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WEAVERS ENGINEERING AND CONSTRUCTION PRIVATE LIMITED
No. 9, First Floor, Canal Bank Road, Kasthuribai Nagar, Adyar, Chennai - 600 020, Tamil Nadu, India.
Phone : 044-2446 3445 ; Email : info@weaversenc.com ; Website : www.weaversenc.com
(CIN of the Company is : U45202TN2016PTC103521)

weavers
engineering & construction

Date: 25.02.2025

The detailed engineering and structure design of the proposed building comprising of Stilt Floor +5 Floors Residential Building with 15 dwelling units at Plot No.4-A,4B & 6A, 3rd Main Road and 2nd Main Road, Kannan Nagar, Madipakkam Chennai 600091, comprised in S.No.86/1, 86/2 & 86/3 (Document) and T.S.No.32/1, 32/3 & 32/4 (Patta), Block No.25, Ward D of Thalakkananchery Village has been done by me/us based on the report of geotechnical investigation(soil test) done by S.ANAND (GEOGLOBE FOUNDATIONS) Report No.GG/24-25/017 Dated 05.09.2024 and considering the functional requirement of the building.

2. It is certified that among other factors, the proposed building has been designed to resist earthquake. I/We have checked various parameters and found that the proposed building would be safe.

3. I/We further certify that:

   (i) The minimum grade of concrete is M25

   (ii) The design and analysis has been done using the code of practice for plain and reinforced concrete as per IS456-2000, design loads as per IS875-2015 And Design of earthquake resistant structure as per IS1893-2016

4. The building will be safe and sound when used for the purpose for which it is designed.

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

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M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

DATE	REV. NO.	DESCRIPTION	Designed	Checked	Approved
25.02.2025	A	Issued for Approval	AJ	HN	MDK

REVISIONS

STRUCTURAL CONSULTANT:

weavers

WEAVERS ENGINEERING AND CONSTRUCTION PVT LTD.

PROJECT :

PROPOSED APPARTMENT BUILDING MEGHA SANGAMAM

JOB No. SD-24-160

TOTAL NO. OF PAGES	NAME	SIGN	DATE
DSGN	AJ	Ajay'	25.02.2025
CHKD	HN	Hema.N	25.02.2025
APVD	MDK	MDK	25.02.2025

TITLE :

RCC AND PT DESIGN REPORT

DOC. No.	CODE	REV.
W E & C P L - T - D E K - 2 4 0 0 1 6 0	IS	A

RELEASED FOR	☐ PRELIMINARY	☐ TENDER	☐ INFORMATION	☑ APPROVAL	CONSTRUCTION

DESIGN BASIS REPORT

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

STRUCTURAL SYSTEM

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

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M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 93401 16064

B	STRUCTURAL SYSTEM

1.0 Design Philosophy

The project consists of Stilt+5 Floors, The first to fifth Floors are used as Residential Space.Stilt floor is used for car parking.

Length of the building is 26.7m & width is 18.9m approximately.The block is used for Residential purpose. In Stilt floor Maximum size of columns 600mm x 900mmm .

All designs shall strictly conform to the standards specified in clause 8.0.

2.0 Design Loads

The following are the design loads considered for this project.

SDL - 2 kN/m2

Live Load - 2kN/m2

** Floor Finish Load due to Tile (10mm thk), bedding mortar (25mm thk) and 40mm thk screed for Block Area.

2.1 Load Combinations

The various loads shall be combined in accordance with the stipulations in IS: 875 (Part 5) – 1987. Whichever combination produces the most unfavorable effect in the building, foundation or structural member concerned shall be adopted.

Values of Partial Safety Factor γ_f for Loads

Load Combination	Limit State of Collapse			Limit State of Serviceability		
	DL	LL	WL/EL	DL	LL	WL/EL
DL + LL	1.5	1.5	--	1.0	1.0	--
DL + WL/EL	1.5/0.9	--	1.5	1.0	--	1.0
DL + LL+WL/EL	1.2	1.2	1.2	1.0	0.8	0.8

This value is to be considered when stability against overturning or stress reversal is critical

DL - Dead load

LL - Live load

WL - Wind load

EL - Earthquake load

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

3.0 Analysis Methods

3D analysis of the structures is carried out using the ETABS Ver.15.0.0 software package. Appropriate loads and its combinations as per relevant clauses in IS codes, for most unfavorable effects are chosen for design.

4.0 Design Life

The design life of the structure is assumed as 50 years. This requirement is not applicable to replaceable materials.

5.0 Design Methodology

All R.C.C structures shall be designed according to the Limit State Method as specified in IS: 456 – 2000. Post Tensioning Slabs shall be designed according to the Limit State Method as specified in IS: 1343 – 2012. Steel structures shall be designed as per IS: 800 – 2015.

6.0 Materials

The self-weight of the various elements are computed based on the unit weight of materials as given below: -

Materials	Unit weight kN/m^3
Reinforced Cement Concrete	25.00
Plain Cement Concrete	24.00
Cement Concrete Solid Block work	20.00
Steel	78.50
Soil	20.00
Water	10.00
Aluminium	28.00
Glass	25.00
Cement Concrete screed	24.00

Normal weight aggregates shall be considered for arriving at the self-weight of all Concrete works.

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

6.1 Concrete

Concrete item	Grade	Max. Size of Aggregate (mm)	Type of cement
Footing	M25	20	OPC / PPC
Column	M25	20	OPC / PPC
Slab & beams (Core)	M25/M40	20	OPC / PPC
Walls	M25	20	OPC / PPC

Normal weight aggregates shall be considered for all concrete works.

6.2 Reinforcement

Steel reinforcement shall be of Grade Fe 500 (TMT with a minimum elongation of 14.5% conforming to IS1786-1985) / Fe 415 conforming to IS: 1786-1985 and of Grade Fe250 conforming to IS: 432-1982.

6.3 STRUCTURAL STEEL

Structural Steel shall conform to the provisions outlined in IS: 2062:1999 or BS: 5950 –1: 2000 or BS: 4360 - 1979 or equivalent international standards. Use of high tensile grades is recommended.

7.0 Nominal Cover

7.1 Reinforcement

From Durability requirement, exposure condition is assumed as mild for Structural elements above ground level and moderate for Structural elements below ground level.

The Nominal cover to reinforcement to meet Durability requirement shall be as follows: -

Moderate - 30 mm

The Nominal cover to main reinforcement shall be as follows: -

Columns - 40 mm or dia of longitudinal reinforcement- whichever is greater.

M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road
Adyar, Chennai - 600 020. Mobile : 93401 16064

For Two-hour fire resistance requirement, The Nominal cover to reinforcement shall be as follows: -

Slabs	-	35 mm for simply supported 25 mm for continuous
Beams	-	40 mm for simply supported 30 mm for continuous
Columns	-	40 mm or diameter of largest bar, whichever is greater

For any other elements not specified above, clear cover shall be as per the clause 26.4 of IS: 456-2000.

8.0 Design Standards

The relevant Indian Standard Codes, as given below, shall be followed for structural design:

S.No.	Code	Description
1.	IS-875 (Part 1) – 1987	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Unit weights of buildings materials and stored material.
2.	IS-875 (Part 2) – 1987	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Imposed loads.
3.	IS-875 (Part 3) – 2015	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Wind loads.
4.	IS-875 (Part 4) – 1987	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Snow loads.
5.	IS-875 (Part 5) – 1987	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Special loads and load combinations.
6.	IS: 456 – 2000	Code of Practice for Plain and Reinforced Concrete.
7.	IS: 1786 – 1985	Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement.

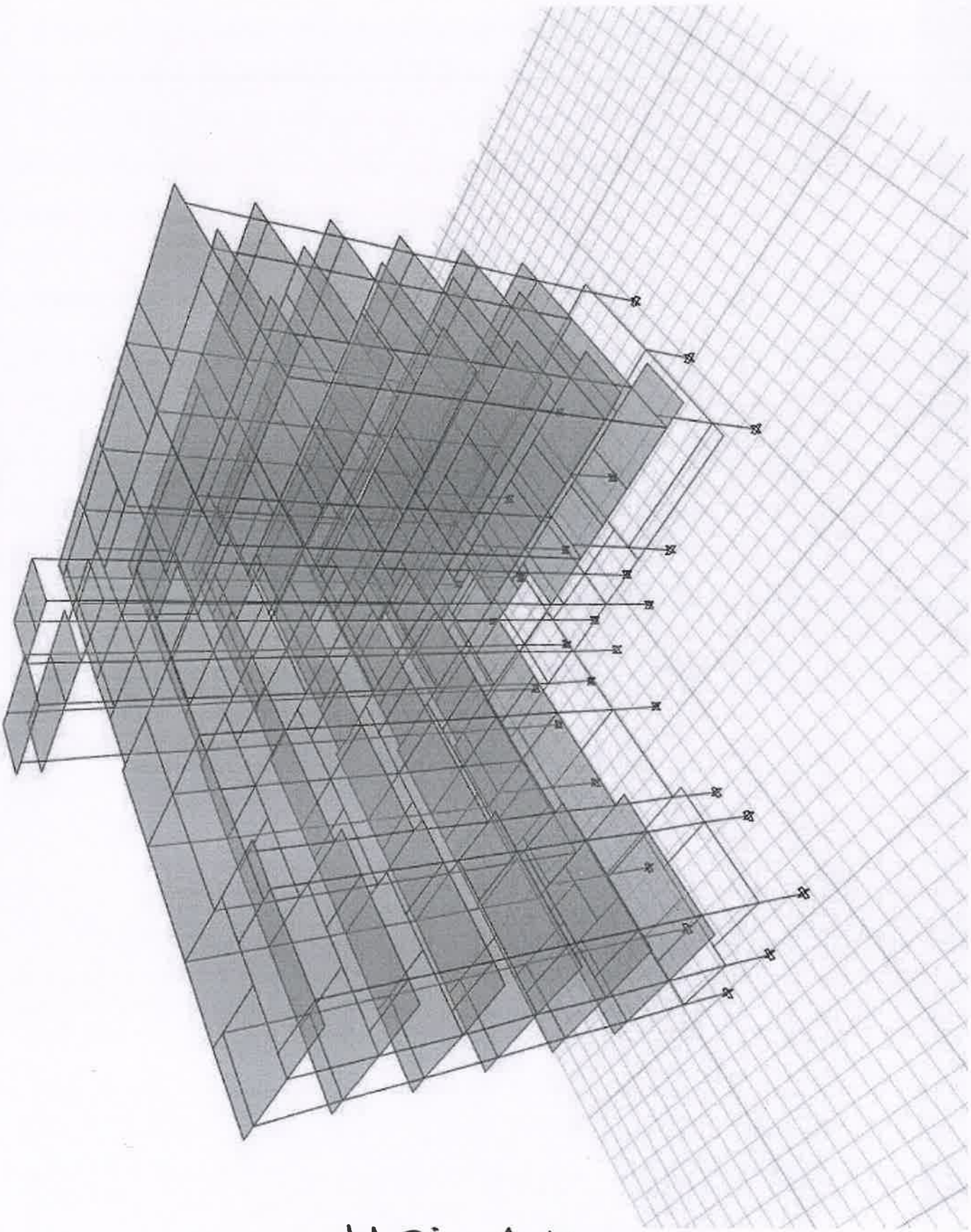
M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structur
Structural Engineer, Regd No. SE/GR-I/19/04/1
N.No: 20, O.No: 14, Gandhi Nagar 1st Main Ro
Adyar, Chennai - 600 020. Mobile : 98401 160

S.No.	Code	Description
8.	IS: 432 (Part 2) - 1982	Specification for Mild Steel and Medium Tensile Steel Bars and Hard Drawn Steel Wire for Concrete Reinforcement – Hard Drawn Steel Wire.
9.	IS: 13920 - 2016	Ductile detailing of reinforced concrete structures subjected to seismic forces – Code of practice
10.	IS: 2062 – 1999	Steel for General Structural Purposes. Specification.
11.	IS: 1161 – 1998	Specification for Steel tubes for Structural Purposes.
12.	IS: 800 – 1984	Code of Practice for General Construction in Steel.
13.	IS: 1893 – 2016	Criteria for Earthquake resistant design of structures.
14.	BS: 5950–2000(Part 1)	Code of practice for design – Rolled and welded sections.
15.	BS: 4360-1979	Hot Rolled steel for general engineering purposes.

