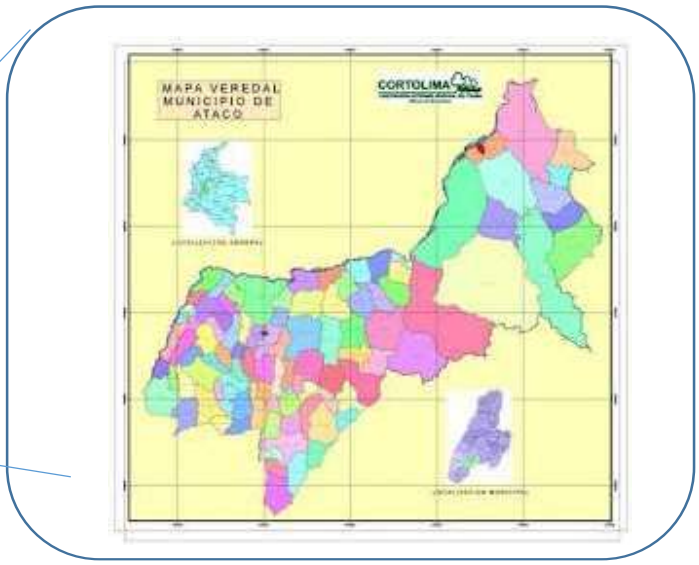
El municipio tiene un área de 996.82 km², de los cuales el 0.07% corresponde al área urbana y el 99.93% a la rural.

Fuente: https://es.wikipedia.org/wiki/Ataco_(Tolima).

Localización General

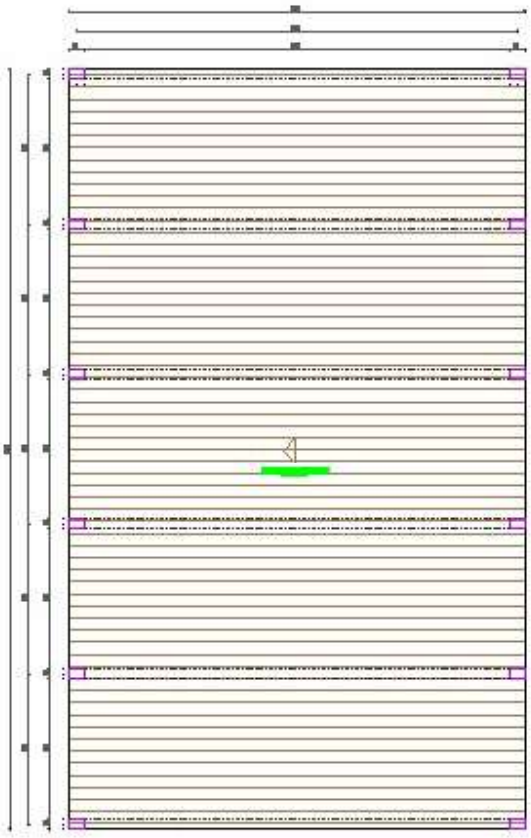


Fuente: https://alchetron.com/cdn/ataco-c6ac13b3-8621-4b55-8b1c-5198e9cfb5a-resize-750.jpg



Fuente: https://unidosataco.blogspot.com/2010/05/embellecimiento-municipio-de-ataco.html

4. PLANTAS ARQUITECTONICAS



Estos esquemas no son precisos ni detallados, para una mejor revisión, ver planos arquitectónicos definitivos.

5. CONFIGURACION GEOMETRICA DE LA ESTRUCTURA.

Numero de ejes numéricos (Sentido Vertical)	4 (1-4)
Numero de ejes Literales (sentido horizontal)	6 (A-F)
Número de pisos	1

Nota: las distancia entre ejes y alturas entre pisos se pueden observar en el anexo: DATOS DE ENTRADA.

6. SISTEMA ESTRUCTURAL ESCOGIDO

Se ha considerado un sistema estructural aporticado, que resiste las cargas verticales y las fuerzas horizontales, esencialmente completo, sin diagonales, construido en concreto siguiendo los requisitos para los materiales de acuerdo a la capacidad de disipación de energía.

La estructura se diseñó y calculo siguiendo todos los requisitos que exige la NSR-10; las columnas, vigas aéreas/cimentación y placas de entrepiso fueron chequeadas teniendo en cuenta los factores de seguridad, deformaciones máximas, cuantías mínimas, cargas sugeridas y parámetros sísmicos que figuran en la NSR-10.

7. DATOS DEL PROYECTO Y ESPECIFICACIONES TECNICAS DE LOS MATERIALES:

Los elementos estructurales tales como:

- Vigas de cimentación
- Columnas
- Vigas aéreas
- Placas de entrepiso
- Escaleras

Deben ser construidos en:

Concreto de f´c =	**21**	**MPa.**
Acero de refuerzo Fy =	**420**	**MPa.**

Los agregados empleados en este concreto deben cumplir la norma NTC 174 (ASTM C33). El valor medio del modulo de elasticidad, para toda la información experimental nacional, sin distinguir por tipo de agregado, es:

Ec = 4700 √ f`c =	**21538.11**	**MPa.**

El cemento utilizado para elaborar este concreto debe cumplir con las normas NTC 121 y NTC 321 (ASTM 150).

Concreto premezclado debe mezclarse y entregarse de acuerdo con los requisitos de NTC 3318 (ASTM C94M) o NTC 4027 (ASTM C685M).

El concreto mezclado en obra debe cumplir con C.5.8.3. / NSR-10.

Se recomienda la realización de diseño de mezclas para concretos y morteros, previo a su utilización; con ello determinara cantidades exactas de cemento, arena, agregado pétreo, agua, así como también, las especificaciones técnicas de cada material.

Es necesario corroborar esta información con ensayos, de acuerdo a C.5.6.2., C.5.6.3. y C.5.6.4.

Se recomienda tener en cuenta todo lo contenido en C.5. / NSR-10: CALIDAD DEL CONCRETO, MEZCLADO Y COLOCACION.

Los agregados deben cumplir con C.3.3. / NSR-10, NTC 174 (ASTM C33). El agua debe cumplir con C.3.4. / NSR-10, NTC 3459 (BS3148).

Para la relación agua – cemento ver C.4.1., C.4.2. y C.4.3. y en especial las tablas C.4.2.1.y C.4.3.1.

El constructor responsable debe conocer lo expuesto en C.3.8. / NSR-10 y complementar este diseño estructural con la información contenida allí, en cuanto a la normatividad aplicable de los materiales empleados en la construcción.

No se recomienda la soldadura en barras de refuerzo. Tampoco se recomienda el uso de acero liso en elementos estructurales o no estructurales.

El refuerzo liso debe cumplir con la norma NTC 161 (ASTM A 615).

Los muros divisorios, antepechos, cerramiento y cuchillas, en mampostería de ladrillo tolete común y/o con perforación vertical, que cumple con la norma NTC 4205 (ASTM C34, C56 Y C62) y F'cu = 15 MPa.

Mortero de pega Tipo M, con resistencia mínima a la compresión, F'cp = 17.5 MPa, con dosificación 2.5:1 en volumen (arena: cemento).

8. ANALISIS SISMICO.

9.1. METODO DE ANALISIS SISMICO A UTILIZAR SEGÚN LA NSR-10

La NSR-10 indica varios métodos de análisis, entre los más comunes se encuentran los siguientes:

9.1.1. MÉTODO DE LA FUERZA HORIZONTAL EQUIVALENTE (A.3.4.2.1)

(a) Todas las edificaciones, regulares e irregulares, en las zonas de amenaza sísmica baja.

(b) Todas las edificaciones, regulares e irregulares, pertenecientes al grupo de uso I, localizadas en zonas de amenaza sísmica intermedia.

(c) Edificaciones regulares, de 20 niveles o menos y 60 m de altura o menos medidos desde la base, en cualquier zona de amenaza sísmica, exceptuando edificaciones localizadas en lugares que tengan un perfil de suelo tipo D, E o F, con periodos de vibración mayores de Tc.

(d) Edificaciones irregulares que no tengan más de 6 niveles ni más de 18 m de altura medidos a partir de la base.

(e) Estructuras flexibles apoyadas sobre estructuras más rígidas que cumplan los requisitos de A3.24.3.

9.1.2. MÉTODO DEL ANÁLISIS DINÁMICO ELÁSTICO (A.3.4.2.2)

(a) Edificaciones de más de 20 niveles o de más de 60 m de altura, exceptuando las edificaciones mencionadas en A.3.4.2.1 (a) y (b).

(b) Edificaciones que tengan irregularidades verticales de los tipos 1aA, 1bA, 2A y 3A, tal como se definen en A.335,

(c) Edificaciones que tengan irregularidades que no estén descritas en A.3.3.4 y A3.3.5, exceptuando el caso descrito en A.3.2.4.3,

(d) Edificaciones de más de 5 niveles o de más de 20 m de altura, localizadas en zonas de amenaza sísmica alta, que no tengan el mismo sistema estructural en toda su altura, con la excepción de los prescrito en A.3.243.

(e) Estructuras, regulares o irregulares, localizadas en sitios que tengan un perfil de suelo D, E o F y que tengan un periodo mayor de 2Tc. En este caso el análisis debe incluir los efectos de interacción suelo-estructura, tal como los prescribe el Capítulo A7, cuando se realice un análisis de la estructura suponiéndola empotrada en su base.

Fuente: tomado textualmente de la NSR-10 Titulo A, A.3.4.2.1 y A.3.4.2.2

El METODO DE ANALISIS SISMICO UTILIZADO EN EL PRESENTE INFORME ES EL DE LA FUERZA HORIZONTAL EQUIVALENTE. (VER ANEXO: RESULTADO ANALISIS SISMICO)

9.2. EFECTOS LOCALES

Aa:	0.25	Según apéndice A-4 NSR-10
Av:	0.20	
Ae:	0.07	
Ad:	0.04	
Fa:	1.30	Según tabla A.2.4-3 NSR-10
Fv:	2.00	

9.3. COEFICIENTE DE IMPORTANCIA Y GRUPO DE USO.

DEFINICION DE LOS GRUPOS DE USO SEGÚN LA NSR-10

A.2.5.1.1- Grupo IV Edificaciones indispensables - Son aquellas edificaciones de atención a la comunidad que deben funcionar durante y después de un sismo, y cuya operación no puede ser trasladada rápidamente a un lugar altero.

A.2.5.1.2- Grupo III Edificaciones de atención a la comunidad Este grupo comprende aquellas edificaciones, y sus accesos, que son indispensables después de un temblor para atender la emergencia y preservar la salud y la seguridad de las personas, exceptuando las incluidas en el grupo IV.

A.2.5.1.3-Grupo II-Estructuras de ocupación especial cubre las siguientes estructuras:

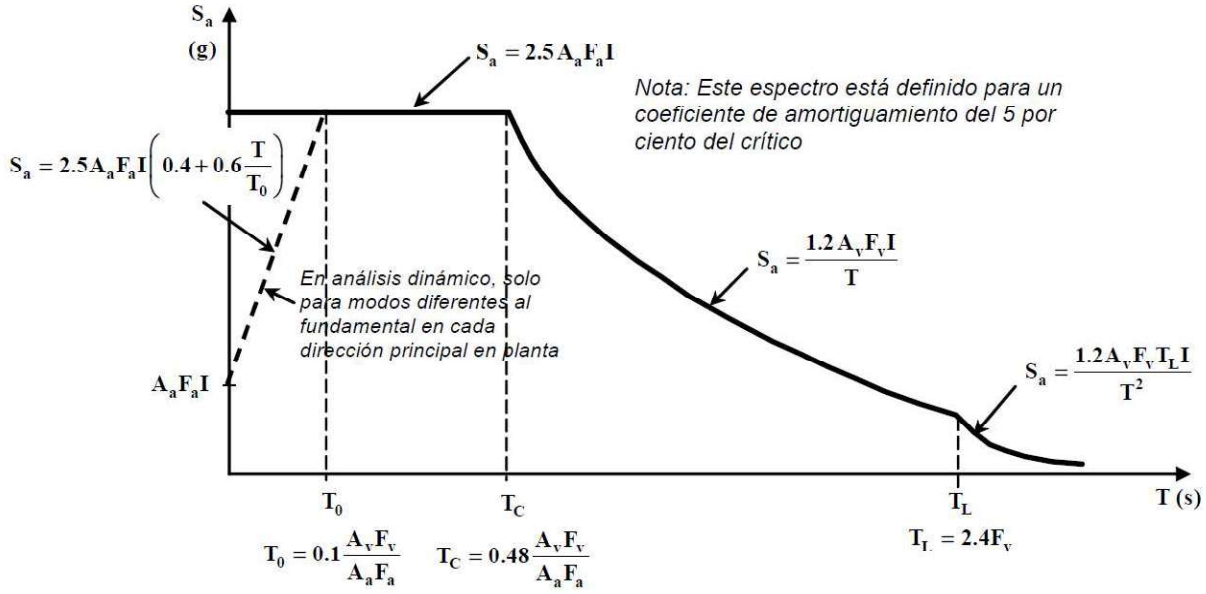
Edificaciones en donde se puedan reunir más de 200 personas en un mismo salón, Graderías al aire libre donde pueda haber más de 2000 personas a la vez, Almacenes y centros comerciales con más de 500 m² por piso, (d) Edificaciones de hospitales, clínicas y centros de salud, no cubiertas en A.2.5.1.1. Edificaciones donde trabajen o residan más de 3000 personas y Edificios gubernamentales.

A.2.5.1.4 Grupo I- Estructuras de ocupación normal Todas las edificaciones cubiertas por el alcance de este Reglamento, pero que no se han incluido en los Grupos II, III y IV.

Grupo de uso	Coeficiente de importancia, I	Grado de Desempeño
IV	1.5	Superior
III	1.25	Superior
II	1.1	Bueno
I	**1**	**Bajo**
Fuente: Tabla A.2.5-1 Valores del coeficiente de importancia, / Tabla A.9.2-1 NSR-10		

GRADO DE DESEMPEÑO MINIMO REQUERIDO	
Grupo De Uso	**Grado De Desempeño**
IV	Superior
III	Superior
II	Bueno
I	**Bajo**

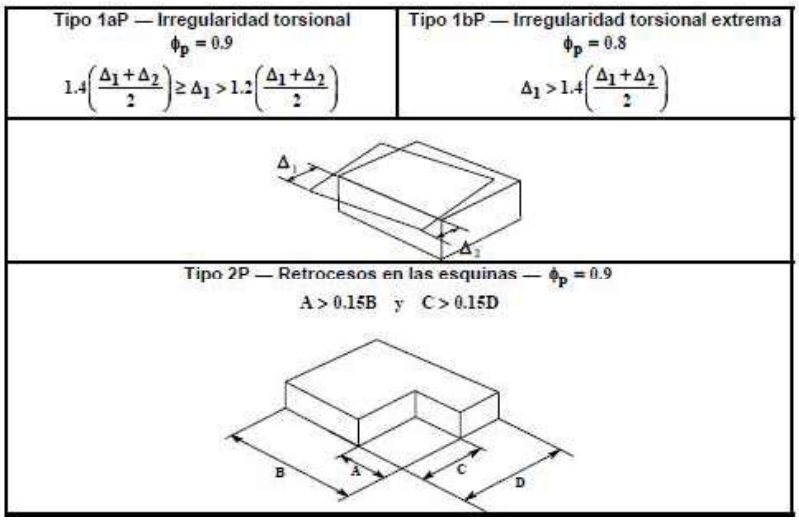
9.4. ESPECTRO ELÁSTICO DE ACELERACIONES DE DISEÑO COMO FRACCIÓN DE G



Fuente: NSR-10

10. DETALLAMIENTO.

10.1. IRREGULARIDADES



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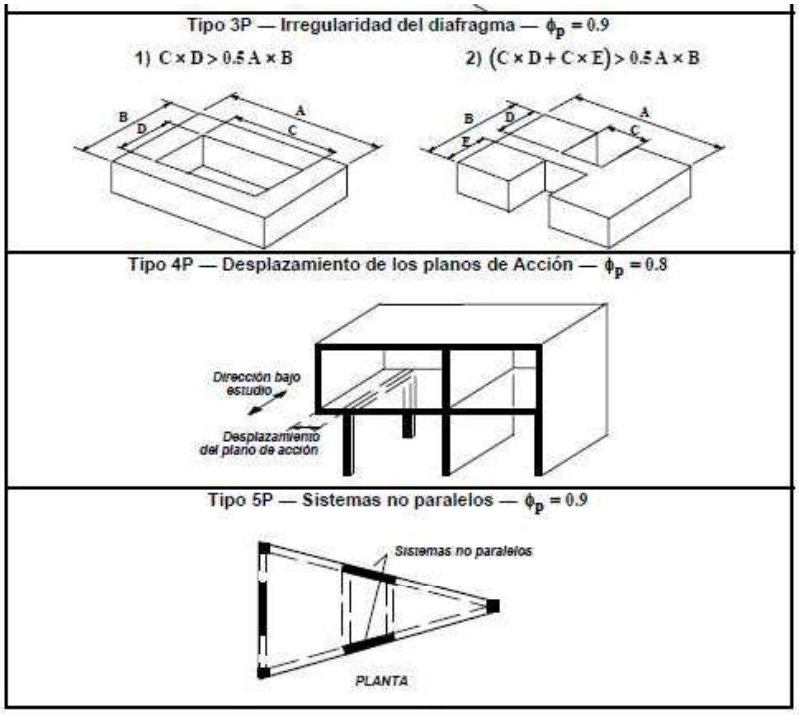
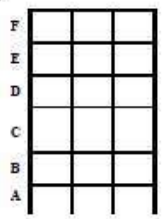
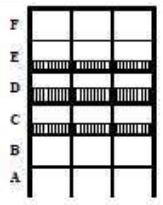


Figura A.3-1 — Irregularidades en planta

Fuente: Capitulo A.3 /NSR-10

Tipo 1aA — Piso flexible $\phi_a = 0.9$ 0.60 Rigidez $K_D \leq$ Rigidez $K_C <$ 0.70 Rigidez K_D o 0.70 $(K_D+K_E+K_F)$ /3 $\leq$ Rigidez $K_C <$ 0.80 $(K_D+K_E+K_F)$ /3	
Tipo 1bA — Piso flexible extremo $\phi_a = 0.8$ Rigidez $K_C <$ 0.60 Rigidez K_D o Rigidez $K_C <$ 0.70 $(K_D+K_E+K_F)$ /3	
Tipo 2A — Distribución masa — $\phi_a = 0.9$ $m_D > 1.50\ m_E$ o $m_D > 1.50\ m_C$	

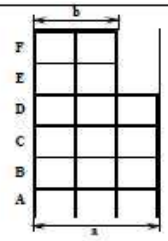
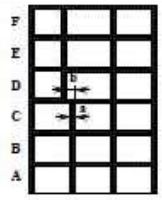
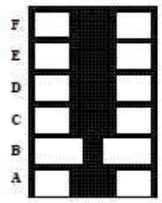
Tipo 3A — Geométrica — $\phi_a = 0.9$ $a > 1.30\ b$	
Tipo 4A — Desplazamiento dentro del plano de acción — $\phi_a = 0.8$ $b > a$	
Tipo 5aA — Piso débil $\phi_a = 0.9$ 0.65 Resist. Piso C ≤ Resist. Piso B < 0.80 Resist. Piso C	
Tipo 5bA — Piso débil extremo $\phi_a = 0.8$ Resistencia Piso B < 0.65 Resistencia Piso C	

Figura A.3-2 — Irregularidades en la altura

Fuente: Capitulo A.3 /NSR-10

10.2. REDUNDANCIA ESTRUCTURAL.

Para que una estructura sea redundante deben cumplirse dos características fundamentales:

1) Que el sistema tenga la mayor cantidad de pórticos y estos a su vez la mayor cantidad de columnas adecuadamente dispuestas que eviten concentraciones de esfuerzos.

2) Que los elementos tengan la capacidad de disipar la energía más allá del rango de deformaciones elásticas (ductilidad).
De esta forma los elementos menos cargados absorben esfuerzos de los más cargados, generándose un mecanismo de distribución de esfuerzos, que determina un comportamiento adecuado del sistema.

10.3. CAPACIDAD DE DISIPACION DE ENERGIA MINIMA REQUERIDA.

Dependiendo del tipo de material estructural y de las características del sistema de resistencia sísmica se establecen los grados de capacidad de disipación de energía mínimos.

Capacidad mínima de disipación de energía DMI

Capacidad moderada de disipación de energía DMO

Capacidad especial de disipación de energía DES

CAPACIDAD DE DISIPACION DE ENERGIA	ZONA DE AMENAZA SISMICA		
	BAJA	INTERMEDIA	ALTA
MINIMA DMI	X	N/A	N/A
MODERADA DMO	X	X	N/A
ALTA DES	X	X	X

Fuente: prefacio-Apendice I, NSR-10

LA PRESENTE ESTRUCTURA DE DISEÑO CON UNA CAPACIDAD ESPECIAL DE DISIPACION DE ENERGIA DES.

10.4. COEFICIENTE DE DISIPACIÓN DE ENERGIA

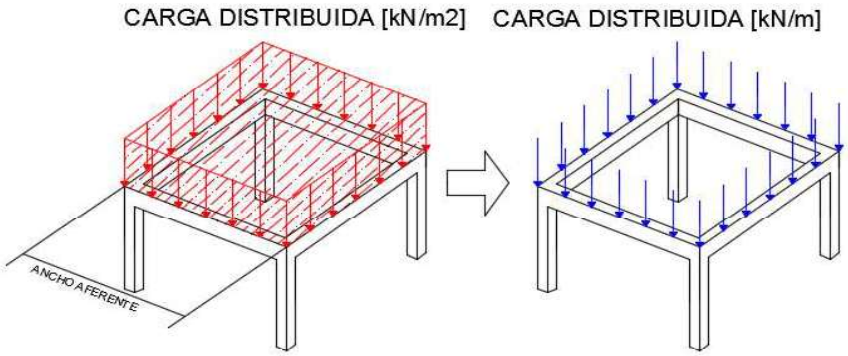
Ro Inicial (Según tabla A.3-3 / NSR-10)				2.00
IRREGULARIDADES EN PLANTA				0.8
	TIPO	Φ	SI/NO	
1aP	Torsional	0.9	NO	
1bP	Torsional Extrema	0.8	SI	
2P	Retroceso en las esquinas	0.9	NO	
3P	Irregulaaridad del diafragma	0.9	NO	
4P	Desplazamiento en los planos de accion	0.8	NO	
5P	Sistemas no paralelos	0.9	NO	
IRREGULARIDADES EN ALTURA				1
	TIPO	Φ	SI/NO	
1aA	Piso flexible	0.9	NO	
1bA	Piso flexible Extremo	0.8	NO	
2A	Distribucion de masa	0.9	NO	
3A	Geometrica	0.9	NO	
4A	Desplazamiento dentro del plano de accion	0.8	NO	
5aA	Piso debil	0.9	NO	
5bA	Piso debil Extremo	0.8	NO	
REDUNDANCIA		**X**	**Y**	1
		1	1	
REDUCCION DEL VALOR DE R				**1.6**
R = øa.øp.ør.Ro				
Donde:				
øa = coeficiente de reducción de la capacidad de disipación de energía causada por la irregularidad en la altura.				
øp = coeficiente de reducción de la capacidad de disipación de energía causada por la irregularidad en la planta.				
ør = Factor de reduccion por ausencia de redundancia				

11. EVALUACION DE CARGAS.

11.1. CARGAS VIVAS

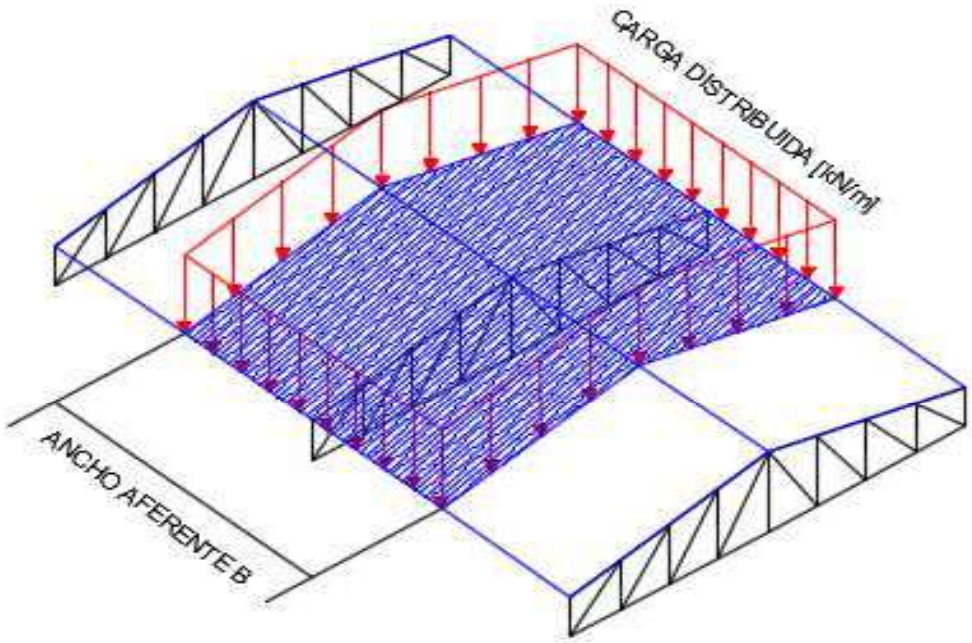
CARGAS VIVAS	kN/m²
Cubierta teja	0.50

11.2. CARGA CUBIERTA



CARGA CUBIERTA	KN/m2
Teja Standing Seam cal 26	0.150
Correas metalicas	0.200
Iluminarias	0.200
Total carga permanente	**0.550**
Carga Viva (mantenimiento)	**0.500**

VIGA CUBIERTA			
Carga muerta	0.550	5.95	**3.273**
Carga Viva	0.500	5.95	**2.975**



	Carga Distribuida [kN/m^2]	ho aferente		Distribuida KN/m
Muerta cubierta Superior D	0.55	5.95		3.27
Muerta cubierta Inferior D	0.20	5.95		1.19
Viva cubierta L	0.500	5.95		2.98
Viento succión Ws	0.500	5.95		2.98
Viento compresión Wc	0.500	5.95		2.98
Granizo Lr	0.100	5.95		0.60

Puntual Carga Muerta (KN) $\frac{CM * Area\ Cubierta}{No.\ Columnas} + Peso\ Cercha$

$\frac{0.55KN/m2 * 538.5m2}{12} + 3KN$=28 KN

Puntual Carga Muerta (KN) $\frac{CV * Area\ Cubierta}{No.\ Columnas}$

$\frac{0.50KN/m2 * 538.5m2}{12}$= 23KN

12. SOFTWARE UTILIZADO.

EngSolutions RCB es un programa estructural para el análisis tridimensional y diseño sísmico de edificios de concreto reforzado, excepcionalmente fácil de utilizar. A través de su interface gráfica es posible crear, analizar y diseñar fácil y muy rápidamente edificios complejos de varios pisos, de acuerdo a los códigos de construcción de varios países. Utilizamos Versión 9.09 (Licencia NºA853-A32561 y Licencia N°B3589-A17693).

