

STRUCTURAL DESIGNS FOR THE CONSTRUCTION OF SCHOOL BUILDING
AT HARUR.

DESIGNED FOR : GROUND + 3 FLOORS ONLY

DESIGNED AS : R.C.C.FRAME STRUCTURE

MATERIALS : CONCRETE-M20
STEEL-Fe500

SBC OF SOIL : 200.00 KN/M2 AT 1.50M DEPTH

STRUCTURAL DESIGN : LIMIT STATE METHOD AS PER IS-456-2000

STRUCTURAL ANALYSIS AND DESIGN : STAAD PRO AND CADMAX SOFTWARE.

Reference : 1)IS-456-2000
2)DESIGN AIDS FOR IS-456-1978-SP16
2)IS-875-PART-2 & 3 FOR LOADS
3)IS-1893 PART-1 FOR EARTHQUAKE LOADS

SOFTWARE USED FOR DESIGN AND DETAILING : CADMAX FREEWARE WITHIN AUTOCAD

NOTE: 1.EARTH QUAKE ANALYSIS AND DESIGN HAS BEEN DONE AS PER ZONE-II
OF IS 1893.
2.THE STIRRUPS IN BEAMS AND TIES IN COLUMNS HAVE TO BE LOCATED AT
10cm SPACING NEAR THE JUNCTION OF BEAMS AND COLUMNS FOR 1/5TH OF
UNSUPPORTED LENGTH.
3.IF THE HEIGHT OF BASEMENT ABOVE GRADE BEAM TOP IS MORE THAN 0.60M,
NOMINAL PLINTH BEAM OF 0.23X0.12M WITH 4 NOS 10MM RODS AND 6MM STIRRUPS
AT 150mm SPACING SHOULD BE PROVIDED TO RESIST FILLING LATERAL LOAD AND
RESTRICT THE UNSUPPORTED LENGTH OF COLUMNS.

SLAB NO:1
TYPE OF SLAB:TOWAY SLAB
DESIGN SPAN(Lx)= 5.70 M.DESIGN SPAN(Ly)= 6.23 M.
LIVE LOAD= 4.00KN/M2FLOOR FINISH= 1.00KN/M2LIGHT PARTITION= 1.00KN/M2
SLAB THICKNESS= 125mm.TOTAL LOAD= 9.13KN/M2
DESIGN MOMENT(Mx)= 12.62KN.M.Mux/bd2=2.098N/mm2
% STEEL REQUIREMENT= 0.826AREA OF STEEL/M.WIDTH= 785mm2
DESIGN MOMENT(My)= 10.97KN.M.Muy/bd2=1.823N/mm2
% STEEL REQUIREMENT= 0.476AREA OF STEEL/M.WIDTH= 452mm2
SHORT SPAN RODS=#10@100LONG SPAN RODS=#8@100
Reinforcement increased due to deflection check
SLAB NO:2
TYPE OF SLAB:TOWAY SLAB
DESIGN SPAN(Lx)= 5.50 M.DESIGN SPAN(Ly)= 6.23 M.
LIVE LOAD= 4.00KN/M2FLOOR FINISH= 1.00KN/M2LIGHT PARTITION= 1.00KN/M2
SLAB THICKNESS= 125mm.TOTAL LOAD= 9.13KN/M2

DESIGN MOMENT(M_x)= 12.32KN.M. $M_{ux}/bd^2=2.048N/mm^2$
 % STEEL REQUIREMENT= 0.661AREA OF STEEL/M.WIDTH= 628mm²
 DESIGN MOMENT(M_y)= 10.21KN.M. $M_{uy}/bd^2=1.697N/mm^2$
 % STEEL REQUIREMENT= 0.439AREA OF STEEL/M.WIDTH= 417mm²
 SHORT SPAN RODS=#10@125LONG SPAN RODS=#8@100
 Reinforcement increased due to deflection check
 SLAB NO:3
 TYPE OF SLAB:TOWAY SLAB
 DESIGN SPAN(L_x)= 4.98 M.DESIGN SPAN(L_y)= 6.23 M.
 LIVE LOAD= 4.00KN/M²FLOOR FINISH= 1.00KN/M²LIGHT PARTITION= 1.00KN/M²
 SLAB THICKNESS= 130mm.TOTAL LOAD= 9.25KN/M²
 DESIGN MOMENT(M_x)= 14.33KN.M. $M_{ux}/bd^2=2.150N/mm^2$
 % STEEL REQUIREMENT= 0.628AREA OF STEEL/M.WIDTH= 628mm²
 DESIGN MOMENT(M_y)= 10.76KN.M. $M_{uy}/bd^2=1.614N/mm^2$
 % STEEL REQUIREMENT= 0.414AREA OF STEEL/M.WIDTH= 414mm²
 SHORT SPAN RODS=#10@125LONG SPAN RODS=#8@100
 Reinforcement increased due to deflection check
 SLAB NO:4
 TYPE OF SLAB:TOWAY SLAB
 DESIGN SPAN(L_x)= 4.26 M.DESIGN SPAN(L_y)= 6.23 M.
 LIVE LOAD= 4.00KN/M²FLOOR FINISH= 1.00KN/M²LIGHT PARTITION= 1.00KN/M²
 SLAB THICKNESS= 120mm.TOTAL LOAD= 9.00KN/M²
 DESIGN MOMENT(M_x)= 11.99KN.M. $M_{ux}/bd^2=2.220N/mm^2$
 % STEEL REQUIREMENT= 0.698AREA OF STEEL/M.WIDTH= 628mm²
 DESIGN MOMENT(M_y)= 7.66KN.M. $M_{uy}/bd^2=1.418N/mm^2$
 % STEEL REQUIREMENT= 0.358AREA OF STEEL/M.WIDTH= 322mm²
 SHORT SPAN RODS=#10@125LONG SPAN RODS=#8@150
 SLAB NO:5
 TYPE OF SLAB:TOWAY SLAB
 DESIGN SPAN(L_x)= 3.57 M.DESIGN SPAN(L_y)= 6.23 M.
 LIVE LOAD= 4.00KN/M²FLOOR FINISH= 1.00KN/M²LIGHT PARTITION= 1.00KN/M²
 SLAB THICKNESS= 120mm.TOTAL LOAD= 9.00KN/M²
 DESIGN MOMENT(M_x)= 9.61KN.M. $M_{ux}/bd^2=1.781N/mm^2$
 % STEEL REQUIREMENT= 0.581AREA OF STEEL/M.WIDTH= 523mm²
 DESIGN MOMENT(M_y)= 5.39KN.M. $M_{uy}/bd^2=0.998N/mm^2$
 % STEEL REQUIREMENT= 0.245AREA OF STEEL/M.WIDTH= 220mm²
 SHORT SPAN RODS=#10@150LONG SPAN RODS=#8@150
 SLAB NO:6
 TYPE OF SLAB:TOWAY SLAB
 DESIGN SPAN(L_x)= 4.27 M.DESIGN SPAN(L_y)= 6.23 M.
 LIVE LOAD= 4.00KN/M²FLOOR FINISH= 1.00KN/M²LIGHT PARTITION= 1.00KN/M²
 SLAB THICKNESS= 120mm.TOTAL LOAD= 9.00KN/M²
 DESIGN MOMENT(M_x)= 12.02KN.M. $M_{ux}/bd^2=2.226N/mm^2$
 % STEEL REQUIREMENT= 0.698AREA OF STEEL/M.WIDTH= 628mm²
 DESIGN MOMENT(M_y)= 7.69KN.M. $M_{uy}/bd^2=1.425N/mm^2$
 % STEEL REQUIREMENT= 0.360AREA OF STEEL/M.WIDTH= 324mm²
 SHORT SPAN RODS=#10@125LONG SPAN RODS=#8@150
 SLAB NO:7
 TYPE OF SLAB:ONEWAY SLAB
 DESIGN SPAN(L_x)= 3.23 M.
 LIVE LOAD= 4.00KN/M²FLOOR FINISH= 1.00KN/M²LIGHT PARTITION= 1.00KN/M²
 SLAB THICKNESS= 120mm.TOTAL LOAD= 9.00KN/M²
 DESIGN MOMENT= 9.39KN.M. $M_u/bd^2=1.561N/mm^2$
 % STEEL REQUIREMENT=0.551AREA OF STEEL/M.WIDTH= 523mm²

MAIN RODS=#10@150DIST RODS=#8@150
 SLAB NO:8
 TYPE OF SLAB:ONEWAY SLAB
 DESIGN SPAN(Lx)= 4.23 M.
 LIVE LOAD= 4.00KN/M2FLOOR FINISH= 1.00KN/M2LIGHT PARTITION= 1.00KN/M2
 SLAB THICKNESS= 140mm.TOTAL LOAD= 9.50KN/M2
 DESIGN MOMENT= 17.00KN.M.Mu/bd2=1.928N/mm2
 % STEEL REQUIREMENT=0.683AREA OF STEEL/M.WIDTH= 785mm2
 MAIN RODS=#10@100DIST RODS=#8@150
 Reinforcement increased due to deflection check.
 SLAB NO:9
 TYPE OF SLAB:ONEWAY SLAB
 DESIGN SPAN(Lx)= 3.00 M.
 LIVE LOAD= 4.00KN/M2FLOOR FINISH= 1.00KN/M2LIGHT PARTITION= 1.00KN/M2
 SLAB THICKNESS= 120mm.TOTAL LOAD= 9.00KN/M2
 DESIGN MOMENT= 8.10KN.M.Mu/bd2=1.346N/mm2
 % STEEL REQUIREMENT=0.551AREA OF STEEL/M.WIDTH= 523mm2
 MAIN RODS=#10@150DIST RODS=#8@150
 SLAB NO:10
 TYPE OF SLAB:ONEWAY SLAB
 DESIGN SPAN(Lx)= 6.23 M.
 LIVE LOAD= 4.00KN/M2FLOOR FINISH= 1.00KN/M2LIGHT PARTITION= 1.00KN/M2
 SLAB THICKNESS= 225mm.TOTAL LOAD=11.63KN/M2
 DESIGN MOMENT= 45.12KN.M.Mu/bd2=1.692N/mm2
 % STEEL REQUIREMENT=0.452AREA OF STEEL/M.WIDTH= 904mm2
 MAIN RODS=#12@125DIST RODS=#8@150
 Reinforcement increased due to deflection check.
 SLAB NO:11
 TYPE OF SLAB:TOWAY SLAB
 DESIGN SPAN(Lx)= 4.53 M.DESIGN SPAN(Ly)= 6.23 M.
 LIVE LOAD= 4.00KN/M2FLOOR FINISH= 1.00KN/M2LIGHT PARTITION= 1.00KN/M2
 SLAB THICKNESS= 120mm.TOTAL LOAD= 9.00KN/M2
 DESIGN MOMENT(Mx)= 9.98KN.M.Mux/bd2=1.847N/mm2
 % STEEL REQUIREMENT= 0.581AREA OF STEEL/M.WIDTH= 523mm2
 DESIGN MOMENT(My)= 6.83KN.M.Muy/bd2=1.265N/mm2
 % STEEL REQUIREMENT= 0.316AREA OF STEEL/M.WIDTH= 284mm2
 SHORT SPAN RODS=#10@150LONG SPAN RODS=#8@150

 ANALYSIS AND DESIGN FOR BEAM:A9- 5.400-A11- 5.400
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 3.23 2.90
 SLD 2 0 1.62 3.23 1.62 5.00 4.00 120
 FMD1 = -37.90FMD2 = 6.55FML1 = -10.63FML2 = 1.55KN.M.
 SFD1 = 48.05SFD2 = 28.63SFL1 = 13.28SFL2 = 7.66KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 13.62KN.M.@ 2.10M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 72.8DM2= 12.2DMM= 20.4KN.M.
 AT SUP1:Mu1/bd2=2.483N/mm2pt1=0.691pc1=0.000AST1=567.243mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=0.414N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.697N/mm2ptm=0.167pcm=0.000ASTM=137.329mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 92KN. Vc= 45KN. Vus= 47KN.
 REINFORCEMENT AT SUP1:T1=2#12+2#16C1=2#12
 REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:A7- 5.400-A9- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 5.50 2.90
SLD 2 0 1.62 5.50 1.62 5.00 4.00 120
FMD1 = -66.68FMD2 = 50.14FML1 = -18.44FML2 = 13.50KN.M.
SFD1 = 68.30SFD2 = 62.28SFL1 = 18.72SFL2 = 16.92KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 39.90KN.M.@ 2.75M. FROM SUP.1

DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 127.7DM2= 95.5DMM= 59.9KN.M.
AT SUP1:Mu1/bd2=4.356N/mm2pt1=1.213pc1=0.513AST1=996.219mm2ASC1=421.626mm2
AT SUP2:Mu2/bd2=3.257N/mm2pt2=0.916pc2=0.181AST2=752.13mm2ASC2=148.245mm2
AT MIDS:Mum/bd2=2.042N/mm2ptm=0.544pcm=0.000ASTM=446.389mm2ASCM=0mm2
SHEAR DESIGN: Vu= 131KN. Vc= 54KN. Vus= 76KN.
REINFORCEMENT AT SUP1:T1=5#16C1=3#16
REINFORCEMENT AT SUP2:T2=4#16C2=2#16
REINFORCEMENT AT MIDS:TM=3#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:A5- 5.400-A7- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 5.50 2.90
SLD 2 0 1.62 5.50 1.62 5.00 4.00 120
FMD1 = -35.53FMD2 = 70.06FML1 = -8.94FML2 = 19.41KN.M.
SFD1 = 59.01SFD2 = 71.57SFL1 = 15.92SFL2 = 19.72KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 48.42KN.M.@ 2.48M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 66.7DM2= 134.2DMM= 72.6KN.M.
AT SUP1:Mu1/bd2=2.276N/mm2pt1=0.620pc1=0.000AST1=508.768mm2ASC1=0mm2
AT SUP2:Mu2/bd2=4.578N/mm2pt2=1.273pc2=0.581AST2=1045.651mm2ASC2=476.989mm2
AT MIDS:Mum/bd2=2.478N/mm2ptm=0.689pcm=0.000ASTM=565.617mm2ASCM=0mm2
SHEAR DESIGN: Vu= 137KN. Vc= 55KN. Vus= 82KN.
REINFORCEMENT AT SUP1:T1=3#16C1=2#16
REINFORCEMENT AT SUP2:T2=3#16+2#20C2=3#16
REINFORCEMENT AT MIDS:TM=3#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@175mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:A9- 1.500-A11- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.23 3.50
FMD1 = -27.11FMD2 = 7.10FML1 = 0.21FML2 = 0.17KN.M.
SFD1 = 35.92SFD2 = 23.52SFL1 = -0.12SFL2 = 0.12KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 7.92KN.M.@ 1.94M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 41.0DM2= 10.9DMM= 11.9KN.M.
AT SUP1:Mu1/bd2=1.398N/mm2pt1=0.353pc1=0.000AST1=289.547mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.372N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.405N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 54KN. Vc= 34KN. Vus= 20KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:A7- 1.500-A9- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 5.50 3.50
FMD1 = -49.72FMD2 = 40.85FML1 = 0.15FML2 = 0.15KN.M.
SFD1 = 52.21SFD2 = 48.99SFL1 = -0.05SFL2 = 0.05KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 24.29KN.M.@ 2.75M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 74.8DM2= 61.5DMM= 36.4KN.M.
AT SUP1:Mu1/bd2=2.552N/mm2pt1=0.715pc1=0.000AST1=587.26mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.098N/mm2pt2=0.562pc2=0.000AST2=461.1mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.243N/mm2ptm=0.310pcm=0.000ASTM=254.433mm2ASCM=0mm2
SHEAR DESIGN: Vu= 78KN. Vc= 45KN. Vus= 33KN.
REINFORCEMENT AT SUP1:T1=2#12+2#16C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:A5- 1.500-A7- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 5.50 3.50
FMD1 = -34.25FMD2 = 51.95FML1 = -0.50FML2 = -0.18KN.M.
SFD1 = 47.38SFD2 = 53.82SFL1 = 0.12SFL2 = -0.12KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 26.47KN.M.@ 2.48M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 52.1DM2= 78.2DMM= 39.7KN.M.
AT SUP1:Mu1/bd2=1.778N/mm2pt1=0.463pc1=0.000AST1=379.806mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.668N/mm2pt2=0.757pc2=0.002AST2=621.335mm2ASC2=1.755mm2
AT MIDS:Mum/bd2=1.355N/mm2ptm=0.341pcm=0.000ASTM=279.605mm2ASCM=0mm2
SHEAR DESIGN: Vu= 81KN. Vc= 46KN. Vus= 35KN.
REINFORCEMENT AT SUP1:T1=4#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12+2#16C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B9- 5.400-B11- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
SLD 3 0.00 0.00 1.62 1.62 3.23 0.00 5.00 4.00 120
SLD 2 0 1.62 3.23 1.62 5.00 4.00 120
FMD1 = -37.31FMD2 = 1.66FML1 = -18.69FML2 = 2.44KN.M.
SFD1 = 34.37SFD2 = 12.30SFL1 = 20.72SFL2 = 10.67KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 8.90KN.M.@ 2.10M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 84.0DM2= 6.2DMM= 13.4KN.M.
AT SUP1:Mu1/bd2=2.866N/mm2pt1=0.810pc1=0.062AST1=665.312mm2ASC1=51.009mm2
AT SUP2:Mu2/bd2=0.210N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.455N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 83KN. Vc= 47KN. Vus= 36KN.
REINFORCEMENT AT SUP1:T1=3#12+2#16C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B7- 5.400-B9- 5.400
SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 5.50 2.90
SLD 2 0 1.62 5.50 1.62 5.00 4.00 120
SLD 3 0.00 0.00 2.75 2.75 5.50 0.00 5.13 4.00 125
FMD1 = -92.85FMD2 = 61.99FML1 = -37.70FML2 = 26.25KN.M.
SFD1 = 91.08SFD2 = 79.86SFL1 = 35.03SFL2 = 30.87KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 69.30KN.M.@ 3.03M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 195.8DM2= 132.4DMM= 104.0KN.M.
AT SUP1:Mu1/bd2=5.140N/mm2pt1=1.425pc1=0.751AST1=1334.271mm2ASC1=703.025mm2
AT SUP2:Mu2/bd2=3.474N/mm2pt2=0.975pc2=0.246AST2=912.544mm2ASC2=230.691mm2
AT MIDS:Mum/bd2=2.728N/mm2ptm=0.773pcm=0.021ASTM=723.758mm2ASCM=19.251mm2
SHEAR DESIGN: Vu= 189KN. Vc= 66KN. Vus= 123KN.
REINFORCEMENT AT SUP1:T1=2#16+3#20C1=4#16
REINFORCEMENT AT SUP2:T2=5#16C2=2#16
REINFORCEMENT AT MIDS:TM=4#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@125mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B5- 5.400-B7- 5.400
SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 5.50 2.90
SLD 2 0 1.62 5.50 1.62 5.00 4.00 120
SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
SLD 3 0.00 0.00 2.75 2.75 5.50 0.00 5.13 4.00 125
FMD1 = -64.69FMD2 = 92.27FML1 = -24.31FML2 = 38.09KN.M.
SFD1 = 80.46SFD2 = 90.48SFL1 = 30.44SFL2 = 35.45KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 68.97KN.M.@ 2.48M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 133.5DM2= 195.5DMM= 103.5KN.M.
AT SUP1:Mu1/bd2=3.504N/mm2pt1=0.983pc1=0.256AST1=920.119mm2ASC1=239.175mm2
AT SUP2:Mu2/bd2=5.132N/mm2pt2=1.423pc2=0.749AST2=1332.377mm2ASC2=700.904mm2
AT MIDS:Mum/bd2=2.715N/mm2ptm=0.770pcm=0.017ASTM=720.469mm2ASCM=15.567mm2
SHEAR DESIGN: Vu= 189KN. Vc= 66KN. Vus= 123KN.
REINFORCEMENT AT SUP1:T1=5#16C1=2#16
REINFORCEMENT AT SUP2:T2=2#16+3#20C2=4#16
REINFORCEMENT AT MIDS:TM=4#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@125mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B3- 5.400-B5- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.26 2.90
SLD 3 0.00 0.00 2.13 2.13 4.26 0.00 5.00 4.00 120
SLD 2 0 0.01 0.01 0.00 5.25 4.00 130
FMD1 = -36.46FMD2 = 44.09FML1 = -7.97FML2 = 14.44KN.M.
SFD1 = 42.81SFD2 = 46.49SFL1 = 7.54SFL2 = 10.60KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 12.84KN.M.@ 2.13M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 66.7DM2= 87.8DMM= 19.3KN.M.
AT SUP1:Mu1/bd2=2.274N/mm2pt1=0.619pc1=0.000AST1=508.207mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.995N/mm2pt2=0.845pc2=0.101AST2=694.062mm2ASC2=83.209mm2
AT MIDS:Mum/bd2=0.657N/mm2ptm=0.157pcm=0.000ASTM=129.126mm2ASCM=0mm2
SHEAR DESIGN: Vu= 86KN. Vc= 48KN. Vus= 38KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12+2#16C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B1- 5.400-B3- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.98 2.90
SLD 3 0.00 0.00 2.49 2.49 4.98 0.00 5.25 4.00 130
FMD1 = -34.44FMD2 = 50.57FML1 = -8.70FML2 = 12.65KN.M.
SFD1 = 51.92SFD2 = 58.50SFL1 = 11.60SFL2 = 13.20KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 42.73KN.M.@ 2.49M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 64.7DM2= 94.8DMM= 64.1KN.M.
AT SUP1:Mu1/bd2=2.208N/mm2pt1=0.597pc1=0.000AST1=490.263mm2ASC1=0mm2
AT SUP2:Mu2/bd2=3.235N/mm2pt2=0.910pc2=0.174AST2=747.357mm2ASC2=142.9mm2
AT MIDS:Mum/bd2=2.187N/mm2ptm=0.590pcm=0.000ASTM=484.618mm2ASCM=0mm2
SHEAR DESIGN: Vu= 108KN. Vc= 49KN. Vus= 58KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12+3#16C2=2#12
REINFORCEMENT AT MIDS:TM=5#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B9- 1.500-B11- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.23 3.50
FMD1 = -24.61FMD2 = 8.56FML1 = 0.40FML2 = 0.28KN.M.
SFD1 = 34.69SFD2 = 24.75SFL1 = -0.21SFL2 = 0.21KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 8.06KN.M.@ 1.94M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 37.5DM2= 13.3DMM= 12.1KN.M.
AT SUP1:Mu1/bd2=1.280N/mm2pt1=0.320pc1=0.000AST1=262.696mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.452N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2