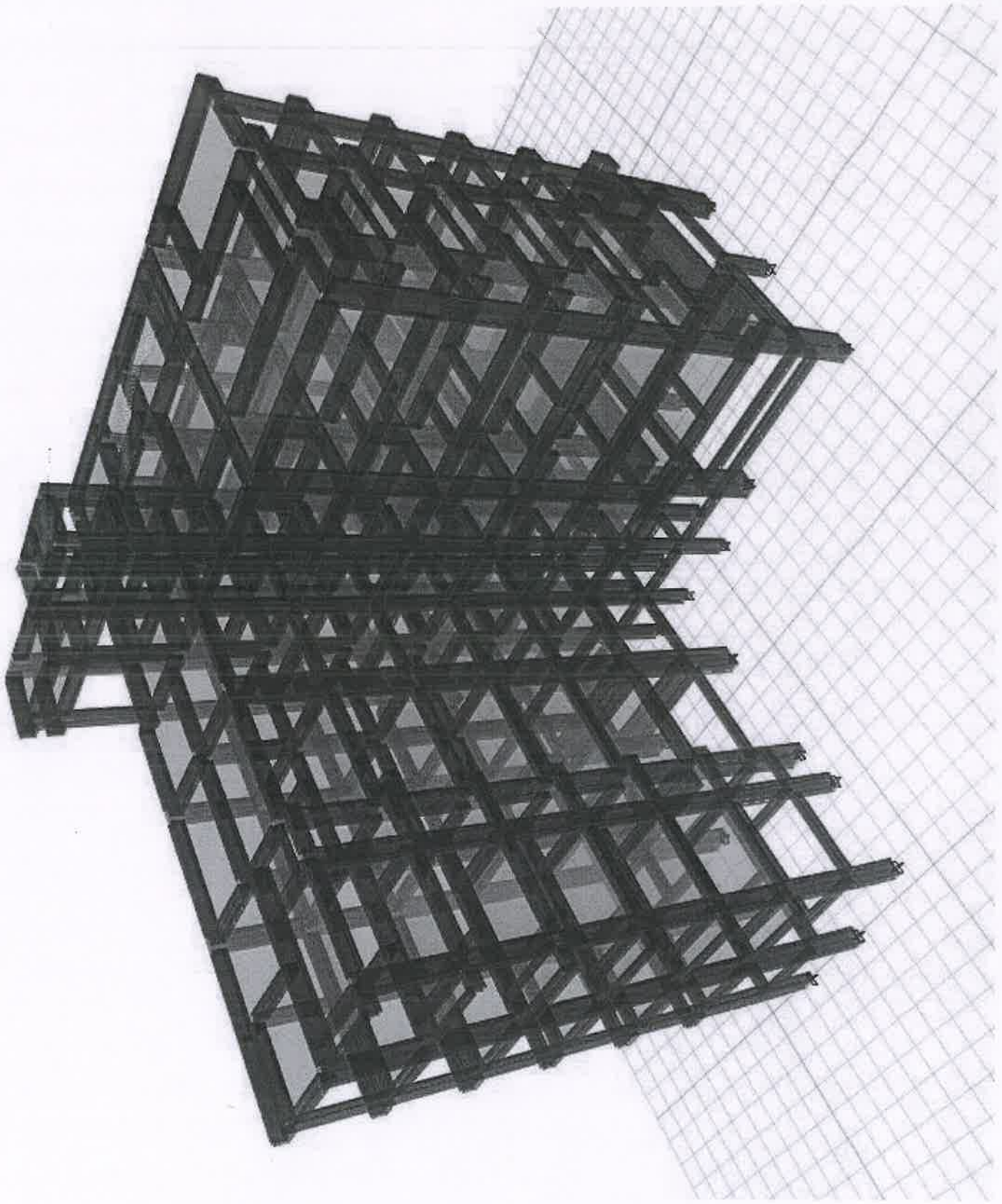
M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 20, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064



M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 20, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064



M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

COLUMN DESIGN

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

PROJECT	PROPOSED APPARTMENT BUILDING MEGHA SANGAMAM				
TITLE:	DESIGN OF COLUMN C1- GRID F16				
DATA					
Length of column		D	=	900	mm
Breadth of column		b	=	600	mm
Unsupported length (longer direction)		L_z	=	3200	mm
Unsupported length (shorter direction)		L_y	=	3200	mm
Eff. length (longer direction)	1.20xLz	L_{ez}	=	3840	mm
Eff. length (shorter direction)	1.20xLy	L_{ey}	=	3840	mm
Braced/Unbraced				**Unbraced**	
Factored axial load		P_u	=	4423	kN
Factored moment (longer direction)		M_{iz}	=	195	kNm
Factored moment (shorter direction)		M_{iy}	=	45	kNm
Charac. comp strength of concrete		f_{ck}	=	25	N/mm^2
Yield stress of steel		f_y	=	500	N/mm^2
cover			=	40	mm
(* The factored moment is inclusive of eccentric moment)					
Check for slenderness					
Longer Direction					
Slenderness ratio		L_{ez}/D	=	4.27	**short**
Additional moment due to slenderness	Pu x (Lez/D)	M_{az}	=	0	kN-m
Shorter Direction					
Slenderness ratio		L_{ey}/b	=	6.40	**short**
Additional moment due to slenderness	Pu x (Ley/D)	M_{ay}	=	0	kN-m
Calculation of P_{uz}					
Assumed percentage of reinforcement		p_t	=	4.030	%
Area of concrete		Ag	=	540000	mm^2
Ultimate axial load (without moments)		P_{uz}	=	13991	kN
Calculation of P_b:					
Longer Direction					
		d'/D	=	0.050	
Coefficient k_1(from TABLE 60 of SP 16:1980)		k_{1z}	=	0.219	
Coefficient k_2(from TABLE 60 of SP 16:1980)		k_{2z}	=	0.545	
Axial load corresponding to balanced failure		P_{bz}	=	4143	kN
Reduction factor for additional moments		k_z	=	0.972	
Moment due to slenderness		M_{az}	=	**0.00**	kN-m
Shorter Direction					
		d'/b	=	0.050	
Coefficient k_1(from TABLE 60 of SP:1980)		k_{1y}	=	0.219	
Coefficient k_2(from TABLE 60 of SP:1980)		k_{2y}	=	0.545	
Axial load corresponding to balanced failure		P_{by}	=	4143	kN
Reduction factor for additional moments		k_y	=	0.972	
Moment due to slenderness		M_{ax}	=	**0.00**	kN-m
Check for moments due to min. eccentricity					
Longer Direction					
Minimum eccentricity		e_z	=	36.40	mm
Moment due to min. eccentricity		M_z	=	161.00	kN-m
Moment in longer direction		M_{uz}	=	195	kNm
Shorter direction					
Minimum eccentricity		e_y	=	26.40	mm

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16084

PROJECT	PROPOSED APPARTMENT BUILDING MEGHA SANGAMAM
TITLE:	DESIGN OF COLUMN C1- GRID F16

Moment due to min. eccentricity	M_y	=	116.77	kN-m
Moment in shorter direction	M_{uy}	=	116.7672	kNm
Final design moments				
Moment in longer direction	M_{uz}	=	**195.00**	kNm
Moment in shorter direction	M_{uy}	=	**116.77**	kNm
Check for interaction				
p/f_{ck}	p/f_{ck}	=	0.161	
$P_u/f_{ck}bD$ value	$P_u/f_{ck}bD$	=	0.328	
$M_{ux1}/f_{ck}bD^2$ value (from SP 16:1980)	$M_{uz1}/f_{ck}bD^2$	=	0.2	
Uniaxial moment capacity (longer direction)	M_{uz1}	=	**2430**	kNm
$M_{uy1}/f_{ck}b^2D$ value (from SP 16:1980)	$M_{uy1}/f_{ck}b^2D$	=	0.2	
Uniaxial moment capacity (shorter direction)	M_{uy1}	=	**1620**	kNm
P_u/P_{uz} ratio	P_u/P_{uz}	=	**0.316**	
Value of exponent	α_n	=	1.194	
Interaction ratio		=	**0.09**	**< 1.00 safe**
Area of steel required		=	**21762**	mm2
Dia of steel provided (At corners)		=	**32**	mm
No of steel provided (At corners)		=	**4**	
Dia of steel provided (At faces)		=	**32**	mm
No of steel provided (At faces)		=	**24**	
Area of steel provided		=	**22519**	mm2

Design of Ties:

Dia of tie bar shall be the greater of the following,

(i) 6 mm

(ii) ϕ/4 mm

Choosing 10 mmdia of ties and the pitch is taken as the minimum of the following,

(i) Least lateral dimension of the column	=	600	mm
(ii) 16 times the smallest dia of the longitudinal bar	=	512	mm
(iii) 300 mm	=	300	mm

Provide 10 mm dia ties @ 125mm c/c

M. Dinesh Kumar .

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

FOOTING DESIGN

M. Dinesh Kumar.
M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N. No: 28, Q.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

PROJECT	PROPOSED APPARTMENT BUILDING MEGHA SANGAMAM				
TITLE	Foundation Design	DESIGNED	CHKD	DATE	SHEET NO.
		AJ	MDK	25.02.2025	1

Reference

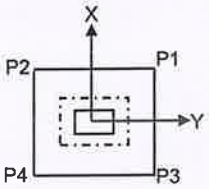
DL+LL

Footing ID: F1

Axial load P = 314 T
MOMENT Mx = -11 T-m/m
My = -7 T-m/m

fy = 500 N/sqmm
fck = 25 N/sqmm
SBC = 34 T/sqm

Footing Size (B X L) mts	3.60	3.30
Pedestal/Column Size	1.2	0.6



P/A = 26.43 T/sqm
Mz/Z = -1.683501684 T/sqm
My/Z = -0.982042649 T/sqm

As per Soil report

P_1 =P/A+Mz/Z+My/Z = 23.7654321 T/sqm
P_2 =P/A-Mz/Z+My/Z = 27.13243547 T/sqm
P_3 =P/A+Mz/Z-My/Z = 25.7295174 T/sqm
P_4 =P/A+Mz/Z+My/Z = 29.09652076 T/sqm

< SBC, Hence SAFE

Moment in :

Longer Direction: M = 22.07463843 T-m/m
Shorter Direction M = 17.2682379 T-m/m

Depth of footing Required d= 713.73 mm
say d_e = 850 mm
D= 900 mm
Ast = 1020.00 sqmm

Percentage of Steel pt = 0.120 %
% of Steel provided pt = 0.120

Check for one way shear :

net soil pressure at ultimate loads(assuming FS is 1.5) 36.0422406 T/sqm

IS:456-2000

Longer direction V u= 12.01 T
Shorter Direction Vu = 8.29 T
ζve = 0.14 N/sqmm

REQUIRED 100As/(bd)= 0.131
from IS456 table 19 ζc = 0.27 N/sqmm OK

FOR PROVIDED AST 100As/(bd)= 0.322
from IS456 table 19 ζc = 0.41 N/sqmm OK

Check for two way Shear :

ζve = 0.59 N/sqmm

ζc = 0.25*√fck = 1.25 N/sqmm OK

Summary

	Breadth	Length	Depth	Reinforcement	
				Bar Size	Spacing
REQUIRED	3600	3300	900	16	197
PROVIDED	3600	3300	900	20	125
	11.81	10.83	3.0		0.0

1
1

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 28, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

BEAM DESIGN

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

PROJECT: PROPOSED APARTMENT BUILDING MEGA SANGAMAM.
TITLE: DESIGN OF BEAM(SFB-09)

DIMENSIONS:

WIDTH	0.3 m
DEPTH	0.6 m
THICKNESS OF SUPPORT	
LONGER IN mm	900
SHORTER IN mm	450
GRADE OF STEEL, **fy**	500 N/mm^2
GRADE OF CONCRETE, **fck**	25 N/mm^2
EFFECTIVE LENGTH OF BEAM,m Span-01	4.8 m
EFFECTIVE LENGTH OF BEAM,m Span-02	3.1 m
EFFECTIVE LENGTH OF BEAM,m Span-03	2.1 m