La generación de la estructura, asignación de propiedades a elementos, definición de apoyos y aplicación de cargas, son todas operaciones que se realizan en forma interactiva, requiriendo un mínimo ingreso de información. No hay necesidad de crear un archivo de entrada de datos. Todas las operaciones, incluyendo análisis y diseño, se realizan dentro de la interface gráfica del programa.

La generación de cargas está totalmente automatizada dentro del programa, liberando al ingeniero de cálculos manuales tediosos y sobretodo, propensos a error. Cargas verticales de piso pueden ser convertidas automáticamente en cargas distribuidas en vigas y muros adyacentes. Fuerzas de sismo y viento pueden ser generadas automáticamente de acuerdo a numerosos reglamentos internacionales de construcción.

Para el diseño de las correas metálicas se utilizó el software Arquimet 2007 proporcionado por Acerías de Colombia S.A. - Acesco.

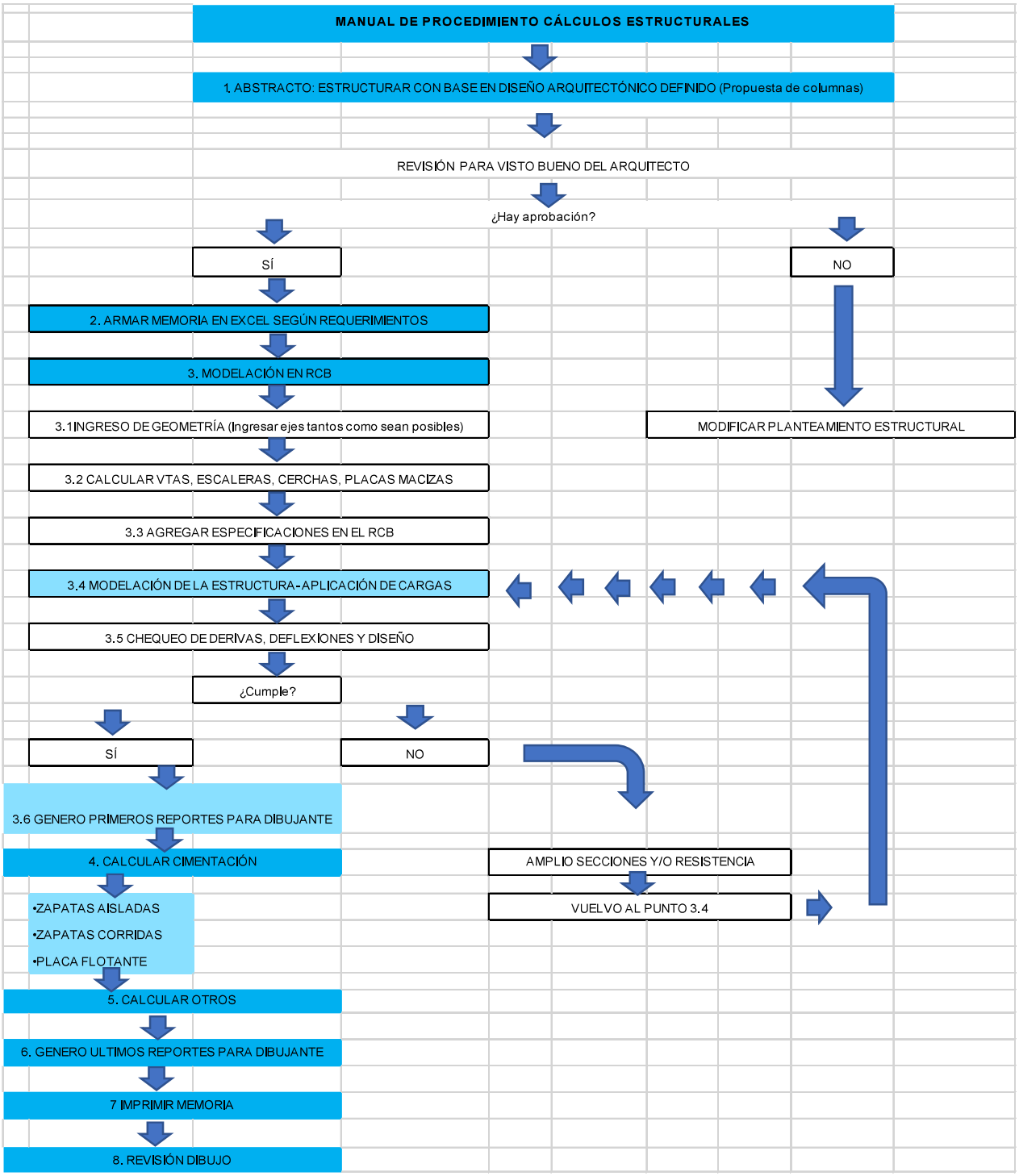
La cimentación y los muros de contención fueron calculados utilizando: Programas de ingeniería civil / Modulo fundaciones / Versión 2.0 del 2005 / del Ing. Fernando Alberto Medina Romero. Y en general, utilizando los conocimientos y bibliografía adquirida durante nuestro ejercicio en la profesión.

El despiece de la mayoría de los elementos en concreto se hizo basándonos en el software **DC-CAD Versión 2010** con el Nº de licencia DDS-2015-05-24-020.

Cálculo
ingeniamos

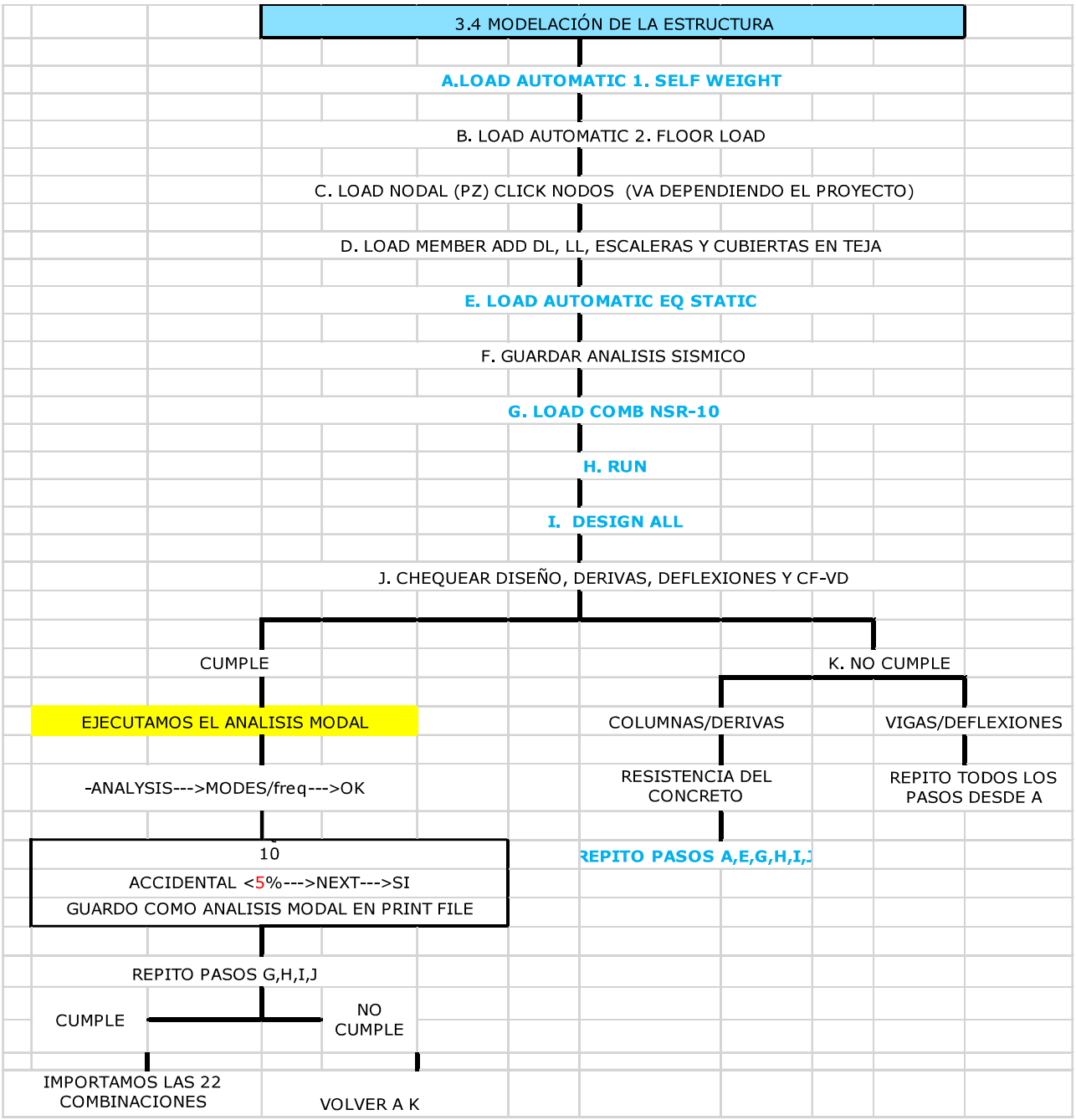


13. PROCEDIMIENTO DE DISEÑO



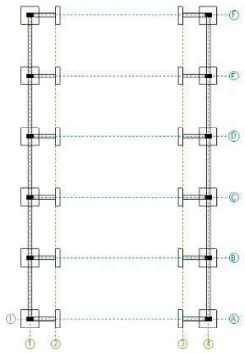
Fuente: elaboración propia

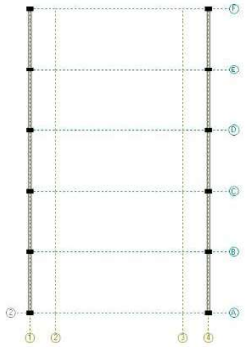
Ampliación punto 3.4



Fuente: elaboración propia

14. PLANTAS ESTRUCTURALES





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15. ESPECIFICACIONES PARA DISEÑO DE CIMENTACION

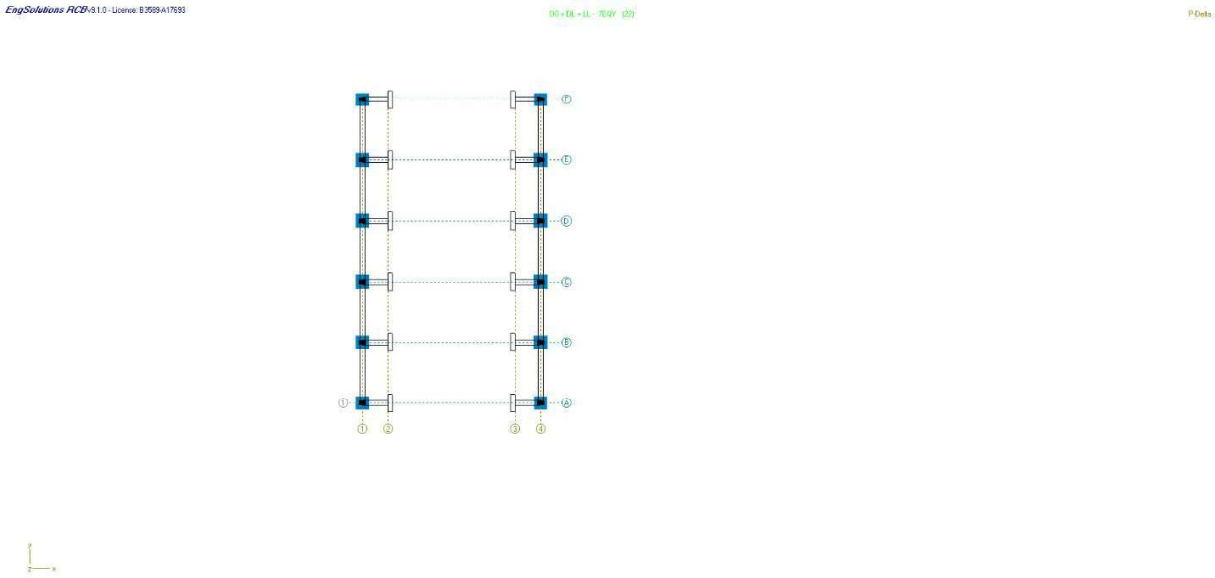
Concretos de limpieza para cimentación F´c = 140 Kg-F/cm^2 ≈ 14 MPa.

Para el predimensionamiento se utilizaron cargas de servicio, ver anexo: RESULTADO DISEÑO DE CIMENTACION.

Capacidad de carga admisible:	96.66 KPa ≈ 9.66 Ton/m^2
Tipo de cimentación:	Zapatas aisladas
Profundidad de cimentación:	1.50 m
Perfil de suelo:	D

Fuente: Estudio de suelos realizado por La Ing. Shirley Peña

El resultado de diseño de la estructura de cimentación, se puede ver en el anexo: DISEÑO DE CIMENTACION



Planta cimentación

16. INDICES DE FLEXIBILIDAD

INDICES DE FLEXIBILIDAD

Indica la susceptibilidad de la estructura a tener deflexiones o derivas excesivas, con respecto a las permitidas por el reglamento.

DERIVAS

Desplazamiento horizontal relativo entre dos puntos colocados en la misma línea vertical, en dos pisos o niveles consecutivos de la edificación.

Fuente: Capitulo A.6/ NSR-10

LIMITES DE LA DERIVA

Tabla A.6.4-1
Derivas máximas como porcentaje de h_{pi}

Estructuras de:	Deriva máxima
concreto reforzado, metálicas, de madera, y de mampostería que cumplen los requisitos de A.6.4.2.2	$1.0\% \left(\Delta^i_{max} \le 0.010\ h_{pi}\right)$
de mampostería que cumplen los requisitos de A.6.4.2.3	$0.5\% \left(\Delta^i_{max} \le 0.005\ h_{pi}\right)$

Fuente: Capitulo A.6/ NSR-10

DEFLEXIONES

La deflexión es el grado en el que un elemento estructural se desplaza bajo la aplicación de una fuerza o carga. La deflexión se determina aplicando las leyes que relacionan las fuerzas y desplazamientos, para ello se utilizan dos métodos de cálculo: los geométricos y los de energía.

Fuente: https://www.construmatica.com/construpedia/Deflexion

FORMULA PARA EL CÁLCULO DE LA DEFLEXIÓN INMEDIATA

$$I_e = \left(\frac{M_{cr}}{M_a}\right)^3 I_g + \left[1 - \left(\frac{M_{cr}}{M_a}\right)^3\right] I_{cr} \qquad \text{(C.9-8)}$$

$$M_{cr} = \frac{f_r I_g}{y_t} \qquad \text{(C.9-9)}$$

FORMULA PARA EL CÁLCULO DE LA DEFLEXIÓN A LARGO PLAZO

$$\lambda_\Delta = \frac{\xi}{1 + 50\rho'} \qquad \text{(C.9-11)}$$

ξ=factor dependiente del tiempo para cargas sostenidas

TIEMPO	ξ
5 años o mas	2.00
12 meses	1.40
6 meses	1.20

Fuente: capitulo 9 titulo c.9.5 control de deflexiones

DEFLEXION MAXIMA ADMISIBLE CALCULADA

Tipo de elemento	Deflexión considerada	Límite de deflexión
Cubiertas planas que no soporten ni estén ligadas a elementos no estructurales susceptibles de sufrir daños debido a deflexiones grandes.	Deflexión inmediata debida a la carga viva, L	$\ell/180$ *
Entrepisos que no soporten ni estén ligados a elementos no estructurales susceptibles de sufrir daños debido a deflexiones grandes.	Deflexión inmediata debida a la carga viva, L	$\ell/360$
Sistema de entrepiso o cubierta que soporte o esté ligado a elementos no estructurales susceptibles de sufrir daños debido a deflexiones grandes.	La parte de la deflexión total que ocurre después de la unión de los elementos no estructurales (la suma de la deflexión a largo plazo debida a todas las cargas permanentes, y la deflexión inmediata debida a cualquier carga viva adicional)†	$\ell/480$ ‡
Sistema de entrepiso o cubierta que soporte o esté ligado a elementos no estructurales no susceptibles de sufrir daños debido a deflexiones grandes.		$\ell/240$§

* Este límite no tiene por objeto constituirse en un resguardo contra el empozamiento de aguas. Este último se debe verificar mediante cálculos de deflexiones adecuados, incluyendo las deflexiones debidas al agua estancada, y considerando los efectos a largo plazo de todas las cargas permanentes, la contraflecha, las tolerancias de construcción y la confiabilidad en las medidas tomadas para el drenaje.
† Las deflexiones a largo plazo deben determinarse de acuerdo con C.9.5.2.5 ó C.9.5.4.3, pero se pueden reducir en la cantidad de deflexión calculada que ocurra antes de unir los elementos no estructurales. Esta cantidad se determina basándose en datos de ingeniería aceptables correspondiente a las características tiempo-deflexión de elementos similares a los que se están considerando.
‡ Este límite se puede exceder si se toman medidas adecuadas para prevenir daños en elementos apoyados o unidos.
§ Pero no mayor que la tolerancia establecida para los elementos no estructurales. Este límite se puede exceder si se proporciona una contraflecha de modo que la deflexión total menos la contraflecha no exceda dicho límite.

Fuente: Capitulo C.9, Tabla C.9.5(b) / NSR-10

17. DATOS PARA DISEÑO DE ELEMENTOS NO ESTRUCTURALES

17.1. ESPECIFICACIONES DE LA MAMPOSTERIA

Bloque Estructural



Características físicas de la unidad (NSR-10/NTC 4026/ASTM C129)		
	Bloque estructural	NSR 10/NTC 4026
Resistencia a la compresión f'cu	15 MPa	> 6 MPa
Absorción de agua	8%	>12%
Contracción lineal por secado	0,033%	< 0,065%

Dimensiones de la unidad			
	Altura (mm)	Espesor(mm)	Longitud(mm)
Nominal	200	120.150. 200	400
Estándar	190	120.150. 200	390
Tolerancias	<1%	<1%	± 2mm

Fuente: ficha técnica bloque estructural www.concretodo.com.co

17.2. DETERMINACION DE F'M

Rm= (2h/75+3h)f'cu+(50kp/75+3h)f'cp <=0.8f'cu				
Mortero tipo **M** f'cp= Mpa	17.5			
MAMPOSTERIA A UTILIZAR			**RESISTENCIA A LA COMPRESION f'cu**	
Bloque estructural			kg/cm2	150
h=mm	200		Mpa	15
a=mm	120			
L=mm	400			
Kp=	1.4	unidades de concreto		
Kp=	0.8	unidades de arcilla		
Rm=	10.70		F'm= 0.75Rm	
0.8*f'cu=	12		**F'm Mpa**	**8**
Rm<= 0.8*f'cu	**VERDADERO**		**F'm= Kg/cm2**	**80**

18. CONCLUSIONES Y RECOMENDACIONES

- Esta memoria de cálculo contiene volúmenes de concreto y pesos de acero aproximados de diseño, se recomienda realizar la revisión de cantidades directamente de los planos estructurales para así obtener información mas cercana a la realidad.
- Es importante que, para la construcción de esta edificación, el propietario exija el estricto cumplimiento de lo descrito en esta memoria de cálculo y planos estructurales.
- La estructura debe ejecutarla un ingeniero civil idóneo, tal y como lo indica la ley 400 Capitulo IV DIRECTORES DE CONSTRUCCCION.
- El constructor responsable debe conocer lo expuesto en C.3.8. / NSR-10 y complementar este diseño estructural con la información contenida allí, en cuanto a la normatividad aplicable de los materiales empleados en la construcción.
- La interpretación de los resultados, recomendaciones y conclusiones aquí dispuestas, aplican únicamente para el proyecto objeto de estudio, no se recomienda que estos parámetros sean utilizados para otras construcciones, ya que cada estructura tiene requerimientos específicos y particulares.
- Con base en esta memoria de cálculo se dibujaron los planos estructurales. Planos y memorias hacen parte integral de este proyecto.
- Si el constructor observa algún error u omisión, ya sea en planos estructurales o en memoria de cálculo, deberá reportarlo, de lo contrario, será responsabilidad del constructor y no del calculista.

19. BIBLIOGRAFIA

AIS, A. C. de I. S. (2010). Reglamento Colombiano de Diseño y Construcción Sismo Resistente. In *Nsr-10: Vol. Titulo A*. Asocicion Colombiana de Ingenieria Sismica AIS.

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Rochel Awad, R. (2012). *Analisis Sismico De Edificios. Roberto Rochel Awad.* (F. E. U. EAFIT (ed.); Segunda Ed).

20. LISTADO DE ANEXOS

20.1. CERTIFICADO DE VIGENCIA DE MATRICULA PROFESIONAL.

20.2. DATOS DE ENTRADA.

20.3. RESULTADOS DETALLAMIENTO (IRREGULARIDADES EN PLANTA, ALTURA Y REDUNDANCIA.)

20.4. RESULTADOS FUERZAS SISMICAS.

20.5. RESULTADOS INDICES DE FLEXIBILIDAD

20.6. RESULTADO DISEÑO DE COLUMNAS Y VIGAS.

20.7. RESULTADO DISEÑO DE CIMENTACION.

20.8. RESULTADO DISEÑO DE CORREAS Y CERCHA

ANEXO

CERTIFICADOS DE VIGENCIA DE MATRICULA PROFESIONAL

REPÚBLICA DE COLOMBIA
COPNIA
Consejo Profesional Nacional de Ingeniería

Certificado de vigencia y antecedentes disciplinarios
CVAD-2024-3126230

CONSEJO PROFESIONAL NACIONAL DE INGENIERÍA
COPNIA

EL DIRECTOR GENERAL

CERTIFICA:

1. Que SHIRLEY JOHANA PEÑA MENA, identificado(a) con CEDULA DE CIUDADANIA 1110486632, se encuentra inscrito(a) en el Registro Profesional Nacional que lleva esta entidad, en la profesión de INGENIERIA CIVIL con MATRICULA PROFESIONAL 70202-393373 desde el 13 de Julio de 2018, otorgado(a) mediante Resolución Nacional 959.

2. Que el(la) MATRICULA PROFESIONAL es la autorización que expide el Estado para que el titular ejerza su profesión en todo el territorio de la República de Colombia, de conformidad con lo dispuesto en la Ley 842 de 2003.

3. Que el(la) referido(a) MATRICULA PROFESIONAL se encuentra **VIGENTE**

4. Que el profesional no tiene antecedentes disciplinarios ético-profesionales.

5. Que la presente certificación se expide en Bogotá, D.C., a los cinco (05) días del mes de Noviembre del año dos mil veinticuatro (2024).