AT MIDS: $M_{um}/bd^2 = 0.412 \text{ N/mm}^2$, $p_{tm} = 0.150$, $p_{cm} = 0.000$, $ASTM = 123.165 \text{ mm}^2$, $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 52 \text{ KN}$, $V_c = 33 \text{ KN}$, $V_{us} = 20 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 3\#12$, $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 2\#12$, $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$, $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: B7- 1.500-B9- 1.500
SIZE OF BEAM = $230 \times 450 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD $0.23 \ 0.00 \ 3.50 \ 5.50 \ 3.50$
FMD1 = -49.71 FMD2 = 41.78 FML1 = 0.20 FML2 = 0.32 KN.M.
SFD1 = 52.83 SFD2 = 49.95 SFL1 = -0.09 SFL2 = 0.09 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = $24.86 \text{ KN.M. @ } 2.75 \text{ M. FROM SUP.1}$
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: $DM_1 = 74.9$, $DM_2 = 63.2$, $DM_M = 37.3 \text{ KN.M.}$
AT SUP1: $M_{u1}/bd^2 = 1.965 \text{ N/mm}^2$, $p_{t1} = 0.520$, $p_{c1} = 0.000$, $AST_1 = 486.372 \text{ mm}^2$, $ASC_1 = 0 \text{ mm}^2$
AT SUP2: $M_{u2}/bd^2 = 1.658 \text{ N/mm}^2$, $p_{t2} = 0.427$, $p_{c2} = 0.000$, $AST_2 = 399.551 \text{ mm}^2$, $ASC_2 = 0 \text{ mm}^2$
AT MIDS: $M_{um}/bd^2 = 0.979 \text{ N/mm}^2$, $p_{tm} = 0.239$, $p_{cm} = 0.000$, $ASTM = 224.109 \text{ mm}^2$, $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 79 \text{ KN}$, $V_c = 45 \text{ KN}$, $V_{us} = 34 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 5\#12$, $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 4\#12$, $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$, $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: B5- 1.500-B7- 1.500
SIZE OF BEAM = $230 \times 450 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD $0.23 \ 0.00 \ 3.50 \ 5.50 \ 3.50$
FMD1 = -43.07 FMD2 = 49.25 FML1 = -0.46 FML2 = -0.21 KN.M.
SFD1 = 50.27 SFD2 = 52.51 SFL1 = 0.12 SFL2 = -0.12 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = $24.38 \text{ KN.M. @ } 2.75 \text{ M. FROM SUP.1}$
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: $DM_1 = 65.3$, $DM_2 = 74.2$, $DM_M = 36.6 \text{ KN.M.}$
AT SUP1: $M_{u1}/bd^2 = 1.714 \text{ N/mm}^2$, $p_{t1} = 0.443$, $p_{c1} = 0.000$, $AST_1 = 415.058 \text{ mm}^2$, $ASC_1 = 0 \text{ mm}^2$
AT SUP2: $M_{u2}/bd^2 = 1.947 \text{ N/mm}^2$, $p_{t2} = 0.514$, $p_{c2} = 0.000$, $AST_2 = 481.221 \text{ mm}^2$, $ASC_2 = 0 \text{ mm}^2$
AT MIDS: $M_{um}/bd^2 = 0.960 \text{ N/mm}^2$, $p_{tm} = 0.234$, $p_{cm} = 0.000$, $ASTM = 219.493 \text{ mm}^2$, $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 79 \text{ KN}$, $V_c = 45 \text{ KN}$, $V_{us} = 34 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 4\#12$, $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 5\#12$, $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$, $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: B3- 1.500-B5- 1.500
SIZE OF BEAM = $230 \times 400 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD $0.23 \ 0.00 \ 3.50 \ 4.26 \ 3.50$
FMD1 = -28.99 FMD2 = 29.90 FML1 = 0.09 FML2 = -0.30 KN.M.
SFD1 = 38.94 SFD2 = 39.44 SFL1 = 0.05 SFL2 = -0.05 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = $12.40 \text{ KN.M. @ } 2.13 \text{ M. FROM SUP.1}$
DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 43.6DM2= 45.3DMM= 18.6KN.M.
AT SUP1:Mu1/bd2=1.488N/mm2pt1=0.378pc1=0.000AST1=310.371mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.545N/mm2pt2=0.394pc2=0.000AST2=323.795mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.635N/mm2ptm=0.152pcm=0.000ASTM=124.518mm2ASCM=0mm2
SHEAR DESIGN: Vu= 59KN. Vc= 36KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B1- 1.500-B3- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.98 3.50
FMD1 = -31.07FMD2 = 39.46FML1 = -0.35FML2 = 0.05KN.M.
SFD1 = 44.08SFD2 = 47.54SFL1 = 0.06SFL2 = -0.06KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 21.46KN.M.@ 2.49M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 47.1DM2= 59.3DMM= 32.2KN.M.
AT SUP1:Mu1/bd2=1.608N/mm2pt1=0.412pc1=0.000AST1=338.575mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.022N/mm2pt2=0.537pc2=0.000AST2=441.216mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.098N/mm2ptm=0.271pcm=0.000ASTM=222.426mm2ASCM=0mm2
SHEAR DESIGN: Vu= 71KN. Vc= 40KN. Vus= 31KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=4#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F2- 5.400-F3- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 3.00 2.90
SLD 3 0 1.98 0.52 2.49 3.00 0.01 5.25 4.00 130
FMD1 = -12.27FMD2 = 27.00FML1 = -2.44FML2 = 8.92KN.M.
SFD1 = 33.05SFD2 = 36.24SFL1 = 8.89SFL2 = 8.16KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 9.52KN.M.@ 1.20M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 22.1DM2= 53.9DMM= 14.3KN.M.
AT SUP1:Mu1/bd2=0.753N/mm2pt1=0.181pc1=0.000AST1=148.868mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.838N/mm2pt2=0.481pc2=0.000AST2=394.619mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.487N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 67KN. Vc= 39KN. Vus= 28KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=4#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F1- 5.400-F2- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 1.98 2.90

SLD 2 0 0.00 1.98 1.98 5.25 4.00 130
FMD1 = -2.45FMD2 = 10.85FML1 = -0.36FML2 = 2.21KN.M.
SFD1 = 14.61SFD2 = 26.64SFL1 = 1.66SFL2 = 6.18KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 4.40KN.M.@ 0.79M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 4.2DM2= 19.6DMM= 6.6KN.M.
AT SUP1:Mu1/bd2=0.144N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.668N/mm2pt2=0.160pc2=0.000AST2=131.435mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.225N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 49KN. Vc= 27KN. Vus= 22KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F9- 5.400-F11- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 3.23 2.90
SLD 2 0 2.12 3.23 2.12 5.50 4.00 140
SLD 3 0.00 0.00 1.62 1.62 3.23 0.00 5.00 4.00 120
FMD1 = -52.82FMD2 = 9.40FML1 = -21.96FML2 = 3.01KN.M.
SFD1 = 64.06SFD2 = 37.20SFL1 = 24.79SFL2 = 13.06KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 19.40KN.M.@ 1.94M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 112.2DM2= 18.6DMM= 29.1KN.M.
AT SUP1:Mu1/bd2=3.827N/mm2pt1=1.070pc1=0.353AST1=878.72mm2ASC1=290.026mm2
AT SUP2:Mu2/bd2=0.635N/mm2pt2=0.152pc2=0.000AST2=124.623mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.993N/mm2ptm=0.243pcm=0.000ASTM=199.577mm2ASCM=0mm2
SHEAR DESIGN: Vu= 133KN. Vc= 52KN. Vus= 81KN.
REINFORCEMENT AT SUP1:T1=5#16C1=2#16
REINFORCEMENT AT SUP2:T2=2#16C2=2#16
REINFORCEMENT AT MIDS:TM=2#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@175mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F7- 5.400-F9- 5.400
SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 5.50 2.90
SLD 2 0 2.12 5.50 2.12 5.50 4.00 140
SLD 3 0.00 0.00 2.75 2.75 5.50 0.00 5.13 4.00 125
FMD1 = -99.77FMD2 = 74.29FML1 = -42.41FML2 = 30.62KN.M.
SFD1 = 99.89SFD2 = 90.63SFL1 = 40.59SFL2 = 36.31KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 76.13KN.M.@ 2.75M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 213.3DM2= 157.4DMM= 114.2KN.M.
AT SUP1:Mu1/bd2=5.598N/mm2pt1=1.549pc1=0.890AST1=1450.194mm2ASC1=832.859mm2
AT SUP2:Mu2/bd2=4.130N/mm2pt2=1.152pc2=0.445AST2=1078.703mm2ASC2=416.789mm2
AT MIDS:Mum/bd2=2.997N/mm2ptm=0.846pcm=0.102ASTM=791.837mm2ASCM=95.499mm2
SHEAR DESIGN: Vu= 211KN. Vc= 68KN. Vus= 143KN.
REINFORCEMENT AT SUP1:T1=5#20C1=3#20
REINFORCEMENT AT SUP2:T2=4#20C2=2#20

REINFORCEMENT AT MIDS:TM=3#20CM=2#20
SHEAR REINFORCEMENT:8#2LEG.STR.@100mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F5- 5.400-F7- 5.400
SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 5.50 2.90
SLD 2 0 2.12 5.50 2.12 5.50 4.00 140
SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
SLD 3 0.00 0.00 2.75 2.75 5.50 0.00 5.13 4.00 125
FMD1 = -79.68FMD2 = 98.60FML1 = -33.21FML2 = 41.86KN.M.
SFD1 = 91.82SFD2 = 98.70SFL1 = 36.88SFL2 = 40.01KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 73.00KN.M.@ 2.75M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 169.3DM2= 210.7DMM= 109.5KN.M.
AT SUP1:Mu1/bd2=4.445N/mm2pt1=1.237pc1=0.540AST1=1158.244mm2ASC1=505.875mm2
AT SUP2:Mu2/bd2=5.530N/mm2pt2=1.531pc2=0.869AST2=1433.049mm2ASC2=813.657mm2
AT MIDS:Mum/bd2=2.874N/mm2ptm=0.813pcm=0.065ASTM=760.638mm2ASCM=60.557mm2
SHEAR DESIGN: Vu= 208KN. Vc= 68KN. Vus= 140KN.
REINFORCEMENT AT SUP1:T1=4#20C1=2#20
REINFORCEMENT AT SUP2:T2=5#20C2=3#20
REINFORCEMENT AT MIDS:TM=3#20CM=2#20
SHEAR REINFORCEMENT:8#2LEG.STR.@125mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F3- 5.400-F5- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.26 2.90
SLD 2 0 2.12 4.26 2.12 5.50 4.00 140
SLD 3 0.00 0.00 2.13 2.13 4.26 0.00 5.00 4.00 120
SLD 2 0 0.01 0.01 0.00 5.25 4.00 130
FMD1 = -37.86FMD2 = 65.68FML1 = -14.12FML2 = 27.70KN.M.
SFD1 = 62.87SFD2 = 76.10SFL1 = 23.91SFL2 = 30.36KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 38.06KN.M.@ 1.91M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 78.0DM2= 140.1DMM= 57.1KN.M.
AT SUP1:Mu1/bd2=2.660N/mm2pt1=0.755pc1=0.000AST1=619.58mm2ASC1=0mm2
AT SUP2:Mu2/bd2=4.778N/mm2pt2=1.328pc2=0.642AST2=1090.082mm2ASC2=526.752mm2
AT MIDS:Mum/bd2=1.948N/mm2ptm=0.514pcm=0.000ASTM=422.18mm2ASCM=0mm2
SHEAR DESIGN: Vu= 160KN. Vc= 56KN. Vus= 103KN.
REINFORCEMENT AT SUP1:T1=4#16C1=2#16
REINFORCEMENT AT SUP2:T2=3#16+2#20C2=3#16
REINFORCEMENT AT MIDS:TM=3#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F2- 1.500-F3- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.00 3.50
FMD1 = -11.08FMD2 = 17.23FML1 = -0.13FML2 = -0.26KN.M.
SFD1 = 25.55SFD2 = 29.65SFL1 = 0.13SFL2 = -0.13KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 6.69KN.M.@ 1.35M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 16.8DM2= 26.2DMM= 10.0KN.M.
AT SUP1:Mu1/bd2=0.574N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.895N/mm2pt2=0.218pc2=0.000AST2=178.713mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.342N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 45KN. Vc= 28KN. Vus= 17KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F1- 1.500-F2- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 1.98 3.50
FMD1 = -2.92FMD2 = 9.12FML1 = -0.02FML2 = 0.05KN.M.
SFD1 = 15.03SFD2 = 21.39SFL1 = -0.02SFL2 = 0.02KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 3.18KN.M.@ 0.79M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 4.4DM2= 13.8DMM= 4.8KN.M.
AT SUP1:Mu1/bd2=0.150N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.469N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.163N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 32KN. Vc= 27KN. Vus= 5KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F9- 1.500-F11- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.23 3.50
FMD1 = -24.59FMD2 = 8.96FML1 = 0.49FML2 = 0.33KN.M.
SFD1 = 34.56SFD2 = 24.88SFL1 = -0.25SFL2 = 0.25KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 7.83KN.M.@ 1.94M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 37.6DM2= 13.9DMM= 11.8KN.M.
AT SUP1:Mu1/bd2=1.283N/mm2pt1=0.321pc1=0.000AST1=263.502mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.475N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.401N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 52KN. Vc= 33KN. Vus= 19KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F7- 1.500-F9- 1.500
SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:

WLD 0.23 0.00 3.50 5.50 3.50
 FMD1 = -49.78 FMD2 = 41.60 FML1 = 0.15 FML2 = 0.33 KN.M.
 SFD1 = 52.88 SFD2 = 49.90 SFL1 = -0.09 SFL2 = 0.09 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 24.88 KN.M.@ 2.75M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 74.9 DM2= 62.9 DMM= 37.3 KN.M.
 AT SUP1: Mu1/bd2=1.966 N/mm2 pt1=0.520 pc1=0.000 AST1=486.601 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=1.651 N/mm2 pt2=0.425 pc2=0.000 AST2=397.718 mm2 ASC2=0 mm2
 AT MIDS: Mum/bd2=0.980 N/mm2 ptm=0.240 pcm=0.000 ASTM=224.302 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 79 KN. Vc= 45 KN. Vus= 34 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=4#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: F5- 1.500-F7- 1.500
 SIZE OF BEAM=230x450mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 5.50 3.50
 FMD1 = -43.35 FMD2 = 49.14 FML1 = -0.24 FML2 = -0.16 KN.M.
 SFD1 = 50.34 SFD2 = 52.44 SFL1 = 0.07 SFL2 = -0.07 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 24.38 KN.M.@ 2.75M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 65.4 DM2= 74.0 DMM= 36.6 KN.M.
 AT SUP1: Mu1/bd2=1.716 N/mm2 pt1=0.444 pc1=0.000 AST1=415.713 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=1.941 N/mm2 pt2=0.512 pc2=0.000 AST2=479.394 mm2 ASC2=0 mm2
 AT MIDS: Mum/bd2=0.960 N/mm2 ptm=0.234 pcm=0.000 ASTM=219.493 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 79 KN. Vc= 45 KN. Vus= 33 KN.
 REINFORCEMENT AT SUP1: T1=4#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=5#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: F3- 1.500-F5- 1.500
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.26 3.50
 FMD1 = -24.18 FMD2 = 32.10 FML1 = -0.26 FML2 = -0.28 KN.M.
 SFD1 = 37.29 SFD2 = 41.09 SFL1 = 0.13 SFL2 = -0.13 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 13.52 KN.M.@ 2.13M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 36.7 DM2= 48.6 DMM= 20.3 KN.M.
 AT SUP1: Mu1/bd2=1.251 N/mm2 pt1=0.312 pc1=0.000 AST1=256.151 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=1.657 N/mm2 pt2=0.427 pc2=0.000 AST2=350.326 mm2 ASC2=0 mm2
 AT MIDS: Mum/bd2=0.692 N/mm2 ptm=0.166 pcm=0.000 ASTM=136.275 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 62 KN. Vc= 37 KN. Vus= 25 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=4#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H10- 5.400-H12- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 2.23 2.90

SLD 2 0 2.12 0.74 2.12 5.50 4.00 140

SLD 2 0.74 1.62 2.23 1.62 5.00 4.00 120

FMD1 = -22.30FMD2 = 17.15FML1 = -8.57FML2 = 5.90KN.M.

SFD1 = 30.98SFD2 = 24.60SFL1 = 9.66SFL2 = 6.27KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= -7.28KN.M.@ 1.23M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 46.3DM2= 34.6DMM= -10.9KN.M.

AT SUP1:Mu1/bd2=1.580N/mm2pt1=0.404pc1=0.000AST1=331.891mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.180N/mm2pt2=0.293pc2=0.000AST2=240.319mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.373N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2

SHEAR DESIGN: Vu= 61KN. Vc= 36KN. Vus= 25KN.

REINFORCEMENT AT SUP1:T1=3#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H8- 5.400-H10- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.23 2.90

SLD 2 0 2.12 4.23 2.12 5.50 4.00 140

SLD 3 0.00 0.00 2.12 2.12 4.23 0.00 5.00 4.00 120

FMD1 = -52.49FMD2 = 39.74FML1 = -21.34FML2 = 15.61KN.M.

SFD1 = 71.95SFD2 = 65.95SFL1 = 28.25SFL2 = 25.56KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 43.89KN.M.@ 2.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 110.8DM2= 83.0DMM= 65.8KN.M.

AT SUP1:Mu1/bd2=3.778N/mm2pt1=1.057pc1=0.338AST1=867.924mm2ASC1=277.935mm2

AT SUP2:Mu2/bd2=2.832N/mm2pt2=0.801pc2=0.052AST2=657.926mm2ASC2=42.737mm2

AT MIDS:Mum/bd2=2.246N/mm2ptm=0.610pcm=0.000ASTM=500.661mm2ASCM=0mm2

SHEAR DESIGN: Vu= 150KN. Vc= 52KN. Vus= 98KN.

REINFORCEMENT AT SUP1:T1=5#16C1=2#16

REINFORCEMENT AT SUP2:T2=4#16C2=2#16

REINFORCEMENT AT MIDS:TM=3#16CM=2#16

SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H6- 5.400-H8- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.25 2.90

SLD 2 0 2.12 4.25 2.12 5.50 4.00 140

SLD 3 0.00 0.00 2.13 2.13 4.25 0.00 5.00 4.00 120

FMD1 = -66.93FMD2 = 46.74FML1 = -28.20FML2 = 18.80KN.M.

SFD1 = 74.07SFD2 = 64.59SFL1 = 29.28SFL2 = 24.87KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 29.58KN.M.@ 2.34M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 142.7DM2= 98.3DMM= 44.4KN.M.

AT SUP1:Mu1/bd2=4.868N/mm2pt1=1.352pc1=0.669AST1=1109.968mm2ASC1=549.025mm2

AT SUP2:Mu2/bd2=3.354N/mm2pt2=0.942pc2=0.210AST2=773.72mm2ASC2=172.427mm2
AT MIDS:Mum/bd2=1.514N/mm2ptm=0.385pcm=0.000ASTM=316.347mm2ASCM=0mm2
SHEAR DESIGN: Vu= 155KN. Vc= 57KN. Vus= 98KN.
REINFORCEMENT AT SUP1:T1=3#16+2#20C1=3#16
REINFORCEMENT AT SUP2:T2=4#16C2=2#16
REINFORCEMENT AT MIDS:TM=2#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H4- 5.400-H6- 5.400

SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 5.70 2.90

SLD 2 0 2.12 5.70 2.12 5.50 4.00 140

SLD 3 0.00 0.00 2.85 2.85 5.70 0.00 5.13 4.00 125

FMD1 = -86.92FMD2 = 90.77FML1 = -36.56FML2 = 38.09KN.M.

SFD1 = 98.78SFD2 = 100.14SFL1 = 40.14SFL2 = 40.68KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 90.76KN.M.@ 2.85M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 185.2DM2= 193.3DMM= 136.1KN.M.

AT SUP1:Mu1/bd2=4.862N/mm2pt1=1.350pc1=0.667AST1=1263.8mm2ASC1=624.098mm2

AT SUP2:Mu2/bd2=5.073N/mm2pt2=1.407pc2=0.731AST2=1317.426mm2ASC2=684.159mm2

AT MIDS:Mum/bd2=3.573N/mm2ptm=1.002pcm=0.276ASTM=937.662mm2ASCM=258.823mm2

SHEAR DESIGN: Vu= 211KN. Vc= 66KN. Vus= 146KN.

REINFORCEMENT AT SUP1:T1=2#16+3#20C1=4#16

REINFORCEMENT AT SUP2:T2=2#16+3#20C2=4#16

REINFORCEMENT AT MIDS:TM=5#16CM=2#16

SHEAR REINFORCEMENT:8#2LEG.STR.@100mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H3- 5.400-H4- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 3.57 2.90

SLD 2 0 2.12 3.57 2.12 5.50 4.00 140

SLD 3 0.00 0.00 1.79 1.79 3.57 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.25 4.00 130

FMD1 = -21.38FMD2 = 59.74FML1 = -6.91FML2 = 25.52KN.M.

SFD1 = 45.96SFD2 = 67.48SFL1 = 16.31SFL2 = 26.74KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 19.78KN.M.@ 1.43M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 42.4DM2= 127.9DMM= 29.7KN.M.

AT SUP1:Mu1/bd2=1.448N/mm2pt1=0.367pc1=0.000AST1=300.983mm2ASC1=0mm2

AT SUP2:Mu2/bd2=4.363N/mm2pt2=1.215pc2=0.516AST2=997.81mm2ASC2=423.407mm2

AT MIDS:Mum/bd2=1.012N/mm2ptm=0.248pcm=0.000ASTM=203.765mm2ASCM=0mm2

SHEAR DESIGN: Vu= 141KN. Vc= 54KN. Vus= 87KN.

REINFORCEMENT AT SUP1:T1=2#16C1=2#16

REINFORCEMENT AT SUP2:T2=5#16C2=3#16

REINFORCEMENT AT MIDS:TM=2#16CM=2#16

SHEAR REINFORCEMENT:8#2LEG.STR.@175mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H2- 5.400-H3- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 3.00 2.90

SLD 3 0 1.98 0.52 2.49 3.00 0.01 5.25 4.00 130

FMD1 = -14.98 FMD2 = 19.57 FML1 = -3.69 FML2 = 5.43 KN.M.

SFD1 = 36.43 SFD2 = 32.86 SFL1 = 10.47 SFL2 = 6.58 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 11.73 KN.M.@ 1.35M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 28.0 DM2= 37.5 DMM= 17.6 KN.M.

AT SUP1: Mu1/bd2=0.955 N/mm² pt1=0.233 pc1=0.000 AST1=191.567 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=1.279 N/mm² pt2=0.320 pc2=0.000 AST2=262.581 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.600 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 70 KN. Vc= 29 KN. Vus= 42 KN.

REINFORCEMENT AT SUP1: T1=2#12 C1=2#12

REINFORCEMENT AT SUP2: T2=3#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: H1- 5.400-H2- 5.400

SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 1.98 2.90

SLD 2 0 0.00 1.98 1.98 5.25 4.00 130

FMD1 = -2.05 FMD2 = 12.58 FML1 = -0.17 FML2 = 3.03 KN.M.

SFD1 = 13.53 SFD2 = 27.72 SFL1 = 1.15 SFL2 = 6.69 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 3.74 KN.M.@ 0.79M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 3.3 DM2= 23.4 DMM= 5.6 KN.M.

AT SUP1: Mu1/bd2=0.114 N/mm² pt1=0.150 pc1=0.000 AST1=123.165 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=0.799 N/mm² pt2=0.193 pc2=0.000 AST2=158.464 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.191 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 52 KN. Vc= 27 KN. Vus= 25 KN.

REINFORCEMENT AT SUP1: T1=2#12 C1=2#12

REINFORCEMENT AT SUP2: T2=2#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: H10- 1.500-H12- 1.500

SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 2.23 3.50

FMD1 = -11.36 FMD2 = 10.79 FML1 = 0.33 FML2 = -0.21 KN.M.

SFD1 = 20.78 SFD2 = 20.26 SFL1 = -0.05 SFL2 = 0.05 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 0.64 KN.M.@ 1.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 17.5 DM2= 16.5 DMM= 1.0 KN.M.

AT SUP1: Mu1/bd2=0.598 N/mm² pt1=0.150 pc1=0.000 AST1=123.165 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=0.563 N/mm² pt2=0.150 pc2=0.000 AST2=123.165 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.033 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 31 KN. Vc= 27 KN. Vus= 4 KN.

REINFORCEMENT AT SUP1: T1=2#12 C1=2#12

REINFORCEMENT AT SUP2: T2=2#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H8- 1.500-H10- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.23 3.50

FMD1 = -28.69FMD2 = 24.08FML1 = -0.05FML2 = 0.22KN.M.

SFD1 = 40.01SFD2 = 37.83SFL1 = -0.04SFL2 = 0.04KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 14.64KN.M.@ 2.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 43.1DM2= 36.5DMM= 22.0KN.M.

AT SUP1:Mu1/bd2=1.471N/mm2pt1=0.373pc1=0.000AST1=306.323mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.243N/mm2pt2=0.310pc2=0.000AST2=254.548mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.749N/mm2ptm=0.180pcm=0.000ASTM=148.124mm2ASCM=0mm2

SHEAR DESIGN: Vu= 60KN. Vc= 35KN. Vus= 25KN.

REINFORCEMENT AT SUP1:T1=3#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H6- 1.500-H8- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.25 3.50

FMD1 = -32.15FMD2 = 25.98FML1 = 0.40FML2 = 0.06KN.M.

SFD1 = 40.55SFD2 = 37.65SFL1 = -0.11SFL2 = 0.11KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 12.65KN.M.@ 2.13M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 48.8DM2= 39.1DMM= 19.0KN.M.