FORCE INPUT:

SUPPORT-1:

Left Negative Moment	35 kNm
Mid span positive Moment	48 kNm
Right Negative Moment	47.5 kNm

SUPPORT-2:

Left Negative Moment	40 kNm
Mid span positive Moment	42 kNm
Right Negative Moment	18.97 kNm

TO FIND LIMITING MOMENT:

M_{ulim}	313 kNm

AREA OF STEEL:

SPAN:01

Min Area of Steel	128 mm^2
Area of Steel Required at Left Support	235 mm^2 **(2Nos of 16mm Dia)**
Area of Steel Required at Right Support	171 mm^2 **(2Nos of 16mm Dia)**
Area of Steel Required in midspan	181 mm^2 **(2Nos of 16mm Dia)**

SPAN:02

Min Area of Steel	128 mm^2
Area of Steel Required at Left Support	155 mm^2 **(2Nos of 16mm Dia)**
Area of Steel Required at Right Support	128 mm^2 **(2Nos of 16mm Dia)**
Area of Steel Required in midspan	181 mm^2 **(2Nos of 16mm Dia)**

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

SHEAR REINFORCEMENT:

SPAN :01

Shaer Vu:	84.95KN (max)
Shear reinforcement provided	3 legged 8mm dia
Spacing required (Cl 40.4):	
Sv= (0.875*Fy*Asv*d)/Vu	424.8mm
Spacing provided	150mm

SHEAR REINFORCEMENT:

SPAN :02

Shaer Vu:	46.3KN (max)
Shear reinforcement provided	3 legged 8mm dia
Spacing required (Cl 40.4):	
Sv= (0.875*Fy*Asv*d)/Vu	779mm
Spacing provided	150mm

Hence ok.

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, D.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

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RAPT - Version: 6.5.18.0
Reinforced And Post-Tensioned Concrete Analysis & Design Package
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Weavers Engineering and Construction Pvt.
NO.9, First Floor, Canal Bank
Kasturi bai Nagar, Adyar,
Chennai-600020,Tamil Nadu,
11093066300120WPN1

Input

General

Design Code	List	INDIA - IS 456/1343*SAVED*
Material	List	INDIA - INDIAN Materials*SAVED*
Reinforcement Type	List	Bonded Prestressed
Member Type	List	Beam
Panel Type	List	External
Strip Type	List	One way - Nominal Width
Column Stiffness	List	Equivalent Column
Concrete Type	List	Standard Concrete
Concrete - Spanning Members	List	40MPa
Concrete - Columns	List	25MPa
Top Reinforcement Cover	mm	55
Bottom Reinforcement Cover	mm	40
Top Reinforcement Axis Depth Limit	mm	55
Bottom Reinforcement Axis Depth Limit	mm	40
Concrete Unit Weight	kn/m3	25
Self Weight Definition	List	Program Calculated
Pattern Live Load	Y/N	N
Earthquake Design	List	None
Moment Redistribution	%	0
Design Surface Levels	List	Extreme Surfaces

Span

Span	Span Length	Slab Depth	Panel Width Left	Panel Width Right	External Edge Distance Left	External Edge Distance Right
	mm	mm	mm	mm	mm	mm
LC	1070	150	4450	4450	225	225
1	9420	150	4450	4450	225	225
RC	1515	150	4450	4450	225	225

Columns

Column	Column Grid Reference	Support Type	Column Height Above	Column Width Above	Column Length Above	Column Height below	Column Width below	Column Length below	Transverse Column spacing	Capital Depth below deepest section	Pin Base below	Percentage Column Stiffness	Braced frame at this column
	A	List	mm	mm	mm	mm	mm	mm	mm	mm	Y/N	%	Y/N
1	1	Column	0	0	0	3000	600	900	8450	0	N	0	Y
2	2	Column	3000	375	900	3000	600	900	8450	0	N	35	Y

Column	Column Shortening Restrained	Punching Shear Check required
	Y/N	Y/N
1	Y	N
2	Y	N

M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29,O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

Beams

Beam Number	Beam Depth	Beam Width at Slab	Beam Width	Effective Flange Width
	mm	mm	mm	mm
LC	900	1350	1350	1889.2
1	900	1350	1350	2349.5
RC	900	1350	1350	1926.3

Load Cases

Load Case	Load Type	Load Definition	Live Load Deflection Case	Description
	List	List	Y/N	A
1	Self Weight	Applied Loads		
2	Initial Dead Load	Applied Loads		
3	Live Load	Applied Loads	Y	

1. Self Weight - Line

Load	Left End Reference Column	Left end of load from reference column	Load at left end	Right End reference column	Right end of load from reference column	Load at right end	Description
	#	mm	kN/m	#	mm	kN/m	A
1	0	0	42	1	0	42	
2	1	0	42	2	0	42	
3	2	0	42	2	1515	42	

2. Initial Dead Load - Line

Load	Left End Reference Column	Left end of load from reference column	Load at left end	Right End reference column	Right end of load from reference column	Load at right end	Description
	#	mm	kN/m	#	mm	kN/m	A
1	0	0	12	2	1515	12	0

2. Initial Dead Load - Panel

Load	Left End reference column	Left end of load from reference column	Load at left end	Right End reference column	Right end of load from reference column	Load at right end	Description
	#	mm	kN/m2	#	mm	kN/m2	A
1	0	0	2	2	1515	2	

2. Initial Dead Load - Point

Load	Reference column	Distance to Load from reference column	Load	Load Length	Description
	#	mm	kN	mm	A
1	0	115	753	230	MANUVAL CAL=753 (UN FAC)
2	1	2275	1233	230	MANUVAL CAL=1233 (UN FAC)
3	1	6176	1095	750	MANUVAL CAL=1095 (UN FAC)

3. Live Load - Panel

Load	Left End reference column	Left end of load from reference column	Load at left end	Right End reference column	Right end of load from reference column	Load at right end	Live Load reduction	Description
	#	mm	kN/m2	#	mm	kN/m2	#.#	A
1	0	0	2	2	1515	2	1	

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

Load Combinations : Ultimate

Load Combination	Description	Prestress Secondary Adverse	Prestress Secondary Beneficial	1. Self Weight	2. Initial Dead Load	3. Live Load
	A	#.#	#.#	#.#	#.#	#.#
1	Live Load	1	1	1.5	1.5	1.5
2	Live Load	1	1	1	1	1.5
3	Dead Load	1	1	1.5	1.5	0

Load Combinations : Short Term Service

Load Combination	Description	Long-term Prestress	1. Self Weight	2. Initial Dead Load	3. Live Load
	A	#.#	#.#	#.#	#.#
1	Live Load	1	1	1	1

Load Combinations : Permanent Service

Load Combination	Description	Long-term Prestress	1. Self Weight	2. Initial Dead Load	3. Live Load
	A	#.#	#.#	#.#	#.#
1	Live Load	1	1	1	0.25

Load Combinations : Deflection

Load Combination	Description	Long-term Prestress	1. Self Weight	2. Initial Dead Load	3. Live Load
	A	#.#	#.#	#.#	#.#
1	Short Term - Deflection	1	1	1	1
2	Permanent - Deflection	1	1	1	0.25
3	Initial - Deflection	1	1	1	0

Load Combinations : Transfer Prestress

Load Combination	Description	Transfer Prestress	1. Self Weight	2. Initial Dead Load	3. Live Load
	A	#.#	#.#	#.#	#.#
1	Transfer	1	1	0	0

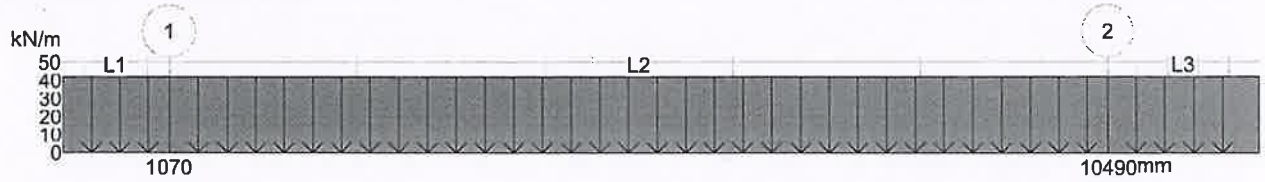
Load Combinations : Pre Existing

Load Combination	Description	Long-term Prestress	1. Self Weight	2. Initial Dead Load	3. Live Load
	A	#.#	#.#	#.#	#.#
1	Pre Existing	1	1	0	0

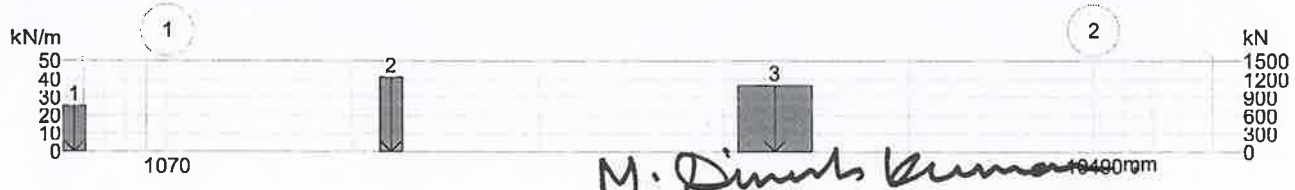
Load Combinations : Construction

Load Combination	Description	Long-term Prestress	1. Self Weight	2. Initial Dead Load	3. Live Load
	A	#.#	#.#	#.#	#.#
1	Construction	1	1	0	0

Load Case 1 : 1. Self Weight

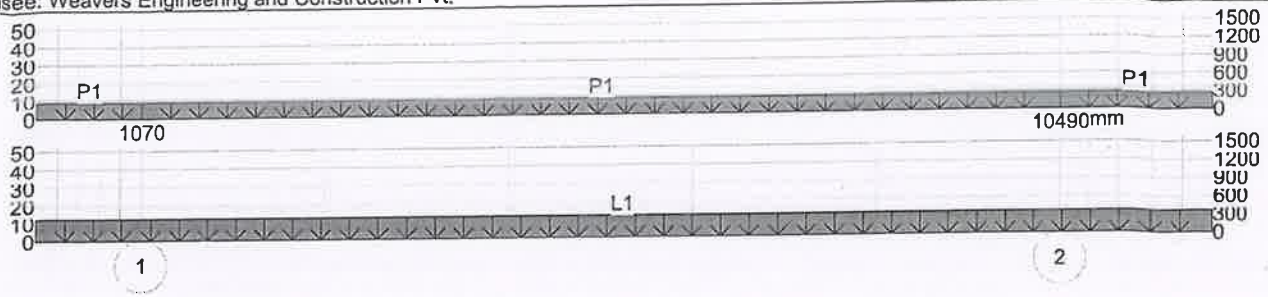


Load Case 2 : 2. Initial Dead Load

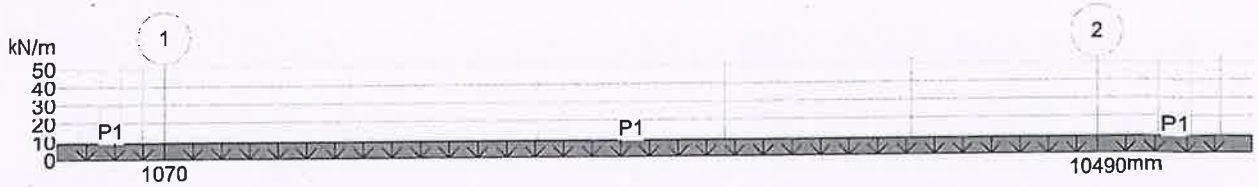


M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064



Load Case 3 : 3. Live Load



Prestress

Tendon	Normal or upside down profiles	Steel Type	Steel Diameter	Prestress Type	Prestress Anchorage Size	Number of Strands	Number of Tendons	Spacing of tendons	Top Cover to Duct	Bottom Cover to Duct	Left Anchorage Reference Column	Distance to left anchorage from column
	List	List	List	List	List	List	#.#	mm	mm	mm	#	mm
1		Strand	12.7mm	MonoStrand	5	5	3		55	210	0	0
2		Strand	12.7mm	MonoStrand	5	5	3		135	120	0	0
3		Strand	12.7mm	MonoStrand	5	5	3		215	40	0	0