Rubén Dario Ochoa Arbeláez

Firmal del titular (*)

(*)Con el fin de verificar que el titular autoriza su participación en procesos estatales de selección de contratistas. La falta de firma del titular no invalida el Certificado
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ANEXO
DATOS DE ENTRADA

GENERAL INPUT DATA

Structure type: Three-Dimensional Frame Structure
Number of Floor Grids . . . . = 1
Building total length . . . . = 17.35 m
Building total width . . . . . = 29.6 m

STORY INFORMATION

Number of Stories . . . . = 1
Total Frame Height . . . . = 6.9 m

Floor	Story Height	Grid No
1	6.90	1
2	-	1

* Story Height in (m)

STRUCTURAL GRID INFORMATION

GRID No 1

Grid Point	X	Y
A-1	0.00	0.00
B-1	0.00	5.92
C-1	0.00	11.84
D-1	0.00	17.76
E-1	0.00	23.68
F-1	0.00	29.60
A-2	2.50	0.00
B-2	2.50	5.92
C-2	2.50	11.84
D-2	2.50	17.76
E-2	2.50	23.68
F-2	2.50	29.60
A-3	14.85	0.00
B-3	14.85	5.92
C-3	14.85	11.84
D-3	14.85	17.76
E-3	14.85	23.68
F-3	14.85	29.60
A-4	17.35	0.00
B-4	17.35	5.92
C-4	17.35	11.84
D-4	17.35	17.76
E-4	17.35	23.68
F-4	17.35	29.60

* Coordinates X & Y are in (m)

N O D E D A T A

Axis	Floor	X	Y	Z	Axis	Floor	X	Y	Z
A-1	1	0.00	0.00	0.00	B-1	1	0.00	5.92	0.00
C-1	1	0.00	11.84	0.00	D-1	1	0.00	17.76	0.00
E-1	1	0.00	23.68	0.00	F-1	1	0.00	29.60	0.00
A-2	1	2.50	0.00	0.00	B-2	1	2.50	5.92	0.00
C-2	1	2.50	11.84	0.00	D-2	1	2.50	17.76	0.00
E-2	1	2.50	23.68	0.00	F-2	1	2.50	29.60	0.00
A-3	1	14.85	0.00	0.00	B-3	1	14.85	5.92	0.00
C-3	1	14.85	11.84	0.00	D-3	1	14.85	17.76	0.00
E-3	1	14.85	23.68	0.00	F-3	1	14.85	29.60	0.00
A-4	1	17.35	0.00	0.00	B-4	1	17.35	5.92	0.00

Axis	Floor	X	Y	Z	Axis	Floor	X	Y	Z
C-4	1	17.35	11.84	0.00	D-4	1	17.35	17.76	0.00
E-4	1	17.35	23.68	0.00	F-4	1	17.35	29.60	0.00
A-1	2	0.00	0.00	6.90	B-1	2	0.00	5.92	6.90
C-1	2	0.00	11.84	6.90	D-1	2	0.00	17.76	6.90
E-1	2	0.00	23.68	6.90	F-1	2	0.00	29.60	6.90
A-4	2	17.35	0.00	6.90	B-4	2	17.35	5.92	6.90
C-4	2	17.35	11.84	6.90	D-4	2	17.35	17.76	6.90
E-4	2	17.35	23.68	6.90	F-4	2	17.35	29.60	6.90

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

MEMBER DATA

Total number of members..... = 22
Number of columns..... = 12
Number of beams ..... = 32
Number of braces ..... = 0

COLUMN SECTIONS

Number of prismatic sections = 1

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	40X65	Rectang	400	650	-	-	-	-	260000	9.15E+09	3.47E+09	8.49E+09

COLUMNS

Column	Story	L (m)	Lu (m)	a (m)	c (m)	Theta (o)	Sec -	Mat -	System -
F-4	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
E-4	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
D-4	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
C-4	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
B-4	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
A-4	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L

Column	Story	L	Lu	a	c	Theta	Sec	Mat	System
F-1	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
E-1	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
D-1	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
C-1	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
B-1	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L
A-1	1	6.90	6.58	0.00	0.33	90.0	1	1	G&L

BEAM SECTIONS

Number of prismatic sections = 2

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	30X40	Rectang	300	400	-	-	-	-	120000	1.60E+09	9.00E+08	1.90E+09
2	50X50	Rectang	500	500	-	-	-	-	250000	5.21E+09	5.21E+09	7.71E+09

BEAMS

Beam	Floor	L (m)	Lu (m)	a (m)	c (m)	Sec -	Mat -	System -
1(A-B)	2	5.92	5.52	0.20	0.20	1	1	G&L
1(B-C)	2	5.92	5.52	0.20	0.20	1	1	G&L
1(C-D)	2	5.92	5.52	0.20	0.20	1	1	G&L
1(D-E)	2	5.92	5.52	0.20	0.20	1	1	G&L
1(E-F)	2	5.92	5.52	0.20	0.20	1	1	G&L
4(A-B)	2	5.92	5.52	0.20	0.20	1	1	G&L
4(B-C)	2	5.92	5.52	0.20	0.20	1	1	G&L
4(C-D)	2	5.92	5.52	0.20	0.20	1	1	G&L
4(D-E)	2	5.92	5.52	0.20	0.20	1	1	G&L
E(1-2)	1	2.50	2.18	0.33	0.00	2	1	G&L
D(1-2)	1	2.50	2.18	0.33	0.00	2	1	G&L
C(1-2)	1	2.50	2.18	0.33	0.00	2	1	G&L
B(1-2)	1	2.50	2.18	0.33	0.00	2	1	G&L
A(1-2)	1	2.50	2.18	0.33	0.00	2	1	G&L
A(3-4)	1	2.50	2.18	0.00	0.33	2	1	G&L
B(3-4)	1	2.50	2.18	0.00	0.33	2	1	G&L
C(3-4)	1	2.50	2.18	0.00	0.33	2	1	G&L
D(3-4)	1	2.50	2.18	0.00	0.33	2	1	G&L
E(3-4)	1	2.50	2.18	0.00	0.33	2	1	G&L
F(1-2)	1	2.50	2.18	0.33	0.00	2	1	G&L
F(3-4)	1	2.50	2.18	0.00	0.33	2	1	G&L
1(A-B)	1	5.92	5.52	0.20	0.20	2	1	G&L
1(B-C)	1	5.92	5.52	0.20	0.20	2	1	G&L
1(C-D)	1	5.92	5.52	0.20	0.20	2	1	G&L
1(D-E)	1	5.92	5.52	0.20	0.20	2	1	G&L
1(E-F)	1	5.92	5.52	0.20	0.20	2	1	G&L
4(A-B)	1	5.92	5.52	0.20	0.20	2	1	G&L
4(B-C)	1	5.92	5.52	0.20	0.20	2	1	G&L
4(C-D)	1	5.92	5.52	0.20	0.20	2	1	G&L
4(D-E)	1	5.92	5.52	0.20	0.20	2	1	G&L
4(E-F)	1	5.92	5.52	0.20	0.20	2	1	G&L
4(E-F)	2	5.92	5.52	0.20	0.20	1	1	G&L

SLAB PROPERTIES AND FLOOR LOAD DATA

Number of slab sections = 1

Floor Type:

1: One-way joist slab
2: One-way flat slab
3: Two-way joist slab
4: Two-way flat slab
5: One-way deck on secondary beams

No	Name	Type	tv (mm)	γ (N/m3)	Sup.DL (Pa)	LL1 (Pa)	LL2 (mm)	h (mm)	hf (mm)	bw (mm)	S
1	Slab type 1	1	92	23500	3000	2000	0	300	50	100	600

FOUNDATION SOIL PROPERTIES

Number of soil properties = 1

Soil	Name	Pressure Distribution	Allowable gross pres. Pa KPa	Increase Pa Combinations incl.EQ & WL (%)	MODULUS OF SUBGRADE REACTION Gravity load Analysis, Kg KN/m3	Lateral load Analysis, Ks KN/m3
1	D	Linear	96.7	33	9601.0	9601.0

* Values of subgrade reaction are used only on footings with rotations and/or vert-displac. permitted.

FOUNDATION BEAM DATA

Number of foundation beams = 22

FOUNDATION BEAMS

Beam	Floor	L (ft)	Lu (ft)	a (ft)	c (ft)	TWidth (ft)	Sec -	Mat -	Soil -	System -
E(1-2)	1	2.50	2.18	0.33	0.00	0.50	2	1	1	G&L
D(1-2)	1	2.50	2.18	0.33	0.00	0.50	2	1	1	G&L
C(1-2)	1	2.50	2.18	0.33	0.00	0.50	2	1	1	G&L
B(1-2)	1	2.50	2.18	0.33	0.00	0.50	2	1	1	G&L
A(1-2)	1	2.50	2.18	0.33	0.00	0.50	2	1	1	G&L
A(3-4)	1	2.50	2.18	0.00	0.33	0.50	2	1	1	G&L
B(3-4)	1	2.50	2.18	0.00	0.33	0.50	2	1	1	G&L
C(3-4)	1	2.50	2.18	0.00	0.33	0.50	2	1	1	G&L
D(3-4)	1	2.50	2.18	0.00	0.33	0.50	2	1	1	G&L
E(3-4)	1	2.50	2.18	0.00	0.33	0.50	2	1	1	G&L
F(1-2)	1	2.50	2.18	0.33	0.00	0.50	2	1	1	G&L
F(3-4)	1	2.50	2.18	0.00	0.33	0.50	2	1	1	G&L
1(A-B)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
1(B-C)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
1(C-D)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
1(D-E)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
1(E-F)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
4(A-B)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
4(B-C)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
4(C-D)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
4(D-E)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L
4(E-F)	1	5.92	5.52	0.20	0.20	0.50	2	1	1	G&L

GROUND SUPPORT DATA

Total number of ground supports = 24

K = Spring constant(kN/mm)

Characteristics for All Degrees of Freedom
Value = K Dash = free C = constrained

Support	Floor	Type	Ux	Uy	Uz	TetX	TetY	TetZ
A-1	1	Fixed	C	C	C	C	C	C
B-1	1	Fixed	C	C	C	C	C	C
C-1	1	Fixed	C	C	C	C	C	C
D-1	1	Fixed	C	C	C	C	C	C
E-1	1	Fixed	C	C	C	C	C	C
F-1	1	Fixed	C	C	C	C	C	C
A-2	1	Fixed	C	C	C	C	C	C
B-2	1	Fixed	C	C	C	C	C	C
C-2	1	Fixed	C	C	C	C	C	C
D-2	1	Fixed	C	C	C	C	C	C
E-2	1	Fixed	C	C	C	C	C	C
F-2	1	Fixed	C	C	C	C	C	C
A-3	1	Fixed	C	C	C	C	C	C
B-3	1	Fixed	C	C	C	C	C	C
C-3	1	Fixed	C	C	C	C	C	C
D-3	1	Fixed	C	C	C	C	C	C
E-3	1	Fixed	C	C	C	C	C	C
F-3	1	Fixed	C	C	C	C	C	C
A-4	1	Fixed	C	C	C	C	C	C
B-4	1	Fixed	C	C	C	C	C	C
C-4	1	Fixed	C	C	C	C	C	C
D-4	1	Fixed	C	C	C	C	C	C
E-4	1	Fixed	C	C	C	C	C	C
F-4	1	Fixed	C	C	C	C	C	C

SUMMARY OF TOTAL FLOOR LOADS

LOAD CASE 1 : SELFW (D0)

	Force (kN)			Moment (kN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
2	0.00	0.00	662.83	0.0	0.0	0.0
1	0.00	0.00	535.20	0.0	0.0	0.0
Total	0.00	0.00	1198.03	0.0	0.0	0.0

LOAD CASE 4 : EQUAKE X (EQX) - TYPE : EQUIVALENT STATIC

	Force (kN)			Acc. Tors. Mom. (kN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
2	1030.00	0.00	0.00	0.0	0.0	1524.0
1	0.00	0.00	0.00	0.0	0.0	0.0
Total	1030.00	0.00	0.00	0.0	0.0	1524.0

LOAD CASE 5 : EQUAKE Y (EQY) - TYPE : EQUIVALENT STATIC

	Force (kN)			Acc. Tors. Mom. (kN-m)		
Floor	Px	Py	Pz	Mx	My	Mz
2	0.00	1030.00	0.00	0.0	0.0	896.1
1	0.00	0.00	0.00	0.0	0.0	0.0
Total	0.00	1030.00	0.00	0.0	0.0	896.1

Floor	Px	Py	Pz	Mx	My	Mz

L O A D S

Total number of load cases = 5

LOAD CASE 1 : SELFW (D0)

Number of nodal loads .... = 0
Number of column loads ... = 12
Number of beam loads ..... = 32

Column Loads (D0)

Class = F: Force M: Moment
System = L: Local Force/Moment referred to local coordinates (1, 2, 3)
G: Global Force/Moment referred to global coordinates (X, Y, Z)
Axis = (1, 2, 3) if System = L, or (X, Y, Z) if System = G
Units = Distributed Force: (kN/m), Distributed Moment: (kN-m/m)
Concentrated Force: (kN), Concentrated Moment: (kN-m)

		Distributed Force/Moment							Concentrated Force/Moment					
Column	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
A-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
B-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
C-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
D-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
E-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
F-1	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
A-4	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
B-4	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
C-4	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
D-4	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
E-4	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0
F-4	1	-	-	-	-	-	-	-	F	G	1.00	0.0	0.0	41.0

Beam Loads (D0)

Class = F: Force M: Moment
System = L: Local Force/Moment referred to local coordinates (1, 2, 3)
G: Global Force/Moment referred to global coordinates (X, Y, Z)
Axis = (1, 2, 3) if System = L, or (X, Y, Z) if System = G
Units = Distributed Force: (kN/m), Distributed Moment: (kN-m/m)
Concentrated Force: (kN), Concentrated Moment: (kN-m)

		Distributed Force/Moment							Concentrated Force/Moment					
Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
1(A-B)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
1(B-C)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
1(C-D)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
1(D-E)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
1(E-F)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
4(A-B)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
4(B-C)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
4(C-D)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
4(D-E)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-
E(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
D(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
C(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
B(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
A(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
B(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
C(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
D(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-

Beam	Floor	Class	Sys	Axis	A/L	B/L	Wi	Wj	Class	Sys	A/L	P1\Px	P2\Py	P3\Pz
E(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
F(1-2)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
F(3-4)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(A-B)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(B-C)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(C-D)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(D-E)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
1(E-F)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
4(A-B)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
4(B-C)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
4(C-D)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
4(D-E)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
4(E-F)	1	F	G	Z	0.00	1.00	6.0	6.0	-	-	-	-	-	-
4(E-F)	2	F	G	Z	0.00	1.00	2.9	2.9	-	-	-	-	-	-

LOAD CASE 2 : MUERTA (DL)

Number of nodal loads .... = 12
Number of column loads ... = 0
Number of beam loads ..... = 0

Nodal Loads (DL)

Axis	Floor	Force (kN)			Moment (kN-m)		
		Px	Py	Pz	Mx	My	Mz
A-1	2	0.00	0.00	28.00	0.0	0.0	0.0
B-1	2	0.00	0.00	28.00	0.0	0.0	0.0
C-1	2	0.00	0.00	28.00	0.0	0.0	0.0
D-1	2	0.00	0.00	28.00	0.0	0.0	0.0
E-1	2	0.00	0.00	28.00	0.0	0.0	0.0
F-1	2	0.00	0.00	28.00	0.0	0.0	0.0
A-4	2	0.00	0.00	28.00	0.0	0.0	0.0
B-4	2	0.00	0.00	28.00	0.0	0.0	0.0
C-4	2	0.00	0.00	28.00	0.0	0.0	0.0
D-4	2	0.00	0.00	28.00	0.0	0.0	0.0
E-4	2	0.00	0.00	28.00	0.0	0.0	0.0
F-4	2	0.00	0.00	28.00	0.0	0.0	0.0

LOAD CASE 3 : VIVA (LL)

Number of nodal loads .... = 12
Number of column loads ... = 0
Number of beam loads ..... = 0

Nodal Loads (LL)

Axis	Floor	Force (kN)			Moment (kN-m)		
		Px	Py	Pz	Mx	My	Mz
A-1	2	0.00	0.00	23.00	0.0	0.0	0.0
B-1	2	0.00	0.00	23.00	0.0	0.0	0.0
C-1	2	0.00	0.00	23.00	0.0	0.0	0.0
D-1	2	0.00	0.00	23.00	0.0	0.0	0.0
E-1	2	0.00	0.00	23.00	0.0	0.0	0.0
F-1	2	0.00	0.00	23.00	0.0	0.0	0.0
A-4	2	0.00	0.00	23.00	0.0	0.0	0.0
B-4	2	0.00	0.00	23.00	0.0	0.0	0.0
C-4	2	0.00	0.00	23.00	0.0	0.0	0.0
D-4	2	0.00	0.00	23.00	0.0	0.0	0.0
E-4	2	0.00	0.00	23.00	0.0	0.0	0.0
F-4	2	0.00	0.00	23.00	0.0	0.0	0.0

LOAD CASE 4 : EQUAKE X (EQX) - TYPE : EQUIVALENT STATIC

Number of nodal loads .... = 12
Number of column loads ... = 0
Number of beam loads ..... = 0

Nodal Loads (EQX)

		Force (kN)			Moment (kN-m)		
Axis	Floor	Px	Py	Pz	Mx	My	Mz
A-1	2	79.97	0.00	0.00	0.0	0.0	0.0
B-1	2	88.76	0.00	0.00	0.0	0.0	0.0
C-1	2	88.76	0.00	0.00	0.0	0.0	0.0
D-1	2	88.76	0.00	0.00	0.0	0.0	0.0
E-1	2	88.76	0.00	0.00	0.0	0.0	0.0
F-1	2	79.97	0.00	0.00	0.0	0.0	0.0
A-4	2	79.97	0.00	0.00	0.0	0.0	0.0
B-4	2	88.76	0.00	0.00	0.0	0.0	0.0
C-4	2	88.76	0.00	0.00	0.0	0.0	0.0
D-4	2	88.76	0.00	0.00	0.0	0.0	0.0
E-4	2	88.76	0.00	0.00	0.0	0.0	0.0
F-4	2	79.97	0.00	0.00	0.0	0.0	0.0

LOAD CASE 5 : EQUAKE Y (EQY) - TYPE : EQUIVALENT STATIC

Number of nodal loads .... = 12
Number of column loads ... = 0
Number of beam loads ..... = 0

Nodal Loads (EQY)

		Force (kN)			Moment (kN-m)		
Axis	Floor	Px	Py	Pz	Mx	My	Mz
A-1	2	0.00	79.97	0.00	0.0	0.0	0.0
B-1	2	0.00	88.76	0.00	0.0	0.0	0.0
C-1	2	0.00	88.76	0.00	0.0	0.0	0.0
D-1	2	0.00	88.76	0.00	0.0	0.0	0.0
E-1	2	0.00	88.76	0.00	0.0	0.0	0.0
F-1	2	0.00	79.97	0.00	0.0	0.0	0.0
A-4	2	0.00	79.97	0.00	0.0	0.0	0.0
B-4	2	0.00	88.76	0.00	0.0	0.0	0.0
C-4	2	0.00	88.76	0.00	0.0	0.0	0.0
D-4	2	0.00	88.76	0.00	0.0	0.0	0.0
E-4	2	0.00	88.76	0.00	0.0	0.0	0.0
F-4	2	0.00	79.97	0.00	0.0	0.0	0.0

SUMMARY QUANTITY OF MATERIALS

C O L U M N S

Item	Section	Material	Length	Weight/Len	Total Weight
-	-	-	m	kN/m	kN
1	40X65	21MPA	78.90	6.240	492.34
				TOTAL =	492.34

B E A M S

Item	Section	Material	Length	Weight/Len	Total Weight
-	-	-	m	kN/m	kN
1	30X40	21MPA	57.20	2.880	164.74

				TOTAL =	164.74

FOUNDATION BEAMS

Item	Section	Material	Length	Weight/Len	Total Weight
-	-	-	m	kN/m	kN
1	50X50	21MPA	85.25	6.000	511.50
				TOTAL =	511.50

ANEXO

RESULTADO DETALLAMIENTO

(IRREGULARIDADES EN PLANTA, ALTURA Y REDUNDANCIA)

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:04:53 p. m. 27/12/2024

PLAN TORSIONAL IRREGULARITY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Level	Δ/h max	Δ/h avg	max/avg Δ/h	Irregular	Δ/h max	Δ/h avg	max/avg Δ/h	Irregular
2	0.0071	0.0059	1.1880	NO	0.0049	0.0049	1.0006	NO

Torsional irregularity is considered to exist if Δ/h max > 1.2 Δ/h ave
EXTreme torsional irregularity is considered to exist if Δ/h max > 1.4 Δ/h ave

Torsional irregularities do NOT exist.

Accidental torsion does not have to be amplified

Notes:
The determination of torsional irregularities (plan structural irregularity type 1) and computation of amplification factors for accidental torsion Ax, is conducted according to FEMA's NEHRP Recommended Provitions for Seismic Regulations for New Buildings and other Structures, Provisions and Commentary ed. 1994, 1997, 2000, 2003, 2009, which is applicable to the following building codes derived from the above documents: (USA) IBC-03/06, ASCE 7-05/10, CBC-01/07, UBC-97, (COLOMBIA) NSR-10, and (PAN) REP-2004,(Dom) R-001, (GUA)

DRIFT-BASED FLEXIBLE-STORY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Δcm*	Δcm/h	Δn/Δn+1	Irregular	Δcm*	Δcm/h	Δn/Δn+1	Irregular
1	40.9994	0.0059	-	-	33.8257	0.0049	-	-

* Δcm: Story drift at center of mass (mm)
n/n+1 Δ/h: (Δcm/h)n/(Δcm/h)n+1: Ratio between drift ratio at CM of a stotry and that of story above

Vertical irregularities type 1a, 1b, 2 and 3 do not apply if drift ratio of each story is less than 1.3 that of next story above (i.e. n/n+1 Δ/h < 1.3). Story drift ratio of top two stories are not considered

Stiffness-based flexible story check is not required!
It can be considered that vertical irregularities type 1aA, 1bA, 2A and 3A DO NOT EXIST !

Use: Øa = 1

DESIGN-SHEAR BASED STORY STIFFNESS

	X - DIRECTION			Y - DIRECTION		
Story	Shear X	Δcm X	Kx	Shear Y	Δcm Y	Ky
1	1030.0	40.9994	25.1	1030.0	33.8257	30.5

Shear: Design Shear, in kN
Δcm: Drift at center of mass, in mm
K: Story stiffness, in kN/mm

STIFFNESS-BASED FLEXIBLE-STORY CHECK - NSR-10

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Kn	Kn/Kn+1	Kn/Kavg3	Irregular	Kn	Kn/Kn+1	Kn/Kavg3	Irregular
1	25.1	-	-	-	30.5	-	-	-

Kn: Stiffness of story n, in kN/mm
Kn/Kn+1: Ratio between stiffness of story n and that of store above n
Kn/Kavg3: Ratio between stiffness of story n and average stiffness of three stories above n

Stiffness-soft story irregularity is considered to exist if Kn/Kn+1 < 0.7 or Kn/Kavg3 < 0.8
Stiffness-EXTreme soft story irregularity is considered to exist if Kn/Kn+1 < 0.6 or Kn/Kavg3 < 0.7

Stiffness-flexible story irregularity types 1aA and 1bA do NOT exist.

Notes:
The determination stiffness-soft story irregularity (vertical structural irregularity types 1a and 1b) is conducted based on story-stiffness computed for the design seismic shear distribution, according to FEMA's NEHRP Recommended Provitions for Seismic Regulations for New Buildings and other Structures, Provisions and Commentary ed. 1994, 1997, 2000, 2003, 2009, which is applicable to the following building codes derived from the above documents: (USA) IBC-03/06, ASCE 7-05/10, CBC-01/07, UBC-97, (COLOMBIA) NSR-10, (PAN) REP-2004,(DOM) R-001, (GUA) NSE

WEIGHT (MASS) IRREGULARITY CHECK

Floor	Wn	Wn/Wn+1	Wn/Wn-1	Irregular
2	998.8	-	-	-

Wn: Effective weight of floor n, in kN
Wn/Wn+1: Ratio between weight of floor n and weight of floor above n
Wn/Wn-1: Ratio between weight of floor n and weight of floor below n

Weight (mass) irregularity is considered to exist if effective weight of any floory is more than 1.5 times the effective weight of an adjacent floor. That is, if Wn/Wn+1 > 1.5 or Wn/Wn-1 > 1.5.
A roof that is lighter than the floor below is not considered.

Weight (mass) irregularity (2A) does NOT exist.

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:04:43 p. m. 27/12/2024

REDUNDANCY ANALYSIS

STORY-STRENGTH REDUCTION DUE TO REMOVAL OF CRITICAL ELEMENT

	EARTHQUAKE - X				EARTHQUAKE - Y			
Story	Vi	Vi/Vb	Crit.Element	Ve/Vi	Vi	Vi/Vb	Crit.Element	Ve/Vi
1	643.8	1.00		0.00	643.8	1.00	BEM:4(E-F)	0.16
MAXIMA				0.00				0.16

NOTE: Shear values are divided by R

Removal of any critial element on any story supporting more than 35% Vb (Base Shear) would not reduce
the story strength by more than 33%. Thus SEISMIC FORCE-RESISTING SYSTEM SEEMS REDUNDANT!!
It should be investigated if removal of critical element would induce Extreme Torsional Irregularity (1bP)

Proposed Reduction Factor for Lack of Redundancy: Ørx = 1 Øry = 1

Cálculo ingeniamos

ANEXO

FUERZAS SISMICAS

S E I S M I C D E S I G N C O D E : COL NSR-10

```
============================================================
 S E I S M I C   B A S E   L E V E L :  1
============================================================


S E I S M I C   F O R C E   R E S I S T I N G   S Y S T E M

System X-Direction:   C: Moment Res.Frame
System Y-Direction:   C: Moment Res.Frame
------------------------------------------------------------
Energy dissip capacity: 3: Special-DES
------------------------------------------------------------
```

EQUIVALENT STATIC EARTHQUAKE FORCES COL NSR-10

Base Shear

$V = Sa\ W$

$Sa = 1.2\ Av\ Fv\ I/\ T,\ \ Sa = 1.2\ Av\ Fv\ Tl/T^2$ for $T > Tl$

$Sa = 2.5\ Aa\ Fa\ I$ for $T < Tc$, where $Tc = 0.48\ AvFv/AaFa$

```
S E I S M I C   P A R A M E T E R S

Eff. peak acceleration & veloc., Aa =   0.25     Av =   0.20

   Region:      10    9     8     7     6     5     4     3     2     1
   Aa or Av    0.50  0.45  0.40  0.35  0.30  0.25  0.20  0.15  0.10  0.05

   LOCATION                                          Aa     Av     Menace
   Barranquilla, Cartagena, San Andres, Valledupar  0.10   0.10    Low
   Bogota, Medellin                                 0.15   0.20    Interm
   Armenia, Bucaramanga, Cali, Manizalez, Pereira   0.25   0.25    High
   Cucuta, Villavicencio                            0.35   0.30    High
   Quibdo                                           0.35   0.35    High

Importance coefficient, I ........ =    1.25

   GROUP                                          COEFFICIENT
   IV - Essential facilities                          1.50
   III- Public assistance facilities                  1.25
   II - Especial occupancy buildings                  1.10
   I  - Normal occupancy buildings                    1.00

Site profile type, S ............ =      D

   TYPE   SOIL PROFILE TYPE          Shear Wave Velocity
    A     Hard Rock                        > 1500 m/s
    B     Rock                        1500 - 760 m/s
    C     Very Dense Soil & Soft Rock  760 - 360 m/s
    D     Stiff Soil Profile           360 - 180 m/s
    E     Soft Soil Profile                < 180 m/s
    F     Soils requiring site-specific evaluations

                                   X-direction   Y-direction
                                   -----------   -----------
Seismic Force-resisting system     = C: Moment     C: Moment
Energy Dissipation Coefficient, Ro =    2             2

Computed fundamental period (sec)  =     .437        .405
          T = 0.1 N ............. =     .1           .1
         Ta = Ct (Hn)^x ......... =  0.047 H^0.9   0.047 H^0.9
                                   =    .27          .27
        *Tmax: 1.7 Ta  .......... =    .46          .46
        *Tmax = Cu Ta
                Cu = 1.75 - 1.2 Av Fv  >= 1.2

Fundamental period, T ............ =     .437         .405
```

DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS

	Short Periods	Long Periods
Effect. peak acceleration & velc.,	Aa = 0.25	Av = 0.20
Site coefficients (Tables below),	Fa = 1.30	Fv = 2.00

Design response parameters, Aa Fa = 0.33 Av Fv= 0.40

Long-period transition period, Tl sec = 4.80 (2.4 Fv)

Site Coefficient Fa

Site Class	Aa<=0.1	Aa=0.2	Aa=0.3	Aa=0.4	Ss>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	a	a	a	a	a

Site Coefficient Fv

Site Class	Av<=0.1	Av=0.2	Av=0.3	Av=0.4	Av>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	a	a	a	a	a

a: Site-specific geotechnical investigation required

VERIFYING UPPER LIMIT ON FUNDAMENTAL PERIOD

Tmax = Cu Ta
Cu = 1.75 - 1.2 Av Fv >= 1.2

Av Fv ..... = 0.4
Cu ..... = 1.27

	X-direction	Y-direction
Fundamental period (sec) . . . . . =	.437	.405
Ta (sec). . . . . =	0.27	0.27
Tmax = Cu Ta (sec). . . . . =	0.3436	0.3436