AT SUP1:Mu1/bd2=1.666N/mm2pt1=0.429pc1=0.000AST1=352.418mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.333N/mm2pt2=0.334pc2=0.000AST2=274.603mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.647N/mm2ptm=0.155pcm=0.000ASTM=127.134mm2ASCM=0mm2

SHEAR DESIGN: Vu= 61KN. Vc= 37KN. Vus= 24KN.

REINFORCEMENT AT SUP1:T1=4#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H4- 1.500-H6- 1.500

SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 5.70 3.50

FMD1 = -46.88FMD2 = 48.74FML1 = -0.26FML2 = 0.26KN.M.

SFD1 = 52.93SFD2 = 53.59SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 27.83KN.M.@ 2.85M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 70.7DM2= 73.5DMM= 41.8KN.M.

AT SUP1:Mu1/bd2=1.856N/mm2pt1=0.486pc1=0.000AST1=454.966mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.929N/mm2pt2=0.508pc2=0.000AST2=475.976mm2ASC2=0mm2

AT MIDS:Mum/bd2=1.096N/mm2ptm=0.270pcm=0.000ASTM=252.969mm2ASCM=0mm2

SHEAR DESIGN: Vu= 80KN. Vc= 45KN. Vus= 35KN.

REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H3- 1.500-H4- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.57 3.50
FMD1 = -15.82FMD2 = 26.70FML1 = -0.28FML2 = -0.58KN.M.
SFD1 = 29.79SFD2 = 35.89SFL1 = 0.24SFL2 = -0.24KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 8.40KN.M.@ 1.61M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 24.2DM2= 40.9DMM= 12.6KN.M.
AT SUP1:Mu1/bd2=0.824N/mm2pt1=0.199pc1=0.000AST1=163.715mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.396N/mm2pt2=0.352pc2=0.000AST2=289.078mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.430N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 54KN. Vc= 34KN. Vus= 20KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H2- 1.500-H3- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.00 3.50
FMD1 = -12.01FMD2 = 14.95FML1 = -0.04FML2 = -0.01KN.M.
SFD1 = 26.62SFD2 = 28.58SFL1 = 0.02SFL2 = -0.02KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 7.20KN.M.@ 1.50M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 18.1DM2= 22.4DMM= 10.8KN.M.
AT SUP1:Mu1/bd2=0.617N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.766N/mm2pt2=0.185pc2=0.000AST2=151.527mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.368N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 43KN. Vc= 27KN. Vus= 16KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H1- 1.500-H2- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 1.98 3.50
FMD1 = -2.75FMD2 = 9.53FML1 = -0.04FML2 = -0.04KN.M.
SFD1 = 14.74SFD2 = 21.68SFL1 = 0.04SFL2 = -0.04KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 3.14KN.M.@ 0.79M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 4.2DM2= 14.4DMM= 4.7KN.M.
AT SUP1:Mu1/bd2=0.143N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.490N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.161N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 33KN. Vc= 27KN. Vus= 5KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I8- 5.400-I10- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.23 2.90
SLD 3 0.00 0.00 2.12 2.12 4.23 0.00 5.00 4.00 120
FMD1 = -36.37FMD2 = 21.74FML1 = -8.58FML2 = 4.88KN.M.
SFD1 = 47.74SFD2 = 40.84SFL1 = 9.83SFL2 = 8.10KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 27.81KN.M.@ 2.33M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 67.4DM2= 39.9DMM= 41.7KN.M.
AT SUP1:Mu1/bd2=2.300N/mm2pt1=0.628pc1=0.000AST1=515.522mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.362N/mm2pt2=0.343pc2=0.000AST2=281.354mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.423N/mm2ptm=0.360pcm=0.000ASTM=295.312mm2ASCM=0mm2
SHEAR DESIGN: Vu= 86KN. Vc= 43KN. Vus= 44KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I6- 5.400-I8- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.25 2.90
SLD 3 0.00 0.00 2.13 2.13 4.25 0.00 5.00 4.00 120
FMD1 = -43.70FMD2 = 31.11FML1 = -11.68FML2 = 7.07KN.M.
SFD1 = 47.50SFD2 = 41.60SFL1 = 10.13SFL2 = 7.98KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 17.49KN.M.@ 2.34M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 83.1DM2= 57.3DMM= 26.2KN.M.
AT SUP1:Mu1/bd2=2.834N/mm2pt1=0.802pc1=0.053AST1=658.266mm2ASC1=43.119mm2
AT SUP2:Mu2/bd2=1.954N/mm2pt2=0.516pc2=0.000AST2=423.744mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.895N/mm2ptm=0.218pcm=0.000ASTM=178.713mm2ASCM=0mm2
SHEAR DESIGN: Vu= 86KN. Vc= 47KN. Vus= 40KN.
REINFORCEMENT AT SUP1:T1=3#12+2#16C1=2#12
REINFORCEMENT AT SUP2:T2=4#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I4- 5.400-I6- 5.400
SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 5.70 2.90
SLD 3 0.00 0.00 2.85 2.85 5.70 0.00 5.13 4.00 125

FMD1 = -58.38 FMD2 = 62.83 FML1 = -16.03 FML2 = 17.45 KN.M.
 SFD1 = 65.45 SFD2 = 67.01 SFL1 = 16.00 SFL2 = 16.50 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 57.81 KN.M.@ 2.85M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 111.6 DM2= 120.4 DMM= 86.7 KN.M.
 AT SUP1: Mu1/bd2=2.930 N/mm2 pt1=0.828 pc1=0.082 AST1=774.693 mm2 ASC1=76.297 mm2
 AT SUP2: Mu2/bd2=3.161 N/mm2 pt2=0.890 pc2=0.152 AST2=833.202 mm2 ASC2=141.828 mm2
 AT MIDS: Mum/bd2=2.276 N/mm2 ptm=0.620 pcm=0.000 ASTM=580.161 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 125 KN. Vc= 56 KN. Vus= 69 KN.
 REINFORCEMENT AT SUP1: T1=4#16 C1=2#16
 REINFORCEMENT AT SUP2: T2=5#16 C2=2#16
 REINFORCEMENT AT MIDS: TM=3#16 CM=2#16
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: I1- 5.400-I3- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.98 2.90
 SLD 3 0.00 0.00 2.49 2.49 4.98 0.00 5.25 4.00 130
 FMD1 = -35.28 FMD2 = 48.18 FML1 = -8.84 FML2 = 12.25 KN.M.
 SFD1 = 52.57 SFD2 = 57.85 SFL1 = 11.70 SFL2 = 13.10 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 43.64 KN.M.@ 2.49M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 66.2 DM2= 90.7 DMM= 65.5 KN.M.
 AT SUP1: Mu1/bd2=2.258 N/mm2 pt1=0.614 pc1=0.000 AST1=503.869 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=3.092 N/mm2 pt2=0.872 pc2=0.131 AST2=715.653 mm2 ASC2=107.391 mm2
 AT MIDS: Mum/bd2=2.233 N/mm2 ptm=0.606 pcm=0.000 ASTM=497.184 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 106 KN. Vc= 49 KN. Vus= 58 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12+2#16 C2=2#12
 REINFORCEMENT AT MIDS: TM=5#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: I3- 5.400-I4- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 3.57 2.90
 SLD 3 0.00 0.00 1.79 1.79 3.57 0.00 5.00 4.00 120
 SLD 2 0 0.01 0.01 0.00 5.25 4.00 130
 FMD1 = -29.02 FMD2 = 34.57 FML1 = -6.80 FML2 = 9.06 KN.M.
 SFD1 = 34.35 SFD2 = 37.46 SFL1 = 5.75 SFL2 = 7.03 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 2.30 KN.M.@ 1.79M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 53.7 DM2= 65.5 DMM= 3.5 KN.M.
 AT SUP1: Mu1/bd2=1.833 N/mm2 pt1=0.479 pc1=0.000 AST1=393.346 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=2.233 N/mm2 pt2=0.605 pc2=0.000 AST2=497.045 mm2 ASC2=0 mm2
 AT MIDS: Mum/bd2=0.118 N/mm2 ptm=0.150 pcm=0.000 ASTM=123.165 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 67 KN. Vc= 42 KN. Vus= 25 KN.
 REINFORCEMENT AT SUP1: T1=4#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=5#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I8- 1.500-I10- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.23 3.50

FMD1 = -29.81FMD2 = 21.24FML1 = 0.03FML2 = 0.23KN.M.

SFD1 = 40.95SFD2 = 36.89SFL1 = -0.06SFL2 = 0.06KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 15.54KN.M.@ 2.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 44.8DM2= 32.2DMM= 23.3KN.M.

AT SUP1:Mu1/bd2=1.527N/mm2pt1=0.389pc1=0.000AST1=319.465mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.099N/mm2pt2=0.271pc2=0.000AST2=222.538mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.795N/mm2ptm=0.192pcm=0.000ASTM=157.715mm2ASCM=0mm2

SHEAR DESIGN: Vu= 62KN. Vc= 36KN. Vus= 26KN.

REINFORCEMENT AT SUP1:T1=3#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I6- 1.500-I8- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.25 3.50

FMD1 = -32.28FMD2 = 26.20FML1 = 0.23FML2 = 0.03KN.M.

SFD1 = 40.53SFD2 = 37.67SFL1 = -0.06SFL2 = 0.06KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 12.40KN.M.@ 2.13M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 48.8DM2= 39.4DMM= 18.6KN.M.

AT SUP1:Mu1/bd2=1.664N/mm2pt1=0.429pc1=0.000AST1=351.925mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.342N/mm2pt2=0.337pc2=0.000AST2=276.811mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.635N/mm2ptm=0.152pcm=0.000ASTM=124.518mm2ASCM=0mm2

SHEAR DESIGN: Vu= 61KN. Vc= 37KN. Vus= 24KN.

REINFORCEMENT AT SUP1:T1=4#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I4- 1.500-I6- 1.500

SIZE OF BEAM=230x450mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 5.70 3.50

FMD1 = -46.19FMD2 = 48.82FML1 = -0.21FML2 = 0.13KN.M.

SFD1 = 52.80SFD2 = 53.72SFL1 = 0.01SFL2 = -0.01KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 28.22KN.M.@ 2.85M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 69.6DM2= 73.4DMM= 42.3KN.M.

AT SUP1:Mu1/bd2=1.827N/mm2pt1=0.477pc1=0.000AST1=446.694mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.927N/mm2pt2=0.508pc2=0.000AST2=475.407mm2ASC2=0mm2

AT MIDS:Mum/bd2=1.111N/mm2ptm=0.274pcm=0.000ASTM=256.797mm2ASCM=0mm2

SHEAR DESIGN: Vu= 81KN. Vc= 45KN. Vus= 35KN.

REINFORCEMENT AT SUP1:T1=4#12C1=2#12

REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I1- 1.500-I3- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.98 3.50
FMD1 = -31.72FMD2 = 37.89FML1 = -0.33FML2 = 0.04KN.M.
SFD1 = 44.53SFD2 = 47.09SFL1 = 0.06SFL2 = -0.06KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 21.94KN.M.@ 2.49M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 48.1DM2= 56.9DMM= 32.9KN.M.
AT SUP1:Mu1/bd2=1.640N/mm2pt1=0.422pc1=0.000AST1=346.275mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.941N/mm2pt2=0.512pc2=0.000AST2=420.488mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.123N/mm2ptm=0.277pcm=0.000ASTM=227.804mm2ASCM=0mm2
SHEAR DESIGN: Vu= 71KN. Vc= 40KN. Vus= 31KN.
REINFORCEMENT AT SUP1:T1=4#12C1=2#12
REINFORCEMENT AT SUP2:T2=4#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I3- 1.500-I4- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.57 3.50
FMD1 = -21.50FMD2 = 24.56FML1 = 0.18FML2 = -0.23KN.M.
SFD1 = 31.98SFD2 = 33.70SFL1 = 0.01SFL2 = -0.01KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 6.48KN.M.@ 1.79M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 32.5DM2= 37.2DMM= 9.7KN.M.
AT SUP1:Mu1/bd2=1.109N/mm2pt1=0.274pc1=0.000AST1=224.889mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.269N/mm2pt2=0.317pc2=0.000AST2=260.166mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.332N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 51KN. Vc= 33KN. Vus= 18KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F1- 5.400-H1- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.23 2.90
SLD 2 0.00 0.99 4.23 0.99 5.00 4.00 120
FMD1 = -42.43FMD2 = 42.43FML1 = -9.67FML2 = 9.67KN.M.
SFD1 = 45.82SFD2 = 45.82SFL1 = 8.38SFL2 = 8.38KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 5.22KN.M.@ 2.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 78.2DM2= 78.2DMM= 7.8KN.M.
AT SUP1:Mu1/bd2=1.247N/mm2pt1=0.311pc1=0.000AST1=426.459mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.247N/mm2pt2=0.311pc2=0.000AST2=426.459mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.125N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 81KN. Vc= 54KN. Vus= 27KN.
REINFORCEMENT AT SUP1:T1=4#12C1=2#12
REINFORCEMENT AT SUP2:T2=4#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B1- 5.400-F1- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.49 2.49 3.74 2.49 6.23 0.00 5.25 4.00 130
FMD1 = -68.65FMD2 = 83.13FML1 = -18.77FML2 = 22.58KN.M.
SFD1 = 74.19SFD2 = 78.83SFL1 = 18.02SFL2 = 19.24KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 72.48KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 131.1DM2= 158.6DMM= 108.7KN.M.
AT SUP1:Mu1/bd2=2.093N/mm2pt1=0.560pc1=0.000AST1=767.654mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.531N/mm2pt2=0.708pc2=0.000AST2=970.183mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.735N/mm2ptm=0.450pcm=0.000ASTM=616.591mm2ASCM=0mm2
SHEAR DESIGN: Vu= 147KN. Vc= 76KN. Vus= 71KN.
REINFORCEMENT AT SUP1:T1=4#16C1=2#16
REINFORCEMENT AT SUP2:T2=5#16C2=2#16
REINFORCEMENT AT MIDS:TM=4#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H1- 5.400-I1- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.49 2.49 3.74 2.49 6.23 0.00 5.25 4.00 130
FMD1 = -83.13FMD2 = 68.65FML1 = -22.58FML2 = 18.77KN.M.
SFD1 = 78.83SFD2 = 74.19SFL1 = 19.24SFL2 = 18.02KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 72.48KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 158.6DM2= 131.1DMM= 108.7KN.M.
AT SUP1:Mu1/bd2=2.531N/mm2pt1=0.708pc1=0.000AST1=970.183mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.093N/mm2pt2=0.560pc2=0.000AST2=767.654mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.735N/mm2ptm=0.450pcm=0.000ASTM=616.591mm2ASCM=0mm2
SHEAR DESIGN: Vu= 147KN. Vc= 76KN. Vus= 71KN.
REINFORCEMENT AT SUP1:T1=5#16C1=2#16
REINFORCEMENT AT SUP2:T2=4#16C2=2#16
REINFORCEMENT AT MIDS:TM=4#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F1- 1.500-H1- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.23 3.50
FMD1 = -32.68FMD2 = 32.68FML1 = 0.34FML2 = -0.34KN.M.

SFD1 = 41.19 SFD2 = 41.19 SFL1 = 0.00 SFL2 = 0.00 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 11.22 KN.M.@ 2.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 49.5 DM2= 49.5 DMM= 16.8 KN.M.
 AT SUP1: Mu1/bd2=0.791 N/mm² pt1=0.191 pc1=0.000 AST1=261.707 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=0.791 N/mm² pt2=0.191 pc2=0.000 AST2=261.707 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.269 N/mm² ptm=0.150 pcm=0.000 ASTM=205.65 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 62 KN. Vc= 45 KN. Vus= 17 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: B1- 1.500-F1- 1.500
 SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 6.23 3.50
 FMD1 = -56.02 FMD2 = 62.80 FML1 = -0.48 FML2 = 0.12 KN.M.
 SFD1 = 59.57 SFD2 = 61.75 SFL1 = 0.06 SFL2 = -0.06 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 34.76 KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 84.8 DM2= 94.4 DMM= 52.1 KN.M.
 AT SUP1: Mu1/bd2=1.353 N/mm² pt1=0.340 pc1=0.000 AST1=466.154 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.506 N/mm² pt2=0.383 pc2=0.000 AST2=525.357 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.832 N/mm² ptm=0.202 pcm=0.000 ASTM=276.273 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 93 KN. Vc= 59 KN. Vus= 34 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=5#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=3#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H1- 1.500-I1- 1.500
 SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 6.23 3.50
 FMD1 = -62.80 FMD2 = 56.02 FML1 = -0.12 FML2 = 0.48 KN.M.
 SFD1 = 61.75 SFD2 = 59.57 SFL1 = -0.06 SFL2 = 0.06 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 34.76 KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 94.4 DM2= 84.8 DMM= 52.1 KN.M.
 AT SUP1: Mu1/bd2=1.506 N/mm² pt1=0.383 pc1=0.000 AST1=525.357 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.353 N/mm² pt2=0.340 pc2=0.000 AST2=466.154 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.832 N/mm² ptm=0.202 pcm=0.000 ASTM=276.273 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 93 KN. Vc= 59 KN. Vus= 34 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=5#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=3#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: F2- 5.400-H2- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

SLD 2 0.00 0.99 4.23 0.99 5.00 4.00 120

SLD 2 2.12 1.50 4.24 1.50 5.00 4.00 120

SLD 2 0.00 1.50 2.12 1.50 5.00 4.00 120

FMD1 = -13.45 FMD2 = 13.45 FML1 = -8.97 FML2 = 8.97 KN.M.

SFD1 = 31.20 SFD2 = 31.27 SFL1 = 21.07 SFL2 = 21.13 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 32.86 KN.M.@ 2.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 33.6 DM2= 33.6 DMM= 49.3 KN.M.

AT SUP1: Mu1/bd2=1.147 N/mm² pt1=0.284 pc1=0.000 AST1=233.202 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=1.147 N/mm² pt2=0.284 pc2=0.000 AST2=233.202 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=1.681 N/mm² ptm=0.434 pcm=0.000 ASTM=356.242 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 79 KN. Vc= 31 KN. Vus= 47 KN.

REINFORCEMENT AT SUP1: T1=3#12 C1=2#12

REINFORCEMENT AT SUP2: T2=3#12 C2=2#12

REINFORCEMENT AT MIDS: TM=4#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: F2- 1.500-H2- 1.500

SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

FMD1 = -3.27 FMD2 = 3.27 FML1 = -0.39 FML2 = 0.39 KN.M.

SFD1 = 4.86 SFD2 = 4.86 SFL1 = 0.00 SFL2 = 0.00 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 1.47 KN.M.@ 2.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 5.5 DM2= 5.5 DMM= 2.2 KN.M.

AT SUP1: Mu1/bd2=0.187 N/mm² pt1=0.150 pc1=0.000 AST1=123.165 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=0.187 N/mm² pt2=0.150 pc2=0.000 AST2=123.165 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.075 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 7 KN. Vc= 27 KN. Vus= KN.

REINFORCEMENT AT SUP1: T1=2#12 C1=2#12

REINFORCEMENT AT SUP2: T2=2#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: B3- 5.400-F3- 5.400

SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 6.23 2.90

SLD 4 0.00 0.00 2.13 2.13 4.10 2.13 6.23 0.00 5.00 4.00 120

SLD 4 0.00 0.00 2.49 2.49 3.74 2.49 6.23 0.00 5.25 4.00 130

FMD1 = -87.56 FMD2 = 108.23 FML1 = -34.98 FML2 = 42.71 KN.M.

SFD1 = 95.03 SFD2 = 101.67 SFL1 = 34.85 SFL2 = 37.33 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 110.82 KN.M.@ 3.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 183.8 DM2= 226.4 DMM= 166.2 KN.M.

AT SUP1: Mu1/bd2=2.934 N/mm² pt1=0.825 pc1=0.075 AST1=1130.503 mm² ASC1=103.323 mm²

AT SUP2: Mu2/bd2=3.614 N/mm² pt2=0.998 pc2=0.263 AST2=1368.604 mm² ASC2=360.473 mm²

AT MIDS: Mum/bd2=2.653 N/mm² ptm=0.752 pcm=0.000 ASTM=1031.082 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 209 KN. Vc= 85 KN. Vus= 124 KN.

REINFORCEMENT AT SUP1: T1=4#20 C1=2#20

REINFORCEMENT AT SUP2: T2=5#20 C2=2#20

REINFORCEMENT AT MIDS:TM=4#20CM=2#20
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F3- 5.400-H3- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.23 2.90
SLD 2 2.12 1.50 4.24 1.50 5.00 4.00 120
SLD 2 0.00 1.50 2.12 1.50 5.00 4.00 120
FMD1 = -53.52FMD2 = 52.13FML1 = -17.93FML2 = 16.82KN.M.
SFD1 = 51.54SFD2 = 50.96SFL1 = 12.95SFL2 = 12.49KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= -2.63KN.M.@ 2.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 107.2DM2= 103.4DMM= -4.0KN.M.
AT SUP1:Mu1/bd2=1.711N/mm2pt1=0.442pc1=0.000AST1=606.573mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.651N/mm2pt2=0.425pc2=0.000AST2=582.451mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.063N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 97KN. Vc= 63KN. Vus= 34KN.
REINFORCEMENT AT SUP1:T1=2#12+2#16C1=2#12
REINFORCEMENT AT SUP2:T2=2#12+2#16C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H3- 5.400-I3- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 1.79 1.79 4.45 1.79 6.23 0.00 5.00 4.00 120
SLD 4 0.00 0.00 2.49 2.49 3.74 2.49 6.23 0.00 5.25 4.00 130
FMD1 = -105.45FMD2 = 85.40FML1 = -40.48FML2 = 33.26KN.M.
SFD1 = 99.61SFD2 = 93.20SFL1 = 35.69SFL2 = 33.39KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 106.36KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 218.9DM2= 178.0DMM= 159.5KN.M.
AT SUP1:Mu1/bd2=3.494N/mm2pt1=0.968pc1=0.230AST1=1326.601mm2ASC1=315.109mm2
AT SUP2:Mu2/bd2=2.841N/mm2pt2=0.801pc2=0.050AST2=1097.973mm2ASC2=68.192mm2
AT MIDS:Mum/bd2=2.546N/mm2ptm=0.713pcm=0.000ASTM=977.812mm2ASCM=0mm2
SHEAR DESIGN: Vu= 203KN. Vc= 84KN. Vus= 119KN.
REINFORCEMENT AT SUP1:T1=2#16+3#20C1=2#16
REINFORCEMENT AT SUP2:T2=3#16+2#20C2=2#16
REINFORCEMENT AT MIDS:TM=5#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B3- 1.500-F3- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -56.48FMD2 = 62.92FML1 = -0.85FML2 = 0.23KN.M.
SFD1 = 59.63SFD2 = 61.69SFL1 = 0.10SFL2 = -0.10KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 34.23KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 86.0DM2= 94.7DMM= 51.4KN.M.
AT SUP1:Mu1/bd2=1.373N/mm2pt1=0.346pc1=0.000AST1=473.721mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.512N/mm2pt2=0.385pc2=0.000AST2=527.508mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.819N/mm2ptm=0.198pcm=0.000ASTM=271.827mm2ASCM=0mm2
SHEAR DESIGN: Vu= 93KN. Vc= 59KN. Vus= 33KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F3- 1.500-H3- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.23 3.50
FMD1 = -32.31FMD2 = 32.40FML1 = 0.65FML2 = -0.59KN.M.
SFD1 = 41.17SFD2 = 41.21SFL1 = -0.01SFL2 = 0.01KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 11.82KN.M.@ 2.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 49.4DM2= 49.5DMM= 17.7KN.M.
AT SUP1:Mu1/bd2=0.789N/mm2pt1=0.191pc1=0.000AST1=261.206mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.790N/mm2pt2=0.191pc2=0.000AST2=261.457mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.283N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 62KN. Vc= 45KN. Vus= 17KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H3- 1.500-I3- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -62.93FMD2 = 56.42FML1 = -0.23FML2 = 0.82KN.M.
SFD1 = 61.70SFD2 = 59.62SFL1 = -0.09SFL2 = 0.09KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 34.27KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 94.7DM2= 85.9DMM= 51.4KN.M.
AT SUP1:Mu1/bd2=1.512N/mm2pt1=0.385pc1=0.000AST1=527.601mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.370N/mm2pt2=0.345pc2=0.000AST2=472.899mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.820N/mm2ptm=0.199pcm=0.000ASTM=272.162mm2ASCM=0mm2
SHEAR DESIGN: Vu= 93KN. Vc= 59KN. Vus= 33KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H4- 5.400-I4- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 1.79 1.79 4.45 1.79 6.23 0.00 5.00 4.00 120