Tendon	Left Anchorage Type	Coupler at Left Anchorage	Right Anchorage Reference Column	Distance to Right Anchorage from Column	Right Anchorage Type	Coupler at Right Anchorage	Stacked tendons, No effect on effective shear width	Tendon Length
	List	Y/N	#	mm	List	Y/N	List	mm
1			3	0			None	12005
2			3	0			None	12005
3			3	0			Individual	12005

Tendon 1 : - Drape Locations

Span	Tendon Profile Type	Length of Left End Straight Section/Start of Drape Section in Span	Length of Right End Straight Section/End of Drape Section in Span	Reverse Curve Radius	Number of strands from left end terminating in span	Extra angle change in this span	Tendon Profile Point Spacing	Number of strands full length of tendon in span
	List	mm	mm	mm	#	#.#	mm	#
LC		0	0	2800	0	0	1000	5
1		0	0	2800	0	0	1000	5
RC		0	0	2800	0	0	1000	5

Tendon 1 : - Allowable Profiles

Span	Tendon Cover to centreline at left end of span	Tendon Cover to duct at low point of parabola	Tendon Cover to duct at right end of span	Available Parabola Drape	Relative Minimum Tendon Ratio
	mm	mm	mm	mm	#.#
LC	415		55	358.9	0.818
1	55	210	55	609.6	0.387
RC	55		415	357.4	1

Tendon 1 : - Adopted Profiles

Span	Profile Height Datum	Profile height at left end of span	Profile Height at midpoint of parabola	Profile height at right end of span	Adopted Parabolic Drape	Percentage of available parabolic drape adopted	Prestress Force	Balanced Uniform Load
	mm	mm	mm	mm	mm	%	kN	%
LC	900	800		832.3	358.9	100	76.61	1715.38
1	900	832.3	332.4	832.3	499.9	82.005	90.63	145.879
RC	900	832.3		800	357.4	100	63.93	711.032

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

Tendon 1 : - Details

Reverse Curve at Left Anchorage	Y/N	N
Reverse Curve at Right Anchorage	Y/N	N
Percentage Jacking Force	%	75
Include Secondary Prestress Effects	Y/N	Y
External Tendon	Y/N	N
Grouted At Transfer	Y/N	N

Tendon 1 : - Jacking Sequence

Stage	Proportion of Jacking force applied at this stage	Stressing Time in days	Concrete Strength
	%	#.#	MPa
	25	0.577	9
	75	3.376	25
	0	0	0
	0	0	0

Tendon 2 : - Drape Locations

Span	Tendon Profile Type	Length of Left End Straight Section/Start of Drape Section in Span	Length of Right End Straight Section/End of Drape Section in Span	Reverse Curve Radius	Number of strands from left end terminating in span	Extra angle change in this span	Tendon Profile Point Spacing	Number of strands full length of tendon in span
	List	mm	mm	mm	#	#.#	mm	#
LC		0	0	2800	0	0	1000	5
1		0	0	2800	0	0	1000	5
RC		0	0	2800	0	0	1000	5

Tendon 2 : - Allowable Profiles

Span	Tendon Cover to centreline at left end of span	Tendon Cover to duct at low point of parabola	Tendon Cover to duct at right end of span	Available Parabola Drape	Relative Minimum Tendon Ratio
	mm	mm	mm	mm	#.#
LC	415		135	278.9	0.862
1	135	120	135	619.6	0.312
RC	135		415	277.4	1

Tendon 2 : - Adopted Profiles

Span	Profile Height Datum	Profile height at left end of span	Profile Height at midpoint of parabola	Profile height at right end of span	Adopted Parabolic Drape	Percentage of available parabolic drape adopted	Prestress Force	Balanced Uniform Load
	mm	mm	mm	mm	mm	%	kN	%
LC	900	700		752.3	278.9	100	78.53	1366.47
1	900	752.3	244.2	752.3	508.1	82.005	93.48	152.938
RC	900	752.3		700	277.4	100	69.16	597

Tendon 2 : - Details

Reverse Curve at Left Anchorage	Y/N	N
Reverse Curve at Right Anchorage	Y/N	N
Percentage Jacking Force	%	75
Include Secondary Prestress Effects	Y/N	Y
External Tendon	Y/N	N
Grouted At Transfer	Y/N	N

Tendon 2 : - Jacking Sequence

Stage	Proportion of Jacking force applied at this stage	Stressing Time in days	Concrete Strength
	%	#.#	MPa
	25	0.577	9
	75	3.376	25
	0	0	0

M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No:29, O.No:14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

Stage	Proportion of Jacking force applied at this stage	Stressing Time in days	Concrete Strength
	%	#.#	MPa
	0	0	0

Tendon 3 : - Drape Locations

Span	Tendon Profile Type	Length of Left End Straight Section/Start of Drape Section in Span	Length of Right End Straight Section/End of Drape Section in Span	Reverse Curve Radius	Number of strands from left end terminating in span	Extra angle change in this span	Tendon Profile Point Spacing	Number of strands full length of tendon in span
	List	mm	mm	mm	#	#.#	mm	#
LC		0	0	2800	0	0	1000	5
1		0	0	2800	0	0	1000	5
RC		0	0	2800	0	0	1000	5

Tendon 3 : - Allowable Profiles

Span	Tendon Cover to centreline at left end of span	Tendon Cover to duct at low point of parabola	Tendon Cover to duct at right end of span	Available Parabola Drape	Relative Minimum Tendon Ratio
	mm	mm	mm	mm	#.#
LC	415		215	198.9	0.907
1	215	40	215	619.6	0.237
RC	215		415	197.4	1

Tendon 3 : - Adopted Profiles

Span	Profile Height Datum	Profile height at left end of span	Profile Height at midpoint of parabola	Profile height at right end of span	Adopted Parabolic Drape	Percentage of available parabolic drape adopted	Prestress Force	Balanced Uniform Load
	mm	mm	mm	mm	mm	%	kN	%
LC	900	600		672.3	198.9	100	80.74	1001.93
1	900	672.3	164.2	672.3	508.1	82.005	95.69	156.543
RC	900	672.3		600	197.4	100	75.05	461.011

Tendon 3 : - Details

Reverse Curve at Left Anchorage	Y/N	N
Reverse Curve at Right Anchorage	Y/N	N
Percentage Jacking Force	%	75
Include Secondary Prestress Effects	Y/N	Y
External Tendon	Y/N	N
Grouted At Transfer	Y/N	N

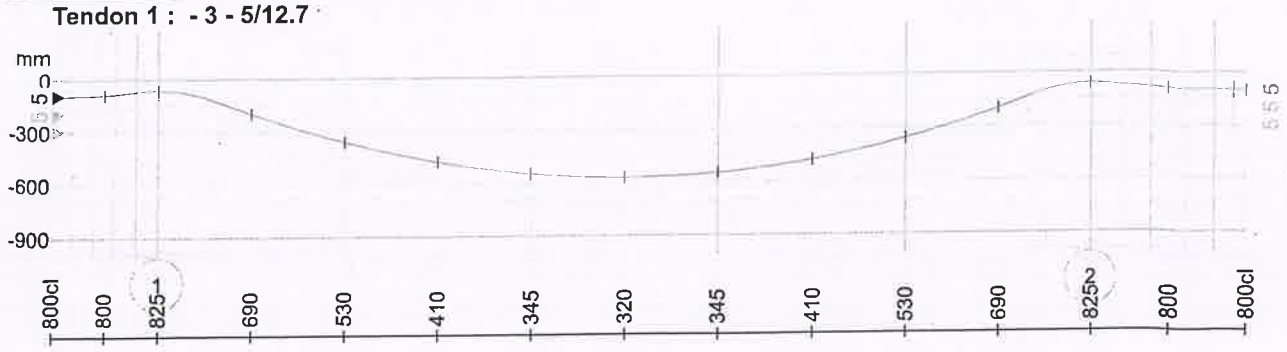
Tendon 3 : - Jacking Sequence

Stage	Proportion of Jacking force applied at this stage	Stressing Time in days	Concrete Strength
	%	#.#	MPa
	25	0.577	9
	75	3.376	25
	0	0	0
	0	0	0

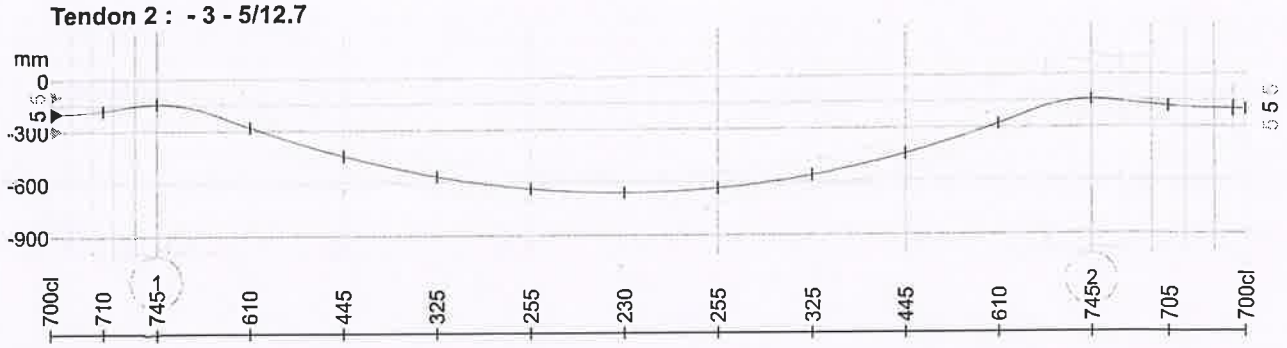
M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

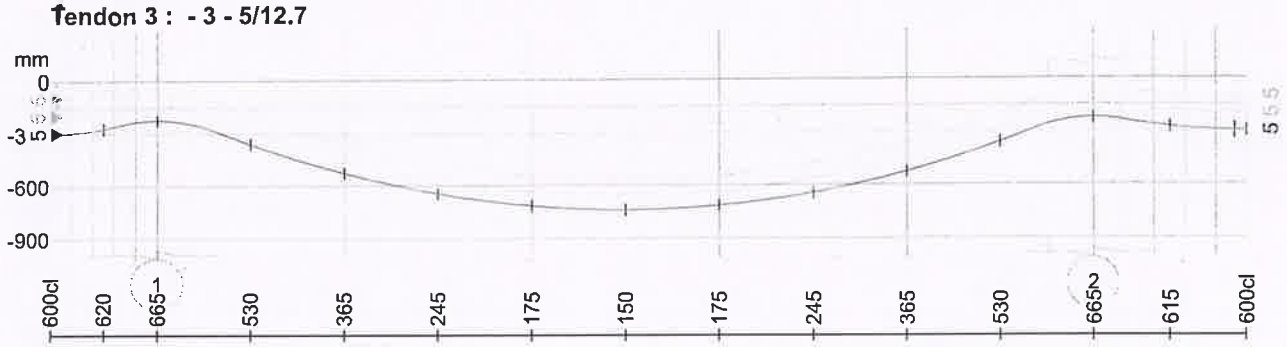
Tendon 1 : - 3 - 5/12.7



Tendon 2 : - 3 - 5/12.7



Tendon 3 : - 3 - 5/12.7



Reinforcement

Reinforcement Use	Reinforcement Type	Preferred Bar Size	Number of Legs
	List	List	#
Flexural Bar	T 500MPa		
Flexural Mesh	C 415MPa		
Shear Option 1	T 500MPa	8	2
Shear Option 2	T 500MPa	10	2
Shear Option 3	T 500MPa	12	2
Punching Shear	T 500MPa	10	2

M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

Reinforcement

	Maximum Bar Spacing	Minimum Bar Spacing	Minimum Continuous Reinforcement	Minimum Span Reinforcement into End Support	Minimum Span Reinforcement into Internal Support	Infill Bars	Stagger Bars
	mm	mm	#.#	#.#	#.#	Y/N	Y/N
Support Reinforcement	300	60	0			N	N
Span Reinforcement	300	60		0	0	N	N