Adjusted fundamental period, T ... = 0.3436 0.3436

Reduction in R for Irregularity and Lack of Redundancy:

PLAN IRREGULARITIES			ELEVATION IRREGULARITIES		
Type	Description	Øp	Type	Description	Øa
1aP	Torsional	0.9	1aA	Flexible	0.9
1bP	Torsional Extrme	0.8	1bA	Flexible Extrme	0.8
2P	Reentrant corners	0.9	2A	Mass	0.9
3P	Diaph. discontin.	0.9	3A	Geometrical	0.9
4P	Plane shifting	0.8	4A	Plane shifting	0.8
5P	Unparallel grid	0.9	5aA	Weak Story	0.9
			5bA	Weak Story Extr	0.8

NOTE: EngSolutions RCB assumes irregular building.
For regular buildings make (Øp . Øa)= 1.0

	X - D I R E C T I O N	Y - D I R E C T I O N
Reduct. factor, (Øp.Øa) =	0.8	0.8
Redundancy factor, Ør =	1	1

R = (Øp Øa) Ør Ro

T O T A L B A S E S H E A R

Building Weight, W, (kN) = 998.83

Peak Acceleration Coeffi., Fa Aa = .33
Peak Velocity coefficient, Fv Av = .4
Transition period, Tc . . . . . = .58
Importance factor, I . . . . . = 1.25
Site class, S . . . . . = D

	X-direction	Y-direction
Energ-disspat coeff, R =	1.6	1.6
Period, T, (sec) . . . =	.3436	.3436
1.2 Av Fv I / T =	1.746	1.746
2.5 Aa Fa I =	1.031	1.031
Sa =	1.031	1.031
Total Base Shear, V, (kN) =	1030.04	1030.04

A C C I D E N T A L T O R S I O N

	X-direction	Y-direction
Accidental eccentricity as a percentage of building dimension, (%)=	5	5

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Project: Untitled 4:02:07 p. m. 27/12/2024

A C C I D E N T A L E C C E N T R I C I T Y:

Level	X - D I R E C T I O N (EQY)			Y - D I R E C T I O N (EQX)		
	$\delta\varepsilon^{xo}$ (m)	Ax -	$\delta\varepsilon^{x}$ (m)	$\delta\varepsilon^{yo}$ (m)	Ax -	$\delta\varepsilon^{y}$ (m)
2	0.87	1.00	0.87	1.48	1.00	1.48

Ax: Amplification factor for accidental eccentricity

EQY: Envelope (1) $E^x = \varepsilon^x$
(2) $E^x = \varepsilon^x + \delta\varepsilon^x$
(3) $E^x = \varepsilon^x - \delta\varepsilon^x$

EQX: Envelope (1) $E^y = \varepsilon^y$
(2) $E^y = \varepsilon^y + \delta\varepsilon^y$
(3) $E^y = \varepsilon^y - \delta\varepsilon^y$

D E S I G N E C C E N T R I C I T Y : $E = \varepsilon + \delta\varepsilon$

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
	Center Mass CMx	Inherent Eccent. ε^{x*}	Accident Eccent. $\delta\varepsilon^x$	Design Eccent. E^x	Center Mass CMy	Inherent Eccent. ε^{y*}	Accident Eccent. $\delta\varepsilon^y$	Design Eccent. E^y
2	8.68	0.00	0.87	0.8787	14.80	0.00	1.48	1.4848

Note: * Inherent eccentricity: ε^x = CMx - CRx and ε^y = CMy - CRy
All values are in meters

D E S I G N E C C E N T R I C I T Y : $E = \varepsilon - \delta\varepsilon$

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
	Center Mass CMx	Inherent Eccent. ε^{x*}	Accident Eccent. $\delta\varepsilon^x$	Design Eccent. E^x	Center Mass CMy	Inherent Eccent. ε^{y*}	Accident Eccent. $\delta\varepsilon^y$	Design Eccent. E^y
2	8.68	0.00	0.87	-0.877	14.80	0.00	1.48	-1.488

Note: * Inherent eccentricity: ε^x = CMx - CRx and ε^y = CMy - CRy
All values are in meters

Equivalent Forces

Fi = (Wi Hi^n /∑Wj Hj^n) V
V =∑Fi
V = Sa W

E Q U I V A L E N T F O R C E S: X - D I R E C T I O N (EQUAKE X)

Floor i -	Height Hi (m)	Weigth Wi (KN)	Wi Hi^n / ∑Wj Hj^n	Force Fi (KN)	Shear Vi (KN)	Torsion Ti=Fi(εy-εy) (kN-m)
2	6.90	998.8	1.000	1030.00	1030.0	1524.4
Σ		998.83		1030.0		

n = 1

E Q U I V A L E N T F O R C E S: Y - D I R E C T I O N (EQUAKE Y)

Floor i -	Height Hi (m)	Weigth Wi (KN)	Wi Hi^n / ∑Wj Hj^n	Force Fi (KN)	Shear Vi (KN)	Torsion Ti=Fi(εx-ex) (kN-m)
2	6.90	998.8	1.000	1030.00	1030.0	896.13
Σ		998.83		1030.0		

n = 1

A C C E L E R A T I O N S O N N O N - S T R U C T U R A L E L E M E N T S - N S R - 1 0

F L O O R A C C E L E R A T I O N S

Level	hx	hx/heq	ax
2	6.90	1.33	1.375

Seismic base level . . . . . = 1
Height above seismic base, hn . . . . . = 6.90 m
Equivalent height, heq = 0.75 hn . . . . . = 5.18 m
Ground acceleration, As = Aa Fa I . . . . . = 0.413
Spectral acceleration, Sa . . . . . = 1.031

ax = Sa hx/heq for hx > heq
ax = As + (Sa -As) hx/heq for hx < heq

Force on structural non-seismic element : Fp = ax Wp / Ro
Force on nonstructural element : Fp = ax ap Wp / Rp
> 0.5 Aa I Wp

ap : component amplification factor

ANEXO
RESULTADOS INDICES DE FLEXIBILIDAD
(DERIVAS Y DEFLEXIONES)

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:02:37 p. m. 27/12/2024

P-DELTA ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, Δ/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio			
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR	Axis
1	0.0059	0.0049	0.0059	0.0071	0.0049	0.0071	A-1
Maxima	0.0059	0.0049	0.0059	0.0071	0.0049	0.0071	

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:03:15 p. m. 27/12/2024

P-DELTA ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, Δ/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio			
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR	Axis
1	0.0059	0.0049	0.0059	0.0071	0.0049	0.0071	A-1
Maxima	0.0059	0.0049	0.0059	0.0071	0.0049	0.0071	

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

P-DELTA ANALYSIS - DETAILED MAXIMUM STORY DRIFT RATIO, δ/h

Story	ColAxis	$(\delta x/h)max$	$(\delta y/h)max$	$([(\delta x/h)^2 + (\delta y/h)^2]^{1/2})max$
1	A-1	0.0071	0.0049	0.0071
	B-1	0.0060	0.0049	0.0060
	C-1	0.0059	0.0049	0.0059
	D-1	0.0059	0.0049	0.0059
	E-1	0.0060	0.0049	0.0060
	F-1	0.0071	0.0049	0.0071
	A-4	0.0071	0.0049	0.0071
	B-4	0.0060	0.0049	0.0060
	C-4	0.0059	0.0049	0.0059
	D-4	0.0059	0.0049	0.0059
	E-4	0.0060	0.0049	0.0060
	F-4	0.0071	0.0049	0.0071

Note: Drift amplification factor, D: .8 in X; .8 in Y
MAXIMA DRIFT: $(\delta/h)x$ =0.0071; $(\delta/h)y$ =0.0049; $(\delta/h)r$ =0.0071

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LONG-TERM BEAM DEFLECTIONS

PERMISSIBLE DEFLECTIONS
Immediate deflection due to Live Load . . . . . = L/360
Long-term deflection due to Sustained loads . . = L/480

TYPE OF DEFLECTION	LOAD COMBINATION
Immediate due to Dead load (DLs)	D0 + DL
Immediate due to Live load (LLs)*	LL
Immediate due to Sus. load (SLds)	D0 + DL + LL
Long-term due to Sus. load (SLds)	D0 + DL + LL

* Computed as Defl(DLS + LLs) - Defl(DLs)

Units: Defl: Max. deflection (mm), L: Beam length (m), h: Beam depth (mm)

Beam	Floor	h	L	L/h	Beam Type	IMMEDIATE DEFLECTIONS DLs Deflc	Live Deflc	Sut.Lds Deflc	ADDITIONAL LONG-TERM DEFLEC. Sus.Lds 6 months Deflc	1-year Deflc	5-years Deflc
1(A-B)	2	400	5.92	15	EndJContin	0.40	0.03	0.43	0.44	0.52	0.74
1(B-C)	2	400	5.92	15	BothEndCnt	0.29	0.03	0.32	0.33	0.38	0.54
1(C-D)	2	400	5.92	15	BothEndCnt	0.31	0.03	0.33	0.34	0.40	0.57
1(D-E)	2	400	5.92	15	BothEndCnt	0.29	0.03	0.32	0.33	0.38	0.54
1(E-F)	2	400	5.92	15	EndIContin	0.40	0.03	0.43	0.44	0.52	0.74
4(A-B)	2	400	5.92	15	EndJContin	0.40	0.03	0.43	0.44	0.52	0.74
4(B-C)	2	400	5.92	15	BothEndCnt	0.29	0.03	0.32	0.33	0.38	0.54
4(C-D)	2	400	5.92	15	BothEndCnt	0.31	0.03	0.33	0.34	0.40	0.57
4(D-E)	2	400	5.92	15	EndIContin	0.29	0.03	0.32	0.33	0.38	0.54
E(1-2)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
D(1-2)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
C(1-2)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
B(1-2)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
A(1-2)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
A(3-4)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
B(3-4)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
C(3-4)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
D(3-4)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
E(3-4)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
F(1-2)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
F(3-4)	1	500	2.50	5	BothEndCnt	0.00	0.00	0.00	0.00	0.00	0.01
1(A-B)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
1(B-C)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
1(C-D)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
1(D-E)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
1(E-F)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
4(A-B)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
4(B-C)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
4(C-D)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
4(D-E)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
4(E-F)	1	500	5.92	12	BothEndCnt	0.13	0.00	0.13	0.13	0.16	0.22
4(E-F)	2	400	5.92	15	SimpSupprt	0.40	0.03	0.43	0.44	0.52	0.74

NOTE: All beam deflections are smaller than maximum permissible deflection
Depth, H, of all beams is larger than that recomemenden in Table 9.5(a)

Immediate deflections are computed according to 9.5.2.3 with:
Effective stiffness: $E\,I = Ec\,.\,Ie$
$Ie = (Mcr/Ma)^3\,Ig + [1 - (Mcr/Ma)^3]\,Icr$
$Mcr = fr\,Ig/Yt$
$Icr = b(kd)^3/3 + n\,As(d-kd)^1 + (n-1)A's(kd-d')^2$
$n = Es/Ec$
Long-term deflections are computed according to 9.5.2.5

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STORY STABILITY INDEX, Q

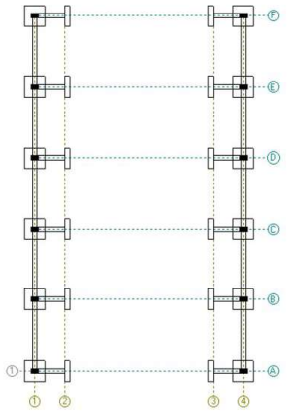
			X - DIRECTION			Y - DIRECTION		
Story	h	P	Shear X	Δcm X	Qx	Shear Y	Δcm Y	Qy
1	6.9	1274.8	1030.0	40.9994	0.0092	1030.0	33.8257	0.0076

h: Story height, m
P: Gravity load, kN :(D0 + DL + LL)
V: Shear: Design shear force, kN
Δcm: Drift at center of mass, mm
Q: Story Stability Index: P. Δcm /(V . h)

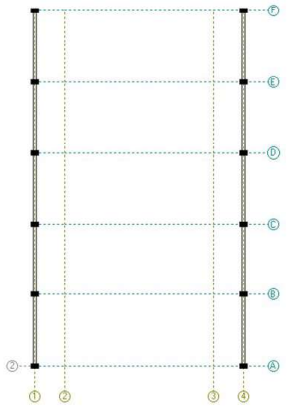
NOTE: P-Δ effects are negligible

Cálculo ingeniamos

ANEXO
RESULTADO DE DISEÑOS DE COLUMNAS Y VIGAS


F
E
D
C
B
A
1
1
2
3
4


y
z
x


F
E
D
C
B
A
2
1
2
3
4


y
z
x

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LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + .5LL + EQX + .3EQY
4	1.2D0 + 1.2DL + .5LL - EQX - .3EQY
5	1.2D0 + 1.2DL + .5LL + EQX - .3EQY
6	1.2D0 + 1.2DL + .5LL - EQX + .3EQY
7	1.2D0 + 1.2DL + .5LL + .3EQX + EQY
8	1.2D0 + 1.2DL + .5LL - .3EQX - EQY
9	1.2D0 + 1.2DL + .5LL - .3EQX + EQY
10	1.2D0 + 1.2DL + .5LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

COLUMN SECTIONS

Number of prismatic sections = 1

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	40X65	Rectang	400	650	-	-	-	-	260000	9.15E+09	3.47E+09	8.49E+09

Design Results - Columns (DES)

Column	Story	L (m)	Lu (m)	Sec Mat	bxh (mm)	TRANSVERSE REINFORCEMENT TIES	TRANSVERSE REINFORCEMENT XTIES	LONGITUDINAL REINFORCEMENT Sec	LdCmb critc	Pu (KN)	Mu2 (KN-m)	Mu3 (KN-m)	RHO -	As (mm2)
F-4	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	8	142.15	11.80	112.81	0.0100	2600
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	4	115.25	589.53	70.65	0.0289	7505

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Column	Story	L	Lu	Sec	bxh	TIES	XTIES	Sec	LdCmb	Pu	Mu2	Mu3	RHO	As
E-4	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	7	124.03	6.74	172.70	0.0107	2783
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	118.23	484.47	79.62	0.0236	6134
D-4	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	15	76.08	6.94	162.58	0.0101	2630
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	114.29	476.34	77.16	0.0230	5982
C-4	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	15	78.70	6.94	162.79	0.0101	2630
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	115.08	476.34	77.32	0.0230	5982
B-4	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	7	107.46	6.74	170.79	0.0107	2783
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	113.26	484.47	78.35	0.0236	6134
A-4	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	7	142.15	11.80	112.81	0.0100	2600
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	115.25	589.53	70.65	0.0289	7505
F-1	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	8	142.15	11.80	112.81	0.0100	2600
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	4	115.25	589.53	70.65	0.0289	7505
E-1	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	7	124.03	6.74	172.70	0.0107	2783
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	118.23	484.47	79.62	0.0236	6134
D-1	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	15	76.08	6.94	162.58	0.0101	2630
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	114.29	476.34	77.16	0.0230	5982
C-1	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	15	78.70	6.94	162.79	0.0101	2630
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	115.08	476.34	77.32	0.0230	5982
B-1	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	7	107.46	6.74	170.79	0.0107	2783
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	113.26	484.47	78.35	0.0236	6134
A-1	1	6.90	6.58	1	400x650	17 #3 @ 70 mm (end)	2 (b)	Top	7	142.15	11.80	112.81	0.0100	2600
				1		30 #3 @ 140 mm (ctr)	1 (h)	Bot	3	115.25	589.53	70.65	0.0289	7505

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LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + .5LL + EQX + .3EQY
4	1.2D0 + 1.2DL + .5LL - EQX - .3EQY
5	1.2D0 + 1.2DL + .5LL + EQX - .3EQY
6	1.2D0 + 1.2DL + .5LL - EQX + .3EQY
7	1.2D0 + 1.2DL + .5LL + .3EQX + EQY
8	1.2D0 + 1.2DL + .5LL - .3EQX - EQY
9	1.2D0 + 1.2DL + .5LL - .3EQX + EQY
10	1.2D0 + 1.2DL + .5LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

BEAM SECTIONS

Number of prismatic sections = 2

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	30X40	Rectang	300	400	-	-	-	-	120000	1.60E+09	9.00E+08	1.90E+09
2	50X50	Rectang	500	500	-	-	-	-	250000	5.21E+09	5.21E+09	7.71E+09

Design Results - Beams (DES)

BEAM: E(1-2) FLOOR: 1

Length: L = 2.50 m a = 0.33 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.33	0.54	0.76	0.98	1.20	1.41	1.63	1.85	2.07	2.28	2.50
Mu(-), kN-m:	-253.73	-213.34	-173.45	-133.97	-94.84	-56.02	-20.59	-20.32	-60.76	-101.61	-142.74
Mu(+), kN-m:	256.68	217.79	178.81	139.53	99.98	60.19	23.20	20.80	58.54	96.13	133.41
As(-), mm2:	1676	1385	1109	844	723	723	723	723	723	723	902
As(+), mm2:	1697	1417	1145	880	723	723	723	723	723	723	840
Vu, kN:	183.44	183.44	183.44	181.96	183.03	184.27	185.47	186.76	187.98	187.98	187.98
Tu, kN-m:	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

E-1 22 #3+1r @ 100 E-2

BEAM: D(1-2) FLOOR: 1

Length: L = 2.50 m a = 0.33 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.33	0.54	0.76	0.98	1.20	1.41	1.63	1.85	2.07	2.28	2.50
Mu(-), kN-m:	-254.76	-214.21	-174.16	-134.52	-95.23	-56.26	-20.68	-20.40	-61.00	-102.01	-143.29
Mu(+), kN-m:	257.71	218.66	179.51	140.08	100.38	60.42	23.29	20.88	58.78	96.52	133.97
As(-), mm2:	1683	1391	1113	847	723	723	723	723	723	723	905
As(+), mm2:	1705	1423	1150	884	723	723	723	723	723	723	844
Vu, kN:	184.17	184.17	184.17	182.70	183.76	185.00	186.20	187.49	188.71	188.71	188.71
Tu, kN-m:	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

D-1 22 #3+1r @ 100 D-2

BEAM: C(1-2) FLOOR: 1

Length: L = 2.50 m a = 0.33 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.33	0.54	0.76	0.98	1.20	1.41	1.63	1.85	2.07	2.28	2.50
Mu(-), kN-m:	-254.76	-214.21	-174.16	-134.52	-95.23	-56.26	-20.68	-20.40	-61.00	-102.01	-143.29
Mu(+), kN-m:	257.71	218.66	179.51	140.08	100.38	60.42	23.29	20.88	58.78	96.52	133.97
As(-), mm2:	1683	1391	1113	847	723	723	723	723	723	723	905
As(+), mm2:	1705	1423	1150	884	723	723	723	723	723	723	844
Vu, kN:	184.17	184.17	184.17	182.70	183.76	185.00	186.20	187.49	188.71	188.71	188.71
Tu, kN-m:	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

C-1 22 #3+1r @ 100 C-2

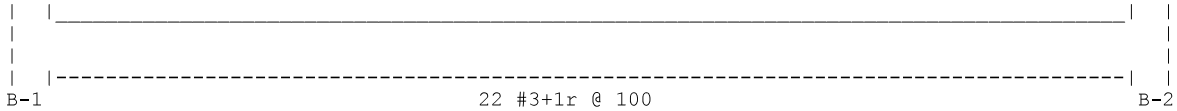
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BEAM: B(1-2) FLOOR: 1

Length: L = 2.50 m a = 0.33 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.33	0.54	0.76	0.98	1.20	1.41	1.63	1.85	2.07	2.28	2.50
Mu(-), kN-m:	-253.73	-213.34	-173.45	-133.97	-94.84	-56.02	-20.59	-20.32	-60.76	-101.61	-142.74
Mu(+), kN-m:	256.68	217.79	178.81	139.53	99.98	60.19	23.20	20.80	58.54	96.13	133.41
As(-), mm2:	1676	1385	1109	844	723	723	723	723	723	723	902
As(+), mm2:	1697	1417	1145	880	723	723	723	723	723	723	840
Vu, kN:	183.44	183.44	183.44	181.96	183.03	184.27	185.47	186.76	187.98	187.98	187.98
Tu, kN-m:	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

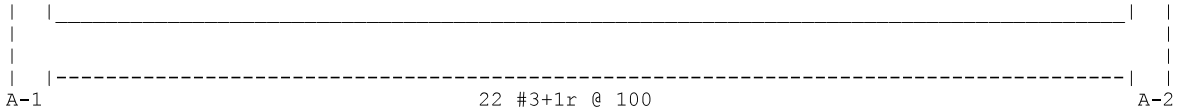


BEAM: A(1-2) FLOOR: 1

Length: L = 2.50 m a = 0.33 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.33	0.54	0.76	0.98	1.20	1.41	1.63	1.85	2.07	2.28	2.50
Mu(-), kN-m:	-313.03	-263.39	-214.32	-165.68	-117.40	-69.47	-25.64	-25.08	-74.60	-124.52	-174.70
Mu(+), kN-m:	316.00	267.86	219.69	171.25	122.56	73.63	28.25	25.56	72.38	119.03	165.37
As(-), mm2:	2123	1747	1392	1056	735	723	723	723	723	781	1117
As(+), mm2:	2146	1780	1430	1094	768	723	723	723	723	745	1054
Vu, kN:	225.78	225.78	225.78	224.23	225.21	226.37	227.49	228.72	229.86	229.86	229.86
Tu, kN-m:	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	175	100	100	100	100	100

DESIGN

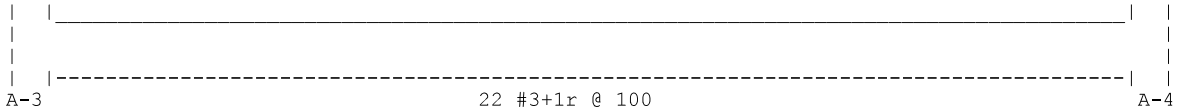


BEAM: A(3-4) FLOOR: 1

Length: L = 2.50 m a = 0.00 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.33 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.65	0.87	1.09	1.31	1.52	1.74	1.96	2.18
Mu(-), kN-m:	-174.70	-124.52	-74.60	-25.08	-25.64	-69.47	-117.40	-165.68	-214.32	-263.39	-313.03
Mu(+), kN-m:	165.37	119.03	72.38	25.56	28.25	73.63	122.56	171.25	219.69	267.86	316.00
As(-), mm2:	1117	781	723	723	723	723	735	1056	1392	1747	2123
As(+), mm2:	1054	745	723	723	723	723	768	1094	1430	1780	2146
Vu, kN:	229.85	229.85	229.85	228.62	227.46	226.26	225.16	224.10	225.69	225.69	225.69
Tu, kN-m:	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN



Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:06 p. m. 27/12/2024

BEAM: B(3-4) FLOOR: 1

Length: L = 2.50 m a = 0.00 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.33 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.65	0.87	1.09	1.31	1.52	1.74	1.96	2.18
Mu(-), kN-m:	-142.74	-101.61	-60.76	-20.32	-20.59	-56.02	-94.84	-133.97	-173.45	-213.34	-253.73
Mu(+), kN-m:	133.41	96.13	58.54	20.80	23.20	60.19	99.98	139.53	178.81	217.79	256.68
As(-), mm2:	902	723	723	723	723	723	723	844	1109	1385	1676
As(+), mm2:	840	723	723	723	723	723	723	880	1145	1417	1697
Vu, kN:	187.97	187.97	187.97	186.68	185.45	184.18	182.99	181.86	183.37	183.37	183.37
Tu, kN-m:	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

B-3 22 #3+1r @ 100 B-4

BEAM: C(3-4) FLOOR: 1

Length: L = 2.50 m a = 0.00 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.33 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.65	0.87	1.09	1.31	1.52	1.74	1.96	2.18
Mu(-), kN-m:	-143.29	-102.01	-61.00	-20.40	-20.68	-56.26	-95.23	-134.52	-174.16	-214.21	-254.76
Mu(+), kN-m:	133.97	96.52	58.78	20.88	23.29	60.42	100.38	140.08	179.51	218.66	257.71
As(-), mm2:	905	723	723	723	723	723	723	847	1113	1391	1683
As(+), mm2:	844	723	723	723	723	723	723	884	1150	1423	1705
Vu, kN:	188.70	188.70	188.70	187.41	186.18	184.91	183.72	182.59	184.10	184.10	184.10
Tu, kN-m:	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

C-3 22 #3+1r @ 100 C-4

BEAM: D(3-4) FLOOR: 1

Length: L = 2.50 m a = 0.00 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.33 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.65	0.87	1.09	1.31	1.52	1.74	1.96	2.18
Mu(-), kN-m:	-143.29	-102.01	-61.00	-20.40	-20.68	-56.26	-95.23	-134.52	-174.16	-214.21	-254.76
Mu(+), kN-m:	133.97	96.52	58.78	20.88	23.29	60.42	100.38	140.08	179.51	218.66	257.71
As(-), mm2:	905	723	723	723	723	723	723	847	1113	1391	1683
As(+), mm2:	844	723	723	723	723	723	723	884	1150	1423	1705
Vu, kN:	188.70	188.70	188.70	187.41	186.18	184.91	183.72	182.59	184.10	184.10	184.10
Tu, kN-m:	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

D-3 22 #3+1r @ 100 D-4

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:06 p. m. 27/12/2024

BEAM: E(3-4) FLOOR: 1

Length: L = 2.50 m a = 0.00 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.33 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.65	0.87	1.09	1.31	1.52	1.74	1.96	2.18
Mu(-), kN-m:	-142.74	-101.61	-60.76	-20.32	-20.59	-56.02	-94.84	-133.97	-173.45	-213.34	-253.73
Mu(+), kN-m:	133.41	96.13	58.54	20.80	23.20	60.19	99.98	139.53	178.81	217.79	256.68
As(-), mm2:	902	723	723	723	723	723	723	844	1109	1385	1676
As(+), mm2:	840	723	723	723	723	723	723	880	1145	1417	1697
Vu, kN:	187.97	187.97	187.97	186.68	185.45	184.18	182.99	181.86	183.37	183.37	183.37
Tu, kN-m:	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

E-3 22 #3+1r @ 100 E-4

BEAM: F(1-2) FLOOR: 1

Length: L = 2.50 m a = 0.33 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.00 m h = 500.00 mm Mat: 21MPA