SLD 4 0.00 0.00 2.85 2.85 3.38 2.85 6.23 0.00 5.13 4.00 125
 FMD1 = -91.20FMD2 = 91.22FML1 = -35.93FML2 = 35.94KN.M.
 SFD1 = 96.65SFD2 = 96.68SFL1 = 35.17SFL2 = 35.19KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 114.57KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 190.7DM2= 190.7DMM= 171.9KN.M.
 AT SUP1:Mu1/bd2=3.044N/mm2pt1=0.853pc1=0.106AST1=1168.985mm2ASC1=144.884mm2
 AT SUP2:Mu2/bd2=3.044N/mm2pt2=0.853pc2=0.106AST2=1169.236mm2ASC2=145.155mm2
 AT MIDS:Mum/bd2=2.743N/mm2ptm=0.776pcm=0.023ASTM=1063.683mm2ASCM=31.158mm2
 SHEAR DESIGN: Vu= 198KN. Vc= 80KN. Vus= 117KN.
 REINFORCEMENT AT SUP1:T1=3#16+2#20C1=2#16
 REINFORCEMENT AT SUP2:T2=3#16+2#20C2=2#16
 REINFORCEMENT AT MIDS:TM=3#16+2#20CM=2#16
 SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:H4- 1.500-I4- 1.500
 SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 6.23 3.50
 FMD1 = -58.49FMD2 = 58.49FML1 = -0.70FML2 = 0.70KN.M.
 SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 35.28KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 88.8DM2= 88.8DMM= 52.9KN.M.
 AT SUP1:Mu1/bd2=1.417N/mm2pt1=0.358pc1=0.000AST1=490.77mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.417N/mm2pt2=0.358pc2=0.000AST2=490.77mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.845N/mm2ptm=0.205pcm=0.000ASTM=280.642mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.
 REINFORCEMENT AT SUP1:T1=5#12C1=2#12
 REINFORCEMENT AT SUP2:T2=5#12C2=2#12
 REINFORCEMENT AT MIDS:TM=3#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:A5- 5.400-B5- 5.400
 SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 3.23 2.90
 FMD1 = -1.16FMD2 = 41.46FML1 = 2.63FML2 = 11.81KN.M.
 SFD1 = 14.51SFD2 = 39.47SFL1 = -4.47SFL2 = 4.47KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 4.47KN.M.@ 0.65M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 5.7DM2= 79.9DMM= 6.7KN.M.
 AT SUP1:Mu1/bd2=0.091N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.275N/mm2pt2=0.319pc2=0.000AST2=436.947mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.107N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 66KN. Vc= 55KN. Vus= 11KN.
 REINFORCEMENT AT SUP1:T1=2#12C1=2#12
 REINFORCEMENT AT SUP2:T2=4#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B5- 5.400-F5- 5.400
 SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 6.23 2.90
 SLD 4 0.00 0.00 2.13 2.13 4.10 2.13 6.23 0.00 5.00 4.00 120
 SLD 4 0.00 0.00 2.75 2.75 3.48 2.75 6.23 0.00 5.13 4.00 125
 FMD1 = -104.92FMD2 = 89.07FML1 = -41.52FML2 = 36.27KN.M.
 SFD1 = 100.99SFD2 = 95.91SFL1 = 37.45SFL2 = 35.77KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 113.90KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 219.7DM2= 188.0DMM= 170.9KN.M.
 AT SUP1:Mu1/bd2=3.506N/mm2pt1=0.971pc1=0.233AST1=1330.877mm2ASC1=319.727mm2
 AT SUP2:Mu2/bd2=3.001N/mm2pt2=0.842pc2=0.094AST2=1153.977mm2ASC2=128.676mm2
 AT MIDS:Mum/bd2=2.727N/mm2ptm=0.772pcm=0.018ASTM=1058.066mm2ASCM=25.092mm2
 SHEAR DESIGN: Vu= 208KN. Vc= 84KN. Vus= 123KN.
 REINFORCEMENT AT SUP1:T1=2#16+3#20C1=2#16
 REINFORCEMENT AT SUP2:T2=3#16+2#20C2=2#16
 REINFORCEMENT AT MIDS:TM=3#16+2#20CM=2#16
 SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:A5- 1.500-B5- 1.500
 SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 3.23 3.50
 FMD1 = -5.26FMD2 = 29.56FML1 = -0.05FML2 = -1.32KN.M.
 SFD1 = 23.93SFD2 = 38.97SFL1 = 0.42SFL2 = -0.42KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 9.90KN.M.@ 1.29M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 8.0DM2= 46.3DMM= 14.9KN.M.
 AT SUP1:Mu1/bd2=0.127N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=0.739N/mm2pt2=0.178pc2=0.000AST2=243.91mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.237N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 59KN. Vc= 45KN. Vus= 14KN.
 REINFORCEMENT AT SUP1:T1=2#12C1=2#12
 REINFORCEMENT AT SUP2:T2=3#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:B5- 1.500-F5- 1.500
 SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 6.23 3.50
 FMD1 = -62.73FMD2 = 56.60FML1 = -0.24FML2 = 0.90KN.M.
 SFD1 = 61.64SFD2 = 59.68SFL1 = -0.11SFL2 = 0.11KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 34.24KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 94.5DM2= 86.3DMM= 51.4KN.M.
 AT SUP1:Mu1/bd2=1.508N/mm2pt1=0.384pc1=0.000AST1=525.824mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.377N/mm2pt2=0.347pc2=0.000AST2=475.274mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.820N/mm2ptm=0.198pcm=0.000ASTM=271.911mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 93KN. Vc= 59KN. Vus= 33KN.
 REINFORCEMENT AT SUP1:T1=5#12C1=2#12

REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H6- 5.400-I6- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.13 2.13 4.11 2.13 6.23 0.00 5.00 4.00 120
SLD 4 0.00 0.00 2.85 2.85 3.38 2.85 6.23 0.00 5.13 4.00 125
FMD1 = -93.56FMD2 = 93.59FML1 = -37.82FML2 = 37.81KN.M.
SFD1 = 98.62SFD2 = 98.65SFL1 = 36.74SFL2 = 36.76KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 119.29KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 197.1DM2= 197.1DMM= 178.9KN.M.
AT SUP1:Mu1/bd2=3.145N/mm2pt1=0.879pc1=0.134AST1=1204.616mm2ASC1=183.365mm2
AT SUP2:Mu2/bd2=3.146N/mm2pt2=0.879pc2=0.134AST2=1204.784mm2ASC2=183.546mm2
AT MIDS:Mum/bd2=2.856N/mm2ptm=0.805pcm=0.054ASTM=1103.255mm2ASCM=73.896mm2
SHEAR DESIGN: Vu= 203KN. Vc= 81KN. Vus= 122KN.
REINFORCEMENT AT SUP1:T1=3#16+2#20C1=2#16
REINFORCEMENT AT SUP2:T2=3#16+2#20C2=2#16
REINFORCEMENT AT MIDS:TM=3#16+2#20CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H6- 1.500-I6- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -58.54FMD2 = 58.54FML1 = -0.73FML2 = 0.73KN.M.
SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 35.20KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 88.9DM2= 88.9DMM= 52.8KN.M.
AT SUP1:Mu1/bd2=1.419N/mm2pt1=0.359pc1=0.000AST1=491.506mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.419N/mm2pt2=0.359pc2=0.000AST2=491.506mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.843N/mm2ptm=0.204pcm=0.000ASTM=279.97mm2ASCM=0mm2
SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B7- 5.400-F7- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.75 2.75 3.48 2.75 6.23 0.00 5.13 4.00 125
SLD 4 0.00 0.00 2.75 2.75 3.48 2.75 6.23 0.00 5.13 4.00 125
FMD1 = -96.50FMD2 = 96.50FML1 = -39.64FML2 = 39.64KN.M.
SFD1 = 101.16SFD2 = 101.16SFL1 = 38.28SFL2 = 38.28KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 125.28KN.M.@ 3.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 204.2DM2= 204.2DMM= 187.9KN.M.
AT SUP1:Mu1/bd2=3.259N/mm2pt1=0.908pc1=0.165AST1=1244.523mm2ASC1=226.465mm2
AT SUP2:Mu2/bd2=3.259N/mm2pt2=0.908pc2=0.165AST2=1244.523mm2ASC2=226.465mm2
AT MIDS:Mum/bd2=2.999N/mm2ptm=0.841pcm=0.093ASTM=1153.474mm2ASCM=128.133mm2
SHEAR DESIGN: Vu= 209KN. Vc= 82KN. Vus= 127KN.
REINFORCEMENT AT SUP1:T1=2#16+3#20C1=2#16
REINFORCEMENT AT SUP2:T2=2#16+3#20C2=2#16
REINFORCEMENT AT MIDS:TM=3#16+2#20CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B7- 1.500-F7- 1.500

SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 6.23 3.50

FMD1 = -58.59FMD2 = 58.59FML1 = -0.78FML2 = 0.78KN.M.

SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 35.10KN.M.@ 3.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 89.1DM2= 89.1DMM= 52.7KN.M.
AT SUP1:Mu1/bd2=1.421N/mm2pt1=0.359pc1=0.000AST1=492.427mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.421N/mm2pt2=0.359pc2=0.000AST2=492.427mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.840N/mm2ptm=0.204pcm=0.000ASTM=279.129mm2ASCM=0mm2
SHEAR DESIGN: Vu= 91KN. Vc= 58KN. Vus= 33KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H8- 5.400-I8- 5.400

SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 6.23 2.90

SLD 4 0.00 0.00 2.12 2.12 4.12 2.12 6.23 0.00 5.00 4.00 120

SLD 4 0.00 0.00 2.13 2.13 4.11 2.13 6.23 0.00 5.00 4.00 120

FMD1 = -90.10FMD2 = 90.13FML1 = -35.56FML2 = 35.59KN.M.

SFD1 = 95.71SFD2 = 95.76SFL1 = 34.91SFL2 = 34.96KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 112.33KN.M.@ 3.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 188.5DM2= 188.6DMM= 168.5KN.M.
AT SUP1:Mu1/bd2=3.008N/mm2pt1=0.844pc1=0.096AST1=1156.66mm2ASC1=131.573mm2
AT SUP2:Mu2/bd2=3.010N/mm2pt2=0.844pc2=0.096AST2=1157.163mm2ASC2=132.117mm2
AT MIDS:Mum/bd2=2.689N/mm2ptm=0.762pcm=0.008ASTM=1044.904mm2ASCM=10.876mm2
SHEAR DESIGN: Vu= 196KN. Vc= 80KN. Vus= 116KN.
REINFORCEMENT AT SUP1:T1=3#16+2#20C1=2#16
REINFORCEMENT AT SUP2:T2=3#16+2#20C2=2#16
REINFORCEMENT AT MIDS:TM=3#16+2#20CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H8- 1.500-I8- 1.500

SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 6.23 3.50

FMD1 = -58.47 FMD2 = 58.47 FML1 = -0.69 FML2 = 0.69 KN.M.

SFD1 = 60.66 SFD2 = 60.66 SFL1 = 0.00 SFL2 = 0.00 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 35.31 KN.M.@ 3.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 88.7 DM2= 88.7 DMM= 53.0 KN.M.

AT SUP1: Mu1/bd2=1.416 N/mm² pt1=0.358 pc1=0.000 AST1=490.494 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=1.416 N/mm² pt2=0.358 pc2=0.000 AST2=490.494 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.845 N/mm² ptm=0.205 pcm=0.000 ASTM=280.895 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 91 KN. Vc= 57 KN. Vus= 34 KN.

REINFORCEMENT AT SUP1: T1=5#12 C1=2#12

REINFORCEMENT AT SUP2: T2=5#12 C2=2#12

REINFORCEMENT AT MIDS: TM=3#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: B9- 5.400-F9- 5.400

SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 6.23 2.90

SLD 4 0.00 0.00 1.62 1.62 4.62 1.62 6.23 0.00 5.00 4.00 120

SLD 4 0.00 0.00 2.75 2.75 3.48 2.75 6.23 0.00 5.13 4.00 125

FMD1 = -89.62 FMD2 = 89.63 FML1 = -34.66 FML2 = 34.68 KN.M.

SFD1 = 95.29 SFD2 = 95.32 SFL1 = 34.08 SFL2 = 34.10 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 111.35 KN.M.@ 3.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 186.4 DM2= 186.5 DMM= 167.0 KN.M.

AT SUP1: Mu1/bd2=2.975 N/mm² pt1=0.835 pc1=0.087 AST1=1145.091 mm² ASC1=119.078 mm²

AT SUP2: Mu2/bd2=2.976 N/mm² pt2=0.835 pc2=0.087 AST2=1145.342 mm² ASC2=119.35 mm²

AT MIDS: Mum/bd2=2.666 N/mm² ptm=0.756 pcm=0.001 ASTM=1036.687 mm² ASCM=2.003 mm²

SHEAR DESIGN: Vu= 194 KN. Vc= 80 KN. Vus= 115 KN.

REINFORCEMENT AT SUP1: T1=3#16+2#20 C1=2#16

REINFORCEMENT AT SUP2: T2=3#16+2#20 C2=2#16

REINFORCEMENT AT MIDS: TM=3#16+2#20 CM=2#16

SHEAR REINFORCEMENT: 8#2 LEG. STR.@150mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: B9- 1.500-F9- 1.500

SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 6.23 3.50

FMD1 = -58.46 FMD2 = 58.46 FML1 = -0.68 FML2 = 0.68 KN.M.

SFD1 = 60.66 SFD2 = 60.66 SFL1 = 0.00 SFL2 = 0.00 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 35.33 KN.M.@ 3.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 88.7 DM2= 88.7 DMM= 53.0 KN.M.

AT SUP1: Mu1/bd2=1.416 N/mm² pt1=0.358 pc1=0.000 AST1=490.31 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=1.416 N/mm² pt2=0.358 pc2=0.000 AST2=490.31 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.846 N/mm² ptm=0.205 pcm=0.000 ASTM=281.063 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 91 KN. Vc= 57 KN. Vus= 34 KN.

REINFORCEMENT AT SUP1: T1=5#12 C1=2#12

REINFORCEMENT AT SUP2: T2=5#12 C2=2#12

REINFORCEMENT AT MIDS: TM=3#12 CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H10- 5.400-I10- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.12 2.12 4.12 2.12 6.23 0.00 5.00 4.00 120
FMD1 = -69.67FMD2 = 69.68FML1 = -18.35FML2 = 18.37KN.M.
SFD1 = 73.86SFD2 = 73.89SFL1 = 17.44SFL2 = 17.46KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 71.41KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 132.0DM2= 132.1DMM= 107.1KN.M.
AT SUP1:Mu1/bd2=2.107N/mm2pt1=0.565pc1=0.000AST1=773.965mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.108N/mm2pt2=0.565pc2=0.000AST2=774.281mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.710N/mm2ptm=0.442pcm=0.000ASTM=606.185mm2ASCM=0mm2
SHEAR DESIGN: Vu= 137KN. Vc= 68KN. Vus= 69KN.
REINFORCEMENT AT SUP1:T1=2#12+3#16C1=2#12
REINFORCEMENT AT SUP2:T2=2#12+3#16C2=2#12
REINFORCEMENT AT MIDS:TM=2#12+2#16CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H10- 1.500-I10- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -58.08FMD2 = 58.07FML1 = -0.37FML2 = 0.37KN.M.
SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 36.03KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 87.7DM2= 87.7DMM= 54.1KN.M.
AT SUP1:Mu1/bd2=1.399N/mm2pt1=0.353pc1=0.000AST1=483.971mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.399N/mm2pt2=0.353pc2=0.000AST2=483.879mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.863N/mm2ptm=0.209pcm=0.000ASTM=286.959mm2ASCM=0mm2
SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G11- 5.400-H11- 5.400
SIZE OF BEAM=230x230mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
FMD1 = -1.32FMD2 = 0.00FML1 = 0.12FML2 = 0.00KN.M.
SFD1 = 2.55SFD2 = 1.73SFL1 = -0.04SFL2 = 0.04KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 1.18KN.M.@ 1.94M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 2.2DM2= 0.0DMM= 1.8KN.M.
AT SUP1:Mu1/bd2=0.269N/mm2pt1=0.150pc1=0.000AST1=64.515mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.000N/mm2pt2=0.150pc2=0.000AST2=64.515mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.220N/mm2ptm=0.150pcm=0.000ASTM=64.515mm2ASCM=0mm2
SHEAR DESIGN: Vu= 4KN. Vc= 14KN. Vus= KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@125mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F11- 5.400-G11- 5.400
SIZE OF BEAM=300x450mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 1.00 2.90
FMD1 = -36.68FMD2 = -2.82FML1 = -9.53FML2 = -1.11KN.M.
SFD1 = 47.86SFD2 = -31.14SFL1 = 10.64SFL2 = -10.64KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 3.93KN.M.@ 1.00M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 69.3DM2= 5.9DMM= 5.9KN.M.
AT SUP1:Mu1/bd2=1.395N/mm2pt1=0.352pc1=0.000AST1=429.479mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.119N/mm2pt2=0.150pc2=0.000AST2=183.15mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.119N/mm2ptm=0.150pcm=0.000ASTM=183.15mm2ASCM=0mm2
SHEAR DESIGN: Vu= 88KN. Vc= 51KN. Vus= 37KN.
REINFORCEMENT AT SUP1:T1=4#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:A11- 5.400-B11- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 3.23 2.90
FMD1 = -3.34FMD2 = 31.60FML1 = 0.99FML2 = 4.41KN.M.
SFD1 = 18.24SFD2 = 35.74SFL1 = -1.67SFL2 = 1.67KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 5.86KN.M.@ 0.97M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 6.5DM2= 54.0DMM= 8.8KN.M.
AT SUP1:Mu1/bd2=0.104N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.862N/mm2pt2=0.209pc2=0.000AST2=286.79mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.140N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 56KN. Vc= 46KN. Vus= 10KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B11- 5.400-F11- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 1.62 1.62 4.62 1.62 6.23 0.00 5.00 4.00 120
FMD1 = -69.93FMD2 = 71.95FML1 = -15.60FML2 = 17.60KN.M.
SFD1 = 70.42SFD2 = 71.09SFL1 = 14.62SFL2 = 15.28KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 57.93KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 128.3DM2= 134.3DMM= 86.9KN.M.

AT SUP1:Mu1/bd2=2.048N/mm2pt1=0.546pc1=0.000AST1=747.907mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.144N/mm2pt2=0.576pc2=0.000AST2=790.15mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.387N/mm2ptm=0.350pcm=0.000ASTM=479.206mm2ASCM=0mm2
SHEAR DESIGN: Vu= 130KN. Vc= 69KN. Vus= 61KN.
REINFORCEMENT AT SUP1:T1=2#12+3#16C1=2#12
REINFORCEMENT AT SUP2:T2=2#12+3#16C2=2#12
REINFORCEMENT AT MIDS:TM=5#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:F11- 1.500-G11- 1.500
SIZE OF BEAM=300x450mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 1.00 3.50
FMD1 = -29.19FMD2 = -3.36FML1 = 0.74FML2 = -0.07KN.M.
SFD1 = 42.29SFD2 = -22.81SFL1 = -0.67SFL2 = 0.67KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 3.43KN.M.@ 1.00M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 44.9DM2= 5.2DMM= 5.2KN.M.
AT SUP1:Mu1/bd2=0.903N/mm2pt1=0.220pc1=0.000AST1=268.409mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.104N/mm2pt2=0.150pc2=0.000AST2=183.15mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.104N/mm2ptm=0.150pcm=0.000ASTM=183.15mm2ASCM=0mm2
SHEAR DESIGN: Vu= 64KN. Vc= 42KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:A11- 1.500-B11- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.23 3.50
FMD1 = -5.32FMD2 = 30.16FML1 = -0.02FML2 = -0.47KN.M.
SFD1 = 23.76SFD2 = 39.14SFL1 = 0.15SFL2 = -0.15KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 9.30KN.M.@ 1.29M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 8.0DM2= 46.0DMM= 14.0KN.M.
AT SUP1:Mu1/bd2=0.128N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.733N/mm2pt2=0.176pc2=0.000AST2=241.839mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.223N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 59KN. Vc= 45KN. Vus= 14KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:B11- 1.500-F11- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -60.60FMD2 = 60.18FML1 = -0.24FML2 = 0.01KN.M.
SFD1 = 60.73SFD2 = 60.59SFL1 = 0.04SFL2 = -0.04KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 33.96KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 91.3DM2= 90.3DMM= 50.9KN.M.
 AT SUP1:Mu1/bd2=1.457N/mm2pt1=0.369pc1=0.000AST1=506.003mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.441N/mm2pt2=0.365pc2=0.000AST2=499.99mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.813N/mm2ptm=0.197pcm=0.000ASTM=269.565mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 91KN. Vc= 58KN. Vus= 33KN.
 REINFORCEMENT AT SUP1:T1=5#12C1=2#12
 REINFORCEMENT AT SUP2:T2=5#12C2=2#12
 REINFORCEMENT AT MIDS:TM=3#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:G15- 5.400-G16- 5.400
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.12 2.90
 SLD 2 0 1.62 4.12 1.62 5.00 4.00 120
 FMD1 = -33.62FMD2 = 34.26FML1 = -9.20FML2 = 9.36KN.M.
 SFD1 = 48.68SFD2 = 49.11SFL1 = 13.29SFL2 = 13.41KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 20.73KN.M.@ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 64.2DM2= 65.4DMM= 31.1KN.M.
 AT SUP1:Mu1/bd2=2.191N/mm2pt1=0.592pc1=0.000AST1=485.855mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=2.232N/mm2pt2=0.605pc2=0.000AST2=496.907mm2ASC2=0mm2
 AT MIDS:Mum/bd2=1.061N/mm2ptm=0.261pcm=0.000ASTM=214.287mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 94KN. Vc= 42KN. Vus= 52KN.
 REINFORCEMENT AT SUP1:T1=5#12C1=2#12
 REINFORCEMENT AT SUP2:T2=5#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:G14- 5.400-G15- 5.400
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.12 2.90
 SLD 2 0 1.62 4.12 1.62 5.00 4.00 120
 FMD1 = -31.14FMD2 = 34.25FML1 = -8.39FML2 = 9.38KN.M.
 SFD1 = 48.08SFD2 = 49.71SFL1 = 13.09SFL2 = 13.61KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 22.37KN.M.@ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 59.3DM2= 65.5DMM= 33.6KN.M.
 AT SUP1:Mu1/bd2=2.023N/mm2pt1=0.538pc1=0.000AST1=441.481mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=2.233N/mm2pt2=0.605pc2=0.000AST2=497.045mm2ASC2=0mm2
 AT MIDS:Mum/bd2=1.145N/mm2ptm=0.283pcm=0.000ASTM=232.639mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 95KN. Vc= 42KN. Vus= 53KN.
 REINFORCEMENT AT SUP1:T1=4#12C1=2#12
 REINFORCEMENT AT SUP2:T2=5#12C2=2#12
 REINFORCEMENT AT MIDS:TM=3#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:G13- 5.400-G14- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.12 2.90

SLD 2 0 1.62 4.12 1.62 5.00 4.00 120

FMD1 = -47.83FMD2 = 28.38FML1 = -13.51FML2 = 7.63KN.M.

SFD1 = 53.57SFD2 = 44.22SFL1 = 14.76SFL2 = 11.94KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 15.90KN.M.@ 2.26M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 92.0DM2= 54.0DMM= 23.9KN.M.

AT SUP1:Mu1/bd2=3.139N/mm2pt1=0.884pc1=0.145AST1=725.993mm2ASC1=118.973mm2

AT SUP2:Mu2/bd2=1.843N/mm2pt2=0.482pc2=0.000AST2=395.765mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.814N/mm2ptm=0.197pcm=0.000ASTM=161.569mm2ASCM=0mm2

SHEAR DESIGN: Vu= 102KN. Vc= 49KN. Vus= 54KN.