Design Zones

Layer Number	Steel type	Left End Reference Column	Distance to left end of bar	Bar stagger length at left end	Top Cover at left end	Right End Reference Column	Distance to right end of bar	Bar stagger length at right end	Top Cover at Right end	Maximum Bar Size	Minimum Bar Size	Preferred bar size
	List	#	mm	mm	mm	#	mm	mm	mm	List	List	List
1	Bar	0	0	0	55	3	0	0	55	32	16	25

Layer Number	Minimum Number of Bars	Maximum Spacing of Bars	Minimum Steel area as %	% in Flange
	#	mm	%	%
1	0	0	0	0

Design Zones

Layer Number	Steel type	Left End Reference Column	Distance to left end of bar	Bar stagger length at left end	Bottom Cover at left end	Right End Reference Column	Distance to right end of bar	Bar stagger length at right end	Bottom Cover at Right End	Maximum Bar Size	Minimum Bar Size	Preferred bar size
	List	#	mm	mm	mm	#	mm	mm	mm	List	List	List
1	Bar	0	0	0	40	3	0	0	40	32	16	25

Layer Number	Minimum Number of Bars	Maximum Spacing of Bars	Minimum Steel area as %	% in Flange
	#	mm	%	%
1	0	0	0	0

User Defined

Layer Number	Steel type	Left End Reference Column	Distance to left end of bar	Bar stagger length at left end	Top Cover at left end	% Development of Left End of Bar in Tension	% Development of Left End of Bar in Compression	Right End Reference Column	Distance to right end of bar	Bar stagger length at right end	Top Cover at Right end
	List	#	mm	mm	mm	%	%	#	mm	mm	mm
1	T 500MPa	0	0	0	55	100	100	2	1515	0	55

Layer Number	% Development of Right End of Bar in Tension	% Development of Right End of Bar in Compression	Bar Size	Number of Bars	Spacing of Bars	% in Flange	Layer attached after the PreExisting Load Case
	%	%	List	#	mm	%	Y/N
1	100	100	25	9	0	0	N

User Defined

Layer Number	Steel type	Left End Reference Column	Distance to left end of bar	Bar stagger length at left end	Bottom Cover at Left end	% Development of Left End of Bar in Tension	% Development of Left End of Bar in Compression	Right End Reference Column	Distance to right end of bar	Bar stagger length at right end	Bottom Cover at Right End
	List	#	mm	mm	mm	%	%	#	mm	mm	mm
1	T 500MPa	0	0	0	40	100	100	2	1515	0	40

Layer Number	% Development of Right End of Bar in Tension	% Development of Right End of Bar in Compression	Bar Size	Number of Bars	Spacing of Bars	% in Flange	Layer attached after the PreExisting Load Case
	%	%	List	#	mm	%	Y/N
1	100	100	25	9	0	0	N

Design Data

Capacity Reduction factor (phi) for Flexure	#.#	1
Capacity Reduction factor (phi) for Shear	#.#	1
Material Factor for Concrete in Flexure	#.#	1.5
Material Factor for Concrete in Shear	#.#	1.5
Material Factor for Reinforcement	#.#	1.15
Maximum Ratio of Neutral Axis Depth for Ductility	#.#	0.6
Ductility Limit - Strain	#.#	0
Ductility Check at Left End Column	Y/N	Y
Ductility Check at Right End Column	Y/N	Y
Minimum Reinforcement Strength Limit - #.## x M*	#.#	0
Flexural Critical Section - Consider Transverse Beams	Y/N	Y
Flexural Critical Section - Distance from centre of Support	#.#	-1
Beam Left Sideface Cover (Internal)	mm	25
Beam Right Sideface cover	mm	25
Prestress Minimum Reinforcement Basis	List	Program Default
Shear Enhancement at Supports	Y/N	Y
Ast Value in Shear Calculations	List	Calculated
Maximum Shear Stress for BS8110	MPa	0
Limit Reinforcement Strain	Y/N	N
Include Strain Hardening of Reinforcement	Y/N	

M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Ganchi Nagar 1st Main Road
Adyar, Chennai - 600 020. Mobile : 98401 16064

Beam Shear Critical Section Location	List	Code Critical Section

Maximum Service Stress Change - Prestressed Sections	MPa	200
Maximum Service Stress Change - Reinforced Sections	MPa	0
Relative Humidity	%	50
Average Temperature	C.	27
Prestress Losses Calculations based on	List	Program Default
Crack Width Calculations	List	Code default
AS3600 Shrinkage and Temperature Reinforcement	List	Moderate
Degree of Restraint in Primary Direction	%	0
Degree of Restraint in Secondary Direction	%	0
Concrete Strength Gain Rate	List	N

Concrete Tensile Strength for Deflection Calculations- #.## x (Fc)n	#.#	-1
Maximum Value of Ieff/Igross for Deflection Calculations	#.#	0.6
Total Deflection Warning Limit - Maximum Span/Deflection	#.#	250
Total Deflection Warning Limit - Maximum Deflection	mm	20
Incremental Deflection Warning Limit - Maximum Span/Deflection	#.#	500
Incremental Deflection Warning Limit - Maximum Deflection	mm	20
Initial Time for Shrinkage	List	Full Shrinkage
Time of Loading in days	#.#	28
Age Adjustment Factor	#.#	0.84
Concrete Strength at Time of Loading	MPa	40
Loaded Period in years	#.#	30
Tension stiffening Approach	List	Modified Concrete Tensile Modulus Method

Live Load Pattern Factor	#.#
Pattern Live Load for Ultimate Strength	Y/N
Pattern Live Load for Crack Control	Y/N
Pattern Live Load For Deflections	Y/N
Pattern Live Load for Deflection Permanent Load Combination	Y/N

Material Properties

Concrete : Standard Concrete : Concrete Strength Basis - Cube

Description	A	25MPa	40MPa
Characteristic Compressive Strength	MPa	25	40
Mean Compressive Strength	MPa	30.25	46.53
Lower Characteristic Tensile Strength	MPa	3.5	4.43
Upper Characteristic Tensile Strength	MPa	6.3	7.97
Concrete Density	kg/m3	2500	2500
Design Concrete Modulus	MPa	25000	31622.8
Mean Concrete Modulus	MPa	27500	34104.6
Basic Shrinkage Strain	mm/mm	0	0
Shrinkage Multiplier	#.#	1	1
Basic Creep Factor	#.#	0	0
Creep Multiplier	#.#	1	1
Concrete Strain at Peak Stress	#.#	0.002	0.002
Squash Load Factor	#.#	0.85	0.85
Concrete Strain Limit	#.#	0.004	0.004
Strength Gain Rate	List	Normal	Normal

Prestress Strand

Diameter	Area	Breaking Load	Proof Stress	1% Stress	Breaking Strain	Design Strain Limit	Elastic Modulus	Plastic Modulus	Basic Relaxation	Weight	Material Factor Flexure	Material Factor Shear	Material Capacity Reduction Factor - Flexure
12.7	100	186	85	85	0.05	90	1.95e5	2000	2	0.77	-1	-1	-1

Material Capacity Reduction Factor - Shear	Include as Flexural Reinforcement for Shear	Set as default	Description
-1	Y	Y	

Bonded Monostrand

Anchorage Size	Description	Transfer Concrete Strength	Anchor Friction	Draw-in	Maximum Jacking Force	Set as default
5	5S	25	2	6	75	Y

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

		Live End	Deformed Strand Dead End	Nominal Swaged Dead End	Full Swaged Dead End
Ineffective Length	mm	100	100	100	100
Force at Start of Transition	%	100	40	50	100
Transition Length	mm	0	1000	600	0
Force at End of Transition	%	100	100	100	100

Number of Cables	Duct depth	Duct Width	Duct Wall Thickness	Centroid Distance	Duct Friction	Wobble - Unintentional Angle Change - B	Minimum Reverse Curve Radius
#	mm	mm	mm	mm	#.#	1/m	mm
4	20	70	0.4	2.7	0.2	0.025	5000
5	20	70	0.4	2.7	0.2	0.025	5000

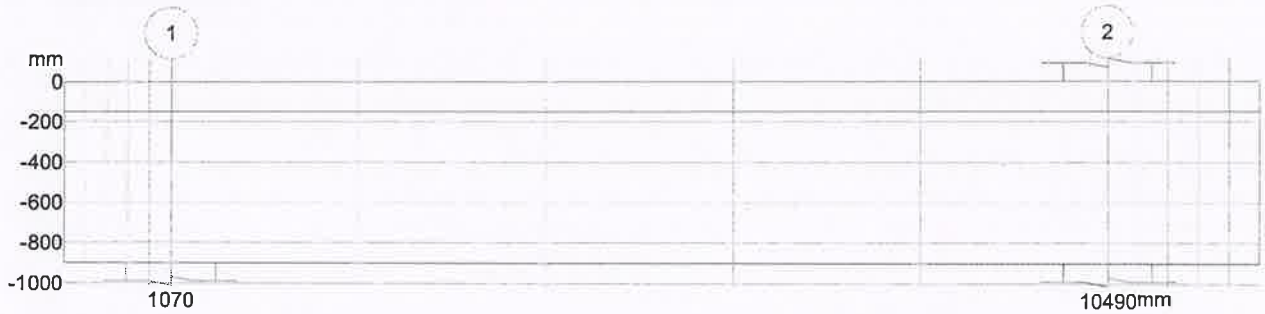
Reinforcement Bar

Designation	Type	Yield Stress	Elastic Modulus	Ductility	Peak Strain	Peak Stress	Design Strain Limit	Material Factor Flexure	Material Factor Shear	Material Capacity Reduction Factor - Flexure	Material Capacity Reduction Factor - Shear	Include as Flexural Reinforcement for Shear
T	Deformed	500	2e5	N	0.05	545	90	-1	-1	-1	-1	Y

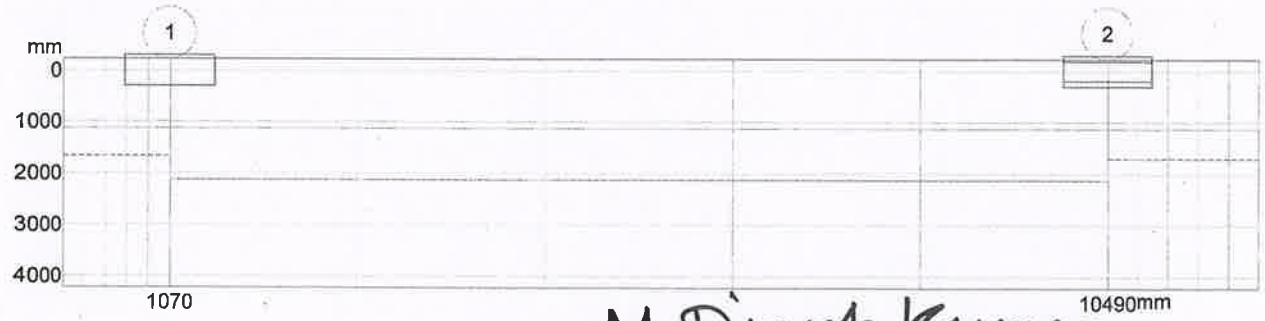
Description

Nominal Bar Size	Bar Diameter	Bar Area	Bar Inertia	Bar Weight	Stock Length
A	mm	mm2	mm4	kg/m	mm
8	8	50	201.14	0.39	12000
10	10	78.5	491.07	0.62	12000
12	12	113	1018.29	0.89	12000
16	16	201	3218.29	1.58	12000
20	20	314	7857.14	2.47	12000
25	25	490	19182.5	3.85	12000
32	32	804	51492.6	6.32	12000