X, m:	0.33	0.54	0.76	0.98	1.20	1.41	1.63	1.85	2.07	2.28	2.50
Mu(-), kN-m:	-313.03	-263.39	-214.32	-165.68	-117.40	-69.47	-25.64	-25.08	-74.60	-124.52	-174.70
Mu(+), kN-m:	316.00	267.86	219.69	171.25	122.56	73.63	28.25	25.56	72.38	119.03	165.37
As(-), mm2:	2123	1747	1392	1056	735	723	723	723	723	781	1117
As(+), mm2:	2146	1780	1430	1094	768	723	723	723	723	745	1054
Vu, kN:	225.78	225.78	225.78	224.23	225.21	226.37	227.49	228.72	229.86	229.86	229.86
Tu, kN-m:	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	175	100	100	100	100	100

DESIGN

F-1 22 #3+1r @ 100 F-2

BEAM: F(3-4) FLOOR: 1

Length: L = 2.50 m a = 0.00 m Section: b = 500.00 mm Sec: 50X50
Lu = 2.18 m c = 0.33 m h = 500.00 mm Mat: 21MPA

X, m:	0.00	0.22	0.44	0.65	0.87	1.09	1.31	1.52	1.74	1.96	2.18
Mu(-), kN-m:	-174.70	-124.52	-74.60	-25.08	-25.64	-69.47	-117.40	-165.68	-214.32	-263.39	-313.03
Mu(+), kN-m:	165.37	119.03	72.38	25.56	28.25	73.63	122.56	171.25	219.69	267.86	316.00
As(-), mm2:	1117	781	723	723	723	723	735	1056	1392	1747	2123
As(+), mm2:	1054	745	723	723	723	723	768	1094	1430	1780	2146
Vu, kN:	229.85	229.85	229.85	228.62	227.46	226.26	225.16	224.10	225.69	225.69	225.69
Tu, kN-m:	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
Stirrup:	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r	#3	#3+1r	#3+1r	#3+1r	#3+1r	#3+1r
Spacing, mm:	100	100	100	100	100	200	100	100	100	100	100

DESIGN

F-3 22 #3+1r @ 100 F-4

BEAM: 1(A-B) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-121.34	-90.71	-64.43	-40.61	-19.03	0.00	-5.18	-26.71	-51.66	-79.53	-109.55
Mu(+), kN-m:	110.12	92.48	76.30	59.05	40.46	20.35	21.41	34.73	47.79	60.13	71.46
As(-), mm2:	761	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	54.02	52.74	47.51	42.51	37.67	38.46	41.75	45.23	48.98	53.04	53.87
Tu, kN-m:	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

A-1 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 B-1

BEAM: 1(B-C) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-92.76	-67.23	-44.51	-24.85	-8.26	0.00	-10.11	-26.66	-45.94	-68.50	-94.11
Mu(+), kN-m:	56.77	48.98	40.38	31.00	20.50	10.12	23.14	34.41	44.22	53.48	62.23
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	44.86	43.81	39.22	34.82	30.57	26.53	29.87	34.23	38.81	43.60	44.49
Tu, kN-m:	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

B-1 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 C-1

BEAM: 1(C-D) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-96.74	-70.41	-47.04	-26.92	-9.57	0.00	-9.57	-26.92	-47.04	-70.41	-96.74
Mu(+), kN-m:	64.55	55.25	45.42	35.05	23.30	10.84	23.30	35.05	45.42	55.25	64.55
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	46.23	45.15	40.49	36.03	31.72	27.63	31.68	35.92	40.40	45.09	45.97
Tu, kN-m:	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

C-1 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 D-1

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:07 p. m. 27/12/2024

BEAM: 1(D-E) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-94.11	-68.50	-45.94	-26.66	-10.11	0.00	-8.26	-24.85	-44.51	-67.23	-92.76
Mu(+), kN-m:	62.23	53.48	44.22	34.41	23.14	10.12	20.50	31.00	40.38	48.98	56.77
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	44.77	43.68	38.93	34.36	29.94	26.53	30.54	34.72	39.14	43.76	44.63
Tu, kN-m:	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

D-1 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 E-1

BEAM: 1(E-F) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-109.55	-79.53	-51.66	-26.71	-5.18	0.00	-19.03	-40.61	-64.43	-90.71	-121.34
Mu(+), kN-m:	71.46	60.13	47.79	34.73	21.41	20.35	40.46	59.05	76.30	92.48	110.12
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	761
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	53.96	53.06	48.97	45.15	41.62	38.46	37.52	42.26	47.32	52.63	53.57
Tu, kN-m:	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

E-1 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 F-1

BEAM: 4(A-B) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-121.34	-90.71	-64.43	-40.61	-19.03	0.00	-5.18	-26.71	-51.66	-79.53	-109.55
Mu(+), kN-m:	110.12	92.48	76.30	59.05	40.46	20.35	21.41	34.73	47.79	60.13	71.46
As(-), mm2:	761	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	54.02	52.74	47.51	42.51	37.67	38.46	41.75	45.23	48.98	53.04	53.87
Tu, kN-m:	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

A-4 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 B-4

BEAM: 4(B-C) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-92.76	-67.23	-44.51	-24.85	-8.26	0.00	-10.11	-26.66	-45.94	-68.50	-94.11
Mu(+), kN-m:	56.77	48.98	40.38	31.00	20.50	10.12	23.14	34.41	44.22	53.48	62.23
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	44.86	43.81	39.22	34.82	30.57	26.53	29.87	34.23	38.81	43.60	44.49
Tu, kN-m:	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

B-4 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 C-4

BEAM: 4(C-D) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-96.74	-70.41	-47.04	-26.92	-9.57	0.00	-9.57	-26.92	-47.04	-70.41	-96.74
Mu(+), kN-m:	64.55	55.25	45.42	35.05	23.30	10.84	23.30	35.05	45.42	55.25	64.55
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	46.23	45.15	40.49	36.03	31.72	27.63	31.68	35.92	40.40	45.09	45.97
Tu, kN-m:	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

C-4 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 D-4

BEAM: 4(D-E) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-94.11	-68.50	-45.94	-26.66	-10.11	0.00	-8.26	-24.85	-44.51	-67.23	-92.76
Mu(+), kN-m:	62.23	53.48	44.22	34.41	23.14	10.12	20.50	31.00	40.38	48.98	56.77
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	723
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	44.77	43.68	38.93	34.36	29.94	26.53	30.54	34.72	39.14	43.76	44.63
Tu, kN-m:	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

D-4 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 E-4

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:07 p. m. 27/12/2024

BEAM: 4(E-F) FLOOR: 1

Length: L = 5.92 m a = 0.20 m Section: b = 500.00 mm Sec: 50X50
Lu = 5.52 m c = 0.20 m h = 500.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-109.55	-79.53	-51.66	-26.71	-5.18	0.00	-19.03	-40.61	-64.43	-90.71	-121.34
Mu(+), kN-m:	71.46	60.13	47.79	34.73	21.41	20.35	40.46	59.05	76.30	92.48	110.12
As(-), mm2:	723	723	723	723	723	723	723	723	723	723	761
As(+), mm2:	723	723	723	723	723	723	723	723	723	723	723
Vu, kN:	53.96	53.06	48.97	45.15	41.62	38.46	37.52	42.26	47.32	52.63	53.57
Tu, kN-m:	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Stirrup:	#3+1r	#3+1r	#3	#3	#3	#3	#3	#3	#3	#3+1r	#3+1r
Spacing, mm:	100	100	200	200	200	200	200	200	200	100	100

DESIGN

E-4 11 #3+1r @ 100 17 #3 @ 200 11 #3+1r @ 100 F-4

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:30 p. m. 27/12/2024

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + .5LL + EQX + .3EQY
4	1.2D0 + 1.2DL + .5LL - EQX - .3EQY
5	1.2D0 + 1.2DL + .5LL + EQX - .3EQY
6	1.2D0 + 1.2DL + .5LL - EQX + .3EQY
7	1.2D0 + 1.2DL + .5LL + .3EQX + EQY
8	1.2D0 + 1.2DL + .5LL - .3EQX - EQY
9	1.2D0 + 1.2DL + .5LL - .3EQX + EQY
10	1.2D0 + 1.2DL + .5LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

MATERIALS

Number of materials = 1

REINFORCED CONCRETE

Mat	Name	f'c (MPa)	fy (MPa)	fys1 (MPa)	fys2 (MPa)	E (MPa)	G (MPa)	w (N/m3)
1	21MPA	21	420	420	420	21538	8743	24000.0

f'c: Compressive strength of concrete
fy: Yield strength of longitudinal reinforcement
fys1: Yiel strength of shear reinforcement, bar sizes <= 3/8"
fys2: Yiel strength of shear reinforcement, bar sizes > 3/8"

BEAM SECTIONS

Number of prismatic sections = 2

Sec	Name	Shape	b (mm)	h (mm)	tw (mm)	tf (mm)	P1 (mm)	P2 (mm)	A (mm2)	I2 (mm4)	I3 (mm4)	J (mm4)
1	30X40	Rectang	300	400	-	-	-	-	120000	1.60E+09	9.00E+08	1.90E+09
2	50X50	Rectang	500	500	-	-	-	-	250000	5.21E+09	5.21E+09	7.71E+09

Design Results - Beams (DES)

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:30 p. m. 27/12/2024

BEAM: 1(A-B) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-120.21	-94.87	-70.77	-47.89	-30.05	-30.05	-30.05	-32.23	-56.13	-81.43	-107.80
Mu(+), kN-m:	110.37	92.41	74.02	55.03	35.00	30.05	30.05	36.11	54.50	72.47	89.82
As(-), mm2:	1067	815	591	390	335	335	335	335	461	688	941
As(+), mm2:	967	791	620	452	335	335	335	335	447	606	767
Vu, kN:	61.85	61.17	59.39	57.61	55.83	55.73	57.51	59.29	61.07	62.85	63.53
Tu, kN-m:	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

A-1 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 B-1

BEAM: 1(B-C) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-91.40	-70.01	-49.67	-30.68	-23.28	-23.28	-23.28	-32.84	-51.66	-71.87	-93.13
Mu(+), kN-m:	74.97	61.89	48.18	33.99	23.28	23.28	23.28	36.57	50.81	64.60	77.76
As(-), mm2:	782	584	405	335	335	335	335	335	423	601	798
As(+), mm2:	629	512	393	335	335	335	335	335	415	536	654
Vu, kN:	50.47	49.79	48.01	46.23	44.45	42.67	44.23	46.01	47.79	49.57	50.25
Tu, kN-m:	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

B-1 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 C-1

BEAM: 1(C-D) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-95.70	-73.65	-52.66	-33.07	-23.92	-23.92	-23.92	-33.07	-52.66	-73.65	-95.70
Mu(+), kN-m:	80.11	66.26	51.80	36.90	23.92	23.92	23.92	36.90	51.80	66.26	80.11
As(-), mm2:	823	617	431	335	335	335	335	335	431	617	823
As(+), mm2:	676	551	424	335	335	335	335	335	424	551	676
Vu, kN:	52.03	51.35	49.57	47.79	46.01	44.23	46.01	47.79	49.57	51.35	52.03
Tu, kN-m:	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

C-1 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 D-1

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:30 p. m. 27/12/2024

BEAM: 1(D-E) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-93.13	-71.87	-51.66	-32.84	-23.28	-23.28	-23.28	-30.68	-49.67	-70.01	-91.40
Mu(+), kN-m:	77.76	64.60	50.81	36.57	23.28	23.28	23.28	33.99	48.18	61.89	74.97
As(-), mm2:	798	601	423	335	335	335	335	335	405	584	782
As(+), mm2:	654	536	415	335	335	335	335	335	393	512	629
Vu, kN:	50.25	49.57	47.79	46.01	44.23	42.67	44.45	46.23	48.01	49.79	50.47
Tu, kN-m:	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

D-1 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 E-1

BEAM: 1(E-F) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-107.80	-81.43	-56.13	-32.23	-30.05	-30.05	-30.05	-47.89	-70.77	-94.87	-120.21
Mu(+), kN-m:	89.82	72.47	54.50	36.11	30.05	30.05	35.00	55.03	74.02	92.41	110.37
As(-), mm2:	941	688	461	335	335	335	335	390	591	815	1067
As(+), mm2:	767	606	447	335	335	335	335	452	620	791	967
Vu, kN:	63.53	62.85	61.07	59.29	57.51	55.73	55.83	57.61	59.39	61.17	61.85
Tu, kN-m:	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

E-1 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 F-1

BEAM: 4(A-B) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-120.21	-94.87	-70.77	-47.89	-30.05	-30.05	-30.05	-32.23	-56.13	-81.43	-107.80
Mu(+), kN-m:	110.37	92.41	74.02	55.03	35.00	30.05	30.05	36.11	54.50	72.47	89.82
As(-), mm2:	1067	815	591	390	335	335	335	335	461	688	941
As(+), mm2:	967	791	620	452	335	335	335	335	447	606	767
Vu, kN:	61.85	61.17	59.39	57.61	55.83	55.73	57.51	59.29	61.07	62.85	63.53
Tu, kN-m:	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

A-4 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 B-4

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:30 p. m. 27/12/2024

BEAM: 4(B-C) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-91.40	-70.01	-49.67	-30.68	-23.28	-23.28	-23.28	-32.84	-51.66	-71.87	-93.13
Mu(+), kN-m:	74.97	61.89	48.18	33.99	23.28	23.28	23.28	36.57	50.81	64.60	77.76
As(-), mm2:	782	584	405	335	335	335	335	335	423	601	798
As(+), mm2:	629	512	393	335	335	335	335	335	415	536	654
Vu, kN:	50.47	49.79	48.01	46.23	44.45	42.67	44.23	46.01	47.79	49.57	50.25
Tu, kN-m:	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

B-4 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 C-4

BEAM: 4(C-D) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-95.70	-73.65	-52.66	-33.07	-23.92	-23.92	-23.92	-33.07	-52.66	-73.65	-95.70
Mu(+), kN-m:	80.11	66.26	51.80	36.90	23.92	23.92	23.92	36.90	51.80	66.26	80.11
As(-), mm2:	823	617	431	335	335	335	335	335	431	617	823
As(+), mm2:	676	551	424	335	335	335	335	335	424	551	676
Vu, kN:	52.03	51.35	49.57	47.79	46.01	44.23	46.01	47.79	49.57	51.35	52.03
Tu, kN-m:	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

C-4 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 D-4

BEAM: 4(D-E) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-93.13	-71.87	-51.66	-32.84	-23.28	-23.28	-23.28	-30.68	-49.67	-70.01	-91.40
Mu(+), kN-m:	77.76	64.60	50.81	36.57	23.28	23.28	23.28	33.99	48.18	61.89	74.97
As(-), mm2:	798	601	423	335	335	335	335	335	405	584	782
As(+), mm2:	654	536	415	335	335	335	335	335	393	512	629
Vu, kN:	50.25	49.57	47.79	46.01	44.23	42.67	44.45	46.23	48.01	49.79	50.47
Tu, kN-m:	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN

D-4 11 #3 @ 80 22 #3 @ 170 11 #3 @ 80 E-4

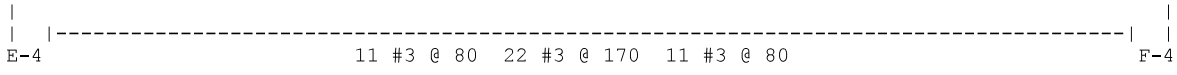
Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:05:30 p. m. 27/12/2024

BEAM: 4(E-F) FLOOR: 2

Length: L = 5.92 m a = 0.20 m Section: b = 300.00 mm Sec: 30X40
Lu = 5.52 m c = 0.20 m h = 400.00 mm Mat: 21MPA

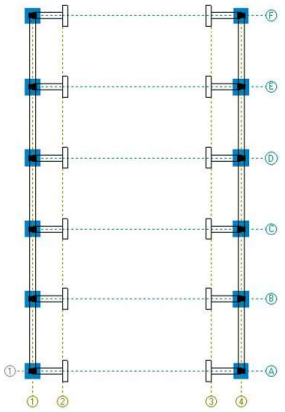
X, m:	0.20	0.75	1.30	1.86	2.41	2.96	3.51	4.06	4.62	5.17	5.72
Mu(-), kN-m:	-107.80	-81.43	-56.13	-32.23	-30.05	-30.05	-30.05	-47.89	-70.77	-94.87	-120.21
Mu(+), kN-m:	89.82	72.47	54.50	36.11	30.05	30.05	35.00	55.03	74.02	92.41	110.37
As(-), mm2:	941	688	461	335	335	335	335	390	591	815	1067
As(+), mm2:	767	606	447	335	335	335	335	452	620	791	967
Vu, kN:	63.53	62.85	61.07	59.29	57.51	55.73	55.83	57.61	59.39	61.17	61.85
Tu, kN-m:	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Stirrup:	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
Spacing, mm:	80	80	170	170	170	170	170	170	170	80	80

DESIGN



Cálculo ingeniamos

ANEXO
RESULTADO DISEÑO DE CIMENTACION


F
E
D
C
B
A
1
2
3
4


y
z
x

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:04:31 p. m. 27/12/2024

P-Delta Analysis- Support Reactions

Support		Load	Force (kN)			Moment (kN-m)		
Axis	Floor	LdCase	Fx	Fy	Fz	Mx	My	Mz
A-1	1	D0	0.00	1.31	75.09	15.71	-4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	67.77	0.00	0.00	0.00	470.13	-7.58
		EQY	10.21	44.14	38.43	-184.44	70.48	4.15
B-1	1	D0	0.00	-0.19	102.87	0.44	-4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	57.71	0.00	0.00	0.00	400.25	-2.35
		EQY	1.73	59.45	-8.29	-219.40	11.57	-1.21
C-1	1	D0	0.00	0.03	101.98	-0.05	-4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	56.91	0.00	0.00	0.00	395.54	-1.60
		EQY	0.68	57.34	1.31	-214.55	4.71	-0.94
D-1	1	D0	0.00	-0.03	101.98	0.05	-4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	56.91	0.00	0.00	0.00	395.54	1.60
		EQY	0.68	57.34	-1.31	-214.55	4.71	0.94
E-1	1	D0	0.00	0.19	102.87	-0.44	-4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	57.71	0.00	0.00	0.00	400.25	2.35
		EQY	1.73	59.45	8.29	-219.40	11.57	1.21
F-1	1	D0	0.00	-1.31	75.09	-15.71	-4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	67.77	0.00	0.00	0.00	470.13	7.58
		EQY	10.21	44.14	-38.43	-184.44	70.48	-4.15
A-2	1	D0	0.00	0.00	6.53	0.00	2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
B-2	1	D0	0.00	0.00	6.53	0.00	2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
C-2	1	D0	0.00	0.00	6.53	0.00	2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
D-2	1	D0	0.00	0.00	6.53	0.00	2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
E-2	1	D0	0.00	0.00	6.53	0.00	2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:04:31 p. m. 27/12/2024

Axis	Floor	LdCase	Fx	Fy	Fz	Mx	My	Mz
F-2	1	D0	0.00	0.00	6.53	0.00	2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
A-3	1	D0	0.00	0.00	6.53	0.00	-2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
B-3	1	D0	0.00	0.00	6.53	0.00	-2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
C-3	1	D0	0.00	0.00	6.53	0.00	-2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
D-3	1	D0	0.00	0.00	6.53	0.00	-2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
E-3	1	D0	0.00	0.00	6.53	0.00	-2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
F-3	1	D0	0.00	0.00	6.53	0.00	-2.37	0.00
		DL	0.00	0.00	0.00	0.00	0.00	0.00
		LL	0.00	0.00	0.00	0.00	0.00	0.00
		EQX	0.00	0.00	0.00	0.00	0.00	0.00
		EQY	0.00	0.00	0.00	0.00	0.00	0.00
A-4	1	D0	0.00	1.31	75.09	15.71	4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	67.77	0.00	0.00	0.00	470.13	-7.58
		EQY	10.21	44.14	38.43	-184.44	70.48	4.15
B-4	1	D0	0.00	-0.19	102.87	0.44	4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	57.71	0.00	0.00	0.00	400.25	-2.35
		EQY	1.73	59.45	-8.29	-219.40	11.57	-1.21
C-4	1	D0	0.00	0.03	101.98	-0.05	4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	56.91	0.00	0.00	0.00	395.54	-1.60
		EQY	0.68	57.34	1.31	-214.55	4.71	-0.94
D-4	1	D0	0.00	-0.03	101.98	0.05	4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	56.91	0.00	0.00	0.00	395.54	1.60
		EQY	0.68	57.34	-1.31	-214.55	4.71	0.94
E-4	1	D0	0.00	0.19	102.87	-0.44	4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	57.71	0.00	0.00	0.00	400.25	2.35
		EQY	1.73	59.45	8.29	-219.40	11.57	1.21

Axis	Floor	LdCase	Fx	Fy	Fz	Mx	My	Mz
F-4	1	D0	0.00	-1.31	75.09	-15.71	4.80	0.00
		DL	0.00	0.00	28.00	0.00	0.00	0.00
		LL	0.00	0.00	23.00	0.00	0.00	0.00
		EQX	67.77	0.00	0.00	0.00	470.13	7.58
		EQY	10.21	44.14	-38.43	-184.44	70.48	-4.15

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:04:15 p. m. 27/12/2024

P-Delta Analysis- Support Reactions

Support		Load	Force (kN)			Moment (kN-m)		
Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
A-1	1	1	0.00	1.83	144.32	22.00	-6.72	0.00
		2	0.00	1.57	160.50	18.86	-5.76	0.00
		3	70.84	14.81	146.73	-36.48	485.51	-6.33
		4	-70.84	-11.68	123.68	74.19	-497.04	6.33
		5	64.71	-11.68	123.68	74.19	443.22	-8.82
		6	-64.71	14.81	146.73	-36.48	-454.75	8.82
		7	30.54	45.71	173.63	-165.59	205.76	1.87
		8	-30.54	-42.58	96.78	203.30	-217.28	-1.87
		9	-10.12	45.71	173.63	-165.59	-76.32	6.42
		10	10.12	-42.58	96.78	203.30	64.79	-6.42
		11	70.84	14.42	104.31	-41.19	486.95	-6.33
		12	-70.84	-12.07	81.25	69.47	-495.60	6.33
		13	64.71	-12.07	81.25	69.47	444.66	-8.82
		14	-64.71	14.42	104.31	-41.19	-453.31	8.82
		15	30.54	45.32	131.20	-170.30	207.20	1.87
		16	-30.54	-42.97	54.35	198.58	-215.84	-1.87
		17	-10.12	45.32	131.20	-170.30	-74.88	6.42
		18	10.12	-42.97	54.35	198.58	66.23	-6.42
		19	47.44	1.31	126.09	15.71	324.29	-5.30
		20	-47.44	1.31	126.09	15.71	-333.89	5.30
		21	7.15	32.20	152.98	-113.40	44.54	2.90
		22	-7.15	-29.59	99.19	144.82	-54.14	-2.90
B-1	1	1	0.00	-0.26	183.21	0.62	-6.72	0.00
		2	0.00	-0.23	193.84	0.53	-5.76	0.00
		3	58.23	17.61	166.05	-65.29	397.96	-2.72
		4	-58.23	-18.06	171.03	66.35	-409.49	2.72
		5	57.19	-18.06	171.03	66.35	391.02	-1.99
		6	-57.19	17.61	166.05	-65.29	-402.55	1.99
		7	19.04	59.23	160.25	-218.87	125.88	-1.92
		8	-19.04	-59.68	176.83	219.92	-137.41	1.92
		9	-15.58	59.23	160.25	-218.87	-114.27	-0.51
		10	15.58	-59.68	176.83	219.92	102.74	0.51
		11	58.23	17.67	115.29	-65.42	399.40	-2.72
		12	-58.23	-18.01	120.27	66.22	-408.05	2.72
		13	57.19	-18.01	120.27	66.22	392.46	-1.99
		14	-57.19	17.67	115.29	-65.42	-401.11	1.99
		15	19.04	59.28	109.49	-219.00	127.32	-1.92
		16	-19.04	-59.62	126.07	219.79	-135.97	1.92
		17	-15.58	59.28	109.49	-219.00	-112.83	-0.51
		18	15.58	-59.62	126.07	219.79	104.18	0.51
		19	40.40	-0.19	153.87	0.44	275.37	-1.65
		20	-40.40	-0.19	153.87	0.44	-284.98	1.65
		21	1.21	41.43	148.06	-153.14	3.30	-0.85
		22	-1.21	-41.81	159.67	154.02	-12.90	0.85
C-1	1	1	0.00	0.04	181.97	-0.08	-6.72	0.00
		2	0.00	0.03	192.78	-0.07	-5.76	0.00
		3	57.12	17.23	167.87	-64.43	391.19	-1.89
		4	-57.12	-17.17	167.09	64.30	-402.72	1.89
		5	56.71	-17.17	167.09	64.30	388.36	-1.32
		6	-56.71	17.23	167.87	-64.43	-399.89	1.32
		7	17.75	57.37	168.79	-214.61	117.61	-1.42
		8	-17.75	-57.30	166.17	214.48	-129.14	1.42
		9	-16.39	57.37	168.79	-214.61	-119.71	-0.46
		10	16.39	-57.30	166.17	214.48	108.18	0.46
		11	57.12	17.22	117.38	-64.41	392.63	-1.89
		12	-57.12	-17.18	116.59	64.31	-401.28	1.89
		13	56.71	-17.18	116.59	64.31	389.80	-1.32
		14	-56.71	17.22	117.38	-64.41	-398.45	1.32
		15	17.75	57.36	118.29	-214.59	119.05	-1.42
		16	-17.75	-57.31	115.68	214.50	-127.70	1.42
		17	-16.39	57.36	118.29	-214.59	-118.27	-0.46
		18	16.39	-57.31	115.68	214.50	109.62	0.46
		19	39.84	0.03	152.98	-0.05	272.07	-1.12
		20	-39.84	0.03	152.98	-0.05	-281.68	1.12
		21	0.48	40.16	153.90	-150.24	-1.50	-0.66
		22	-0.48	-40.11	152.07	150.13	-8.10	0.66
D-1	1	1	0.00	-0.04	181.97	0.08	-6.72	0.00