REINFORCEMENT AT SUP1:T1=3#12+2#16C1=2#12

REINFORCEMENT AT SUP2:T2=4#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G11- 5.400-G13- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 5.61 2.90

SLD 2 0 1.62 5.61 1.62 5.00 4.00 120

FMD1 = -39.84FMD2 = 64.59FML1 = -10.11FML2 = 17.75KN.M.

SFD1 = 62.18SFD2 = 71.00SFL1 = 16.82SFL2 = 19.54KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 53.18KN.M.@ 2.52M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 74.9DM2= 123.5DMM= 79.8KN.M.

AT SUP1:Mu1/bd2=2.556N/mm2pt1=0.717pc1=0.000AST1=588.467mm2ASC1=0mm2

AT SUP2:Mu2/bd2=4.213N/mm2pt2=1.175pc2=0.470AST2=964.628mm2ASC2=386.244mm2

AT MIDS:Mum/bd2=2.721N/mm2ptm=0.771pcm=0.018ASTM=633.267mm2ASCM=15.119mm2

SHEAR DESIGN: Vu= 136KN. Vc= 54KN. Vus= 82KN.

REINFORCEMENT AT SUP1:T1=3#16C1=2#16

REINFORCEMENT AT SUP2:T2=5#16C2=2#16

REINFORCEMENT AT MIDS:TM=4#16CM=2#16

SHEAR REINFORCEMENT:8#2LEG.STR.@175mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G15- 1.500-G16- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.12 3.50

FMD1 = -25.88FMD2 = 26.37FML1 = 0.01FML2 = -0.02KN.M.

SFD1 = 37.74SFD2 = 38.06SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 12.84KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 38.8DM2= 39.6DMM= 19.3KN.M.

AT SUP1:Mu1/bd2=1.325N/mm2pt1=0.332pc1=0.000AST1=272.862mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.350N/mm2pt2=0.339pc2=0.000AST2=278.673mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.657N/mm2ptm=0.157pcm=0.000ASTM=129.126mm2ASCM=0mm2

SHEAR DESIGN: Vu= 57KN. Vc= 34KN. Vus= 23KN.

REINFORCEMENT AT SUP1:T1=3#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G14- 1.500-G15- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.12 3.50
FMD1 = -25.11FMD2 = 26.29FML1 = -0.09FML2 = -0.04KN.M.
SFD1 = 37.57SFD2 = 38.23SFL1 = 0.03SFL2 = -0.03KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 13.23KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 37.8DM2= 39.5DMM= 19.9KN.M.
AT SUP1:Mu1/bd2=1.290N/mm2pt1=0.323pc1=0.000AST1=264.884mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.347N/mm2pt2=0.339pc2=0.000AST2=277.974mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.677N/mm2ptm=0.162pcm=0.000ASTM=133.222mm2ASCM=0mm2
SHEAR DESIGN: Vu= 57KN. Vc= 34KN. Vus= 24KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G13- 1.500-G14- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.12 3.50
FMD1 = -33.28FMD2 = 23.04FML1 = 0.30FML2 = 0.09KN.M.
SFD1 = 40.35SFD2 = 35.45SFL1 = -0.09SFL2 = 0.09KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 11.00KN.M.@ 2.26M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 50.4DM2= 34.7DMM= 16.5KN.M.
AT SUP1:Mu1/bd2=1.718N/mm2pt1=0.445pc1=0.000AST1=365.167mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.184N/mm2pt2=0.294pc2=0.000AST2=241.225mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.563N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 61KN. Vc= 38KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=4#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G11- 1.500-G13- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 5.61 3.50
FMD1 = -37.69FMD2 = 49.31FML1 = -0.51FML2 = -0.07KN.M.
SFD1 = 49.54SFD2 = 53.68SFL1 = 0.10SFL2 = -0.10KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 28.66KN.M.@ 2.81M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 57.3DM2= 74.1DMM= 43.0KN.M.
AT SUP1:Mu1/bd2=1.955N/mm2pt1=0.516pc1=0.000AST1=424.005mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.527N/mm2pt2=0.706pc2=0.000AST2=579.896mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.467N/mm2ptm=0.372pcm=0.000ASTM=305.372mm2ASCM=0mm2

SHEAR DESIGN: $V_u = 81\text{KN}$. $V_c = 45\text{KN}$. $V_{us} = 35\text{KN}$.

REINFORCEMENT AT SUP1: $T_1 = 4\#12C_1 = 2\#12$

REINFORCEMENT AT SUP2: $T_2 = 2\#12 + 2\#16C_2 = 2\#12$

REINFORCEMENT AT MIDS: $TM = 3\#12C_M = 2\#12$

SHEAR REINFORCEMENT: $8\#2\text{LEG.STR.}@200\text{mm}$ SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR $1/6\text{th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: H15- 5.400-H16- 5.400

SIZE OF BEAM = $230 \times 400\text{mm}$. TYPE: BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.12 2.90

SLD 2 0 1.62 4.12 1.62 5.00 4.00 120

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -42.52 FMD2 = 42.94 FML1 = -16.39 FML2 = 16.56 KN.M.

SFD1 = 59.34 SFD2 = 59.67 SFL1 = 21.77 SFL2 = 21.90 KN.

CRITICAL MIDSPAN MOMENT (DL+LL) = 30.94 KN.M. @ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: $DM_1 = 88.4$ $DM_2 = 89.3$ $DMM = 46.4$ KN.M.

AT SUP1: $\mu_1/bd^2 = 3.015$ N/mm^2 $pt_1 = 0.851$ $pc_1 = 0.107$ $AST_1 = 698.38$ mm^2 $ASC_1 = 88.046$ mm^2

AT SUP2: $\mu_2/bd^2 = 3.045$ N/mm^2 $pt_2 = 0.859$ $pc_2 = 0.116$ $AST_2 = 705.084$ mm^2 $ASC_2 = 95.555$ mm^2

AT MIDS: $\mu_m/bd^2 = 1.583$ N/mm^2 $pt_m = 0.405$ $pc_m = 0.000$ $AST_m = 332.74$ mm^2 $ASC_m = 0$ mm^2

SHEAR DESIGN: $V_u = 122\text{KN}$. $V_c = 48\text{KN}$. $V_{us} = 74\text{KN}$.

REINFORCEMENT AT SUP1: $T_1 = 3\#12 + 2\#16C_1 = 2\#12$

REINFORCEMENT AT SUP2: $T_2 = 3\#12 + 2\#16C_2 = 2\#12$

REINFORCEMENT AT MIDS: $TM = 3\#12C_M = 2\#12$

SHEAR REINFORCEMENT: $8\#2\text{LEG.STR.}@200\text{mm}$ SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR $1/6\text{th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: H14- 5.400-H15- 5.400

SIZE OF BEAM = $230 \times 400\text{mm}$. TYPE: BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.11 2.90

SLD 2 0 1.62 4.12 1.62 5.00 4.00 120

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -42.37 FMD2 = 42.64 FML1 = -16.31 FML2 = 16.44 KN.M.

SFD1 = 59.37 SFD2 = 59.51 SFL1 = 21.78 SFL2 = 21.89 KN.

CRITICAL MIDSPAN MOMENT (DL+LL) = 31.26 KN.M. @ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: $DM_1 = 88.0$ $DM_2 = 88.6$ $DMM = 46.9$ KN.M.

AT SUP1: $\mu_1/bd^2 = 3.003$ N/mm^2 $pt_1 = 0.847$ $pc_1 = 0.104$ $AST_1 = 695.766$ mm^2 $ASC_1 = 85.118$ mm^2

AT SUP2: $\mu_2/bd^2 = 3.023$ N/mm^2 $pt_2 = 0.853$ $pc_2 = 0.110$ $AST_2 = 700.312$ mm^2 $ASC_2 = 90.209$ mm^2

AT MIDS: $\mu_m/bd^2 = 1.600$ N/mm^2 $pt_m = 0.410$ $pc_m = 0.000$ $AST_m = 336.627$ mm^2 $ASC_m = 0$ mm^2

SHEAR DESIGN: $V_u = 122\text{KN}$. $V_c = 48\text{KN}$. $V_{us} = 74\text{KN}$.

REINFORCEMENT AT SUP1: $T_1 = 3\#12 + 2\#16C_1 = 2\#12$

REINFORCEMENT AT SUP2: $T_2 = 3\#12 + 2\#16C_2 = 2\#12$

REINFORCEMENT AT MIDS: $TM = 3\#12C_M = 2\#12$

SHEAR REINFORCEMENT: $8\#2\text{LEG.STR.}@200\text{mm}$ SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR $1/6\text{th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: H13- 5.400-H14- 5.400

SIZE OF BEAM = $230 \times 400\text{mm}$. TYPE: BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.12 2.90
 SLD 2 0 1.62 4.12 1.62 5.00 4.00 120
 SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
 SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
 FMD1 = -44.27 FMD2 = 41.99 FML1 = -17.20 FML2 = 16.14 KN.M.
 SFD1 = 59.99 SFD2 = 59.02 SFL1 = 22.07 SFL2 = 21.60 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 30.34 KN.M.@ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 92.2 DM2= 87.2 DMM= 45.5 KN.M.
 AT SUP1: Mu1/bd2=3.146 N/mm² pt1=0.886 pc1=0.147 AST1=727.471 mm² ASC1=120.627 mm²
 AT SUP2: Mu2/bd2=2.975 N/mm² pt2=0.840 pc2=0.095 AST2=689.516 mm² ASC2=78.118 mm²
 AT MIDS: Mum/bd2=1.553 N/mm² ptm=0.396 pcm=0.000 ASTM=325.482 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 123 KN. Vc= 49 KN. Vus= 74 KN.
 REINFORCEMENT AT SUP1: T1=3#12+2#16 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12+2#16 C2=2#12
 REINFORCEMENT AT MIDS: TM=3#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H12- 5.400-H13- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.12 2.90
 SLD 2 0 1.62 4.12 1.62 5.00 4.00 120
 SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
 FMD1 = -32.08 FMD2 = 46.51 FML1 = -11.70 FML2 = 18.15 KN.M.
 SFD1 = 55.93 SFD2 = 63.08 SFL1 = 20.24 SFL2 = 23.43 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 35.94 KN.M.@ 1.85M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 65.7 DM2= 97.0 DMM= 53.9 KN.M.
 AT SUP1: Mu1/bd2=2.240 N/mm² pt1=0.608 pc1=0.000 AST1=499.13 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=3.309 N/mm² pt2=0.930 pc2=0.196 AST2=763.72 mm² ASC2=161.227 mm²
 AT MIDS: Mum/bd2=1.839 N/mm² ptm=0.481 pcm=0.000 ASTM=394.873 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 130 KN. Vc= 50 KN. Vus= 80 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=2#12+3#16 C2=2#12
 REINFORCEMENT AT MIDS: TM=4#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@175mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H15- 1.500-H16- 1.500
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.12 3.50
 FMD1 = -25.98 FMD2 = 25.95 FML1 = -0.01 FML2 = -0.02 KN.M.
 SFD1 = 37.87 SFD2 = 37.93 SFL1 = 0.01 SFL2 = -0.01 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 12.99 KN.M.@ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 39.0 DM2= 39.0 DMM= 19.5 KN.M.
 AT SUP1: Mu1/bd2=1.330 N/mm² pt1=0.334 pc1=0.000 AST1=274.022 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.329 N/mm² pt2=0.333 pc2=0.000 AST2=273.79 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.665 N/mm² ptm=0.159 pcm=0.000 ASTM=130.7 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 57 KN. Vc= 33 KN. Vus= 24 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H14- 1.500-H15- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -25.96FMD2 = 25.99FML1 = -0.02FML2 = -0.01KN.M.
SFD1 = 37.85SFD2 = 37.79SFL1 = 0.01SFL2 = -0.01KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 12.97KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 39.0DM2= 39.0DMM= 19.5KN.M.
AT SUP1:Mu1/bd2=1.329N/mm2pt1=0.334pc1=0.000AST1=273.906mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.330N/mm2pt2=0.334pc2=0.000AST2=274.139mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.664N/mm2ptm=0.159pcm=0.000ASTM=130.49mm2ASCM=0mm2
SHEAR DESIGN: Vu= 57KN. Vc= 33KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H13- 1.500-H14- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.12 3.50
FMD1 = -26.28FMD2 = 25.83FML1 = 0.06FML2 = 0.02KN.M.
SFD1 = 37.97SFD2 = 37.83SFL1 = -0.02SFL2 = 0.02KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 12.92KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 39.5DM2= 38.8DMM= 19.4KN.M.
AT SUP1:Mu1/bd2=1.348N/mm2pt1=0.339pc1=0.000AST1=278.091mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.323N/mm2pt2=0.332pc2=0.000AST2=272.399mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.661N/mm2ptm=0.158pcm=0.000ASTM=129.965mm2ASCM=0mm2
SHEAR DESIGN: Vu= 57KN. Vc= 34KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H12- 1.500-H13- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.12 3.50
FMD1 = -22.53FMD2 = 27.47FML1 = -0.24FML2 = -0.08KN.M.
SFD1 = 36.66SFD2 = 39.14SFL1 = 0.08SFL2 = -0.08KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 13.87KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 34.2DM2= 41.3DMM= 20.8KN.M.
AT SUP1:Mu1/bd2=1.165N/mm2pt1=0.289pc1=0.000AST1=237.151mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.410N/mm2pt2=0.356pc2=0.000AST2=292.25mm2ASC2=0mm2

AT MIDS: $M_{um}/bd^2 = 0.710 \text{ N/mm}^2$, $p_{tm} = 0.170$, $p_{cm} = 0.000$, $ASTM = 139.968 \text{ mm}^2$, $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 59 \text{ KN}$, $V_c = 34 \text{ KN}$, $V_{us} = 25 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 3\#12$, $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 3\#12$, $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$, $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: I14- 5.400-I15- 5.400
SIZE OF BEAM = $230 \times 400 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.12 2.90
SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
FMD1 = -30.92 FMD2 = 31.25 FML1 = -7.20 FML2 = 7.31 KN.M.
SFD1 = 42.70 SFD2 = 42.95 SFL1 = 8.45 SFL2 = 8.53 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = 20.96 KN.M. @ 2.06 M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: $DM_1 = 57.2$, $DM_2 = 57.8$, $DMM = 31.4 \text{ KN.M.}$
AT SUP1: $M_{u1}/bd^2 = 1.951 \text{ N/mm}^2$, $p_{t1} = 0.515$, $p_{c1} = 0.000$, $AST_1 = 422.962 \text{ mm}^2$, $ASC_1 = 0 \text{ mm}^2$
AT SUP2: $M_{u2}/bd^2 = 1.973 \text{ N/mm}^2$, $p_{t2} = 0.522$, $p_{c2} = 0.000$, $AST_2 = 428.71 \text{ mm}^2$, $ASC_2 = 0 \text{ mm}^2$
AT MIDS: $M_{um}/bd^2 = 1.073 \text{ N/mm}^2$, $p_{tm} = 0.264$, $p_{cm} = 0.000$, $ASTM = 216.847 \text{ mm}^2$, $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 77 \text{ KN}$, $V_c = 40 \text{ KN}$, $V_{us} = 37 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 4\#12$, $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 4\#12$, $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$, $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: I15- 5.400-I16- 5.400
SIZE OF BEAM = $230 \times 400 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.11 2.90
SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
FMD1 = -31.10 FMD2 = 31.50 FML1 = -7.24 FML2 = 7.41 KN.M.
SFD1 = 42.68 SFD2 = 42.83 SFL1 = 8.44 SFL2 = 8.54 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = 20.67 KN.M. @ 2.06 M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: $DM_1 = 57.5$, $DM_2 = 58.4$, $DMM = 31.0 \text{ KN.M.}$
AT SUP1: $M_{u1}/bd^2 = 1.962 \text{ N/mm}^2$, $p_{t1} = 0.519$, $p_{c1} = 0.000$, $AST_1 = 425.832 \text{ mm}^2$, $ASC_1 = 0 \text{ mm}^2$
AT SUP2: $M_{u2}/bd^2 = 1.991 \text{ N/mm}^2$, $p_{t2} = 0.528$, $p_{c2} = 0.000$, $AST_2 = 433.303 \text{ mm}^2$, $ASC_2 = 0 \text{ mm}^2$
AT MIDS: $M_{um}/bd^2 = 1.058 \text{ N/mm}^2$, $p_{tm} = 0.260$, $p_{cm} = 0.000$, $ASTM = 213.621 \text{ mm}^2$, $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 77 \text{ KN}$, $V_c = 40 \text{ KN}$, $V_{us} = 37 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 4\#12$, $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 4\#12$, $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$, $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: I13- 5.400-I14- 5.400
SIZE OF BEAM = $230 \times 400 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.12 2.90

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
FMD1 = -33.02 FMD2 = 30.50 FML1 = -7.81 FML2 = 7.11 KN.M.
SFD1 = 43.39 SFD2 = 42.26 SFL1 = 8.65 SFL2 = 8.33 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 20.08 KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 61.3 DM2= 56.4 DMM= 30.1 KN.M.
AT SUP1: Mu1/bd2=2.089 N/mm² pt1=0.559 pc1=0.000 AST1=458.814 mm² ASC1=0 mm²
AT SUP2: Mu2/bd2=1.925 N/mm² pt2=0.507 pc2=0.000 AST2=416.332 mm² ASC2=0 mm²
AT MIDS: Mum/bd2=1.028 N/mm² ptm=0.252 pcm=0.000 ASTM=207.079 mm² ASCM=0 mm²
SHEAR DESIGN: Vu= 78 KN. Vc= 41 KN. Vus= 37 KN.

REINFORCEMENT AT SUP1: T1=5#12 C1=2#12

REINFORCEMENT AT SUP2: T2=4#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: I12- 5.400-I13- 5.400

SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.12 2.90

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

FMD1 = -19.79 FMD2 = 35.62 FML1 = -4.28 FML2 = 8.44 KN.M.

SFD1 = 38.93 SFD2 = 46.72 SFL1 = 7.47 SFL2 = 9.51 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 25.52 KN.M.@ 1.85M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 36.1 DM2= 66.1 DMM= 38.3 KN.M.
AT SUP1: Mu1/bd2=1.232 N/mm² pt1=0.307 pc1=0.000 AST1=251.919 mm² ASC1=0 mm²
AT SUP2: Mu2/bd2=2.255 N/mm² pt2=0.613 pc2=0.000 AST2=503.031 mm² ASC2=0 mm²
AT MIDS: Mum/bd2=1.306 N/mm² ptm=0.327 pcm=0.000 ASTM=268.579 mm² ASCM=0 mm²
SHEAR DESIGN: Vu= 84 KN. Vc= 42 KN. Vus= 42 KN.

REINFORCEMENT AT SUP1: T1=3#12 C1=2#12

REINFORCEMENT AT SUP2: T2=5#12 C2=2#12

REINFORCEMENT AT MIDS: TM=3#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: I14- 1.500-I15- 1.500

SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.12 3.50

FMD1 = -25.93 FMD2 = 26.00 FML1 = -0.01 FML2 = 0.00 KN.M.

SFD1 = 37.84 SFD2 = 37.96 SFL1 = 0.00 SFL2 = 0.00 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 12.98 KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 38.9 DM2= 39.0 DMM= 19.5 KN.M.
AT SUP1: Mu1/bd2=1.327 N/mm² pt1=0.333 pc1=0.000 AST1=273.442 mm² ASC1=0 mm²
AT SUP2: Mu2/bd2=1.330 N/mm² pt2=0.334 pc2=0.000 AST2=274.139 mm² ASC2=0 mm²
AT MIDS: Mum/bd2=0.664 N/mm² ptm=0.159 pcm=0.000 ASTM=130.595 mm² ASCM=0 mm²
SHEAR DESIGN: Vu= 57 KN. Vc= 33 KN. Vus= 24 KN.

REINFORCEMENT AT SUP1: T1=3#12 C1=2#12

REINFORCEMENT AT SUP2: T2=3#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I15- 1.500-I16- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.11 3.50

FMD1 = -25.99FMD2 = 25.96FML1 = -0.01FML2 = -0.02KN.M.

SFD1 = 37.87SFD2 = 37.77SFL1 = 0.01SFL2 = -0.01KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 12.98KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 39.0DM2= 39.0DMM= 19.5KN.M.

AT SUP1:Mu1/bd2=1.330N/mm2pt1=0.334pc1=0.000AST1=274.139mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.329N/mm2pt2=0.334pc2=0.000AST2=273.906mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.664N/mm2ptm=0.159pcm=0.000ASTM=130.595mm2ASCM=0mm2

SHEAR DESIGN: Vu= 57KN. Vc= 33KN. Vus= 23KN.

REINFORCEMENT AT SUP1:T1=3#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I13- 1.500-I14- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.12 3.50

FMD1 = -26.56FMD2 = 25.72FML1 = 0.06FML2 = 0.03KN.M.

SFD1 = 38.06SFD2 = 37.74SFL1 = -0.02SFL2 = 0.02KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 12.83KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 39.9DM2= 38.6DMM= 19.3KN.M.

AT SUP1:Mu1/bd2=1.362N/mm2pt1=0.343pc1=0.000AST1=281.354mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.318N/mm2pt2=0.330pc2=0.000AST2=271.24mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.657N/mm2ptm=0.157pcm=0.000ASTM=129.021mm2ASCM=0mm2

SHEAR DESIGN: Vu= 57KN. Vc= 34KN. Vus= 23KN.

REINFORCEMENT AT SUP1:T1=3#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I12- 1.500-I13- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.12 3.50

FMD1 = -19.79FMD2 = 28.62FML1 = -0.22FML2 = -0.08KN.M.

SFD1 = 35.71SFD2 = 40.09SFL1 = 0.07SFL2 = -0.07KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 14.71KN.M.@ 1.85M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 30.0DM2= 43.1DMM= 22.1KN.M.

AT SUP1:Mu1/bd2=1.024N/mm2pt1=0.251pc1=0.000AST1=206.305mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.469N/mm2pt2=0.372pc2=0.000AST2=305.847mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.753N/mm2ptm=0.181pcm=0.000ASTM=148.868mm2ASCM=0mm2

SHEAR DESIGN: Vu= 60KN. Vc= 35KN. Vus= 25KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I19- 5.400-I20- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.53 2.90

SLD 2 2.27 3.12 4.54 3.12 7.63 4.00 225

SLD 2 0.00 3.12 2.27 3.12 7.63 4.00 225

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -59.11FMD2 = 58.14FML1 = -18.06FML2 = 17.69KN.M.

SFD1 = 89.55SFD2 = 89.37SFL1 = 28.35SFL2 = 28.31KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 56.69KN.M.@ 2.27M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 115.8DM2= 113.8DMM= 85.0KN.M.

AT SUP1:Mu1/bd2=3.949N/mm2pt1=1.103pc1=0.390AST1=905.879mm2ASC1=320.444mm2

AT SUP2:Mu2/bd2=3.880N/mm2pt2=1.085pc2=0.369AST2=890.652mm2ASC2=303.39mm2

AT MIDS:Mum/bd2=2.901N/mm2ptm=0.820pcm=0.073ASTM=673.153mm2ASCM=59.791mm2

SHEAR DESIGN: Vu= 177KN. Vc= 53KN. Vus= 124KN.

REINFORCEMENT AT SUP1:T1=5#16C1=2#16

REINFORCEMENT AT SUP2:T2=5#16C2=2#16

REINFORCEMENT AT MIDS:TM=4#16CM=2#16

SHEAR REINFORCEMENT:8#2LEG.STR.@125mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I19- 1.500-I20- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.53 3.50

FMD1 = -31.19FMD2 = 31.21FML1 = -0.13FML2 = 0.16KN.M.

SFD1 = 41.68SFD2 = 41.68SFL1 = -0.01SFL2 = 0.01KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 15.86KN.M.@ 2.27M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 47.0DM2= 47.1DMM= 23.8KN.M.

AT SUP1:Mu1/bd2=1.603N/mm2pt1=0.411pc1=0.000AST1=337.358mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.605N/mm2pt2=0.412pc2=0.000AST2=337.966mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.812N/mm2ptm=0.196pcm=0.000ASTM=161.14mm2ASCM=0mm2

SHEAR DESIGN: Vu= 63KN. Vc= 36KN. Vus= 26KN.