Elevation view



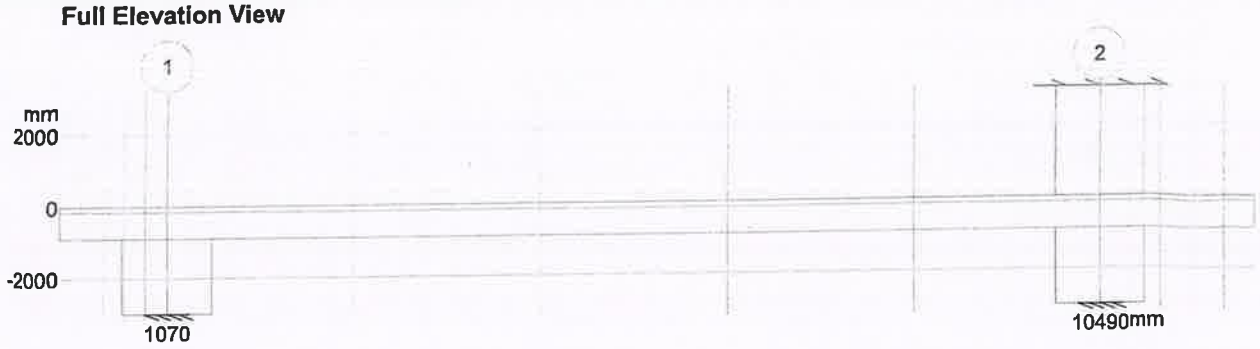
Plan view



M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

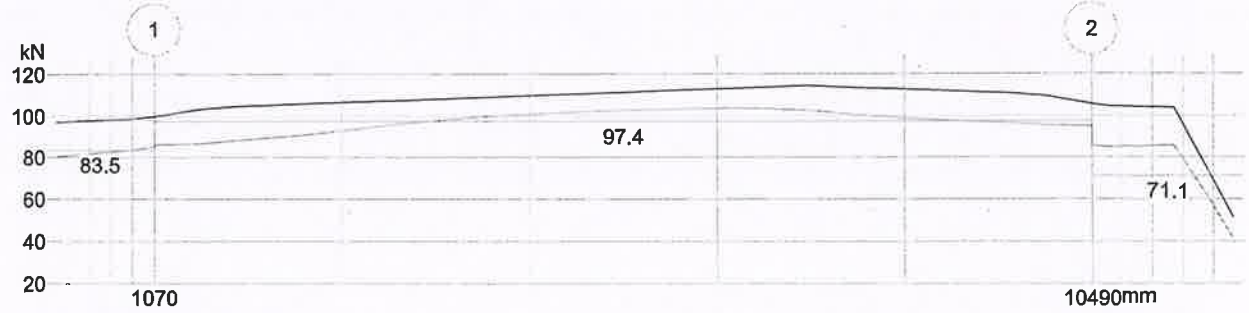
Full Elevation View



Prestress

Tendon Forces

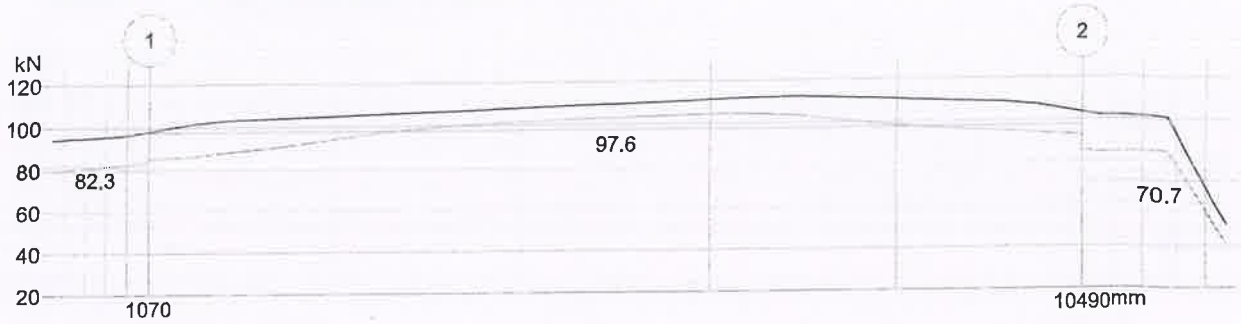
Tendon 1 : - Gross Extension: 65mm - 3 - 5/12.7



M. Dinesh Kumar.

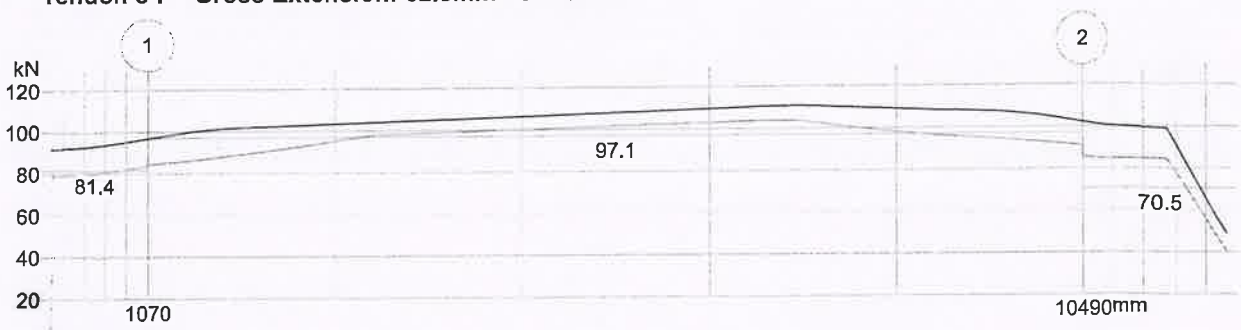
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Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

Tendon 2 : - Gross Extension: 63.8mm - 3 - 5/12.7



Transfer Service Average

Tendon 3 : - Gross Extension: 62.8mm - 3 - 5/12.7



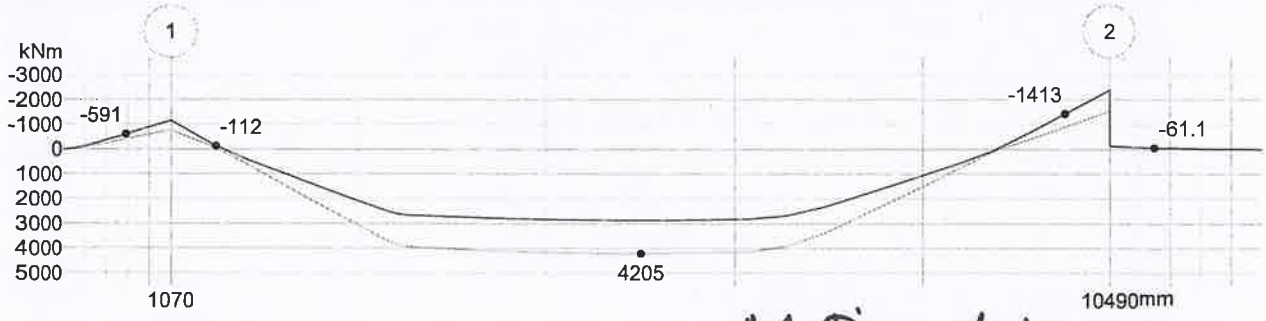
Transfer Service Average

Bending Moments
Load Combinations
Column Actions

Col No. 1		Characteristic Service	Characteristic Service (Reversal)	Service	Service (Reversal)	Ultimate Flexure	Ultimate Flexure (Reversal)	Ultimate Shear	Ultimate Shear (Reversal)
Moment Above	kNm	0	0	0	0	0	0	0	0
Moment Below	kNm	0	0	0	0	0	0	0	0
Reaction	kN	2399.67	2399.67	2399.67	2399.67	3589.37	3589.37	2423.04	3589.37
Elastic Rotation	#.#	2.08e-3	2.08e-3	2.08e-3	2.08e-3	3.27e-3	3.27e-3	2.11e-3	3.27e-3
Elastic Axial Shortening	mm	0	0	0	0	0	0	0	0

Col No. 2		Characteristic Service	Characteristic Service (Reversal)	Service	Service (Reversal)	Ultimate Flexure	Ultimate Flexure (Reversal)	Ultimate Shear	Ultimate Shear (Reversal)
Moment Above	kNm	-349.72	-349.72	-349.72	-349.72	-547.82	-354.49	-354.49	-547.82
Moment Below	kNm	-1087.76	-1087.76	-1087.76	-1087.76	-1703.93	-1102.59	-1102.59	-1703.93
Reaction	kN	1543.29	1543.29	1543.29	1543.29	2325.07	1573.34	1573.34	2325.07
Elastic Rotation	#.#	-1.59e-3	-1.59e-3	-1.59e-3	-1.59e-3	-2.49e-3	-1.61e-3	-1.61e-3	-2.49e-3
Elastic Axial Shortening	mm	0	0	0	0	0	0	0	0

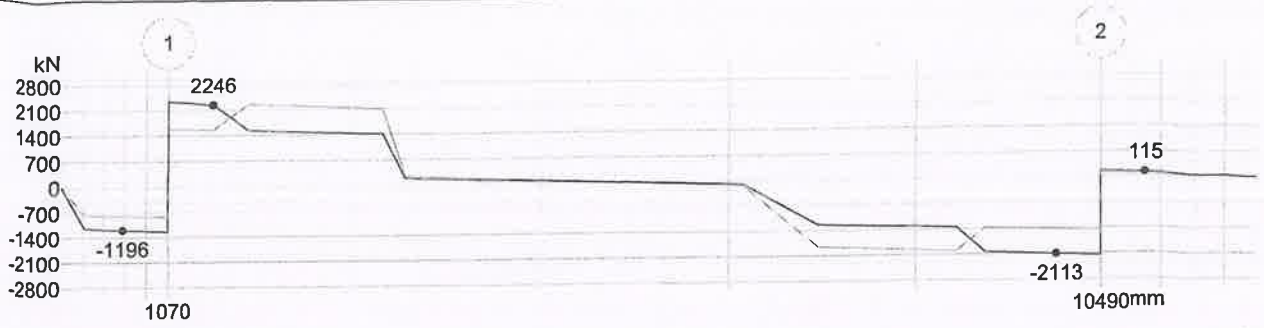
Ultimate Flexure



Moment Moment 1 Moment 2

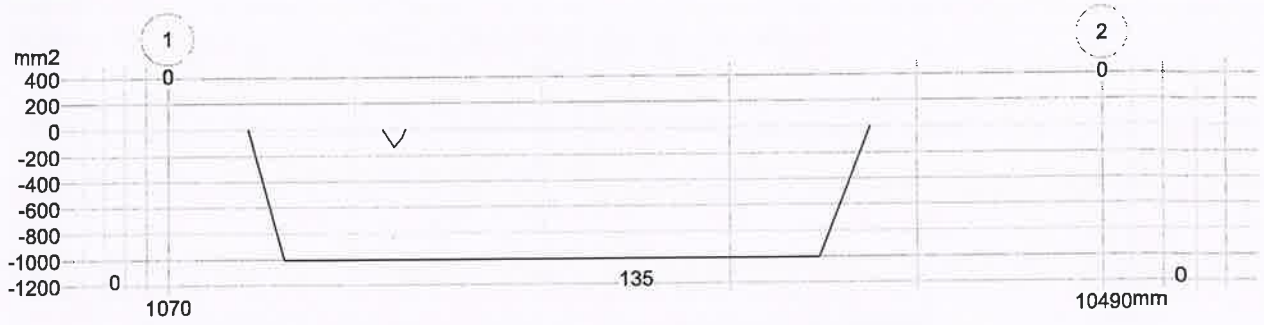
M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 28, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