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		2	0.00	-0.03	192.78	0.07	-5.76	0.00
		3	57.12	17.17	167.09	-64.30	391.19	1.89
		4	-57.12	-17.23	167.87	64.43	-402.72	-1.89
		5	56.71	-17.23	167.87	64.43	388.36	1.32
		6	-56.71	17.17	167.09	-64.30	-399.89	-1.32
		7	17.75	57.30	166.17	-214.48	117.61	1.42
		8	-17.75	-57.37	168.79	214.61	-129.14	-1.42
		9	-16.39	57.30	166.17	-214.48	-119.71	0.46
		10	16.39	-57.37	168.79	214.61	108.18	-0.46
		11	57.12	17.18	116.59	-64.31	392.63	1.89
		12	-57.12	-17.22	117.38	64.41	-401.28	-1.89
		13	56.71	-17.22	117.38	64.41	389.80	1.32
		14	-56.71	17.18	116.59	-64.31	-398.45	-1.32
		15	17.75	57.31	115.68	-214.50	119.05	1.42
		16	-17.75	-57.36	118.29	214.59	-127.70	-1.42
		17	-16.39	57.31	115.68	-214.50	-118.27	0.46
		18	16.39	-57.36	118.29	214.59	109.62	-0.46
		19	39.84	-0.03	152.98	0.05	272.07	1.12
		20	-39.84	-0.03	152.98	0.05	-281.68	-1.12
		21	0.48	40.11	152.07	-150.13	-1.50	0.66
		22	-0.48	-40.16	153.90	150.24	-8.10	-0.66
E-1	1	1	0.00	0.26	183.21	-0.62	-6.72	0.00
		2	0.00	0.23	193.84	-0.53	-5.76	0.00
		3	58.23	18.06	171.03	-66.35	397.96	2.72
		4	-58.23	-17.61	166.05	65.29	-409.49	-2.72
		5	57.19	-17.61	166.05	65.29	391.02	1.99
		6	-57.19	18.06	171.03	-66.35	-402.55	-1.99
		7	19.04	59.68	176.83	-219.92	125.88	1.92
		8	-19.04	-59.23	160.25	218.87	-137.41	-1.92
		9	-15.58	59.68	176.83	-219.92	-114.27	0.51
		10	15.58	-59.23	160.25	218.87	102.74	-0.51
		11	58.23	18.01	120.27	-66.22	399.40	2.72
		12	-58.23	-17.67	115.29	65.42	-408.05	-2.72
		13	57.19	-17.67	115.29	65.42	392.46	1.99
		14	-57.19	18.01	120.27	-66.22	-401.11	-1.99
		15	19.04	59.62	126.07	-219.79	127.32	1.92
		16	-19.04	-59.28	109.49	219.00	-135.97	-1.92
		17	-15.58	59.62	126.07	-219.79	-112.83	0.51
		18	15.58	-59.28	109.49	219.00	104.18	-0.51
		19	40.40	0.19	153.87	-0.44	275.37	1.65
		20	-40.40	0.19	153.87	-0.44	-284.98	-1.65
		21	1.21	41.81	159.67	-154.02	3.30	0.85
		22	-1.21	-41.43	148.06	153.14	-12.90	-0.85
F-1	1	1	0.00	-1.83	144.32	-22.00	-6.72	0.00
		2	0.00	-1.57	160.50	-18.86	-5.76	0.00
		3	70.84	11.68	123.68	-74.19	485.51	6.33
		4	-70.84	-14.81	146.73	36.48	-497.04	-6.33
		5	64.71	-14.81	146.73	36.48	443.22	8.82
		6	-64.71	11.68	123.68	-74.19	-454.75	-8.82
		7	30.54	42.58	96.78	-203.30	205.76	-1.87
		8	-30.54	-45.71	173.63	165.59	-217.28	1.87
		9	-10.12	42.58	96.78	-203.30	-76.32	-6.42
		10	10.12	-45.71	173.63	165.59	64.79	6.42
		11	70.84	12.07	81.25	-69.47	486.95	6.33
		12	-70.84	-14.42	104.31	41.19	-495.60	-6.33
		13	64.71	-14.42	104.31	41.19	444.66	8.82
		14	-64.71	12.07	81.25	-69.47	-453.31	-8.82
		15	30.54	42.97	54.35	-198.58	207.20	-1.87
		16	-30.54	-45.32	131.20	170.30	-215.84	1.87
		17	-10.12	42.97	54.35	-198.58	-74.88	-6.42
		18	10.12	-45.32	131.20	170.30	66.23	6.42
		19	47.44	-1.31	126.09	-15.71	324.29	5.30
		20	-47.44	-1.31	126.09	-15.71	-333.89	-5.30
		21	7.15	29.59	99.19	-144.82	44.54	-2.90
		22	-7.15	-32.20	152.98	113.40	-54.14	2.90
A-2	1	1	0.00	0.00	9.13	0.00	3.31	0.00
		2	0.00	0.00	7.83	0.00	2.84	0.00
		3	0.00	0.00	7.83	0.00	2.84	0.00
		4	0.00	0.00	7.83	0.00	2.84	0.00
		5	0.00	0.00	7.83	0.00	2.84	0.00
		6	0.00	0.00	7.83	0.00	2.84	0.00
		7	0.00	0.00	7.83	0.00	2.84	0.00

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		8	0.00	0.00	7.83	0.00	2.84	0.00
		9	0.00	0.00	7.83	0.00	2.84	0.00
		10	0.00	0.00	7.83	0.00	2.84	0.00
		11	0.00	0.00	5.87	0.00	2.13	0.00
		12	0.00	0.00	5.87	0.00	2.13	0.00
		13	0.00	0.00	5.87	0.00	2.13	0.00
		14	0.00	0.00	5.87	0.00	2.13	0.00
		15	0.00	0.00	5.87	0.00	2.13	0.00
		16	0.00	0.00	5.87	0.00	2.13	0.00
		17	0.00	0.00	5.87	0.00	2.13	0.00
		18	0.00	0.00	5.87	0.00	2.13	0.00
		19	0.00	0.00	6.53	0.00	2.37	0.00
		20	0.00	0.00	6.53	0.00	2.37	0.00
		21	0.00	0.00	6.53	0.00	2.37	0.00
		22	0.00	0.00	6.53	0.00	2.37	0.00
B-2	1	1	0.00	0.00	9.13	0.00	3.31	0.00
		2	0.00	0.00	7.83	0.00	2.84	0.00
		3	0.00	0.00	7.83	0.00	2.84	0.00
		4	0.00	0.00	7.83	0.00	2.84	0.00
		5	0.00	0.00	7.83	0.00	2.84	0.00
		6	0.00	0.00	7.83	0.00	2.84	0.00
		7	0.00	0.00	7.83	0.00	2.84	0.00
		8	0.00	0.00	7.83	0.00	2.84	0.00
		9	0.00	0.00	7.83	0.00	2.84	0.00
		10	0.00	0.00	7.83	0.00	2.84	0.00
		11	0.00	0.00	5.87	0.00	2.13	0.00
		12	0.00	0.00	5.87	0.00	2.13	0.00
		13	0.00	0.00	5.87	0.00	2.13	0.00
		14	0.00	0.00	5.87	0.00	2.13	0.00
		15	0.00	0.00	5.87	0.00	2.13	0.00
		16	0.00	0.00	5.87	0.00	2.13	0.00
		17	0.00	0.00	5.87	0.00	2.13	0.00
		18	0.00	0.00	5.87	0.00	2.13	0.00
		19	0.00	0.00	6.53	0.00	2.37	0.00
		20	0.00	0.00	6.53	0.00	2.37	0.00
		21	0.00	0.00	6.53	0.00	2.37	0.00
		22	0.00	0.00	6.53	0.00	2.37	0.00
C-2	1	1	0.00	0.00	9.13	0.00	3.31	0.00
		2	0.00	0.00	7.83	0.00	2.84	0.00
		3	0.00	0.00	7.83	0.00	2.84	0.00
		4	0.00	0.00	7.83	0.00	2.84	0.00
		5	0.00	0.00	7.83	0.00	2.84	0.00
		6	0.00	0.00	7.83	0.00	2.84	0.00
		7	0.00	0.00	7.83	0.00	2.84	0.00
		8	0.00	0.00	7.83	0.00	2.84	0.00
		9	0.00	0.00	7.83	0.00	2.84	0.00
		10	0.00	0.00	7.83	0.00	2.84	0.00
		11	0.00	0.00	5.87	0.00	2.13	0.00
		12	0.00	0.00	5.87	0.00	2.13	0.00
		13	0.00	0.00	5.87	0.00	2.13	0.00
		14	0.00	0.00	5.87	0.00	2.13	0.00
		15	0.00	0.00	5.87	0.00	2.13	0.00
		16	0.00	0.00	5.87	0.00	2.13	0.00
		17	0.00	0.00	5.87	0.00	2.13	0.00
		18	0.00	0.00	5.87	0.00	2.13	0.00
		19	0.00	0.00	6.53	0.00	2.37	0.00
		20	0.00	0.00	6.53	0.00	2.37	0.00
		21	0.00	0.00	6.53	0.00	2.37	0.00
		22	0.00	0.00	6.53	0.00	2.37	0.00
D-2	1	1	0.00	0.00	9.13	0.00	3.31	0.00
		2	0.00	0.00	7.83	0.00	2.84	0.00
		3	0.00	0.00	7.83	0.00	2.84	0.00
		4	0.00	0.00	7.83	0.00	2.84	0.00
		5	0.00	0.00	7.83	0.00	2.84	0.00
		6	0.00	0.00	7.83	0.00	2.84	0.00
		7	0.00	0.00	7.83	0.00	2.84	0.00
		8	0.00	0.00	7.83	0.00	2.84	0.00
		9	0.00	0.00	7.83	0.00	2.84	0.00
		10	0.00	0.00	7.83	0.00	2.84	0.00
		11	0.00	0.00	5.87	0.00	2.13	0.00
		12	0.00	0.00	5.87	0.00	2.13	0.00
		13	0.00	0.00	5.87	0.00	2.13	0.00

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		14	0.00	0.00	5.87	0.00	2.13	0.00
		15	0.00	0.00	5.87	0.00	2.13	0.00
		16	0.00	0.00	5.87	0.00	2.13	0.00
		17	0.00	0.00	5.87	0.00	2.13	0.00
		18	0.00	0.00	5.87	0.00	2.13	0.00
		19	0.00	0.00	6.53	0.00	2.37	0.00
		20	0.00	0.00	6.53	0.00	2.37	0.00
		21	0.00	0.00	6.53	0.00	2.37	0.00
		22	0.00	0.00	6.53	0.00	2.37	0.00
E-2	1	1	0.00	0.00	9.13	0.00	3.31	0.00
		2	0.00	0.00	7.83	0.00	2.84	0.00
		3	0.00	0.00	7.83	0.00	2.84	0.00
		4	0.00	0.00	7.83	0.00	2.84	0.00
		5	0.00	0.00	7.83	0.00	2.84	0.00
		6	0.00	0.00	7.83	0.00	2.84	0.00
		7	0.00	0.00	7.83	0.00	2.84	0.00
		8	0.00	0.00	7.83	0.00	2.84	0.00
		9	0.00	0.00	7.83	0.00	2.84	0.00
		10	0.00	0.00	7.83	0.00	2.84	0.00
		11	0.00	0.00	5.87	0.00	2.13	0.00
		12	0.00	0.00	5.87	0.00	2.13	0.00
		13	0.00	0.00	5.87	0.00	2.13	0.00
		14	0.00	0.00	5.87	0.00	2.13	0.00
		15	0.00	0.00	5.87	0.00	2.13	0.00
		16	0.00	0.00	5.87	0.00	2.13	0.00
		17	0.00	0.00	5.87	0.00	2.13	0.00
		18	0.00	0.00	5.87	0.00	2.13	0.00
		19	0.00	0.00	6.53	0.00	2.37	0.00
		20	0.00	0.00	6.53	0.00	2.37	0.00
		21	0.00	0.00	6.53	0.00	2.37	0.00
		22	0.00	0.00	6.53	0.00	2.37	0.00
F-2	1	1	0.00	0.00	9.13	0.00	3.31	0.00
		2	0.00	0.00	7.83	0.00	2.84	0.00
		3	0.00	0.00	7.83	0.00	2.84	0.00
		4	0.00	0.00	7.83	0.00	2.84	0.00
		5	0.00	0.00	7.83	0.00	2.84	0.00
		6	0.00	0.00	7.83	0.00	2.84	0.00
		7	0.00	0.00	7.83	0.00	2.84	0.00
		8	0.00	0.00	7.83	0.00	2.84	0.00
		9	0.00	0.00	7.83	0.00	2.84	0.00
		10	0.00	0.00	7.83	0.00	2.84	0.00
		11	0.00	0.00	5.87	0.00	2.13	0.00
		12	0.00	0.00	5.87	0.00	2.13	0.00
		13	0.00	0.00	5.87	0.00	2.13	0.00
		14	0.00	0.00	5.87	0.00	2.13	0.00
		15	0.00	0.00	5.87	0.00	2.13	0.00
		16	0.00	0.00	5.87	0.00	2.13	0.00
		17	0.00	0.00	5.87	0.00	2.13	0.00
		18	0.00	0.00	5.87	0.00	2.13	0.00
		19	0.00	0.00	6.53	0.00	2.37	0.00
		20	0.00	0.00	6.53	0.00	2.37	0.00
		21	0.00	0.00	6.53	0.00	2.37	0.00
		22	0.00	0.00	6.53	0.00	2.37	0.00
A-3	1	1	0.00	0.00	9.13	0.00	-3.31	0.00
		2	0.00	0.00	7.83	0.00	-2.84	0.00
		3	0.00	0.00	7.83	0.00	-2.84	0.00
		4	0.00	0.00	7.83	0.00	-2.84	0.00
		5	0.00	0.00	7.83	0.00	-2.84	0.00
		6	0.00	0.00	7.83	0.00	-2.84	0.00
		7	0.00	0.00	7.83	0.00	-2.84	0.00
		8	0.00	0.00	7.83	0.00	-2.84	0.00
		9	0.00	0.00	7.83	0.00	-2.84	0.00
		10	0.00	0.00	7.83	0.00	-2.84	0.00
		11	0.00	0.00	5.87	0.00	-2.13	0.00
		12	0.00	0.00	5.87	0.00	-2.13	0.00
		13	0.00	0.00	5.87	0.00	-2.13	0.00
		14	0.00	0.00	5.87	0.00	-2.13	0.00
		15	0.00	0.00	5.87	0.00	-2.13	0.00
		16	0.00	0.00	5.87	0.00	-2.13	0.00
		17	0.00	0.00	5.87	0.00	-2.13	0.00
		18	0.00	0.00	5.87	0.00	-2.13	0.00
		19	0.00	0.00	6.53	0.00	-2.37	0.00

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		20	0.00	0.00	6.53	0.00	-2.37	0.00
		21	0.00	0.00	6.53	0.00	-2.37	0.00
		22	0.00	0.00	6.53	0.00	-2.37	0.00
B-3	1	1	0.00	0.00	9.13	0.00	-3.31	0.00
		2	0.00	0.00	7.83	0.00	-2.84	0.00
		3	0.00	0.00	7.83	0.00	-2.84	0.00
		4	0.00	0.00	7.83	0.00	-2.84	0.00
		5	0.00	0.00	7.83	0.00	-2.84	0.00
		6	0.00	0.00	7.83	0.00	-2.84	0.00
		7	0.00	0.00	7.83	0.00	-2.84	0.00
		8	0.00	0.00	7.83	0.00	-2.84	0.00
		9	0.00	0.00	7.83	0.00	-2.84	0.00
		10	0.00	0.00	7.83	0.00	-2.84	0.00
		11	0.00	0.00	5.87	0.00	-2.13	0.00
		12	0.00	0.00	5.87	0.00	-2.13	0.00
		13	0.00	0.00	5.87	0.00	-2.13	0.00
		14	0.00	0.00	5.87	0.00	-2.13	0.00
		15	0.00	0.00	5.87	0.00	-2.13	0.00
		16	0.00	0.00	5.87	0.00	-2.13	0.00
		17	0.00	0.00	5.87	0.00	-2.13	0.00
		18	0.00	0.00	5.87	0.00	-2.13	0.00
		19	0.00	0.00	6.53	0.00	-2.37	0.00
		20	0.00	0.00	6.53	0.00	-2.37	0.00
		21	0.00	0.00	6.53	0.00	-2.37	0.00
		22	0.00	0.00	6.53	0.00	-2.37	0.00
C-3	1	1	0.00	0.00	9.13	0.00	-3.31	0.00
		2	0.00	0.00	7.83	0.00	-2.84	0.00
		3	0.00	0.00	7.83	0.00	-2.84	0.00
		4	0.00	0.00	7.83	0.00	-2.84	0.00
		5	0.00	0.00	7.83	0.00	-2.84	0.00
		6	0.00	0.00	7.83	0.00	-2.84	0.00
		7	0.00	0.00	7.83	0.00	-2.84	0.00
		8	0.00	0.00	7.83	0.00	-2.84	0.00
		9	0.00	0.00	7.83	0.00	-2.84	0.00
		10	0.00	0.00	7.83	0.00	-2.84	0.00
		11	0.00	0.00	5.87	0.00	-2.13	0.00
		12	0.00	0.00	5.87	0.00	-2.13	0.00
		13	0.00	0.00	5.87	0.00	-2.13	0.00
		14	0.00	0.00	5.87	0.00	-2.13	0.00
		15	0.00	0.00	5.87	0.00	-2.13	0.00
		16	0.00	0.00	5.87	0.00	-2.13	0.00
		17	0.00	0.00	5.87	0.00	-2.13	0.00
		18	0.00	0.00	5.87	0.00	-2.13	0.00
		19	0.00	0.00	6.53	0.00	-2.37	0.00
		20	0.00	0.00	6.53	0.00	-2.37	0.00
		21	0.00	0.00	6.53	0.00	-2.37	0.00
		22	0.00	0.00	6.53	0.00	-2.37	0.00
D-3	1	1	0.00	0.00	9.13	0.00	-3.31	0.00
		2	0.00	0.00	7.83	0.00	-2.84	0.00
		3	0.00	0.00	7.83	0.00	-2.84	0.00
		4	0.00	0.00	7.83	0.00	-2.84	0.00
		5	0.00	0.00	7.83	0.00	-2.84	0.00
		6	0.00	0.00	7.83	0.00	-2.84	0.00
		7	0.00	0.00	7.83	0.00	-2.84	0.00
		8	0.00	0.00	7.83	0.00	-2.84	0.00
		9	0.00	0.00	7.83	0.00	-2.84	0.00
		10	0.00	0.00	7.83	0.00	-2.84	0.00
		11	0.00	0.00	5.87	0.00	-2.13	0.00
		12	0.00	0.00	5.87	0.00	-2.13	0.00
		13	0.00	0.00	5.87	0.00	-2.13	0.00
		14	0.00	0.00	5.87	0.00	-2.13	0.00
		15	0.00	0.00	5.87	0.00	-2.13	0.00
		16	0.00	0.00	5.87	0.00	-2.13	0.00
		17	0.00	0.00	5.87	0.00	-2.13	0.00
		18	0.00	0.00	5.87	0.00	-2.13	0.00
		19	0.00	0.00	6.53	0.00	-2.37	0.00
		20	0.00	0.00	6.53	0.00	-2.37	0.00
		21	0.00	0.00	6.53	0.00	-2.37	0.00
		22	0.00	0.00	6.53	0.00	-2.37	0.00
E-3	1	1	0.00	0.00	9.13	0.00	-3.31	0.00
		2	0.00	0.00	7.83	0.00	-2.84	0.00

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		3	0.00	0.00	7.83	0.00	-2.84	0.00
		4	0.00	0.00	7.83	0.00	-2.84	0.00
		5	0.00	0.00	7.83	0.00	-2.84	0.00
		6	0.00	0.00	7.83	0.00	-2.84	0.00
		7	0.00	0.00	7.83	0.00	-2.84	0.00
		8	0.00	0.00	7.83	0.00	-2.84	0.00
		9	0.00	0.00	7.83	0.00	-2.84	0.00
		10	0.00	0.00	7.83	0.00	-2.84	0.00
		11	0.00	0.00	5.87	0.00	-2.13	0.00
		12	0.00	0.00	5.87	0.00	-2.13	0.00
		13	0.00	0.00	5.87	0.00	-2.13	0.00
		14	0.00	0.00	5.87	0.00	-2.13	0.00
		15	0.00	0.00	5.87	0.00	-2.13	0.00
		16	0.00	0.00	5.87	0.00	-2.13	0.00
		17	0.00	0.00	5.87	0.00	-2.13	0.00
		18	0.00	0.00	5.87	0.00	-2.13	0.00
		19	0.00	0.00	6.53	0.00	-2.37	0.00
		20	0.00	0.00	6.53	0.00	-2.37	0.00
		21	0.00	0.00	6.53	0.00	-2.37	0.00
		22	0.00	0.00	6.53	0.00	-2.37	0.00
F-3	1	1	0.00	0.00	9.13	0.00	-3.31	0.00
		2	0.00	0.00	7.83	0.00	-2.84	0.00
		3	0.00	0.00	7.83	0.00	-2.84	0.00
		4	0.00	0.00	7.83	0.00	-2.84	0.00
		5	0.00	0.00	7.83	0.00	-2.84	0.00
		6	0.00	0.00	7.83	0.00	-2.84	0.00
		7	0.00	0.00	7.83	0.00	-2.84	0.00
		8	0.00	0.00	7.83	0.00	-2.84	0.00
		9	0.00	0.00	7.83	0.00	-2.84	0.00
		10	0.00	0.00	7.83	0.00	-2.84	0.00
		11	0.00	0.00	5.87	0.00	-2.13	0.00
		12	0.00	0.00	5.87	0.00	-2.13	0.00
		13	0.00	0.00	5.87	0.00	-2.13	0.00
		14	0.00	0.00	5.87	0.00	-2.13	0.00
		15	0.00	0.00	5.87	0.00	-2.13	0.00
		16	0.00	0.00	5.87	0.00	-2.13	0.00
		17	0.00	0.00	5.87	0.00	-2.13	0.00
		18	0.00	0.00	5.87	0.00	-2.13	0.00
		19	0.00	0.00	6.53	0.00	-2.37	0.00
		20	0.00	0.00	6.53	0.00	-2.37	0.00
		21	0.00	0.00	6.53	0.00	-2.37	0.00
		22	0.00	0.00	6.53	0.00	-2.37	0.00
A-4	1	1	0.00	1.83	144.32	22.00	6.72	0.00
		2	0.00	1.57	160.50	18.86	5.76	0.00
		3	70.84	14.81	146.73	-36.48	497.04	-6.33
		4	-70.84	-11.68	123.68	74.19	-485.51	6.33
		5	64.71	-11.68	123.68	74.19	454.75	-8.82
		6	-64.71	14.81	146.73	-36.48	-443.22	8.82
		7	30.54	45.71	173.63	-165.59	217.28	1.87
		8	-30.54	-42.58	96.78	203.30	-205.76	-1.87
		9	-10.12	45.71	173.63	-165.59	-64.79	6.42
		10	10.12	-42.58	96.78	203.30	76.32	-6.42
		11	70.84	14.42	104.31	-41.19	495.60	-6.33
		12	-70.84	-12.07	81.25	69.47	-486.95	6.33
		13	64.71	-12.07	81.25	69.47	453.31	-8.82
		14	-64.71	14.42	104.31	-41.19	-444.66	8.82
		15	30.54	45.32	131.20	-170.30	215.84	1.87
		16	-30.54	-42.97	54.35	198.58	-207.20	-1.87
		17	-10.12	45.32	131.20	-170.30	-66.23	6.42
		18	10.12	-42.97	54.35	198.58	74.88	-6.42
		19	47.44	1.31	126.09	15.71	333.89	-5.30
		20	-47.44	1.31	126.09	15.71	-324.29	5.30
		21	7.15	32.20	152.98	-113.40	54.14	2.90
		22	-7.15	-29.59	99.19	144.82	-44.54	-2.90
B-4	1	1	0.00	-0.26	183.21	0.62	6.72	0.00
		2	0.00	-0.23	193.84	0.53	5.76	0.00
		3	58.23	17.61	166.05	-65.29	409.49	-2.72
		4	-58.23	-18.06	171.03	66.35	-397.96	2.72
		5	57.19	-18.06	171.03	66.35	402.55	-1.99
		6	-57.19	17.61	166.05	-65.29	-391.02	1.99
		7	19.04	59.23	160.25	-218.87	137.41	-1.92
		8	-19.04	-59.68	176.83	219.92	-125.88	1.92