REINFORCEMENT AT SUP1:T1=3#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H19- 5.400-H20- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.53 2.90

SLD 2 2.27 3.12 4.54 3.12 7.63 4.00 225

SLD 2 0.00 3.12 2.27 3.12 7.63 4.00 225

SLD 2 0 1.62 4.53 1.62 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -72.13 FMD2 = 72.12 FML1 = -28.58 FML2 = 28.57 KN.M.
 SFD1 = 107.69 SFD2 = 107.93 SFL1 = 42.94 SFL2 = 43.07 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 69.88 KN.M.@ 2.27M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 151.1 DM2= 151.0 DMM= 104.8 KN.M.
 AT SUP1: Mu1/bd2=5.153 N/mm² pt1=1.429 pc1=0.755 AST1=1173.377 mm² ASC1=620.043 mm²
 AT SUP2: Mu2/bd2=5.152 N/mm² pt2=1.429 pc2=0.755 AST2=1173.15 mm² ASC2=619.788 mm²
 AT MIDS: Mum/bd2=3.576 N/mm² ptm=1.002 pcm=0.277 ASTM=823.038 mm² ASCM=227.663 mm²
 SHEAR DESIGN: Vu= 227 KN. Vc= 58 KN. Vus= 169 KN.
 REINFORCEMENT AT SUP1: T1=3#16+2#20 C1=4#16
 REINFORCEMENT AT SUP2: T2=3#16+2#20 C2=4#16
 REINFORCEMENT AT MIDS: TM=5#16 CM=2#16
 SHEAR REINFORCEMENT: 10#2 LEG. STR.@125mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H19- 1.500-H20- 1.500
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.53 3.50
 FMD1 = -31.22 FMD2 = 31.22 FML1 = -0.16 FML2 = 0.16 KN.M.
 SFD1 = 41.68 SFD2 = 41.68 SFL1 = 0.00 SFL2 = 0.00 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 15.83 KN.M.@ 2.27M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 47.1 DM2= 47.1 DMM= 23.8 KN.M.
 AT SUP1: Mu1/bd2=1.606 N/mm² pt1=0.412 pc1=0.000 AST1=338.088 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.606 N/mm² pt2=0.412 pc2=0.000 AST2=338.088 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.810 N/mm² ptm=0.196 pcm=0.000 ASTM=160.819 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 63 KN. Vc= 37 KN. Vus= 26 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: C20- 1.500-C21- 1.500
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 2.12 3.50
 FMD1 = -15.86 FMD2 = 1.50 FML1 = 0.28 FML2 = 0.01 KN.M.
 SFD1 = 26.25 SFD2 = 12.75 SFL1 = -0.14 SFL2 = 0.14 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 2.93 KN.M.@ 1.37M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 24.2 DM2= 2.3 DMM= 4.4 KN.M.
 AT SUP1: Mu1/bd2=0.826 N/mm² pt1=0.200 pc1=0.000 AST1=164.144 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=0.077 N/mm² pt2=0.150 pc2=0.000 AST2=123.165 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.150 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 40 KN. Vc= 27 KN. Vus= 12 KN.
 REINFORCEMENT AT SUP1: T1=2#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=2#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: C18- 1.500-C19- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 1.89 3.50

FMD1 = -0.23 FMD2 = 15.34 FML1 = -0.01 FML2 = -0.30 KN.M.

SFD1 = 9.32 SFD2 = 25.44 SFL1 = 0.16 SFL2 = -0.16 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 2.19 KN.M.@ 0.47M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 0.4 DM2= 23.5 DMM= 3.3 KN.M.

AT SUP1: Mu1/bd2=0.012 N/mm² pt1=0.150 pc1=0.000 AST1=123.165 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=0.800 N/mm² pt2=0.193 pc2=0.000 AST2=158.785 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.112 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 38 KN. Vc= 27 KN. Vus= 11 KN.

REINFORCEMENT AT SUP1: T1=2#12 C1=2#12

REINFORCEMENT AT SUP2: T2=2#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: C20- 5.400-C21- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 2.12 2.90

FMD1 = -17.65 FMD2 = 0.11 FML1 = -3.46 FML2 = -1.03 KN.M.

SFD1 = 24.83 SFD2 = 8.32 SFL1 = 2.12 SFL2 = -2.12 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 2.11 KN.M.@ 1.69M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 31.7 DM2= 1.7 DMM= 3.2 KN.M.

AT SUP1: Mu1/bd2=1.080 N/mm² pt1=0.266 pc1=0.000 AST1=218.518 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=0.058 N/mm² pt2=0.150 pc2=0.000 AST2=123.165 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.108 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 40 KN. Vc= 30 KN. Vus= 10 KN.

REINFORCEMENT AT SUP1: T1=2#12 C1=2#12

REINFORCEMENT AT SUP2: T2=2#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: C18- 5.400-C19- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 1.89 2.90

FMD1 = 1.01 FMD2 = 17.53 FML1 = 1.07 FML2 = 3.73 KN.M.

SFD1 = 4.90 SFD2 = 24.65 SFL1 = -2.55 SFL2 = 2.55 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 2.25 KN.M.@ 0.19M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 3.1 DM2= 31.9 DMM= 3.4 KN.M.

AT SUP1: Mu1/bd2=0.106 N/mm² pt1=0.150 pc1=0.000 AST1=123.165 mm² ASC1=0 mm²

AT SUP2: Mu2/bd2=1.088 N/mm² pt2=0.268 pc2=0.000 AST2=220.192 mm² ASC2=0 mm²

AT MIDS: Mum/bd2=0.115 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²

SHEAR DESIGN: Vu= 41 KN. Vc= 30 KN. Vus= 10 KN.

REINFORCEMENT AT SUP1: T1=2#12 C1=2#12

REINFORCEMENT AT SUP2: T2=2#12 C2=2#12

REINFORCEMENT AT MIDS: TM=2#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:C19- 5.400-C20- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.53 2.90

SLD 3 0.00 0.00 2.27 2.27 4.53 0.00 5.00 4.00 120

FMD1 = -34.05FMD2 = 34.11FML1 = -8.22FML2 = 8.09KN.M.

SFD1 = 48.26SFD2 = 48.30SFL1 = 10.31SFL2 = 10.26KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 32.83KN.M.@ 2.27M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 63.4DM2= 63.3DMM= 49.3KN.M.

AT SUP1:Mu1/bd2=2.163N/mm2pt1=0.583pc1=0.000AST1=478.318mm2ASC1=0mm2

AT SUP2:Mu2/bd2=2.159N/mm2pt2=0.581pc2=0.000AST2=477.362mm2ASC2=0mm2

AT MIDS:Mum/bd2=1.680N/mm2ptm=0.433pcm=0.000ASTM=355.871mm2ASCM=0mm2

SHEAR DESIGN: Vu= 88KN. Vc= 41KN. Vus= 46KN.

REINFORCEMENT AT SUP1:T1=5#12C1=2#12

REINFORCEMENT AT SUP2:T2=5#12C2=2#12

REINFORCEMENT AT MIDS:TM=4#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:C19- 1.500-C20- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.53 3.50

FMD1 = -29.40FMD2 = 29.61FML1 = -0.08FML2 = 0.12KN.M.

SFD1 = 41.63SFD2 = 41.73SFL1 = -0.01SFL2 = 0.01KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 17.60KN.M.@ 2.27M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 44.2DM2= 44.6DMM= 26.4KN.M.

AT SUP1:Mu1/bd2=1.509N/mm2pt1=0.384pc1=0.000AST1=315.149mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.521N/mm2pt2=0.387pc2=0.000AST2=318.145mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.901N/mm2ptm=0.219pcm=0.000ASTM=179.906mm2ASCM=0mm2

SHEAR DESIGN: Vu= 63KN. Vc= 36KN. Vus= 27KN.

REINFORCEMENT AT SUP1:T1=3#12C1=2#12

REINFORCEMENT AT SUP2:T2=3#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:E17- 5.400-E18- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 2.23 2.90

FMD1 = -4.42FMD2 = 4.42FML1 = 0.00FML2 = 0.00KN.M.

SFD1 = 17.44SFD2 = 17.44SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 5.30KN.M.@ 1.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 6.6DM2= 6.6DMM= 8.0KN.M.

AT SUP1:Mu1/bd2=0.226N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.226N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.271N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2

SHEAR DESIGN: Vu= 26KN. Vc= 27KN. Vus= KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:E17- 1.500-E18- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 2.23 3.50

FMD1 = -5.22FMD2 = 5.22FML1 = 0.00FML2 = 0.00KN.M.

SFD1 = 20.52SFD2 = 20.52SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 6.22KN.M.@ 1.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 7.8DM2= 7.8DMM= 9.3KN.M.

AT SUP1:Mu1/bd2=0.267N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.267N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.318N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2

SHEAR DESIGN: Vu= 31KN. Vc= 27KN. Vus= 4KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G20- 1.500-G21- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 2.12 3.50

FMD1 = -15.46FMD2 = 2.40FML1 = 0.48FML2 = 0.17KN.M.

SFD1 = 25.63SFD2 = 13.37SFL1 = -0.31SFL2 = 0.31KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 2.45KN.M.@ 1.37M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 23.9DM2= 3.9DMM= 3.7KN.M.

AT SUP1:Mu1/bd2=0.816N/mm2pt1=0.197pc1=0.000AST1=161.998mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.132N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.125N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2

SHEAR DESIGN: Vu= 39KN. Vc= 27KN. Vus= 12KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G18- 1.500-G19- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 1.89 3.50

FMD1 = -1.58FMD2 = 14.82FML1 = -0.14FML2 = -0.49KN.M.

SFD1 = 10.32SFD2 = 24.44SFL1 = 0.33SFL2 = -0.33KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 1.36KN.M.@ 0.57M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 2.6DM2= 23.0DMM= 2.0KN.M.

AT SUP1:Mu1/bd2=0.088N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.783N/mm2pt2=0.189pc2=0.000AST2=155.258mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.070N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 37KN. Vc= 27KN. Vus= 10KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G20- 5.400-G21- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 2.12 2.90
SLD 2 0 1.62 2.12 1.62 5.00 4.00 120
FMD1 = -29.05FMD2 = -0.31FML1 = -11.22FML2 = -1.26KN.M.
SFD1 = 38.98SFD2 = 11.33SFL1 = 12.75SFL2 = 0.99KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 4.00KN.M.@ 1.69M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 60.4DM2= 2.4DMM= 6.0KN.M.
AT SUP1:Mu1/bd2=2.061N/mm2pt1=0.550pc1=0.000AST1=451.317mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.080N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.205N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 78KN. Vc= 41KN. Vus= 37KN.
REINFORCEMENT AT SUP1:T1=4#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G18- 5.400-G19- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 1.89 2.90
SLD 2 0 1.62 1.89 1.62 5.00 4.00 120
FMD1 = 1.03FMD2 = 28.63FML1 = 1.41FML2 = 11.30KN.M.
SFD1 = 6.64SFD2 = 38.21SFL1 = -0.63SFL2 = 12.88KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 3.03KN.M.@ 0.19M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 3.7DM2= 59.9DMM= 4.6KN.M.
AT SUP1:Mu1/bd2=0.125N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.043N/mm2pt2=0.544pc2=0.000AST2=446.787mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.155N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 77KN. Vc= 40KN. Vus= 36KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=4#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G19- 5.400-G20- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.53 2.90
SLD 3 0.00 0.00 2.27 2.27 4.53 0.00 5.00 4.00 120

SLD 2 0 1.62 4.53 1.62 5.00 4.00 120
 FMD1 = -46.48 FMD2 = 46.67 FML1 = -18.09 FML2 = 18.06 KN.M.
 SFD1 = 66.58 SFD2 = 66.67 SFL1 = 24.96 SFL2 = 24.96 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 47.81 KN.M.@ 2.27M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 96.9 DM2= 97.1 DMM= 71.7 KN.M.
 AT SUP1: Mu1/bd2=3.304 N/mm2 pt1=0.929 pc1=0.195 AST1=762.698 mm2 ASC1=160.082 mm2
 AT SUP2: Mu2/bd2=3.312 N/mm2 pt2=0.931 pc2=0.197 AST2=764.516 mm2 ASC2=162.118 mm2
 AT MIDS: Mum/bd2=2.447 N/mm2 ptm=0.678 pcm=0.000 ASTM=556.642 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 137 KN. Vc= 50 KN. Vus= 88 KN.
 REINFORCEMENT AT SUP1: T1=2#12+3#16 C1=2#12
 REINFORCEMENT AT SUP2: T2=2#12+3#16 C2=2#12
 REINFORCEMENT AT MIDS: TM=5#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@175mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: G19- 1.500-G20- 1.500
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.53 3.50
 FMD1 = -29.36 FMD2 = 29.57 FML1 = -0.12 FML2 = 0.14 KN.M.
 SFD1 = 41.63 SFD2 = 41.73 SFL1 = 0.00 SFL2 = 0.00 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 17.61 KN.M.@ 2.27M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 44.2 DM2= 44.6 DMM= 26.4 KN.M.
 AT SUP1: Mu1/bd2=1.509 N/mm2 pt1=0.384 pc1=0.000 AST1=315.149 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=1.520 N/mm2 pt2=0.387 pc2=0.000 AST2=317.905 mm2 ASC2=0 mm2
 AT MIDS: Mum/bd2=0.901 N/mm2 ptm=0.219 pcm=0.000 ASTM=180.015 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 63 KN. Vc= 36 KN. Vus= 27 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: G17- 5.400-G18- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 2.23 2.90
 SLD 2 0 1.62 2.23 1.62 5.00 4.00 120
 FMD1 = -21.64 FMD2 = 1.62 FML1 = -6.24 FML2 = -0.26 KN.M.
 SFD1 = 35.45 SFD2 = 17.49 SFL1 = 10.14 SFL2 = 4.32 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 6.47 KN.M.@ 1.56M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 41.8 DM2= 2.8 DMM= 9.7 KN.M.
 AT SUP1: Mu1/bd2=1.427 N/mm2 pt1=0.361 pc1=0.000 AST1=296.138 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=0.096 N/mm2 pt2=0.150 pc2=0.000 AST2=123.165 mm2 ASC2=0 mm2
 AT MIDS: Mum/bd2=0.331 N/mm2 ptm=0.150 pcm=0.000 ASTM=123.165 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 68 KN. Vc= 35 KN. Vus= 34 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=2#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:G21- 5.400-G22- 5.400
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 2.00 2.90
 SLD 2 0 1.62 2.00 1.62 5.00 4.00 120
 FMD1 = -0.52FMD2 = 20.75FML1 = 0.56FML2 = 6.00KN.M.
 SFD1 = 13.63SFD2 = 33.86SFL1 = 3.20SFL2 = 9.76KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 4.70KN.M.@ 0.60M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 1.6DM2= 40.1DMM= 7.1KN.M.
 AT SUP1:Mu1/bd2=0.055N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.369N/mm2pt2=0.345pc2=0.000AST2=282.872mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.241N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 65KN. Vc= 34KN. Vus= 32KN.
 REINFORCEMENT AT SUP1:T1=2#12C1=2#12
 REINFORCEMENT AT SUP2:T2=3#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G17- 1.500-G18- 1.500
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 2.23 3.50
 FMD1 = -15.01FMD2 = 3.30FML1 = 0.15FML2 = 0.19KN.M.
 SFD1 = 25.77SFD2 = 15.27SFL1 = -0.15SFL2 = 0.15KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 2.95KN.M.@ 1.34M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 22.7DM2= 5.2DMM= 4.4KN.M.
 AT SUP1:Mu1/bd2=0.776N/mm2pt1=0.187pc1=0.000AST1=153.658mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=0.179N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.151N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 39KN. Vc= 27KN. Vus= 12KN.
 REINFORCEMENT AT SUP1:T1=2#12C1=2#12
 REINFORCEMENT AT SUP2:T2=2#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G21- 1.500-G22- 1.500
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 2.00 3.50
 FMD1 = -2.27FMD2 = 14.28FML1 = -0.17FML2 = -0.17KN.M.
 SFD1 = 12.40SFD2 = 24.41SFL1 = 0.17SFL2 = -0.17KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 1.85KN.M.@ 0.70M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 3.7DM2= 21.7DMM= 2.8KN.M.
 AT SUP1:Mu1/bd2=0.125N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=0.739N/mm2pt2=0.178pc2=0.000AST2=146.107mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.095N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 37KN. Vc= 27KN. Vus= 10KN.
 REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H12- 5.400-I12- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
FMD1 = -69.29FMD2 = 69.29FML1 = -18.04FML2 = 18.04KN.M.
SFD1 = 73.54SFD2 = 73.54SFL1 = 17.18SFL2 = 17.18KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 70.59KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 131.0DM2= 131.0DMM= 105.9KN.M.
AT SUP1:Mu1/bd2=2.091N/mm2pt1=0.559pc1=0.000AST1=766.709mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.091N/mm2pt2=0.559pc2=0.000AST2=766.709mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.690N/mm2ptm=0.436pcm=0.000ASTM=598.244mm2ASCM=0mm2
SHEAR DESIGN: Vu= 136KN. Vc= 68KN. Vus= 68KN.
REINFORCEMENT AT SUP1:T1=2#12+3#16C1=2#12
REINFORCEMENT AT SUP2:T2=2#12+3#16C2=2#12
REINFORCEMENT AT MIDS:TM=2#12+2#16CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H12- 1.500-I12- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -58.07FMD2 = 58.07FML1 = -0.36FML2 = 0.36KN.M.
SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 36.04KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 87.7DM2= 87.7DMM= 54.1KN.M.
AT SUP1:Mu1/bd2=1.399N/mm2pt1=0.353pc1=0.000AST1=483.788mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.399N/mm2pt2=0.353pc2=0.000AST2=483.788mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.863N/mm2ptm=0.209pcm=0.000ASTM=287.043mm2ASCM=0mm2
SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H13- 5.400-I13- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
FMD1 = -89.27FMD2 = 89.27FML1 = -34.90FML2 = 34.90KN.M.
SFD1 = 95.02SFD2 = 95.02SFL1 = 34.36SFL2 = 34.36KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 110.60KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 186.3DM2= 186.3DMM= 165.9KN.M.
 AT SUP1:Mu1/bd2=2.973N/mm2pt1=0.835pc1=0.086AST1=1144.168mm2ASC1=118.082mm2
 AT SUP2:Mu2/bd2=2.973N/mm2pt2=0.835pc2=0.086AST2=1144.168mm2ASC2=118.082mm2
 AT MIDS:Mum/bd2=2.648N/mm2ptm=0.750pcm=0.000ASTM=1028.416mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 194KN. Vc= 80KN. Vus= 115KN.
 REINFORCEMENT AT SUP1:T1=3#16+2#20C1=2#16
 REINFORCEMENT AT SUP2:T2=3#16+2#20C2=2#16
 REINFORCEMENT AT MIDS:TM=2#16+2#20CM=2#16
 SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:H13- 1.500-I13- 1.500
 SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 6.23 3.50
 FMD1 = -58.45FMD2 = 58.45FML1 = -0.68FML2 = 0.68KN.M.
 SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 35.34KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 88.7DM2= 88.7DMM= 53.0KN.M.
 AT SUP1:Mu1/bd2=1.416N/mm2pt1=0.358pc1=0.000AST1=490.218mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.416N/mm2pt2=0.358pc2=0.000AST2=490.218mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.846N/mm2ptm=0.205pcm=0.000ASTM=281.147mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.
 REINFORCEMENT AT SUP1:T1=5#12C1=2#12
 REINFORCEMENT AT SUP2:T2=5#12C2=2#12
 REINFORCEMENT AT MIDS:TM=3#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:E17- 5.400-G17- 5.400
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 2.33 2.90
 SLD 2 0.00 1.12 2.33 1.12 5.00 4.00 120
 FMD1 = -5.46FMD2 = 5.46FML1 = -1.05FML2 = 1.05KN.M.
 SFD1 = 24.74SFD2 = 24.74SFL1 = 5.22SFL2 = 5.22KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 10.94KN.M.@ 1.17M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 9.8DM2= 9.8DMM= 16.4KN.M.
 AT SUP1:Mu1/bd2=0.333N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=0.333N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.560N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 45KN. Vc= 27KN. Vus= 18KN.
 REINFORCEMENT AT SUP1:T1=2#12C1=2#12
 REINFORCEMENT AT SUP2:T2=2#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:E17- 1.500-G17- 1.500
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 2.33 3.50

FMD1 = -5.81 FMD2 = 5.81 FML1 = -0.07 FML2 = 0.07 KN.M.
SFD1 = 21.44 SFD2 = 21.44 SFL1 = 0.00 SFL2 = 0.00 KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 6.61 KN.M.@ 1.17M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 8.8 DM2= 8.8 DMM= 9.9 KN.M.
AT SUP1: Mu1/bd2=0.301 N/mm² pt1=0.150 pc1=0.000 AST1=123.165 mm² ASC1=0 mm²
AT SUP2: Mu2/bd2=0.301 N/mm² pt2=0.150 pc2=0.000 AST2=123.165 mm² ASC2=0 mm²
AT MIDS: Mum/bd2=0.338 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²
SHEAR DESIGN: Vu= 32 KN. Vc= 27 KN. Vus= 5 KN.
REINFORCEMENT AT SUP1: T1=2#12 C1=2#12
REINFORCEMENT AT SUP2: T2=2#12 C2=2#12
REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: E18- 5.400-G18- 5.400

SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 2.33 2.90

SLD 2 0 0.94 2.33 0.94 5.00 4.00 120

SLD 2 0.00 1.12 2.33 1.12 5.00 4.00 120

FMD1 = -23.70 FMD2 = 3.76 FML1 = -5.26 FML2 = 1.61 KN.M.

SFD1 = 40.03 SFD2 = 22.91 SFL1 = 11.17 SFL2 = 8.03 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 8.16 KN.M.@ 1.40M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 43.4 DM2= 8.1 DMM= 12.2 KN.M.
AT SUP1: Mu1/bd2=0.693 N/mm² pt1=0.166 pc1=0.000 AST1=228.051 mm² ASC1=0 mm²
AT SUP2: Mu2/bd2=0.129 N/mm² pt2=0.150 pc2=0.000 AST2=205.65 mm² ASC2=0 mm²
AT MIDS: Mum/bd2=0.195 N/mm² ptm=0.150 pcm=0.000 ASTM=205.65 mm² ASCM=0 mm²
SHEAR DESIGN: Vu= 77 KN. Vc= 45 KN. Vus= 32 KN.
REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
REINFORCEMENT AT SUP2: T2=2#12 C2=2#12
REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: C18- 5.400-E18- 5.400

SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 3.90 2.90

SLD 2 0 0.94 3.90 0.94 5.00 4.00 120

FMD1 = -19.86 FMD2 = 27.04 FML1 = -3.06 FML2 = 5.43 KN.M.

SFD1 = 39.92 SFD2 = 43.60 SFL1 = 6.72 SFL2 = 7.94 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 20.17 KN.M.@ 1.76M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 34.4 DM2= 48.7 DMM= 30.3 KN.M.
AT SUP1: Mu1/bd2=0.549 N/mm² pt1=0.150 pc1=0.000 AST1=205.65 mm² ASC1=0 mm²
AT SUP2: Mu2/bd2=0.777 N/mm² pt2=0.188 pc2=0.000 AST2=257.121 mm² ASC2=0 mm²
AT MIDS: Mum/bd2=0.483 N/mm² ptm=0.150 pcm=0.000 ASTM=205.65 mm² ASCM=0 mm²
SHEAR DESIGN: Vu= 77 KN. Vc= 45 KN. Vus= 32 KN.
REINFORCEMENT AT SUP1: T1=2#12 C1=2#12
REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:E18- 1.500-G18- 1.500

SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 2.33 3.50

FMD1 = -17.92FMD2 = 3.20FML1 = 0.08FML2 = 0.12KN.M.

SFD1 = 29.01SFD2 = 16.37SFL1 = -0.09SFL2 = 0.09KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 3.63KN.M.@ 1.51M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 27.0DM2= 5.0DMM= 5.5KN.M.

AT SUP1:Mu1/bd2=0.431N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.079N/mm2pt2=0.150pc2=0.000AST2=205.65mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.087N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2

SHEAR DESIGN: Vu= 44KN. Vc= 45KN. Vus= KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:C18- 1.500-E18- 1.500

SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 3.90 3.50

FMD1 = -21.09FMD2 = 22.77FML1 = -0.15FML2 = -0.06KN.M.