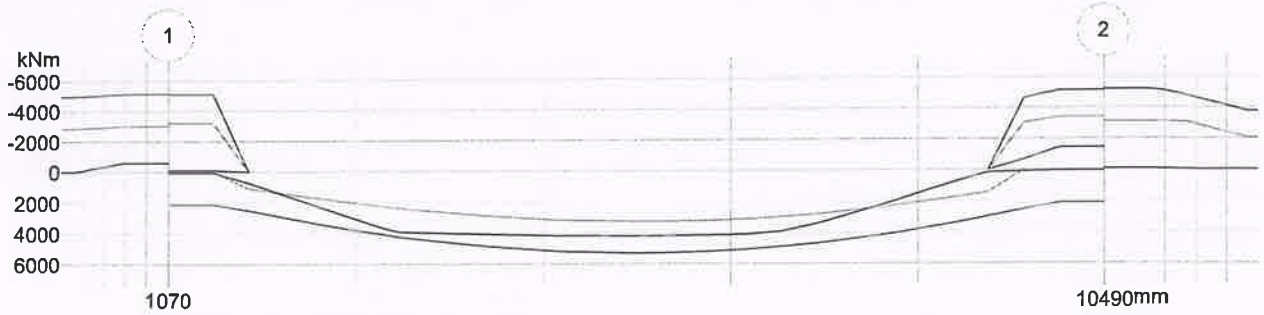


Shear Shear 1 Shear 2

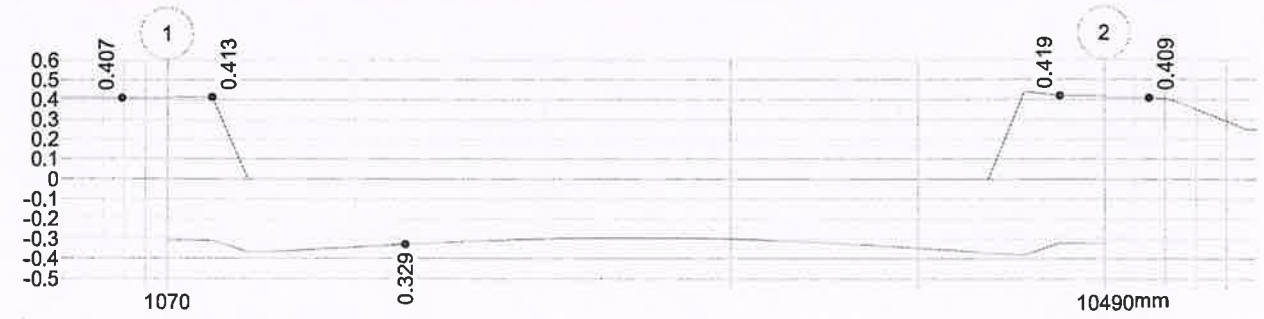
Flexural Design
Ultimate



Reinforcement Top Total Bottom Total Top Ultimate Bottom Ultimate Min Top Min Bot



Capacity Minimum Ultimate Design Initial Final



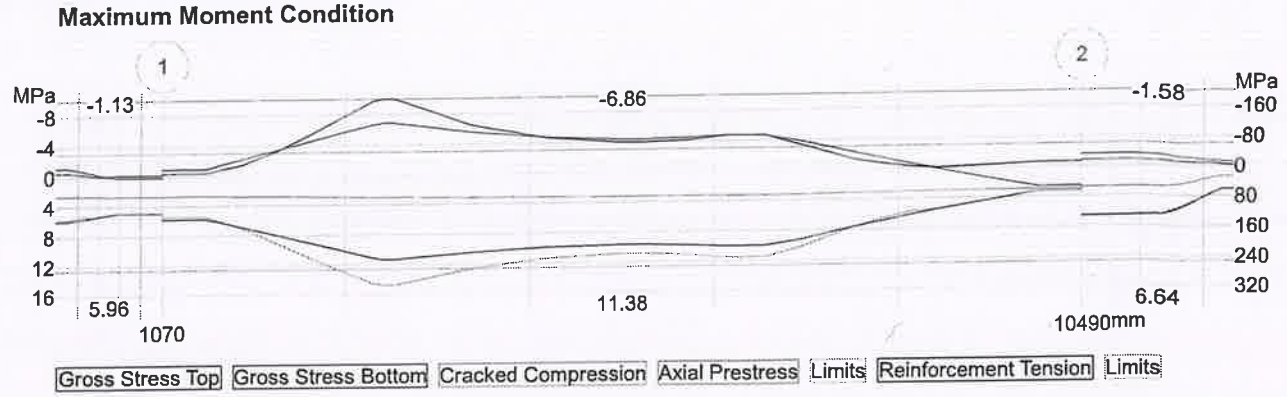
Neutral Axis Depth Initial Final

M. Dinesh Kumar

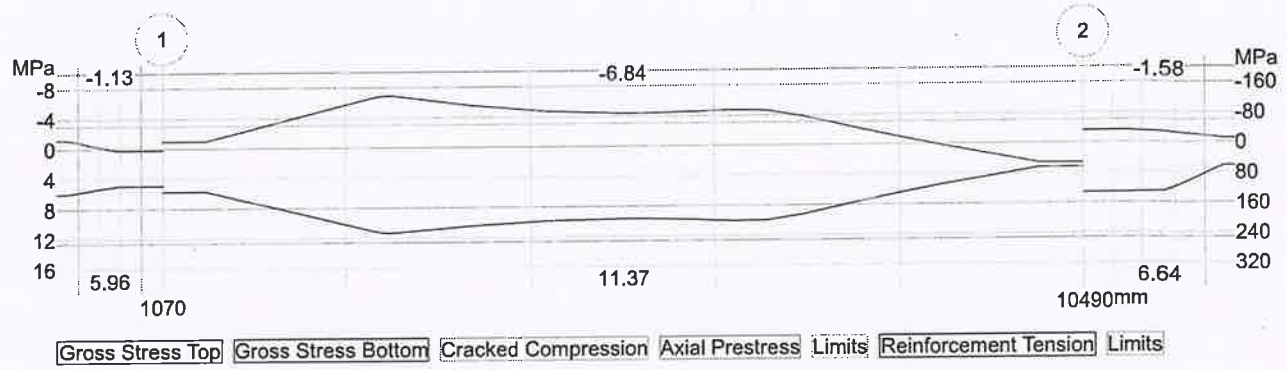
M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 28, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

Service

Maximum Moment Condition

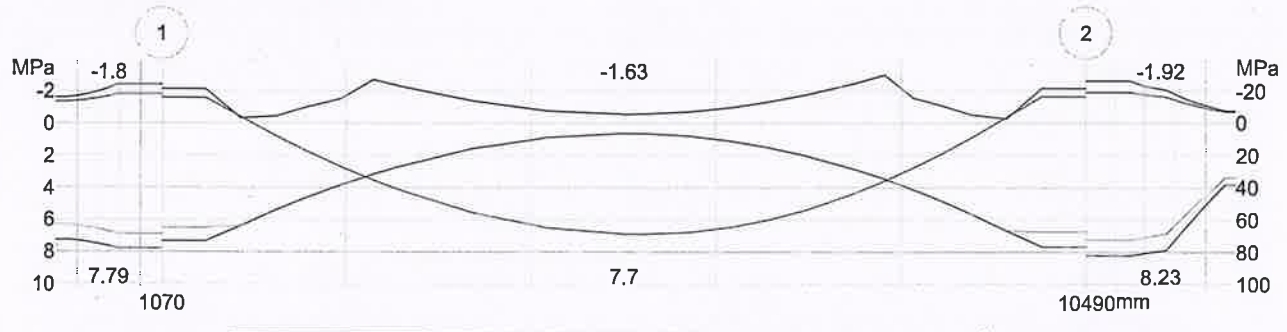


Reversal Moment Condition



Transfer Prestress

Maximum Moment Condition



M. Dinesh Kumar.
M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road
Adyar, Chennai - 600 020. Mobile : 98401 16064

Shear Design

Beam

Span 0

Locat	V*	Mv*	Mdec	d	Ast	bv	phi Vuc	phi Vut	phi Vu	Phi Vumax	phi VuMin	phi Vus	Theta	Asv/s
mm	kN	kNm	kNm	mm	mm2	mm	kN	kN	kN	kN	kN	kN	#.#	mm2/mm
101	-506.88	-25.6	1416.35	765.9	0	1210	99999	1808.85	1808.85	3666.22	2179.54	0	26	1.11
115	-577.14	-33.19	1417.91	766	0	1210	99999	1815.17	1815.17	3666.69	2185.91	0	26	1.11
173	-868.21	-75.1	1425.73	766.6	0	1210	99999	1841.59	1841.59	3669.28	2212.59	0	26	1.11
230	-1154.27	-132.74	1435.57	767.3	0	1210	99999	1867.93	1867.93	3672.85	2239.3	0	26	1.11
267.5	-1158.31	-176.1	1443.05	767.9	0	1210	99999	1885.41	1885.41	3675.74	2257.07	0	26	1.11
357	-1167.95	-280.2	1463.28	769.7	0	1210	99999	1927.26	1927.26	3684.42	2299.8	0	26	1.11
446	-1177.53	-384.58	1486.79	772	0	1210	99999	1969.04	1969.04	3695.51	2342.7	0	26	1.11
535	-1187.12	-489.8	1513.73	774.9	0	1210	99999	2010.97	2010.97	3709.06	2386	0	26	1.11
620	-1196.27	-591.1	1542.72	778	0	1210	99999	2051.13	2051.13	3724.3	2427.7	0	26	1.11

Spacing of Sets				Minimum Legs	Shear Comments
2 legs T8	2 legs T10	2 legs T12	Min legs T8		
mm	mm	mm	mm	#	A
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel

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Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road
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Span 1

Locat	V*	Mv*	Mdec	d	Ast	bv	phi Vuc	phi Vut	phi Vu	Phi Vumax	phi VuMin	phi Vus	Theta	Asv/s
mm	kN	kNm	kNm	mm	mm2	mm	kN	kN	kN	kN	kN	kN	#.#	mm2/mm
450	2297.06	-95.74	1587.5	773.7	0	1210	99999	2345.29	2345.29	3703.66	2719.77	0	26	1.11
810	2258.29	724.22	-24.77	548.7	0	1210	1157.42	2525.65	1157.42	2626.55	1422.99	1100.87	26	2.99
1170	2220.62	1522.38	251.16	584	0	1210	964.14	99999	964.14	2795.63	1246.82	1256.48	26	3.41
1500	2185.18	2249.35	490.09	613.4	0	1210	876.37	99999	876.37	2936.25	1173.26	1308.81	26	3.55
1830	2149.64	2964.6	716.22	639.9	0	1210	848.06	99999	848.06	3063.11	1157.77	1301.58	26	3.53
2160	2111.99	3672.82	929.57	663.5	0	1210	866.95	99999	866.95	3176.23	1188.1	1245.05	26	3.38
2275	1179.49	3837.8	999.44	673.7	135.46	1210	691.64	99999	691.64	3225.06	1017.73	487.84	26	1.32
2355	528.63	3906.12	1044.76	677.3	57.94	1210	557.98	99999	557.98	3241.91	885.78	0	26	1.11
2390	243.42	3919.63	1064.12	678.3	0	1210	519.1	99999	519.1	3246.94	847.4	0	26	1.11
3163	161.15	4048.97	1423.81	717.7	0	1210	549.26	99999	549.26	3435.64	896.65	0	26	1.11
3936	82.83	4144.27	1644.37	741.4	0	1210	567.37	99999	567.37	3548.9	926.21	0	26	1.11
4710	-24.84	4152.56	1722.02	749.3	0	1210	573.42	99999	573.42	3586.71	936.08	0	26	1.11
4932.5	-45.83	4144.7	1717.49	748.6	0	1210	572.92	99999	572.92	3583.59	935.26	0	26	1.11
5367	-90.09	4142.57	1673.02	743.6	0	1210	569.06	99999	569.06	3559.47	928.96	0	26	1.11
5801	-136.83	4093.33	1580.13	733.6	0	1210	561.4	99999	561.4	3511.57	916.47	0	26	1.11
6176	-994.84	3902.86	1457.38	721	0	1210	747.95	99999	747.95	3451.04	1096.89	246.89	26	1.11
6551	-1852.92	3383.91	1290.3	704.6	0	1210	1010.67	99999	1010.67	3372.76	1351.7	842.24	26	2.29
7065	-1908.28	2417.29	987.42	676.2	0	1210	1061.65	99999	1061.65	3236.61	1388.91	846.63	26	2.3
7362	-1940.26	1845.78	792.52	656.5	0	1210	1098.52	2423.99	1098.52	3142.74	1416.29	841.74	26	2.28
7658	-1972.14	1266.74	584.11	634.7	0	1210	1152.25	2470.62	1152.25	3038.1	1459.44	819.89	26	2.23
7954	-2004.02	678.27	361.31	610.5	0	1210	1354.01	2518.02	1354.01	2922.4	1649.5	650.01	26	1.76
8250	-2037.39	74.91	123.58	584	0	1210	99999	2566.38	2566.38	2795.63	2849.05	0	26	1.11
8610	-2075.67	-660.47	1610.42	737.3	0	1210	99999	2626.82	2626.82	3529.49	2983.7	0	26	1.11
8970	-2114.44	-1414.69	1904.73	773.7	0	1210	99999	2441.99	2441.99	3703.66	2816.47	0	26	1.11