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		9	-15.58	59.23	160.25	-218.87	-102.74	-0.51
		10	15.58	-59.68	176.83	219.92	114.27	0.51
		11	58.23	17.67	115.29	-65.42	408.05	-2.72
		12	-58.23	-18.01	120.27	66.22	-399.40	2.72
		13	57.19	-18.01	120.27	66.22	401.11	-1.99
		14	-57.19	17.67	115.29	-65.42	-392.46	1.99
		15	19.04	59.28	109.49	-219.00	135.97	-1.92
		16	-19.04	-59.62	126.07	219.79	-127.32	1.92
		17	-15.58	59.28	109.49	-219.00	-104.18	-0.51
		18	15.58	-59.62	126.07	219.79	112.83	0.51
		19	40.40	-0.19	153.87	0.44	284.98	-1.65
		20	-40.40	-0.19	153.87	0.44	-275.37	1.65
		21	1.21	41.43	148.06	-153.14	12.90	-0.85
		22	-1.21	-41.81	159.67	154.02	-3.30	0.85
C-4	1	1	0.00	0.04	181.97	-0.08	6.72	0.00
		2	0.00	0.03	192.78	-0.07	5.76	0.00
		3	57.12	17.23	167.87	-64.43	402.72	-1.89
		4	-57.12	-17.17	167.09	64.30	-391.19	1.89
		5	56.71	-17.17	167.09	64.30	399.89	-1.32
		6	-56.71	17.23	167.87	-64.43	-388.36	1.32
		7	17.75	57.37	168.79	-214.61	129.14	-1.42
		8	-17.75	-57.30	166.17	214.48	-117.61	1.42
		9	-16.39	57.37	168.79	-214.61	-108.18	-0.46
		10	16.39	-57.30	166.17	214.48	119.71	0.46
		11	57.12	17.22	117.38	-64.41	401.28	-1.89
		12	-57.12	-17.18	116.59	64.31	-392.63	1.89
		13	56.71	-17.18	116.59	64.31	398.45	-1.32
		14	-56.71	17.22	117.38	-64.41	-389.80	1.32
		15	17.75	57.36	118.29	-214.59	127.70	-1.42
		16	-17.75	-57.31	115.68	214.50	-119.05	1.42
		17	-16.39	57.36	118.29	-214.59	-109.62	-0.46
		18	16.39	-57.31	115.68	214.50	118.27	0.46
		19	39.84	0.03	152.98	-0.05	281.68	-1.12
		20	-39.84	0.03	152.98	-0.05	-272.07	1.12
		21	0.48	40.16	153.90	-150.24	8.10	-0.66
		22	-0.48	-40.11	152.07	150.13	1.50	0.66
D-4	1	1	0.00	-0.04	181.97	0.08	6.72	0.00
		2	0.00	-0.03	192.78	0.07	5.76	0.00
		3	57.12	17.17	167.09	-64.30	402.72	1.89
		4	-57.12	-17.23	167.87	64.43	-391.19	-1.89
		5	56.71	-17.23	167.87	64.43	399.89	1.32
		6	-56.71	17.17	167.09	-64.30	-388.36	-1.32
		7	17.75	57.30	166.17	-214.48	129.14	1.42
		8	-17.75	-57.37	168.79	214.61	-117.61	-1.42
		9	-16.39	57.30	166.17	-214.48	-108.18	0.46
		10	16.39	-57.37	168.79	214.61	119.71	-0.46
		11	57.12	17.18	116.59	-64.31	401.28	1.89
		12	-57.12	-17.22	117.38	64.41	-392.63	-1.89
		13	56.71	-17.22	117.38	64.41	398.45	1.32
		14	-56.71	17.18	116.59	-64.31	-389.80	-1.32
		15	17.75	57.31	115.68	-214.50	127.70	1.42
		16	-17.75	-57.36	118.29	214.59	-119.05	-1.42
		17	-16.39	57.31	115.68	-214.50	-109.62	0.46
		18	16.39	-57.36	118.29	214.59	118.27	-0.46
		19	39.84	-0.03	152.98	0.05	281.68	1.12
		20	-39.84	-0.03	152.98	0.05	-272.07	-1.12
		21	0.48	40.11	152.07	-150.13	8.10	0.66
		22	-0.48	-40.16	153.90	150.24	1.50	-0.66
E-4	1	1	0.00	0.26	183.21	-0.62	6.72	0.00
		2	0.00	0.23	193.84	-0.53	5.76	0.00
		3	58.23	18.06	171.03	-66.35	409.49	2.72
		4	-58.23	-17.61	166.05	65.29	-397.96	-2.72
		5	57.19	-17.61	166.05	65.29	402.55	1.99
		6	-57.19	18.06	171.03	-66.35	-391.02	-1.99
		7	19.04	59.68	176.83	-219.92	137.41	1.92
		8	-19.04	-59.23	160.25	218.87	-125.88	-1.92
		9	-15.58	59.68	176.83	-219.92	-102.74	0.51
		10	15.58	-59.23	160.25	218.87	114.27	-0.51
		11	58.23	18.01	120.27	-66.22	408.05	2.72
		12	-58.23	-17.67	115.29	65.42	-399.40	-2.72
		13	57.19	-17.67	115.29	65.42	401.11	1.99
		14	-57.19	18.01	120.27	-66.22	-392.46	-1.99

Axis	Floor	LdComb	Fx	Fy	Fz	Mx	My	Mz
		15	19.04	59.62	126.07	-219.79	135.97	1.92
		16	-19.04	-59.28	109.49	219.00	-127.32	-1.92
		17	-15.58	59.62	126.07	-219.79	-104.18	0.51
		18	15.58	-59.28	109.49	219.00	112.83	-0.51
		19	40.40	0.19	153.87	-0.44	284.98	1.65
		20	-40.40	0.19	153.87	-0.44	-275.37	-1.65
		21	1.21	41.81	159.67	-154.02	12.90	0.85
		22	-1.21	-41.43	148.06	153.14	-3.30	-0.85
F-4	1	1	0.00	-1.83	144.32	-22.00	6.72	0.00
		2	0.00	-1.57	160.50	-18.86	5.76	0.00
		3	70.84	11.68	123.68	-74.19	497.04	6.33
		4	-70.84	-14.81	146.73	36.48	-485.51	-6.33
		5	64.71	-14.81	146.73	36.48	454.75	8.82
		6	-64.71	11.68	123.68	-74.19	-443.22	-8.82
		7	30.54	42.58	96.78	-203.30	217.28	-1.87
		8	-30.54	-45.71	173.63	165.59	-205.76	1.87
		9	-10.12	42.58	96.78	-203.30	-64.79	-6.42
		10	10.12	-45.71	173.63	165.59	76.32	6.42
		11	70.84	12.07	81.25	-69.47	495.60	6.33
		12	-70.84	-14.42	104.31	41.19	-486.95	-6.33
		13	64.71	-14.42	104.31	41.19	453.31	8.82
		14	-64.71	12.07	81.25	-69.47	-444.66	-8.82
		15	30.54	42.97	54.35	-198.58	215.84	-1.87
		16	-30.54	-45.32	131.20	170.30	-207.20	1.87
		17	-10.12	42.97	54.35	-198.58	-66.23	-6.42
		18	10.12	-45.32	131.20	170.30	74.88	6.42
		19	47.44	-1.31	126.09	-15.71	333.89	5.30
		20	-47.44	-1.31	126.09	-15.71	-324.29	-5.30
		21	7.15	29.59	99.19	-144.82	54.14	-2.90
		22	-7.15	-32.20	152.98	113.40	-44.54	2.90

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + .5LL + EQX + .3EQY
4	1.2D0 + 1.2DL + .5LL - EQX - .3EQY
5	1.2D0 + 1.2DL + .5LL + EQX - .3EQY
6	1.2D0 + 1.2DL + .5LL - EQX + .3EQY
7	1.2D0 + 1.2DL + .5LL + .3EQX + EQY
8	1.2D0 + 1.2DL + .5LL - .3EQX - EQY
9	1.2D0 + 1.2DL + .5LL - .3EQX + EQY
10	1.2D0 + 1.2DL + .5LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

NUDO	REACCIONES EN LOS SOPORTES (MAYORADA) - KN	REACCIONES EN LOS SOPORTES (AREA) - KN	AREA COLUMNA(CM2)			PRESION PRODUCIDA	LA CUAL DEBE SER MENOR QUE	CUMPLE	CAPACIDAD PORTANTE (KPa)	AREA REQUERIDA (M2)	LADO REQUERIDO (M2)	AREA UTILIZADA		L(M)	L(M)	AREA UTILIZADA (M2)	PRESION NETA (KN/M2)
A-1	116.64	126.09	40.00	65.00	2,600.00	0.048	Fb = 2ϕ x 0.85 x F´c	ok	96.66	1.30	1.1	1.44	OK	1.20	1.20	1.44	87.56
B-1	138.03	153.87	40.00	65.00	2,600.00	0.059	Fb = 2 x 0.7 x 0.85 x 0.211	ok		1.59	1.3	1.69	OK	1.30	1.30	1.69	91.05
C-1	137.14	152.98	40.00	65.00	2,600.00	0.059	Fb = 2 x 0.7 x 0.85 x 0.212	ok		1.58	1.3	1.69	OK	1.30	1.30	1.69	90.52
D-1	137.14	152.98	40.00	65.00	2,600.00	0.059		ok		1.58	1.3	1.69	OK	1.30	1.30	1.69	90.52
E-1	138.03	153.87	40.00	65.00	2,600.00	0.059		ok		1.59	1.3	1.69	OK	1.30	1.30	1.69	91.05
F-1	116.64	126.09	40.00	65.00	2,600.00	0.048		ok		1.30	1.1	1.44	OK	1.20	1.20	1.44	87.56
A-2	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
B-2	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
C-2	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
D-2	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
E-2	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
F-2	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
A-3	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
B-3	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
C-3	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
D-3	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
E-3	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
F-3	4.18	6.53			-					0.07	0.3	0.09	OK	1.00	1.00	1.00	6.53
A-4	116.64	126.09	40.00	65.00	2,600.00	0.048		ok		1.30	1.1	1.44	OK	1.20	1.20	1.44	87.56
B-4	138.03	153.87	40.00	65.00	2,600.00	0.059		ok		1.59	1.3	1.69	OK	1.30	1.30	1.69	91.05
C-4	137.14	152.98	40.00	65.00	2,600.00	0.059		ok		1.58	1.3	1.69	OK	1.30	1.30	1.69	90.52
D-4	137.14	152.98	40.00	65.00	2,600.00	0.059		ok		1.58	1.3	1.69	OK	1.30	1.30	1.69	90.52
E-4	138.03	153.87	40.00	65.00	2,600.00	0.059		ok		1.59	1.3	1.69	OK	1.30	1.30	1.69	91.05
F-4	116.64	126.09	40.00	65.00	2,600.00	0.048		ok		1.30	1.1	1.44	OK	1.20	1.20	1.44	87.56

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:03:27 p. m. 27/12/2024

LOAD COMBINATIONS

No	Load combination
1	1.4D0 + 1.4DL
2	1.2D0 + 1.2DL + 1.6LL
3	1.2D0 + 1.2DL + .5LL + EQX + .3EQY
4	1.2D0 + 1.2DL + .5LL - EQX - .3EQY
5	1.2D0 + 1.2DL + .5LL + EQX - .3EQY
6	1.2D0 + 1.2DL + .5LL - EQX + .3EQY
7	1.2D0 + 1.2DL + .5LL + .3EQX + EQY
8	1.2D0 + 1.2DL + .5LL - .3EQX - EQY
9	1.2D0 + 1.2DL + .5LL - .3EQX + EQY
10	1.2D0 + 1.2DL + .5LL + .3EQX - EQY
11	.9D0 + .9DL + EQX + .3EQY
12	.9D0 + .9DL - EQX - .3EQY
13	.9D0 + .9DL + EQX - .3EQY
14	.9D0 + .9DL - EQX + .3EQY
15	.9D0 + .9DL + .3EQX + EQY
16	.9D0 + .9DL - .3EQX - EQY
17	.9D0 + .9DL - .3EQX + EQY
18	.9D0 + .9DL + .3EQX - EQY
19	D0 + DL + LL + .7EQX
20	D0 + DL + LL - .7EQX
21	D0 + DL + LL + .7EQY
22	D0 + DL + LL - .7EQY

Design results - Footings

Footing	Floor	Mat	B m	L m	h mm	Vu1/ØVc1 Vu2/ØVc2	Dir -	Reinforcem	As mm2	Mu kN-m
F-4	1	1	1.20	1.20	350	0.26	B	6#4@210 mm	756.0	23.90
						0.37	L	6#4@210 mm	756.0	22.19
E-4	1	1	1.30	1.30	350	0.30	B	7#4@191 mm	819.0	27.71
						0.29	L	7#4@191 mm	819.0	15.00
D-4	1	1	1.30	1.30	350	0.29	B	7#4@191 mm	819.0	27.17
						0.29	L	7#4@191 mm	819.0	14.88
C-4	1	1	1.30	1.30	350	0.29	B	7#4@191 mm	819.0	27.17
						0.29	L	7#4@191 mm	819.0	14.52
B-4	1	1	1.30	1.30	350	0.29	B	7#4@191 mm	819.0	27.54
						0.29	L	7#4@191 mm	819.0	15.33
A-4	1	1	1.20	1.20	350	0.26	B	6#4@210 mm	756.0	23.90
						0.28	L	6#4@210 mm	756.0	11.64
F-1	1	1	1.20	1.20	350	0.28	B	6#4@210 mm	756.0	25.16
						0.40	L	6#4@210 mm	756.0	23.94
E-1	1	1	1.30	1.30	350	0.30	B	7#4@191 mm	819.0	27.71
						0.30	L	7#4@191 mm	819.0	14.81
D-1	1	1	1.30	1.30	350	0.29	B	7#4@191 mm	819.0	27.26
						0.29	L	7#4@191 mm	819.0	14.82
C-1	1	1	1.30	1.30	350	0.29	B	7#4@191 mm	819.0	27.17
						0.29	L	7#4@191 mm	819.0	14.90
B-1	1	1	1.30	1.30	350	0.29	B	7#4@191 mm	819.0	27.54
						0.30	L	7#4@191 mm	819.0	14.71
A-1	1	1	1.20	1.20	350	0.26	B	6#4@210 mm	756.0	23.90
						0.40	L	6#4@210 mm	756.0	22.19

Cálculo ingeniamos

ANEXO

RESULTADO DISEÑO DE CORREAS Y CERCHA

Memorias de Cálculo

PROGRAMA DE DISENO Y CALCULO ESTRUCTURAL
ARQUIMET 2.0

Proyecto: _____ Fecha: _____

Ingeniero: _____ Firma: _____

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTE DE CORREAS

PHR Cajón 150 x 50 x 17 (1.20 mm)
con Fy = 35.15 Kgf/mm² cada 1.20 m sin arriostramiento interior.

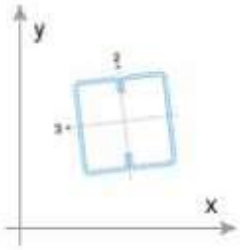
SECCION LONGITUDINAL

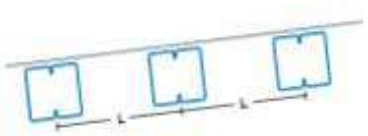


L1	5.92 m
L2	5.92 m
L3	5.92 m
L4	5.92 m
L5	5.92 m
A1	0.10 m
A2	0.10 m
A3	0.10 m
A4	0.10 m
A5	0.10 m
A6	0.10 m

CONFIGURACION	
TIPO DE CARGA	DISTRIBUIDA
Carga muerta	0.35 KN/m²
Peso propio correa	0.05 KN/m
Carga viva	0.50 KN/m²
Carga granizo	0.10 KN/m²
Viento compresión (Perpendicular)	0.50 KN/m²
Viento succión (Perpendicular)	-0.50 KN/m²
Pendiente sección transversal	6.843° = 12.0000%

SECCION TRANSVERSAL





L = 1.20 m

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

REPORTES DE DISEÑO

REPORTE FLEXION				
	Apoyos		Interiores	
Ejes locales	3	2	3	2
Resistente (KN.m)	8.6010	3.7701	8.6010	3.7701
Calculado (KN.m)	6.9157	0.6926	6.9157	0.6926

REPORTE CORTANTE		
Ejes locales	2	3
Resistente (KN)	23.4271	35.4644
Calculado (KN)	6.5942	0.6604

REPORTE DEFLEXION		
Deflexiones máximas	Instantanea	Permanente
Admisible (m)	0.0223	0.0334
Calculado (m)	0.0114	0.0203

REPORTE ARRUGAMIENTO	
No. de Apoyo	0
Resistencia máxima (Kgf)	4.3079
Arrugamiento (Kgf)	7.4806

COMBINACIONES DE CARGA					
No	Muerta	Viva	Granizo	Viento compresión	Viento succión
1	1.4000	0.0000	0.0000	0.0000	0.0000
2	1.2000	0.5000	0.0000	0.0000	0.0000
3	1.2000	0.0000	0.5000	0.0000	0.0000
4	1.2000	1.6000	0.0000	0.5000	0.0000
5	1.2000	0.0000	1.6000	0.5000	0.0000
6	1.2000	1.6000	0.0000	0.0000	0.5000
7	1.2000	0.0000	1.6000	0.0000	0.5000
8	1.2000	0.5000	0.0000	0.0000	1.0000
9	1.2000	0.0000	0.5000	0.0000	1.0000
10	1.2000	0.5000	0.0000	1.0000	0.0000
11	1.2000	0.0000	0.5000	1.0000	0.0000
12	0.9000	0.0000	0.0000	0.0000	1.0000
13	0.9000	0.0000	0.0000	1.0000	0.0000

REACCIONES - EJES GLOBALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1		
Combinacion	Rx	Ry
Muerta	-9.5818E-09	1.1163
Viva de Cub.	-8.0363E-09	1.4258
Granizo	-2.1272E-09	0.2852
Viento Comp.	-0.1699	1.4156
Viento Succion	0.0000	0.0000
Comb. 1	-9.9971E-09	1.5628
Comb. 2	-3.1637E-08	2.0525
Comb. 3	-1.4010E-08	1.4821
Comb. 4	-0.0849	4.3286
Comb. 5	-0.0849	2.5036
Comb. 6	-5.3180E-08	3.6208
Comb. 7	-4.4487E-11	1.7958
Comb. 8	-3.1637E-08	2.0525
Comb. 9	-1.4010E-08	1.4821
Comb. 10	-0.1699	3.4681
Comb. 11	-0.1699	2.8978
Comb. 12	-5.2062E-09	1.0047
Comb. 13	-0.1699	2.4203

APOYO 2		
Combinacion	Rx	Ry
Muerta	-2.3159E-08	3.2001
Viva de Cub.	4.8130E-08	4.0873
Granizo	2.6604E-10	0.8175
Viento Comp.	-0.4870	4.0581
Viento Succion	0.0000	0.0000
Comb. 1	-1.8456E-08	4.4801
Comb. 2	4.1143E-08	5.8837
Comb. 3	-5.1504E-08	4.2488
Comb. 4	-0.2435	12.4088
Comb. 5	-0.2435	7.1771
Comb. 6	-5.0626E-08	10.3797
Comb. 7	-3.3606E-08	5.1480
Comb. 8	4.1143E-08	5.8837
Comb. 9	-5.1504E-08	4.2488
Comb. 10	-0.4870	9.9418
Comb. 11	-0.4870	8.3069
Comb. 12	-2.4705E-08	2.8801
Comb. 13	-0.4870	6.9382

APOYO 3		
Combinacion	Rx	Ry
Muerta	-4.1718E-09	2.7535
Viva de Cub.	2.9356E-08	3.5169
Granizo	5.2237E-10	0.7034
Viento Comp.	-0.4190	3.4919
Viento Succion	0.0000	0.0000
Comb. 1	1.2911E-09	3.8550
Comb. 2	3.1809E-08	5.0627
Comb. 3	1.2935E-08	3.6559
Comb. 4	-0.2095	10.6773
Comb. 5	-0.2095	6.1756
Comb. 6	-1.5091E-08	8.9314
Comb. 7	-3.2797E-09	4.4297
Comb. 8	3.1809E-08	5.0627
Comb. 9	1.2935E-08	3.6559
Comb. 10	-0.4190	8.5546
Comb. 11	-0.4190	7.1478
Comb. 12	3.3770E-09	2.4782
Comb. 13	-0.4190	5.9701

APOYO 4		
Combinacion	Rx	Ry
Muerta	-4.1718E-09	2.7535
Viva de Cub.	2.9356E-08	3.5169
Granizo	5.2237E-10	0.7034
Viento Comp.	-0.4190	3.4919
Viento Succion	0.0000	0.0000
Comb. 1	1.2911E-09	3.8550
Comb. 2	3.1809E-08	5.0627
Comb. 3	1.2935E-08	3.6559
Comb. 4	-0.2095	10.6773
Comb. 5	-0.2095	6.1756
Comb. 6	-1.5091E-08	8.9314
Comb. 7	-3.2797E-09	4.4297
Comb. 8	3.1809E-08	5.0627
Comb. 9	1.2935E-08	3.6559
Comb. 10	-0.4190	8.5546
Comb. 11	-0.4190	7.1478
Comb. 12	3.3770E-09	2.4782
Comb. 13	-0.4190	5.9701

APOYO 5		
Combinacion	Rx	Ry
Muerta	-2.3159E-08	3.2001
Viva de Cub.	1.0987E-08	4.0873
Granizo	2.6604E-10	0.8175
Viento Comp.	-0.4870	4.0581
Viento Succion	0.0000	0.0000
Comb. 1	-1.8456E-08	4.4801
Comb. 2	-3.3143E-08	5.8837
Comb. 3	-5.1504E-08	4.2488
Comb. 4	-0.2435	12.4088
Comb. 5	-0.2435	7.1771
Comb. 6	-5.0626E-08	10.3797
Comb. 7	-3.3606E-08	5.1480
Comb. 8	-3.3143E-08	5.8837
Comb. 9	-5.1504E-08	4.2488
Comb. 10	-0.4870	9.9418
Comb. 11	-0.4870	8.3069
Comb. 12	-2.4705E-08	2.8801
Comb. 13	-0.4870	6.9382

APOYO 6		
Combinacion	Rx	Ry
Muerta	-9.5818E-09	1.1163
Viva de Cub.	-8.0363E-09	1.4258
Granizo	1.9422E-10	0.2852
Viento Comp.	-0.1699	1.4156
Viento Succion	0.0000	0.0000
Comb. 1	-9.9971E-09	1.5628
Comb. 2	-3.1637E-08	2.0525
Comb. 3	-1.4010E-08	1.4821
Comb. 4	-0.0849	4.3286
Comb. 5	-0.0849	2.5036
Comb. 6	-5.3180E-08	3.6208
Comb. 7	-4.4487E-11	1.7958
Comb. 8	-3.1637E-08	2.0525
Comb. 9	-1.4010E-08	1.4821
Comb. 10	-0.1699	3.4681
Comb. 11	-0.1699	2.8978
Comb. 12	-5.2062E-09	1.0047
Comb. 13	-0.1699	2.4203

FUERZAS INTERNAS - EJES LOCALES (KN-m)

Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO

APOYO 1				
Combinacion	R2	R3	M2	M3
Muerta	0.1330	1.1083	1.9154E-08	0.0000
Viva de Cub.	0.1699	1.4156	0.0000	-1.5323E-07
Granizo	0.0340	0.2831	4.7884E-09	-3.8307E-08
Viento Comp.	0.0000	1.4258	0.0000	0.0000
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.1862	1.5517	2.6815E-08	0.0000
Comb. 2	0.2445	2.0378	2.2984E-08	-7.6614E-08
Comb. 3	0.1766	1.4716	2.5379E-08	-1.9154E-08
Comb. 4	0.4314	4.3079	2.2984E-08	-2.4517E-07
Comb. 5	0.2140	2.4959	3.0646E-08	-6.1292E-08
Comb. 6	0.4314	3.5950	2.2984E-08	-2.4517E-07
Comb. 7	0.2140	1.7830	3.0646E-08	-6.1292E-08
Comb. 8	0.2445	2.0378	2.2984E-08	-7.6614E-08
Comb. 9	0.1766	1.4716	2.5379E-08	-1.9154E-08
Comb. 10	0.2445	3.4636	2.2984E-08	-7.6614E-08
Comb. 11	0.1766	2.8974	2.5379E-08	-1.9154E-08
Comb. 12	0.1197	0.9975	1.7238E-08	0.0000
Comb. 13	0.1197	2.4233	1.7238E-08	0.0000

APOYO 2				
Combinacion	R2	R3	M2	M3
Muerta	0.3813	3.1773	0.2135	-1.7793
Viva de Cub.	0.4870	4.0581	0.2727	-2.2726
Granizo	0.0974	0.8116	0.0545	-0.4545
Viento Comp.	0.0000	4.0873	0.0000	-2.2889
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.5338	4.4482	0.2989	-2.4910
Comb. 2	0.7010	5.8418	0.3926	-3.2714
Comb. 3	0.5062	4.2185	0.2835	-2.3624
Comb. 4	1.2367	12.3494	0.6926	-6.9157
Comb. 5	0.6134	7.1550	0.3435	-4.0068
Comb. 6	1.2367	10.3058	0.6926	-5.7712
Comb. 7	0.6134	5.1113	0.3435	-2.8623
Comb. 8	0.7010	5.8418	0.3926	-3.2714
Comb. 9	0.5062	4.2185	0.2835	-2.3624
Comb. 10	0.7010	9.9291	0.3926	-5.5603
Comb. 11	0.5062	8.3058	0.2835	-4.6512
Comb. 12	0.3432	2.8595	0.1922	-1.6013
Comb. 13	0.3432	6.9468	0.1922	-3.8902

APOYO 3				
Combinacion	R2	R3	M2	M3
Muerta	0.3281	2.7339	0.1601	-1.3345
Viva de Cub.	0.4190	3.4919	0.2045	-1.7044
Granizo	0.0838	0.6984	0.0409	-0.3409
Viento Comp.	0.0000	3.5169	0.0000	-1.7167
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.4593	3.8275	0.2242	-1.8682
Comb. 2	0.6032	5.0267	0.2944	-2.4536
Comb. 3	0.4356	3.6299	0.2126	-1.7718
Comb. 4	1.0642	10.6262	0.5194	-5.1867
Comb. 5	0.5278	6.1566	0.2576	-3.0051
Comb. 6	1.0642	8.8677	0.5194	-4.3284
Comb. 7	0.5278	4.3981	0.2576	-2.1468
Comb. 8	0.6032	5.0267	0.2944	-2.4536
Comb. 9	0.4356	3.6299	0.2126	-1.7718
Comb. 10	0.6032	8.5436	0.2944	-4.1702
Comb. 11	0.4356	7.1468	0.2126	-3.4884
Comb. 12	0.2953	2.4605	0.1441	-1.2010
Comb. 13	0.2953	5.9775	0.1441	-2.9177

APOYO 4				
Combinacion	R2	R3	M2	M3
Muerta	0.3281	2.7339	0.1601	-1.3345
Viva de Cub.	0.4190	3.4919	0.2045	-1.7044
Granizo	0.0838	0.6984	0.0409	-0.3409
Viento Comp.	0.0000	3.5169	0.0000	-1.7167
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.4593	3.8275	0.2242	-1.8682
Comb. 2	0.6032	5.0267	0.2944	-2.4536
Comb. 3	0.4356	3.6299	0.2126	-1.7718
Comb. 4	1.0642	10.6262	0.5194	-5.1867
Comb. 5	0.5278	6.1566	0.2576	-3.0051
Comb. 6	1.0642	8.8677	0.5194	-4.3284
Comb. 7	0.5278	4.3981	0.2576	-2.1468
Comb. 8	0.6032	5.0267	0.2944	-2.4536
Comb. 9	0.4356	3.6299	0.2126	-1.7718
Comb. 10	0.6032	8.5436	0.2944	-4.1702
Comb. 11	0.4356	7.1468	0.2126	-3.4884
Comb. 12	0.2953	2.4605	0.1441	-1.2010
Comb. 13	0.2953	5.9775	0.1441	-2.9177

FUERZAS INTERNAS - EJES LOCALES (KN-m) *Elementos calculados con el programa de diseño Arquimet 2.0 de ACESCO*

APOYO 5				
Combinacion	R2	R3	M2	M3
Muerta	0.3813	3.1773	0.2135	-1.7793
Viva de Cub.	0.4870	4.0581	0.2727	-2.2726
Granizo	0.0974	0.8116	0.0545	-0.4545
Viento Comp.	0.0000	4.0873	0.0000	-2.2889
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.5338	4.4482	0.2989	-2.4910
Comb. 2	0.7010	5.8418	0.3926	-3.2714
Comb. 3	0.5062	4.2185	0.2835	-2.3624
Comb. 4	1.2367	12.3494	0.6926	-6.9157
Comb. 5	0.6134	7.1550	0.3435	-4.0068
Comb. 6	1.2367	10.3058	0.6926	-5.7712
Comb. 7	0.6134	5.1113	0.3435	-2.8623
Comb. 8	0.7010	5.8418	0.3926	-3.2714
Comb. 9	0.5062	4.2185	0.2835	-2.3624
Comb. 10	0.7010	9.9291	0.3926	-5.5603
Comb. 11	0.5062	8.3058	0.2835	-4.6512
Comb. 12	0.3432	2.8595	0.1922	-1.6013
Comb. 13	0.3432	6.9468	0.1922	-3.8902

APOYO 6				
Combinacion	R2	R3	M2	M3
Muerta	0.1330	1.1083	0.0000	-1.5323E-07
Viva de Cub.	0.1699	1.4156	-1.1492E-07	-6.1292E-07
Granizo	0.0340	0.2831	4.7884E-09	-3.8307E-08
Viento Comp.	0.0000	1.4258	0.0000	-9.1937E-07
Viento Succion	0.0000	0.0000	0.0000	0.0000
Comb. 1	0.1862	1.5517	0.0000	-2.1452E-07
Comb. 2	0.2445	2.0378	-5.7461E-08	-4.9033E-07
Comb. 3	0.1766	1.4716	2.3942E-09	-2.0303E-07
Comb. 4	0.4314	4.3079	-1.8387E-07	-1.6242E-06
Comb. 5	0.2140	2.4959	7.6614E-09	-7.0485E-07
Comb. 6	0.4314	3.5950	-1.8387E-07	-1.1645E-06
Comb. 7	0.2140	1.7830	7.6614E-09	-2.4517E-07
Comb. 8	0.2445	2.0378	-5.7461E-08	-4.9033E-07
Comb. 9	0.1766	1.4716	2.3942E-09	-2.0303E-07
Comb. 10	0.2445	3.4636	-5.7461E-08	-1.4097E-06
Comb. 11	0.1766	2.8974	2.3942E-09	-1.1224E-06
Comb. 12	0.1197	0.9975	0.0000	-1.3791E-07
Comb. 13	0.1197	2.4233	0.0000	-1.0573E-06

Memorias de Cálculo

PROGRAMA DE DISEÑO Y CALCULO ESTRUCTURAL
PARA PRODUCTOS ACESCO

Proyecto: _____ **Fecha:** _____

Ingeniero:_____ **Firma:** _____

REPORTE ELEMENTOS PLANO Y = 0.0000 m

1. MATERIAL: ACERO

Módulo de Elasticidad (e) (kN/m²)	Coeficiente de Poisson	Módulo de Elasticidad de Cortante (g) (kN/m²)
2.0340E08	0.3000	7.8231E07

2. SECCIONES

ID	Geometría	Grado	Acabado
0	PHR C 160 x 60 x 20 (2.00 mm) (Cajón)	50	Negro
1	PHR C 100 x 50 x 15 (1.20 mm) (Cajón)	50	Negro
2	PHR C 100 x 50 x 15 (1.50 mm) (Cajón)	50	Negro
3	PHR C 100 x 50 x 15 (2.00 mm) (Cajón)	50	Negro
4	PHR C 100 x 50 x 15 (2.50 mm) (Cajón)	50	Negro
5	PHR C 100 x 50 x 15 (3.00 mm) (Cajón)	50	Negro
6	PHR C 120 x 60 x 15 (1.20 mm) (Cajón)	50	Negro
7	PHR C 120 x 60 x 15 (1.50 mm) (Cajón)	50	Negro
8	PHR C 120 x 60 x 15 (2.00 mm) (Cajón)	50	Negro
9	PHR C 120 x 60 x 15 (2.50 mm) (Cajón)	50	Negro
10	PHR C 120 x 60 x 15 (3.00 mm) (Cajón)	50	Negro
11	PHR C 150 x 50 x 17 (1.20 mm) (Cajón)	50	Negro
12	PHR C 150 x 50 x 17 (1.50 mm) (Cajón)	50	Negro
13	PHR C 150 x 50 x 17 (2.00 mm) (Cajón)	50	Negro
14	PHR C 150 x 50 x 17 (2.50 mm) (Cajón)	50	Negro
15	PHR C 150 x 50 x 17 (3.00 mm) (Cajón)	50	Negro
16	PHR C 160 x 60 x 20 (1.20 mm) (Cajón)	50	Negro
17	PHR C 160 x 60 x 20 (1.50 mm) (Cajón)	50	Negro
18	PHR C 160 x 60 x 20 (2.50 mm) (Cajón)	50	Negro
19	PHR C 160 x 60 x 20 (3.00 mm) (Cajón)	50	Negro
20	PHR C 203 x 67 x 19 (1.20 mm) (Cajón)	50	Negro
21	PHR C 203 x 67 x 19 (1.50 mm) (Cajón)	50	Negro

ID	Geometría	Grado	Acabado
22	PHR C 203 x 67 x 19 (2.00 mm) (Cajón)	50	Negro
23	PHR C 203 x 67 x 19 (2.50 mm) (Cajón)	50	Negro
24	PHR C 203 x 67 x 19 (3.00 mm) (Cajón)	50	Negro
25	PHR C 220 x 80 x 20 (1.20 mm) (Cajón)	50	Negro
26	PHR C 220 x 80 x 20 (1.50 mm) (Cajón)	50	Negro
27	PHR C 220 x 80 x 20 (2.00 mm) (Cajón)	50	Negro
28	PHR C 220 x 80 x 20 (2.50 mm) (Cajón)	50	Negro
29	PHR C 220 x 80 x 20 (3.00 mm) (Cajón)	50	Negro
30	PHR C 254 x 67 x 18 (1.50 mm) (Cajón)	50	Negro
31	PHR C 254 x 67 x 18 (2.00 mm) (Cajón)	50	Negro
32	PHR C 254 x 67 x 18 (2.50 mm) (Cajón)	50	Negro
33	PHR C 254 x 67 x 18 (3.00 mm) (Cajón)	50	Negro
34	PHR C 305 x 80 x 25 (1.50 mm) (Cajón)	50	Negro
35	PHR C 305 x 80 x 25 (2.00 mm) (Cajón)	50	Negro
36	PHR C 305 x 80 x 25 (2.50 mm) (Cajón)	50	Negro
37	PHR C 305 x 80 x 25 (3.00 mm) (Cajón)	50	Negro
38	PHR C 355 x 110 x 25 (2.00 mm) (Cajón)	50	Negro

3. NODOS

ID	Coordenada (x, y, z) m	Restricciones
0	(0.00, 0.00, 0.00)	Ux, Uy, Uz, Rx, Ry, Rz
1	(1.12, 0.00, 0.00)	Uy, Rx, Ry, Rz
2	(2.24, 0.00, 0.00)	Uy, Rx, Ry, Rz
3	(3.37, 0.00, 0.00)	Uy, Rx, Ry, Rz
4	(4.49, 0.00, 0.00)	Uy, Rx, Ry, Rz
5	(5.61, 0.00, 0.00)	Uy, Rx, Ry, Rz
6	(6.73, 0.00, 0.00)	Uy, Rx, Ry, Rz
7	(7.85, 0.00, 0.00)	Uy, Rx, Ry, Rz
8	(8.98, 0.00, 0.00)	Uy, Rx, Ry, Rz
9	(10.10, 0.00, 0.00)	Uy, Rx, Ry, Rz
10	(11.22, 0.00, 0.00)	Uy, Rx, Ry, Rz
11	(12.34, 0.00, 0.00)	Uy, Rx, Ry, Rz
12	(13.46, 0.00, 0.00)	Uy, Rx, Ry, Rz
13	(14.58, 0.00, 0.00)	Uy, Rx, Ry, Rz
14	(15.71, 0.00, 0.00)	Uy, Rx, Ry, Rz
15	(16.83, 0.00, 0.00)	Uy, Rx, Ry, Rz
16	(17.95, 0.00, 0.00)	Ux, Uy, Uz, Rx, Ry, Rz
17	(0.00, 0.00, 0.80)	Uy, Rx, Ry, Rz
18	(1.12, 0.00, 0.94)	Uy, Rx, Ry, Rz

ID	Coordenada (x, y, z) m	Restricciones
19	(2.24, 0.00, 1.08)	Uy, Rx, Ry, Rz
20	(3.37, 0.00, 1.21)	Uy, Rx, Ry, Rz
21	(4.49, 0.00, 1.35)	Uy, Rx, Ry, Rz
22	(5.61, 0.00, 1.49)	Uy, Rx, Ry, Rz
23	(6.73, 0.00, 1.63)	Uy, Rx, Ry, Rz
24	(7.85, 0.00, 1.76)	Uy, Rx, Ry, Rz
25	(8.98, 0.00, 1.90)	Uy, Rx, Ry, Rz
26	(10.10, 0.00, 1.76)	Uy, Rx, Ry, Rz
27	(11.22, 0.00, 1.63)	Uy, Rx, Ry, Rz
28	(12.34, 0.00, 1.49)	Uy, Rx, Ry, Rz
29	(13.46, 0.00, 1.35)	Uy, Rx, Ry, Rz
30	(14.58, 0.00, 1.21)	Uy, Rx, Ry, Rz
31	(15.71, 0.00, 1.08)	Uy, Rx, Ry, Rz
32	(16.83, 0.00, 0.94)	Uy, Rx, Ry, Rz
33	(17.95, 0.00, 0.80)	Uy, Rx, Ry, Rz

4. GRUPOS DE ELEMENTOS

ID	Descripción
0	Cordón superior
1	Cordón Inferior
2	Diagonales
3	Verticales Principales
4	Verticales

5. ELEMENTOS

ID	ID Nodo Inicial	ID Nodo Final	ID Sección	ID Grupo	Longitud (m)	Ángulo de Rotación (º)	Liberaciones Nodo Inicial	Liberaciones Nodo Final
0	0	1	19	1	1.1219	0.0000		
1	17	18	19	0	1.1303	0.0000		
2	0	17	19	3	0.8000	0.0000		
3	1	2	19	1	1.1219	0.0000		
4	18	19	19	0	1.1303	0.0000		
5	1	18	0	4	0.9375	0.0000		
6	2	3	19	1	1.1219	0.0000		
7	19	20	19	0	1.1303	0.0000		
8	2	19	0	4	1.0750	0.0000		
9	3	4	19	1	1.1219	0.0000		
10	20	21	19	0	1.1303	0.0000		
11	3	20	0	4	1.2125	0.0000		
12	4	5	19	1	1.1219	0.0000		
13	21	22	19	0	1.1303	0.0000		
14	4	21	0	4	1.3500	0.0000		
15	5	6	19	1	1.1219	0.0000		
16	22	23	19	0	1.1303	0.0000		
17	5	22	0	4	1.4875	0.0000		
18	6	7	19	1	1.1219	0.0000		
19	23	24	19	0	1.1303	0.0000		

ID	ID Nodo Inicial	ID Nodo Final	ID Sección	ID Grupo	Longitud (m)	Ángulo de Rotación (°)	Liberaciones Nodo Inicial	Liberaciones Nodo Final
20	6	23	0	4	1.6250	0.0000		
21	7	8	19	1	1.1219	0.0000		
22	24	25	19	0	1.1303	0.0000		
23	7	24	0	4	1.7625	0.0000		
24	8	9	19	1	1.1219	0.0000		
25	25	26	19	0	1.1303	0.0000		
26	8	25	0	4	1.9000	0.0000		
27	9	10	19	1	1.1219	0.0000		
28	26	27	19	0	1.1303	0.0000		
29	9	26	0	4	1.7625	0.0000		
30	10	11	19	1	1.1219	0.0000		
31	27	28	19	0	1.1303	0.0000		
32	10	27	0	4	1.6250	0.0000		
33	11	12	19	1	1.1219	0.0000		
34	28	29	19	0	1.1303	0.0000		
35	11	28	0	4	1.4875	0.0000		
36	12	13	19	1	1.1219	0.0000		
37	29	30	19	0	1.1303	0.0000		
38	12	29	0	4	1.3500	0.0000		
39	13	14	19	1	1.1219	0.0000		
40	30	31	19	0	1.1303	0.0000		
41	13	30	0	4	1.2125	0.0000		
42	14	15	19	1	1.1219	0.0000		
43	31	32	19	0	1.1303	0.0000		
44	14	31	0	4	1.0750	0.0000		
45	15	16	19	1	1.1219	0.0000		
46	32	33	19	0	1.1303	0.0000		
47	15	32	0	4	0.9375	0.0000		
48	16	33	19	3	0.8000	0.0000		
49	0	18	0	2	1.4620	0.0000		
50	2	18	0	2	1.4620	0.0000		
51	2	20	0	2	1.6519	0.0000		
52	4	20	0	2	1.6519	0.0000		
53	4	22	0	2	1.8631	0.0000		
54	6	22	0	2	1.8631	0.0000		
55	6	24	0	2	2.0893	0.0000		
56	8	24	0	2	2.0893	0.0000		
57	8	26	0	2	2.0893	0.0000		
58	10	26	0	2	2.0893	0.0000		
59	10	28	0	2	1.8631	0.0000		
60	12	28	0	2	1.8631	0.0000		
61	12	30	0	2	1.6519	0.0000		
62	14	30	0	2	1.6519	0.0000		
63	14	32	0	2	1.4620	0.0000		
64	16	32	0	2	1.4620	0.0000		

6. CANTIDADES DE MATERIAL

Referencia	Cantidad (m)	Peso (kN)
PHR C 160 x 60 x 20 (2.00 mm) (50) (Cajón)	49.0652	4.5935

Referencia	Cantidad (m)	Peso (kN)
PHR C 160 x 60 x 20 (3.00 mm) (50) (Cajón)	37.6343	5.2850
	Total Peso Estructura	9.8786

ANEXO
CHEQUEO UMBRAL DE DAÑO

Company: INGENIAMOS INGENIERIA Y MANTENIMIENTO Engineer: SERGIO F CARDENAS D
Project: POLIDEPORTIVO 4:42:36 p. m. 7/02/2025

S E I S M I C D E S I G N C O D E : COL NSR-10

S E I S M I C B A S E L E V E L : 1

S E I S M I C F O R C E R E S I S T I N G S Y S T E M

System X-Direction: C: Moment Res.Frame
System Y-Direction: C: Moment Res.Frame

Energy dissip capacity: 3: Special-DES

EQUIVALENT STATIC EARTHQUAKE FORCES COL NSR-10

Base Shear

V = Sa W
Sa = 1.2 Av Fv I/ T, Sa = 1.2 Av Fv Tl/T² for T >Tl
Sa = 2.5 Aa Fa I for T<Tc, where Tc = 0.48 AvFv/AaFa

S E I S M I C P A R A M E T E R S

Eff. peak acceleration & veloc., Aa = 0.25 Av = 0.20

Region:	10	9	8	7	6	5	4	3	2	1
Aa or Av	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05

LOCATION	Aa	Av	Menace
Barranquilla, Cartagena, San Andres, Valledupar	0.10	0.10	Low
Bogota, Medellin	0.15	0.20	Interm
Armenia, Bucaramanga, Cali, Manizalez, Pereira	0.25	0.25	High
Cucuta, Villavicencio	0.35	0.30	High
Quibdo	0.35	0.35	High

Importance coefficient, I ..... = 1.25

GROUP	COEFFICIENT
IV - Essential facilities	1.50
III- Public assistance facilities	1.25
II - Especial occupancy buildings	1.10
I - Normal occupancy buildings	1.00

Site profile type, S ..... = D

TYPE	SOIL PROFILE TYPE	Shear Wave Velocity
A	Hard Rock	> 1500 m/s
B	Rock	1500 - 760 m/s
C	Very Dense Soil & Soft Rock	760 - 360 m/s
D	Stiff Soil Profile	360 - 180 m/s
E	Soft Soil Profile	< 180 m/s
F	Soils requiring site-specific evaluations	

	X-direction	Y-direction
Seismic Force-resisting system	C: Moment	C: Moment
Energy Dissipation Coefficient, Ro	2	2
Computed fundamental period (sec)	.437	.405
T = 0.1 N	.1	.1
Ta = Ct (Hn)^x	0.047 H^0.9	0.047 H^0.9
	.27	.27
*Tmax: 1.7 Ta	.46	.46
*Tmax = Cu Ta		
Cu = 1.75 - 1.2 Av Fv >= 1.2		
Fundamental period, T	.437	.405

DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS

	Short Periods	Long Periods
Effect. peak acceleration & velc.,	Aa = 0.25	Av = 0.20
Site coefficients (Tables below),	Fa = 1.30	Fv = 2.00

Design response parameters, Aa Fa = 0.33 Av Fv= 0.40

Long-period transition period, Tl sec = 4.80 (2.4 Fv)

Site Coefficient Fa

Site Class	Aa<=0.1	Aa=0.2	Aa=0.3	Aa=0.4	Ss>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	a	a	a	a	a

Site Coefficient Fv

Site Class	Av<=0.1	Av=0.2	Av=0.3	Av=0.4	Av>=0.5
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	a	a	a	a	a

a: Site-specific geotechnical investigation required

VERIFYING UPPER LIMIT ON FUNDAMENTAL PERIOD

Tmax = Cu Ta
Cu = 1.75 - 1.2 Av Fv >= 1.2

Av Fv ..... = 0.4
Cu ..... = 1.27

	X-direction	Y-direction
Fundamental period (sec) . . . . . =	.437	.405
Ta (sec). . . . . =	0.27	0.27
Tmax = Cu Ta (sec). . . . . =	0.3436	0.3436

Adjusted fundamental period, T ... = 0.3436 0.3436

Reduction in R for Irregularity and Lack of Redundancy:

PLAN IRREGULARITIES			ELEVATION IRREGULARITIES		
Type	Description	Øp	Type	Description	Øa
1aP	Torsional	0.9	1aA	Flexible	0.9
1bP	Torsional Extrme	0.8	1bA	Flexible Extrme	0.8
2P	Reentrant corners	0.9	2A	Mass	0.9
3P	Diaph. discontin.	0.9	3A	Geometrical	0.9
4P	Plane shifting	0.8	4A	Plane shifting	0.8
5P	Unparallel grid	0.9	5aA	Weak Story	0.9
			5bA	Weak Story Extr	0.8

NOTE: EngSolutions RCB assumes irregular building.
For regular buildings make (Øp . Øa)= 1.0

	X - D I R E C T I O N	Y - D I R E C T I O N
Reduct. factor, (Øp.Øa) =	0.8	0.8
Redundancy factor, Ør =	1	1

R = (Øp Øa) Ør Ro

T O T A L B A S E S H E A R

Building Weight, W, (kN) = 998.83

Peak Acceleration Coeffi., Fa Aa = .33
Peak Velocity coefficient, Fv Av = .4
Transition period, Tc . . . . . = .58
Importance factor, I . . . . . = 1.25
Site class, S . . . . . = D

	X-direction	Y-direction
Energ-disspat coeff, R =	1.6	1.6
Period, T, (sec) . . . =	.3436	.3436
1.2 Av Fv I / T =	1.746	1.746
2.5 Aa Fa I =	1.031	1.031
Sa =	1.031	1.031
Total Base Shear, V, (kN) =	119.86	119.86

A C C I D E N T A L T O R S I O N

	X-direction	Y-direction
Accidental eccentricity as a percentage of building dimension, (%)=	5	5

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A C C I D E N T A L E C C E N T R I C I T Y:

Level	X - D I R E C T I O N (EQY)			Y - D I R E C T I O N (EQX)		
	$\delta\varepsilon^{xo}$ (m)	Ax -	$\delta\varepsilon^{x}$ (m)	$\delta\varepsilon^{yo}$ (m)	Ax -	$\delta\varepsilon^{y}$ (m)
2	0.87	1.00	0.87	1.48	1.00	1.48

Ax: Amplification factor for accidental eccentricity

EQY: Envelope (1) $E^x = \varepsilon^x$
(2) $E^x = \varepsilon^x + \delta\varepsilon^x$
(3) $E^x = \varepsilon^x - \delta\varepsilon^x$

EQX: Envelope (1) $E^y = \varepsilon^y$
(2) $E^y = \varepsilon^y + \delta\varepsilon^y$
(3) $E^y = \varepsilon^y - \delta\varepsilon^y$

D E S I G N E C C E N T R I C I T Y : $E = \varepsilon + \delta\varepsilon$

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
	Center Mass CMx	Inherent Eccent. ε^{x*}	Accident Eccent. $\delta\varepsilon^x$	Design Eccent. E^x	Center Mass CMy	Inherent Eccent. ε^{y*}	Accident Eccent. $\delta\varepsilon^y$	Design Eccent. E^y
2	8.68	0.00	0.87	0.8787	14.80	0.00	1.48	1.4848

Note: * Inherent eccentricity: ε^x = CMx - CRx and ε^y = CMy - CRy
All values are in meters

D E S I G N E C C E N T R I C I T Y : $E = \varepsilon - \delta\varepsilon$

Level	X - D I R E C T I O N (EQY)				Y - D I R E C T I O N (EQX)			
	Center Mass CMx	Inherent Eccent. ε^{x*}	Accident Eccent. $\delta\varepsilon^x$	Design Eccent. E^x	Center Mass CMy	Inherent Eccent. ε^{y*}	Accident Eccent. $\delta\varepsilon^y$	Design Eccent. E^y
2	8.68	0.00	0.87	-0.877	14.80	0.00	1.48	-1.488

Note: * Inherent eccentricity: ε^x = CMx - CRx and ε^y = CMy - CRy
All values are in meters

Equivalent Forces

Fi = (Wi Hi^n /∑Wj Hj^n) V
V =∑Fi
V = Sa W

E Q U I V A L E N T F O R C E S: X - D I R E C T I O N (EQUAKE X)

Floor i -	Height Hi (m)	Weigth Wi (KN)	Wi Hi^n / ∑Wj Hj^n	Force Fi (KN)	Shear Vi (KN)	Torsion Ti=Fi(εy-εy) (kN-m)
2	6.90	998.8	1.000	119.86	119.86	177.39
Σ		998.83		119.86		

n = 1

E Q U I V A L E N T F O R C E S: Y - D I R E C T I O N (EQUAKE Y)

Floor i -	Height Hi (m)	Weigth Wi (KN)	Wi Hi^n / ∑Wj Hj^n	Force Fi (KN)	Shear Vi (KN)	Torsion Ti=Fi(εx-ex) (kN-m)
2	6.90	998.8	1.000	119.86	119.86	104.27
Σ		998.83		119.86		

n = 1

ACCELERATIONS ON NON-STRUCTURAL ELEMENTS- NSR-10

F L O O R A C C E L E R A T I O N S

Level	hx	hx/heq	ax NSR-10	ax ASCE7-16	ax UBC-97	ax EUROCODE8	ax NZS1170.5
2	6.90	1.33	0.160	1.238	1.650	1.444	1.238

Seismic base level . . . . . = 1
Height above seismic base, hn . . . . . = 6.90 m
Equivalent height, heq = 0.75 hn . . . . . = 5.18 m
Ground acceleration, As = Aa Fa I . . . . . = 0.413
Spectral acceleration, Sa . . . . . = 0.120

NSR-10:	ax = Sa hx/heq	for hi > heq
	ax = As + (Sa -As) hi/heq	for hi < heq
ASCE7-16:	ax = As (1 + 2 hx/ hn)	
UBC-97:	ax = As (1 + 3 hx/ hn)	
Eurocode 8:	ax = As [3/2(1+ hx/hn) - 0.5]	for (Ta/T1=0)
NZS 1170.5	ax = As (1 + 2 hx/hl)	for hx < hl
	ax = 3 As	for hx > hl (hl = 0.2 hn)

Note: RCB recommends using ASCE7-16/10 accelerations for this project

Force on structural non-seismic element : Fp = ai Wp / Ro
Force on nonstructural element : Fp = ai ap Wp / Rp
> 0.5 Aa I Wp

ap : component amplification factor

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P-DELTA ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, Δ/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio			
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR	Axis
1	0.0007	0.0006	0.0007	0.0008	0.0006	0.0008	A-1
Maxima	0.0007	0.0006	0.0007	0.0008	0.0006	0.0008	

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

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Project: POLIDEPORTIVO 4:43:30 p. m. 7/02/2025

P-DELTA ANALYSIS - SUMMARY MAXIMUM STORY DRIFT RATIO, Δ/h

	Drift-Ratio at CENTER OF MASS			MAXIMUM Corner Story-Drift-Ratio			
Story	DriftX	DriftY	DriftR	DriftX	DriftY	DriftR	Axis
1	0.0007	0.0006	0.0007	0.0008	0.0006	0.0008	A-1
Maxima	0.0007	0.0006	0.0007	0.0008	0.0006	0.0008	

DriftX = $(\Delta x/h)max$
DriftY = $(\Delta y/h)max$
DriftR = $([(\Delta x/h)^2 + (\Delta y/h)^2]^{1/2})max$

P-DELTA ANALYSIS - DETAILED MAXIMUM STORY DRIFT RATIO, δ/h

Story	ColAxis	$(\delta x/h)max$	$(\delta y/h)max$	$([(\delta x/h)^2 + (\delta y/h)^2]^{1/2})max$
1	A-1	0.0008	0.0006	0.0008
	B-1	0.0007	0.0006	0.0007
	C-1	0.0007	0.0006	0.0007
	D-1	0.0007	0.0006	0.0007
	E-1	0.0007	0.0006	0.0007
	F-1	0.0008	0.0006	0.0008
	A-4	0.0008	0.0006	0.0008
	B-4	0.0007	0.0006	0.0007
	C-4	0.0007	0.0006	0.0007
	D-4	0.0007	0.0006	0.0007
	E-4	0.0007	0.0006	0.0007
	F-4	0.0008	0.0006	0.0008

Note: Drift amplification factor, D: .8 in X; .8 in Y
MAXIMA DRIFT: $(\delta/h)x$ =0.0008; $(\delta/h)y$ =0.0006; $(\delta/h)r$ =0.0008