Spacing of Sets				Minimum Legs	Shear Comments
2 legs T8	2 legs T10	2 legs T12	Min legs T8		
mm	mm	mm	mm	#	A
89.8	141	203	179.7	4	Minimum Steel
33.5	52.6	75.6	66.9	4	
29.3	46	66.3	58.7	4	
28.2	44.2	63.6	56.3	4	
28.3	44.4	64	56.6	4	
29.6	46.5	66.9	59.2	4	
75.5	118.6	170.7	151.1	4	
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
43.7	68.7	98.9	87.5	4	
43.5	68.3	98.4	87	4	
43.8	68.7	98.9	87.6	4	
44.9	70.6	101.6	89.9	4	
56.7	89	128.1	113.4	4	
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel

Span 2

Locat	V*	Mv*	Mdec	d	Ast	bv	phi Vuc	phi Vut	phi Vu	Phi Vumax	phi VuMin	phi Vus	Theta	Asv/s
mm	kN	kNm	kNm	mm	mm2	mm	kN	kN	kN	kN	kN	kN	#.#	mm2/mm
450	114.7	-61.08	1622.54	792.5	0	1210	99999	1999.88	1999.88	3793.61	2383.46	0	26	1.11
614	97.04	-43.72	1591.36	792	0	1210	99999	1969.86	1969.86	3791.16	2353.19	0	26	1.11
616	96.82	-43.52	1591	792	0	1210	99999	1969.49	1969.49	3791.18	2352.82	0	26	1.11
757.5	81.58	-30.9	1567.66	792.3	0	1210	99999	1943.17	1943.17	3792.66	2326.65	0	26	1.11
815	75.39	-26.39	1559.13	792.1	0	1210	99999	1932.38	1932.38	3791.63	2315.76	0	26	1.11
976.3	58.02	-15.63	1332.17	790.3	0	1210	99999	1813.52	1813.52	3783.05	2196.03	0	26	1.11
1136.3	40.79	-7.72	1111.61	789	0	1210	99999	1698.16	1698.16	3776.74	2080.03	0	26	1.11
1170	37.16	-6.41	1064.27	788.8	0	1210	99999	1673.58	1673.58	3775.69	2055.34	0	26	1.11
1292	24.02	-2.68	894.41	788.2	0	1210	99999	1585.75	1585.75	3772.71	1967.21	0	26	1.11
1414	10.88	-0.55	727.71	787.8	0	1210	99999	1499.94	1499.94	3771.02	1881.23	0	26	1.11

Spacing of Sets				Minimum Legs	Shear Comments
2 legs T8	2 legs T10	2 legs T12	Min legs T8		
mm	mm	mm	mm	#	A
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel
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89.8	141	203	179.7	4	Minimum Steel
89.8	141	203	179.7	4	Minimum Steel

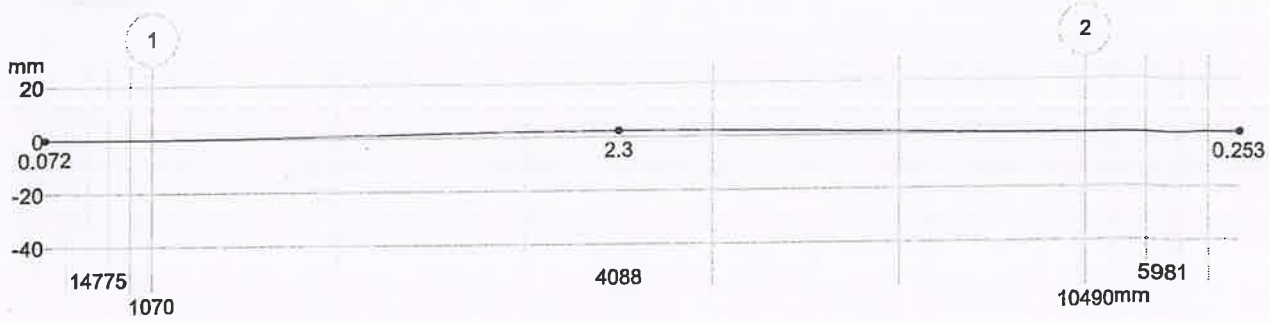
M. Dinesh Kumar.

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Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

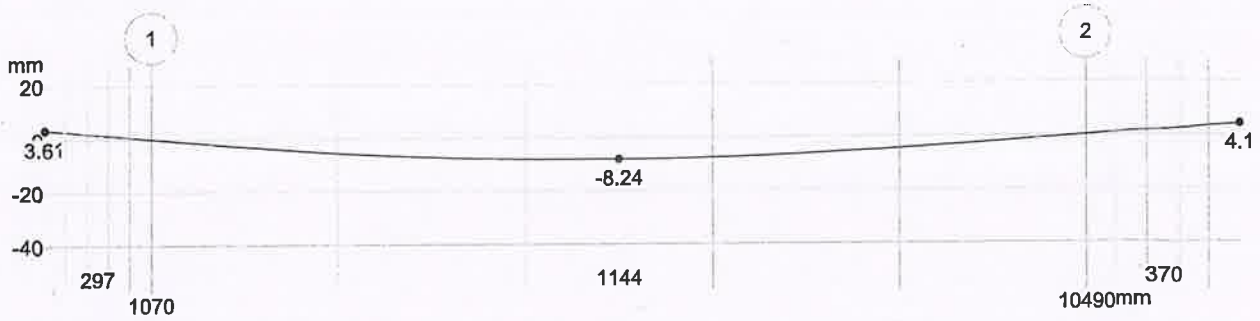
Deflections

All Spans Loaded

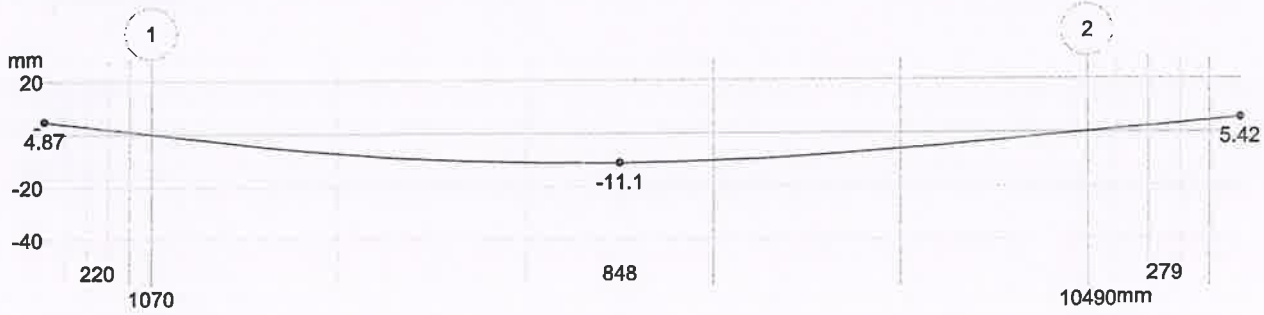
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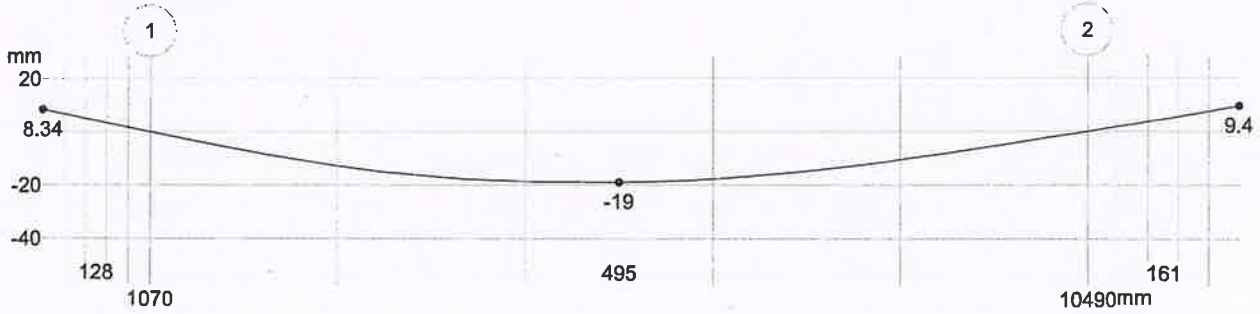
Short Term



Incremental



Total Long Term



M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 93401 16064

SLAB DESIGN

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/103
H.No: 29, D.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

PROJECT: PROPOSED APARTMENT BUILDING MEGHA SANGAMAM.
TITLE: DESIGN OF SLAB ID S1 GRID(E TO H-2 TO 4)

CLEAR SPAN:

L	3.6 m
B	2.91 m
THICKNESS OF SUPPORT	
LONGER IN mm	230
SHORTER IN mm	450
LIVE LOAD IN kN/m^2	2
DEAD LOAD IN kN/m^2	2
WALL HEIGHT	3.2 m
GRADE OF STEEL, **fy**	500 N/mm^2
GRADE OF CONCRETE, **fck**	25 N/mm^2
DEPTH OF SLAB IN mm	125
DEPTH OF COVER IN mm	25

TO FIND ONE WAY OR TWO WAY SLAB:

LONGER SPAN, L_y	3.73
SHORTER SPAN, L_x	3.1
Ly/Lx	1.19
CHECK Ly/Lx< 2	**DESIGN OF SLAB AS TWO WAY**

TO FIND EFFECTIVE DEPTH OF SLAB IN mm,	95

TO FIND EFFECTIVE SPAN LENGTH IN m:

clear span in m	2.91
(i) clear span+ d	3.005
(ii) c/c distance	3.2
TAKE LEAST VALUE	

TO FIND LOADINGS:

Self weight of slab in kN/m^2	3.125
Design Load	7.125
Factored Load in kN/m^2 (W)	10.69

TO FIND SHEAR FORCE AND BENDING MOMENT :

If one long edges discontinuous (ref. IS 456:2000)

α_x	0.053
α_y	0.037
Moment at shorter span in kNm	3.43
Moment at longer span in kNm	3.27
shear force in kN , V_u	15.55

M. Dinesh Kumar.
M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, D.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

TO CHECK DEPTH :

requied depth is 27

check $d_{req} < d_{assume}$ Hence it is ok

REINFORCEMENT IN SHORTER DIRECTION :

REF SP16 T-2 Mu/bd^2=0.42

Pt= 0.13 (ref SP:16, Pg.no:49)

Ast= 129 mm^2

use of bar 8 mm

Ast provided> Mini Ast

Minimum Ast 97 mm^2

spacing required 225 mm

spacing provided= 150

Ast provided= 8 mm Dia at 150mm Spacing

REINFORCEMENT IN LONGER DIRECTION:

REF SP16 T-3 Mu/bd^2= 0.46

Pt= 0.11 ref SP:16, Pg.no:49

Ast= 96 mm^2

use of bar 8 mm

spacing requied 250 mm

Ast provided= 8 mm Dia at 150mm Spacing

SHEAR REINFORCEMENT:

$Vu/bd(\tau_u)$= 0.155 N/mm^2

Pt= 0.33

τ_c= 0.41 N/mm^2

K= 1.3 ref. IS 456-2000 (pg.no:72)

$K.\tau_c$= 0.53 N/mm^2

HENCE SHEAR REINFORCEMENT IS NOT REQUIED

CHECK FOR DEFLECTION:

Basic span depth ratio= 20

fs= 84 ref. IS456-2000 (fig-4 pg.no:38)

kt= 2.0

pt= 0.33

L/D(actual) = 23.28

L/D(max) = 40

HENCE DEFLECTION IS SAFE

M. Dinesh Kumar.

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 93461 16064



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3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai, India

hello@verified.realestate
+91 9996 12 9996
www.verified.realestate