SFD1 = 37.55SFD2 = 38.41SFL1 = 0.05SFL2 = -0.05KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 15.06KN.M.@ 1.95M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 31.9DM2= 34.3DMM= 22.6KN.M.

AT SUP1:Mu1/bd2=0.509N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.547N/mm2pt2=0.150pc2=0.000AST2=205.65mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.361N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2

SHEAR DESIGN: Vu= 58KN. Vc= 45KN. Vus= 12KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:C20- 5.400-G20- 5.400

SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

SLD 2 0.00 1.06 6.23 1.06 5.00 4.00 120

SLD 4 0.00 0.00 2.27 2.27 3.97 2.27 6.23 0.00 5.00 4.00 120

FMD1 = -46.57FMD2 = 46.59FML1 = -29.41FML2 = 29.42KN.M.

SFD1 = 49.51SFD2 = 49.54SFL1 = 31.20SFL2 = 31.22KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 68.32KN.M.@ 3.12M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 114.0DM2= 114.0DMM= 102.5KN.M.

AT SUP1:Mu1/bd2=1.819N/mm2pt1=0.475pc1=0.000AST1=650.994mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.820N/mm2pt2=0.475pc2=0.000AST2=651.292mm2ASC2=0mm2

AT MIDS:Mum/bd2=1.636N/mm2ptm=0.420pcm=0.000ASTM=576.415mm2ASCM=0mm2

SHEAR DESIGN: Vu= 121KN. Vc= 64KN. Vus= 57KN.

REINFORCEMENT AT SUP1:T1=3#12+2#16C1=2#12
REINFORCEMENT AT SUP2:T2=3#12+2#16C2=2#12
REINFORCEMENT AT MIDS:TM=2#12+2#16CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:C20- 1.500-G20- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 1.00 6.23 1.00
FMD1 = -24.12FMD2 = 24.12FML1 = -0.59FML2 = 0.57KN.M.
SFD1 = 24.84SFD2 = 24.84SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 13.98KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 37.1DM2= 37.0DMM= 21.0KN.M.
AT SUP1:Mu1/bd2=0.592N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.591N/mm2pt2=0.150pc2=0.000AST2=205.65mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.335N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 37KN. Vc= 45KN. Vus= KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:C21- 5.400-G21- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 2 0.00 1.06 6.23 1.06 5.00 4.00 120
FMD1 = -60.95FMD2 = 60.95FML1 = -11.36FML2 = 11.36KN.M.
SFD1 = 68.58SFD2 = 68.58SFL1 = 13.21SFL2 = 13.21KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 55.09KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 108.5DM2= 108.5DMM= 82.6KN.M.
AT SUP1:Mu1/bd2=1.731N/mm2pt1=0.449pc1=0.000AST1=614.934mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.731N/mm2pt2=0.449pc2=0.000AST2=614.934mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.319N/mm2ptm=0.331pcm=0.000ASTM=453.358mm2ASCM=0mm2
SHEAR DESIGN: Vu= 123KN. Vc= 63KN. Vus= 60KN.
REINFORCEMENT AT SUP1:T1=2#12+2#16C1=2#12
REINFORCEMENT AT SUP2:T2=2#12+2#16C2=2#12
REINFORCEMENT AT MIDS:TM=5#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:C21- 1.500-G21- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -57.92FMD2 = 57.92FML1 = -0.23FML2 = 0.23KN.M.
SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 36.32KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 87.2DM2= 87.2DMM= 54.5KN.M.

AT SUP1:Mu1/bd2=1.392N/mm2pt1=0.351pc1=0.000AST1=481.221mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.392N/mm2pt2=0.351pc2=0.000AST2=481.221mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.870N/mm2ptm=0.211pcm=0.000ASTM=289.405mm2ASCM=0mm2
SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H22- 5.400-I22- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
FMD1 = -89.27FMD2 = 89.27FML1 = -34.90FML2 = 34.90KN.M.
SFD1 = 95.02SFD2 = 95.02SFL1 = 34.36SFL2 = 34.36KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 110.60KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 186.3DM2= 186.3DMM= 165.9KN.M.
AT SUP1:Mu1/bd2=2.973N/mm2pt1=0.835pc1=0.086AST1=1144.168mm2ASC1=118.082mm2
AT SUP2:Mu2/bd2=2.973N/mm2pt2=0.835pc2=0.086AST2=1144.168mm2ASC2=118.082mm2
AT MIDS:Mum/bd2=2.648N/mm2ptm=0.750pcm=0.000ASTM=1028.416mm2ASCM=0mm2
SHEAR DESIGN: Vu= 194KN. Vc= 80KN. Vus= 115KN.
REINFORCEMENT AT SUP1:T1=3#16+2#20C1=2#16
REINFORCEMENT AT SUP2:T2=3#16+2#20C2=2#16
REINFORCEMENT AT MIDS:TM=2#16+2#20CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H22- 1.500-I22- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -58.45FMD2 = 58.45FML1 = -0.68FML2 = 0.68KN.M.
SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 35.34KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 88.7DM2= 88.7DMM= 53.0KN.M.
AT SUP1:Mu1/bd2=1.416N/mm2pt1=0.358pc1=0.000AST1=490.218mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.416N/mm2pt2=0.358pc2=0.000AST2=490.218mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.846N/mm2ptm=0.205pcm=0.000ASTM=281.147mm2ASCM=0mm2
SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H27- 5.400-I27- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90

SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
 FMD1 = -69.29 FMD2 = 69.29 FML1 = -18.04 FML2 = 18.04 KN.M.
 SFD1 = 73.54 SFD2 = 73.54 SFL1 = 17.18 SFL2 = 17.18 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 70.59 KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 131.0 DM2= 131.0 DMM= 105.9 KN.M.
 AT SUP1: Mu1/bd2=2.091 N/mm² pt1=0.559 pc1=0.000 AST1=766.709 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=2.091 N/mm² pt2=0.559 pc2=0.000 AST2=766.709 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=1.690 N/mm² ptm=0.436 pcm=0.000 ASTM=598.244 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 136 KN. Vc= 68 KN. Vus= 68 KN.
 REINFORCEMENT AT SUP1: T1=2#12+3#16 C1=2#12
 REINFORCEMENT AT SUP2: T2=2#12+3#16 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12+2#16 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H27- 1.500-I27- 1.500
 SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 6.23 3.50
 FMD1 = -58.07 FMD2 = 58.07 FML1 = -0.36 FML2 = 0.36 KN.M.
 SFD1 = 60.66 SFD2 = 60.66 SFL1 = 0.00 SFL2 = 0.00 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 36.04 KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 87.7 DM2= 87.7 DMM= 54.1 KN.M.
 AT SUP1: Mu1/bd2=1.399 N/mm² pt1=0.353 pc1=0.000 AST1=483.788 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.399 N/mm² pt2=0.353 pc2=0.000 AST2=483.788 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.863 N/mm² ptm=0.209 pcm=0.000 ASTM=287.043 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 91 KN. Vc= 57 KN. Vus= 34 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=5#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=3#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H29- 5.400-I29- 5.400
 SIZE OF BEAM=300x500mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 6.23 2.90
 SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
 FMD1 = -69.29 FMD2 = 69.29 FML1 = -18.04 FML2 = 18.04 KN.M.
 SFD1 = 73.54 SFD2 = 73.54 SFL1 = 17.18 SFL2 = 17.18 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 70.59 KN.M.@ 3.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 131.0 DM2= 131.0 DMM= 105.9 KN.M.
 AT SUP1: Mu1/bd2=2.091 N/mm² pt1=0.559 pc1=0.000 AST1=766.709 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=2.091 N/mm² pt2=0.559 pc2=0.000 AST2=766.709 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=1.690 N/mm² ptm=0.436 pcm=0.000 ASTM=598.244 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 136 KN. Vc= 68 KN. Vus= 68 KN.
 REINFORCEMENT AT SUP1: T1=2#12+3#16 C1=2#12
 REINFORCEMENT AT SUP2: T2=2#12+3#16 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12+2#16 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

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ANALYSIS AND DESIGN FOR BEAM:H29- 1.500-I29- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -58.07FMD2 = 58.07FML1 = -0.36FML2 = 0.36KN.M.
SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 36.04KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 87.7DM2= 87.7DMM= 54.1KN.M.
AT SUP1:Mu1/bd2=1.399N/mm2pt1=0.353pc1=0.000AST1=483.788mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.399N/mm2pt2=0.353pc2=0.000AST2=483.788mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.863N/mm2ptm=0.209pcm=0.000ASTM=287.043mm2ASCM=0mm2
SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

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ANALYSIS AND DESIGN FOR BEAM:H30- 5.400-I30- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
FMD1 = -89.27FMD2 = 89.27FML1 = -34.90FML2 = 34.90KN.M.
SFD1 = 95.02SFD2 = 95.02SFL1 = 34.36SFL2 = 34.36KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 110.60KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 186.3DM2= 186.3DMM= 165.9KN.M.
AT SUP1:Mu1/bd2=2.973N/mm2pt1=0.835pc1=0.086AST1=1144.168mm2ASC1=118.082mm2
AT SUP2:Mu2/bd2=2.973N/mm2pt2=0.835pc2=0.086AST2=1144.168mm2ASC2=118.082mm2
AT MIDS:Mum/bd2=2.648N/mm2ptm=0.750pcm=0.000ASTM=1028.416mm2ASCM=0mm2
SHEAR DESIGN: Vu= 194KN. Vc= 80KN. Vus= 115KN.
REINFORCEMENT AT SUP1:T1=3#16+2#20C1=2#16
REINFORCEMENT AT SUP2:T2=3#16+2#20C2=2#16
REINFORCEMENT AT MIDS:TM=2#16+2#20CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

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ANALYSIS AND DESIGN FOR BEAM:H30- 1.500-I30- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -58.45FMD2 = 58.45FML1 = -0.68FML2 = 0.68KN.M.
SFD1 = 60.66SFD2 = 60.66SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 35.34KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 88.7DM2= 88.7DMM= 53.0KN.M.
AT SUP1:Mu1/bd2=1.416N/mm2pt1=0.358pc1=0.000AST1=490.218mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.416N/mm2pt2=0.358pc2=0.000AST2=490.218mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.846N/mm2ptm=0.205pcm=0.000ASTM=281.147mm2ASCM=0mm2
SHEAR DESIGN: Vu= 91KN. Vc= 57KN. Vus= 34KN.

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REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H31- 5.400-I31- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 6.23 2.90
SLD 4 0.00 0.00 2.06 2.06 4.17 2.06 6.23 0.00 5.00 4.00 120
FMD1 = -76.63FMD2 = 66.48FML1 = -19.77FML2 = 17.40KN.M.
SFD1 = 75.17SFD2 = 71.91SFL1 = 17.56SFL2 = 16.80KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 67.78KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 144.6DM2= 125.8DMM= 101.7KN.M.
AT SUP1:Mu1/bd2=2.308N/mm2pt1=0.630pc1=0.000AST1=864.338mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.008N/mm2pt2=0.533pc2=0.000AST2=730.827mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.623N/mm2ptm=0.417pcm=0.000ASTM=571.255mm2ASCM=0mm2
SHEAR DESIGN: Vu= 139KN. Vc= 72KN. Vus= 68KN.
REINFORCEMENT AT SUP1:T1=5#16C1=2#16
REINFORCEMENT AT SUP2:T2=4#16C2=2#16
REINFORCEMENT AT MIDS:TM=3#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G31- 5.400-H31- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 3.23 2.90
FMD1 = -10.85FMD2 = 30.34FML1 = 1.95FML2 = 5.88KN.M.
SFD1 = 20.96SFD2 = 33.02SFL1 = -2.42SFL2 = 2.42KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 1.37KN.M.@ 1.13M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 19.2DM2= 54.3DMM= 2.1KN.M.
AT SUP1:Mu1/bd2=0.306N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.867N/mm2pt2=0.210pc2=0.000AST2=288.561mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.033N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 53KN. Vc= 46KN. Vus= 7KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D31- 5.400-G31- 5.400
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 3.34 2.90
FMD1 = -8.31FMD2 = 15.12FML1 = -0.25FML2 = -1.12KN.M.
SFD1 = 25.87SFD2 = 29.95SFL1 = 0.41SFL2 = -0.41KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 12.06KN.M.@ 1.50M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 12.8DM2= 24.4DMM= 18.1KN.M.

AT SUP1:Mu1/bd2=0.205N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.389N/mm2pt2=0.150pc2=0.000AST2=205.65mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.289N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 46KN. Vc= 45KN. Vus= KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H31- 1.500-I31- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 6.23 3.50
FMD1 = -61.92FMD2 = 56.34FML1 = -0.09FML2 = 0.44KN.M.
SFD1 = 61.56SFD2 = 59.76SFL1 = -0.06SFL2 = 0.06KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 35.08KN.M.@ 3.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 93.0DM2= 85.2DMM= 52.6KN.M.
AT SUP1:Mu1/bd2=1.485N/mm2pt1=0.377pc1=0.000AST1=516.869mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.359N/mm2pt2=0.342pc2=0.000AST2=468.704mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.840N/mm2ptm=0.203pcm=0.000ASTM=278.961mm2ASCM=0mm2
SHEAR DESIGN: Vu= 92KN. Vc= 59KN. Vus= 34KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G31- 1.500-H31- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.23 3.50
FMD1 = -15.54FMD2 = 26.24FML1 = -0.16FML2 = -0.69KN.M.
SFD1 = 28.14SFD2 = 34.76SFL1 = 0.26SFL2 = -0.26KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 5.01KN.M.@ 1.45M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 23.6DM2= 40.4DMM= 7.5KN.M.
AT SUP1:Mu1/bd2=0.376N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.645N/mm2pt2=0.154pc2=0.000AST2=211.391mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.120N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 53KN. Vc= 45KN. Vus= 7KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D31- 1.500-G31- 1.500
SIZE OF BEAM=300x500mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 3.34 3.50
FMD1 = -9.40FMD2 = 19.40FML1 = 0.01FML2 = 0.18KN.M.
SFD1 = 29.53SFD2 = 35.51SFL1 = -0.06SFL2 = 0.06KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 12.90KN.M.@ 1.50M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 14.1DM2= 29.4DMM= 19.4KN.M.
AT SUP1:Mu1/bd2=0.225N/mm2pt1=0.150pc1=0.000AST1=205.65mm2ASC1=0mm2
AT SUP2:Mu2/bd2=0.469N/mm2pt2=0.150pc2=0.000AST2=205.65mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.309N/mm2ptm=0.150pcm=0.000ASTM=205.65mm2ASCM=0mm2
SHEAR DESIGN: Vu= 53KN. Vc= 45KN. Vus= 8KN.
REINFORCEMENT AT SUP1:T1=2#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D30- 5.400-D31- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.12 2.90
SLD 2 0 1.67 4.12 1.67 5.00 4.00 120
FMD1 = -50.98FMD2 = 15.06FML1 = -14.67FML2 = 3.74KN.M.
SFD1 = 58.09SFD2 = 40.74SFL1 = 16.40SFL2 = 11.12KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 24.77KN.M.@ 2.47M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 98.5DM2= 28.2DMM= 37.2KN.M.
AT SUP1:Mu1/bd2=3.359N/mm2pt1=0.944pc1=0.212AST1=774.97mm2ASC1=173.827mm2
AT SUP2:Mu2/bd2=0.962N/mm2pt2=0.235pc2=0.000AST2=192.99mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.268N/mm2ptm=0.317pcm=0.000ASTM=259.936mm2ASCM=0mm2
SHEAR DESIGN: Vu= 112KN. Vc= 50KN. Vus= 62KN.
REINFORCEMENT AT SUP1:T1=2#12+3#16C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D28- 5.400-D30- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 5.35 2.90
SLD 2 0 1.67 5.35 1.67 5.00 4.00 120
FMD1 = -35.12FMD2 = 62.05FML1 = -9.04FML2 = 17.48KN.M.
SFD1 = 59.07SFD2 = 69.26SFL1 = 16.27SFL2 = 19.47KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 48.34KN.M.@ 2.41M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 66.2DM2= 119.3DMM= 72.5KN.M.
AT SUP1:Mu1/bd2=2.260N/mm2pt1=0.614pc1=0.000AST1=504.428mm2ASC1=0mm2
AT SUP2:Mu2/bd2=4.070N/mm2pt2=1.136pc2=0.427AST2=932.697mm2ASC2=350.48mm2
AT MIDS:Mum/bd2=2.474N/mm2ptm=0.687pcm=0.000ASTM=564.435mm2ASCM=0mm2
SHEAR DESIGN: Vu= 133KN. Vc= 53KN. Vus= 80KN.
REINFORCEMENT AT SUP1:T1=3#16C1=2#16
REINFORCEMENT AT SUP2:T2=5#16C2=2#16
REINFORCEMENT AT MIDS:TM=3#16CM=2#16
SHEAR REINFORCEMENT:8#2LEG.STR.@175mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D30- 1.500-D31- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.12 3.50

FMD1 = -35.14FMD2 = 15.59FML1 = 0.32FML2 = 0.34KN.M.

SFD1 = 42.61SFD2 = 33.19SFL1 = -0.16SFL2 = 0.16KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 14.13KN.M.@ 2.26M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 53.2DM2= 23.9DMM= 21.2KN.M.

AT SUP1:Mu1/bd2=1.815N/mm2pt1=0.473pc1=0.000AST1=388.774mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.815N/mm2pt2=0.197pc2=0.000AST2=161.891mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.723N/mm2ptm=0.174pcm=0.000ASTM=142.717mm2ASCM=0mm2

SHEAR DESIGN: Vu= 64KN. Vc= 39KN. Vus= 26KN.

REINFORCEMENT AT SUP1:T1=4#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D28- 1.500-D30- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 5.35 3.50

FMD1 = -33.39FMD2 = 45.99FML1 = -0.49FML2 = -0.14KN.M.

SFD1 = 46.81SFD2 = 51.61SFL1 = 0.12SFL2 = -0.12KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 25.83KN.M.@ 2.67M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 50.8DM2= 69.2DMM= 38.8KN.M.

AT SUP1:Mu1/bd2=1.734N/mm2pt1=0.449pc1=0.000AST1=368.905mm2ASC1=0mm2

AT SUP2:Mu2/bd2=2.361N/mm2pt2=0.648pc2=0.000AST2=532.301mm2ASC2=0mm2

AT MIDS:Mum/bd2=1.322N/mm2ptm=0.331pcm=0.000ASTM=272.167mm2ASCM=0mm2

SHEAR DESIGN: Vu= 78KN. Vc= 43KN. Vus= 34KN.

REINFORCEMENT AT SUP1:T1=4#12C1=2#12

REINFORCEMENT AT SUP2:T2=5#12C2=2#12

REINFORCEMENT AT MIDS:TM=3#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G27- 5.400-G29- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.23 2.90

SLD 2 3.00 1.67 4.23 1.67 5.00 4.00 120

SLD 2 0 1.62 4.23 1.62 5.00 4.00 120

PPL 3.00 26.12 0.00

FMD1 = -41.18FMD2 = 53.10FML1 = -9.44FML2 = 14.71KN.M.

SFD1 = 56.48SFD2 = 80.33SFL1 = 13.65SFL2 = 21.98KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 30.77KN.M.@ 2.33M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 75.9DM2= 101.7DMM= 46.2KN.M.

AT SUP1:Mu1/bd2=2.590N/mm2pt1=0.729pc1=0.000AST1=598.632mm2ASC1=0mm2

AT SUP2:Mu2/bd2=3.470N/mm2pt2=0.974pc2=0.245AST2=799.516mm2ASC2=201.318mm2

AT MIDS:Mum/bd2=1.575N/mm2ptm=0.403pcm=0.000ASTM=330.68mm2ASCM=0mm2

SHEAR DESIGN: Vu= 153KN. Vc= 50KN. Vus= 103KN.

REINFORCEMENT AT SUP1:T1=2#12+2#16C1=2#12

REINFORCEMENT AT SUP2:T2=2#12+3#16C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@150mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G26- 5.400-G27- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.11 2.90
SLD 2 0 1.62 4.11 1.62 5.00 4.00 120
FMD1 = -32.29FMD2 = 36.84FML1 = -9.10FML2 = 9.28KN.M.
SFD1 = 47.73SFD2 = 49.85SFL1 = 13.29SFL2 = 13.34KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 20.19KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 62.1DM2= 69.2DMM= 30.3KN.M.
AT SUP1:Mu1/bd2=2.118N/mm2pt1=0.568pc1=0.000AST1=466.36mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.360N/mm2pt2=0.648pc2=0.000AST2=532.158mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.033N/mm2ptm=0.254pcm=0.000ASTM=208.297mm2ASCM=0mm2
SHEAR DESIGN: Vu= 95KN. Vc= 43KN. Vus= 51KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G25- 5.400-G26- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.12 2.90
SLD 2 0 1.62 4.12 1.62 5.00 4.00 120
FMD1 = -33.74FMD2 = 32.98FML1 = -9.17FML2 = 9.13KN.M.
SFD1 = 49.02SFD2 = 48.77SFL1 = 13.34SFL2 = 13.36KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 21.44KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 64.4DM2= 63.2DMM= 32.2KN.M.
AT SUP1:Mu1/bd2=2.196N/mm2pt1=0.593pc1=0.000AST1=487.093mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.155N/mm2pt2=0.580pc2=0.000AST2=476.135mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.097N/mm2ptm=0.271pcm=0.000ASTM=222.203mm2ASCM=0mm2
SHEAR DESIGN: Vu= 94KN. Vc= 42KN. Vus= 52KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G24- 5.400-G25- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.11 2.90
SLD 2 0 1.62 4.11 1.62 5.00 4.00 120
FMD1 = -33.32FMD2 = 33.67FML1 = -9.10FML2 = 9.17KN.M.
SFD1 = 48.75SFD2 = 48.83SFL1 = 13.31SFL2 = 13.32KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 21.32KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 63.6 DM2= 64.3 DMM= 32.0 KN.M.
 AT SUP1: Mu1/bd2=2.171 N/mm² pt1=0.585 pc1=0.000 AST1=480.369 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=2.192 N/mm² pt2=0.592 pc2=0.000 AST2=486.13 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=1.091 N/mm² ptm=0.269 pcm=0.000 ASTM=220.862 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 93 KN. Vc= 42 KN. Vus= 52 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=5#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: G23- 5.400-G24- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.12 2.90
 SLD 2 0 1.62 4.12 1.62 5.00 4.00 120
 FMD1 = -34.47 FMD2 = 33.16 FML1 = -9.43 FML2 = 9.05 KN.M.
 SFD1 = 49.16 SFD2 = 48.63 SFL1 = 13.42 SFL2 = 13.28 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 20.89 KN.M. @ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 65.9 DM2= 63.3 DMM= 31.3 KN.M.
 AT SUP1: Mu1/bd2=2.246 N/mm² pt1=0.610 pc1=0.000 AST1=500.8 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=2.160 N/mm² pt2=0.582 pc2=0.000 AST2=477.499 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=1.069 N/mm² ptm=0.263 pcm=0.000 ASTM=216.067 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 94 KN. Vc= 42 KN. Vus= 52 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=5#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: G22- 5.400-G23- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.11 2.90
 SLD 2 0 1.62 4.11 1.62 5.00 4.00 120
 FMD1 = -27.78 FMD2 = 35.60 FML1 = -7.57 FML2 = 9.71 KN.M.
 SFD1 = 46.94 SFD2 = 50.64 SFL1 = 12.81 SFL2 = 13.82 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 23.62 KN.M. @ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 53.0 DM2= 68.0 DMM= 35.4 KN.M.
 AT SUP1: Mu1/bd2=1.809 N/mm² pt1=0.472 pc1=0.000 AST1=387.38 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=2.319 N/mm² pt2=0.634 pc2=0.000 AST2=520.614 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=1.209 N/mm² ptm=0.301 pcm=0.000 ASTM=246.789 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 97 KN. Vc= 43 KN. Vus= 54 KN.
 REINFORCEMENT AT SUP1: T1=4#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=5#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=3#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: G30- 5.400-G31- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.11 2.90
 SLD 2 0 1.67 4.12 1.67 5.00 4.00 120
 SLD 2 0 1.62 4.11 1.62 5.00 4.00 120
 FMD1 = -52.79 FMD2 = 22.41 FML1 = -22.40 FML2 = 8.36 KN.M.
 SFD1 = 73.41 SFD2 = 58.58 SFL1 = 30.49 SFL2 = 23.67 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 44.08 KN.M.@ 2.26M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 112.8 DM2= 46.2 DMM= 66.1 KN.M.
 AT SUP1: Mu1/bd2=3.848 N/mm² pt1=1.076 pc1=0.360 AST1=883.379 mm² ASC1=295.244 mm²
 AT SUP2: Mu2/bd2=1.575 N/mm² pt2=0.403 pc2=0.000 AST2=330.68 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=2.256 N/mm² ptm=0.613 pcm=0.000 ASTM=503.31 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 156 KN. Vc= 52 KN. Vus= 104 KN.
 REINFORCEMENT AT SUP1: T1=5#16 C1=2#16
 REINFORCEMENT AT SUP2: T2=2#16 C2=2#16
 REINFORCEMENT AT MIDS: TM=3#16 CM=2#16
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@150mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: G29- 5.400-G30- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.12 2.90
 SLD 2 0 1.67 4.12 1.67 5.00 4.00 120
 SLD 2 0 1.62 4.12 1.62 5.00 4.00 120
 FMD1 = -47.48 FMD2 = 48.16 FML1 = -16.06 FML2 = 21.14 KN.M.
 SFD1 = 65.86 SFD2 = 66.34 SFL1 = 25.85 SFL2 = 28.37 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 29.38 KN.M.@ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 95.3 DM2= 104.0 DMM= 44.1 KN.M.
 AT SUP1: Mu1/bd2=3.251 N/mm² pt1=0.915 pc1=0.179 AST1=750.993 mm² ASC1=146.973 mm²
 AT SUP2: Mu2/bd2=3.546 N/mm² pt2=0.994 pc2=0.268 AST2=816.447 mm² ASC2=220.281 mm²
 AT MIDS: Mum/bd2=1.503 N/mm² ptm=0.382 pcm=0.000 ASTM=313.953 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 142 KN. Vc= 51 KN. Vus= 91 KN.
 REINFORCEMENT AT SUP1: T1=2#12+3#16 C1=2#12
 REINFORCEMENT AT SUP2: T2=2#12+3#16 C2=2#12
 REINFORCEMENT AT MIDS: TM=3#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@150mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: G27- 1.500-G29- 1.500
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.23 3.50
 PPL 3.00 30.73 0.00
 FMD1 = -35.09 FMD2 = 42.17 FML1 = -0.05 FML2 = -0.05 KN.M.
 SFD1 = 46.18 SFD2 = 62.38 SFL1 = 0.02 SFL2 = -0.02 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 22.85 KN.M.@ 2.54M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 52.7 DM2= 63.3 DMM= 34.3 KN.M.
 AT SUP1: Mu1/bd2=1.798 N/mm² pt1=0.469 pc1=0.000 AST1=384.724 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=2.160 N/mm² pt2=0.582 pc2=0.000 AST2=477.635 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=1.169 N/mm² ptm=0.290 pcm=0.000 ASTM=238.055 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 94 KN. Vc= 41 KN. Vus= 52 KN.
 REINFORCEMENT AT SUP1: T1=4#12 C1=2#12

REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G26- 1.500-G27- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -24.79FMD2 = 28.95FML1 = 0.01FML2 = 0.00KN.M.
SFD1 = 36.85SFD2 = 38.79SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 12.09KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 37.2DM2= 43.4DMM= 18.1KN.M.
AT SUP1:Mu1/bd2=1.269N/mm2pt1=0.317pc1=0.000AST1=260.281mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.481N/mm2pt2=0.376pc2=0.000AST2=308.821mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.619N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2
SHEAR DESIGN: Vu= 58KN. Vc= 35KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G25- 1.500-G26- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.12 3.50
FMD1 = -26.13FMD2 = 25.60FML1 = 0.01FML2 = 0.01KN.M.
SFD1 = 37.99SFD2 = 37.81SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 13.09KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 39.2DM2= 38.4DMM= 19.6KN.M.
AT SUP1:Mu1/bd2=1.338N/mm2pt1=0.336pc1=0.000AST1=275.764mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.310N/mm2pt2=0.328pc2=0.000AST2=269.619mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.670N/mm2ptm=0.160pcm=0.000ASTM=131.75mm2ASCM=0mm2
SHEAR DESIGN: Vu= 57KN. Vc= 33KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:G24- 1.500-G25- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -25.90FMD2 = 26.03FML1 = 0.00FML2 = 0.00KN.M.
SFD1 = 37.83SFD2 = 37.81SFL1 = 0.00SFL2 = 0.00KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 12.99KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 38.9DM2= 39.1DMM= 19.5KN.M.
AT SUP1:Mu1/bd2=1.325N/mm2pt1=0.332pc1=0.000AST1=272.978mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.332N/mm2pt2=0.334pc2=0.000AST2=274.487mm2ASC2=0mm2

AT MIDS: $M_{um}/bd^2 = 0.665 \text{ N/mm}^2$ $p_{tm} = 0.159 \text{ pc} = 0.000$ $ASTM = 130.7 \text{ mm}^2$ $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 57 \text{ KN}$. $V_c = 33 \text{ KN}$. $V_{us} = 23 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 3\#12$ $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 3\#12$ $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$ $C_M = 2\#12$
SHEAR REINFORCEMENT: 8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: G23- 1.500-G24- 1.500
SIZE OF BEAM=230x400mm. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.12 3.50
FMD1 = -26.43 FMD2 = 25.78 FML1 = 0.02 FML2 = 0.01 KN.M.
SFD1 = 38.02 SFD2 = 37.78 SFL1 = -0.01 SFL2 = 0.01 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = 12.85 KN.M. @ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: $DM_1 = 39.7$ $DM_2 = 38.7$ $DM_M = 19.3$ KN.M.
AT SUP1: $M_{u1}/bd^2 = 1.353 \text{ N/mm}^2$ $p_{t1} = 0.340$ $p_{c1} = 0.000$ $AST_1 = 279.372 \text{ mm}^2$ $ASC_1 = 0 \text{ mm}^2$
AT SUP2: $M_{u2}/bd^2 = 1.320 \text{ N/mm}^2$ $p_{t2} = 0.331$ $p_{c2} = 0.000$ $AST_2 = 271.703 \text{ mm}^2$ $ASC_2 = 0 \text{ mm}^2$
AT MIDS: $M_{um}/bd^2 = 0.658 \text{ N/mm}^2$ $p_{tm} = 0.157$ $p_{cm} = 0.000$ $ASTM = 129.231 \text{ mm}^2$ $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 57 \text{ KN}$. $V_c = 34 \text{ KN}$. $V_{us} = 23 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 3\#12$ $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 3\#12$ $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$ $C_M = 2\#12$
SHEAR REINFORCEMENT: 8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: G22- 1.500-G23- 1.500
SIZE OF BEAM=230x400mm. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -22.23 FMD2 = 27.48 FML1 = -0.03 FML2 = -0.01 KN.M.
SFD1 = 36.58 SFD2 = 39.06 SFL1 = 0.01 SFL2 = -0.01 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = 14.09 KN.M. @ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: $DM_1 = 33.4$ $DM_2 = 41.2$ $DM_M = 21.1$ KN.M.
AT SUP1: $M_{u1}/bd^2 = 1.139 \text{ N/mm}^2$ $p_{t1} = 0.282$ $p_{c1} = 0.000$ $AST_1 = 231.4 \text{ mm}^2$ $ASC_1 = 0 \text{ mm}^2$
AT SUP2: $M_{u2}/bd^2 = 1.407 \text{ N/mm}^2$ $p_{t2} = 0.355$ $p_{c2} = 0.000$ $AST_2 = 291.544 \text{ mm}^2$ $ASC_2 = 0 \text{ mm}^2$
AT MIDS: $M_{um}/bd^2 = 0.721 \text{ N/mm}^2$ $p_{tm} = 0.173$ $p_{cm} = 0.000$ $ASTM = 142.293 \text{ mm}^2$ $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 59 \text{ KN}$. $V_c = 34 \text{ KN}$. $V_{us} = 24 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 3\#12$ $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 3\#12$ $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$ $C_M = 2\#12$
SHEAR REINFORCEMENT: 8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: G30- 1.500-G31- 1.500
SIZE OF BEAM=230x400mm. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -28.50 FMD2 = 18.33 FML1 = 0.19 FML2 = 0.56 KN.M.
SFD1 = 40.33 SFD2 = 35.31 SFL1 = -0.18 SFL2 = 0.18 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = 15.43 KN.M. @ 2.26M. FROM SUP.1
DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 43.0 DM2= 28.3 DMM= 23.2 KN.M.
 AT SUP1: Mu1/bd2=1.468 N/mm² pt1=0.372 pc1=0.000 AST1=305.728 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=0.967 N/mm² pt2=0.236 pc2=0.000 AST2=193.977 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.790 N/mm² ptm=0.191 pcm=0.000 ASTM=156.54 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 61 KN. Vc= 35 KN. Vus= 26 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=2#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @ 200 mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: G29- 1.500-G30- 1.500
 SIZE OF BEAM=230x400 mm. TYPE: BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.12 3.50
 FMD1 = -31.14 FMD2 = 24.72 FML1 = -0.14 FML2 = -0.19 KN.M.
 SFD1 = 39.42 SFD2 = 36.38 SFL1 = 0.08 SFL2 = -0.08 KN.
 CRITICAL MIDSPAN MOMENT (DL+LL)= 11.05 KN.M. @ 2.06 M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 46.9 DM2= 37.4 DMM= 16.6 KN.M.
 AT SUP1: Mu1/bd2=1.601 N/mm² pt1=0.410 pc1=0.000 AST1=336.871 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.275 N/mm² pt2=0.319 pc2=0.000 AST2=261.545 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.565 N/mm² ptm=0.150 pcm=0.000 ASTM=123.165 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 59 KN. Vc= 36 KN. Vus= 23 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @ 200 mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H25- 5.400-H26- 5.400
 SIZE OF BEAM=230x400 mm. TYPE: BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.11 2.90
 SLD 2 0 1.62 4.12 1.62 5.00 4.00 120
 SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
 SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
 FMD1 = -42.46 FMD2 = 43.03 FML1 = -16.27 FML2 = 16.84 KN.M.
 SFD1 = 59.30 SFD2 = 59.58 SFL1 = 21.67 SFL2 = 22.00 KN.
 CRITICAL MIDSPAN MOMENT (DL+LL)= 30.84 KN.M. @ 2.06 M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 88.1 DM2= 89.8 DMM= 46.3 KN.M.
 AT SUP1: Mu1/bd2=3.005 N/mm² pt1=0.848 pc1=0.104 AST1=696.334 mm² ASC1=85.755 mm²
 AT SUP2: Mu2/bd2=3.064 N/mm² pt2=0.864 pc2=0.122 AST2=709.289 mm² ASC2=100.264 mm²
 AT MIDS: Mum/bd2=1.578 N/mm² ptm=0.404 pcm=0.000 ASTM=331.528 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 122 KN. Vc= 48 KN. Vus= 74 KN.
 REINFORCEMENT AT SUP1: T1=3#12+2#16 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12+2#16 C2=2#12
 REINFORCEMENT AT MIDS: TM=3#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @ 200 mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H24- 5.400-H25- 5.400
 SIZE OF BEAM=230x400 mm. TYPE: BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.12 2.90

SLD 2 0 1.62 4.11 1.62 5.00 4.00 120

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -42.58 FMD2 = 42.56 FML1 = -16.43 FML2 = 16.37 KN.M.

SFD1 = 59.44 SFD2 = 59.49 SFL1 = 21.82 SFL2 = 21.79 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 31.17 KN.M. @ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 88.5 DM2= 88.4 DMM= 46.8 KN.M.

AT SUP1: $\mu_1/bd^2 = 3.02$ N/mm² $\rho_1 = 0.852$ $\rho_1 = 0.109$ $A_{ST1} = 699.516$ mm² $A_{SC1} = 89.318$ mm²

AT SUP2: $\mu_2/bd^2 = 3.016$ N/mm² $\rho_2 = 0.851$ $\rho_2 = 0.108$ $A_{ST2} = 698.607$ mm² $A_{SC2} = 88.3$ mm²

AT MIDS: $\mu_m/bd^2 = 1.595$ N/mm² $\rho_m = 0.409$ $\rho_m = 0.000$ $A_{STm} = 335.533$ mm² $A_{SCm} = 0$ mm²

SHEAR DESIGN: $V_u = 122$ KN. $V_c = 48$ KN. $V_{us} = 74$ KN.

REINFORCEMENT AT SUP1: T1=3#12+2#16 C1=2#12

REINFORCEMENT AT SUP2: T2=3#12+2#16 C2=2#12

REINFORCEMENT AT MIDS: TM=3#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR. @ 200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: H23- 5.400-H24- 5.400

SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.11 2.90

SLD 2 0 1.62 4.12 1.62 5.00 4.00 120

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -42.95 FMD2 = 42.49 FML1 = -16.56 FML2 = 16.38 KN.M.

SFD1 = 59.55 SFD2 = 59.33 SFL1 = 21.85 SFL2 = 21.82 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 30.95 KN.M. @ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 89.3 DM2= 88.3 DMM= 46.4 KN.M.

AT SUP1: $\mu_1/bd^2 = 3.045$ N/mm² $\rho_1 = 0.859$ $\rho_1 = 0.117$ $A_{ST1} = 705.198$ mm² $A_{SC1} = 95.682$ mm²

AT SUP2: $\mu_2/bd^2 = 3.012$ N/mm² $\rho_2 = 0.850$ $\rho_2 = 0.107$ $A_{ST2} = 697.925$ mm² $A_{SC2} = 87.537$ mm²

AT MIDS: $\mu_m/bd^2 = 1.584$ N/mm² $\rho_m = 0.405$ $\rho_m = 0.000$ $A_{STm} = 332.861$ mm² $A_{SCm} = 0$ mm²

SHEAR DESIGN: $V_u = 122$ KN. $V_c = 48$ KN. $V_{us} = 74$ KN.

REINFORCEMENT AT SUP1: T1=3#12+2#16 C1=2#12

REINFORCEMENT AT SUP2: T2=3#12+2#16 C2=2#12

REINFORCEMENT AT MIDS: TM=3#12 CM=2#12

SHEAR REINFORCEMENT: 8#2 LEG. STR. @ 200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM: H22- 5.400-H23- 5.400

SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.11 2.90

SLD 2 0 1.62 4.11 1.62 5.00 4.00 120

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -40.48 FMD2 = 43.38 FML1 = -15.53 FML2 = 16.75 KN.M.

SFD1 = 58.74 SFD2 = 60.06 SFL1 = 21.51 SFL2 = 22.10 KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 32.07 KN.M. @ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 84.0 DM2= 90.2 DMM= 48.1 KN.M.

AT SUP1:Mu1/bd2=2.866N/mm2pt1=0.810pc1=0.062AST1=665.425mm2ASC1=51.137mm2
 AT SUP2:Mu2/bd2=3.077N/mm2pt2=0.867pc2=0.126AST2=712.243mm2ASC2=103.573mm2
 AT MIDS:Mum/bd2=1.641N/mm2ptm=0.422pcm=0.000ASTM=346.52mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 123KN. Vc= 48KN. Vus= 75KN.
 REINFORCEMENT AT SUP1:T1=3#12+2#16C1=2#12
 REINFORCEMENT AT SUP2:T2=3#12+2#16C2=2#12
 REINFORCEMENT AT MIDS:TM=4#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:H25- 1.500-H26- 1.500
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.11 3.50
 FMD1 = -26.00FMD2 = 25.90FML1 = -0.02FML2 = -0.04KN.M.
 SFD1 = 37.88SFD2 = 37.76SFL1 = 0.01SFL2 = -0.01KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 13.01KN.M.@ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 39.0DM2= 38.9DMM= 19.5KN.M.
 AT SUP1:Mu1/bd2=1.331N/mm2pt1=0.334pc1=0.000AST1=274.371mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.327N/mm2pt2=0.333pc2=0.000AST2=273.442mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.666N/mm2ptm=0.159pcm=0.000ASTM=130.91mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 57KN. Vc= 33KN. Vus= 23KN.
 REINFORCEMENT AT SUP1:T1=3#12C1=2#12
 REINFORCEMENT AT SUP2:T2=3#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:H24- 1.500-H25- 1.500
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.12 3.50
 FMD1 = -25.97FMD2 = 25.98FML1 = 0.00FML2 = 0.01KN.M.
 SFD1 = 37.86SFD2 = 37.94SFL1 = 0.00SFL2 = 0.00KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 12.97KN.M.@ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 39.0DM2= 39.0DMM= 19.5KN.M.
 AT SUP1:Mu1/bd2=1.329N/mm2pt1=0.333pc1=0.000AST1=273.79mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.330N/mm2pt2=0.334pc2=0.000AST2=274.022mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.664N/mm2ptm=0.159pcm=0.000ASTM=130.49mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 57KN. Vc= 33KN. Vus= 24KN.
 REINFORCEMENT AT SUP1:T1=3#12C1=2#12
 REINFORCEMENT AT SUP2:T2=3#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:H23- 1.500-H24- 1.500
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.11 3.50
 FMD1 = -25.94FMD2 = 25.98FML1 = 0.02FML2 = 0.01KN.M.
 SFD1 = 37.85SFD2 = 37.79SFL1 = -0.01SFL2 = 0.01KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 13.00KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 38.9DM2= 39.0DMM= 19.5KN.M.
AT SUP1:Mu1/bd2=1.328N/mm2pt1=0.333pc1=0.000AST1=273.674mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.330N/mm2pt2=0.334pc2=0.000AST2=274.022mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.665N/mm2ptm=0.159pcm=0.000ASTM=130.805mm2ASCM=0mm2
SHEAR DESIGN: Vu= 57KN. Vc= 33KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H22- 1.500-H23- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -26.01FMD2 = 25.98FML1 = -0.09FML2 = -0.03KN.M.
SFD1 = 37.87SFD2 = 37.77SFL1 = 0.03SFL2 = -0.03KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 12.93KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 39.2DM2= 39.0DMM= 19.4KN.M.
AT SUP1:Mu1/bd2=1.336N/mm2pt1=0.335pc1=0.000AST1=275.3mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.331N/mm2pt2=0.334pc2=0.000AST2=274.255mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.662N/mm2ptm=0.158pcm=0.000ASTM=130.07mm2ASCM=0mm2
SHEAR DESIGN: Vu= 57KN. Vc= 33KN. Vus= 23KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=3#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I25- 5.400-I26- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.11 2.90
SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
FMD1 = -30.47FMD2 = 33.11FML1 = -7.09FML2 = 7.84KN.M.
SFD1 = 42.14SFD2 = 43.37SFL1 = 8.30SFL2 = 8.68KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 20.04KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 56.3DM2= 61.4DMM= 30.1KN.M.
AT SUP1:Mu1/bd2=1.922N/mm2pt1=0.506pc1=0.000AST1=415.684mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.095N/mm2pt2=0.561pc2=0.000AST2=460.427mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.025N/mm2ptm=0.252pcm=0.000ASTM=206.637mm2ASCM=0mm2
SHEAR DESIGN: Vu= 78KN. Vc= 41KN. Vus= 37KN.
REINFORCEMENT AT SUP1:T1=4#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I24- 5.400-I25- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.12 2.90

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -31.25FMD2 = 30.89FML1 = -7.31FML2 = 7.21KN.M.

SFD1 = 42.87SFD2 = 42.78SFL1 = 8.50SFL2 = 8.48KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 20.97KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 57.8DM2= 57.2DMM= 31.5KN.M.

AT SUP1:Mu1/bd2=1.973N/mm2pt1=0.522pc1=0.000AST1=428.71mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.950N/mm2pt2=0.515pc2=0.000AST2=422.701mm2ASC2=0mm2

AT MIDS:Mum/bd2=1.073N/mm2ptm=0.264pcm=0.000ASTM=216.958mm2ASCM=0mm2

SHEAR DESIGN: Vu= 77KN. Vc= 40KN. Vus= 37KN.

REINFORCEMENT AT SUP1:T1=4#12C1=2#12

REINFORCEMENT AT SUP2:T2=4#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I23- 5.400-I24- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.11 2.90

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -31.47FMD2 = 31.10FML1 = -7.40FML2 = 7.25KN.M.

SFD1 = 42.87SFD2 = 42.64SFL1 = 8.52SFL2 = 8.46KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 20.69KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 58.3DM2= 57.5DMM= 31.0KN.M.

AT SUP1:Mu1/bd2=1.989N/mm2pt1=0.527pc1=0.000AST1=432.777mm2ASC1=0mm2

AT SUP2:Mu2/bd2=1.962N/mm2pt2=0.519pc2=0.000AST2=425.963mm2ASC2=0mm2

AT MIDS:Mum/bd2=1.059N/mm2ptm=0.260pcm=0.000ASTM=213.843mm2ASCM=0mm2

SHEAR DESIGN: Vu= 77KN. Vc= 40KN. Vus= 37KN.

REINFORCEMENT AT SUP1:T1=4#12C1=2#12

REINFORCEMENT AT SUP2:T2=4#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:I22- 5.400-I23- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.12 2.90

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -29.34FMD2 = 31.85FML1 = -6.55FML2 = 7.56KN.M.

SFD1 = 42.17SFD2 = 43.48SFL1 = 8.23SFL2 = 8.75KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 21.65KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 53.8DM2= 59.1DMM= 32.5KN.M.

AT SUP1:Mu1/bd2=1.837N/mm2pt1=0.480pc1=0.000AST1=394.237mm2ASC1=0mm2

AT SUP2:Mu2/bd2=2.017N/mm2pt2=0.536pc2=0.000AST2=439.894mm2ASC2=0mm2

AT MIDS: $M_{um}/bd^2 = 1.108 \text{ N/mm}^2$ $p_{tm} = 0.273$ $p_{cm} = 0.000$ $ASTM = 224.553 \text{ mm}^2$ $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 78 \text{ KN}$. $V_c = 40 \text{ KN}$. $V_{us} = 38 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 4\#12$ $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 4\#12$ $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$ $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: I25- 1.500-I26- 1.500
SIZE OF BEAM = $230 \times 400 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -25.71 FMD2 = 26.57 FML1 = -0.03 FML2 = -0.06 KN.M.
SFD1 = 37.65 SFD2 = 37.99 SFL1 = 0.02 SFL2 = -0.02 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = 12.83 KN.M. @ 2.06 M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: $DM_1 = 38.6$ $DM_2 = 40.0$ $DMM = 19.3 \text{ KN.M.}$
AT SUP1: $M_{u1}/bd^2 = 1.317 \text{ N/mm}^2$ $p_{t1} = 0.330$ $p_{c1} = 0.000$ $AST_1 = 271.124 \text{ mm}^2$ $ASC_1 = 0 \text{ mm}^2$
AT SUP2: $M_{u2}/bd^2 = 1.363 \text{ N/mm}^2$ $p_{t2} = 0.343$ $p_{c2} = 0.000$ $AST_2 = 281.471 \text{ mm}^2$ $ASC_2 = 0 \text{ mm}^2$
AT MIDS: $M_{um}/bd^2 = 0.657 \text{ N/mm}^2$ $p_{tm} = 0.157$ $p_{cm} = 0.000$ $ASTM = 129.021 \text{ mm}^2$ $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 57 \text{ KN}$. $V_c = 34 \text{ KN}$. $V_{us} = 23 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 3\#12$ $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 3\#12$ $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$ $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: I24- 1.500-I25- 1.500
SIZE OF BEAM = $230 \times 400 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.12 3.50
FMD1 = -25.99 FMD2 = 25.93 FML1 = 0.01 FML2 = 0.02 KN.M.
SFD1 = 37.87 SFD2 = 37.93 SFL1 = -0.01 SFL2 = 0.01 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = 12.99 KN.M. @ 2.06 M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: $DM_1 = 39.0$ $DM_2 = 38.9$ $DMM = 19.5 \text{ KN.M.}$
AT SUP1: $M_{u1}/bd^2 = 1.330 \text{ N/mm}^2$ $p_{t1} = 0.334$ $p_{c1} = 0.000$ $AST_1 = 274.139 \text{ mm}^2$ $ASC_1 = 0 \text{ mm}^2$
AT SUP2: $M_{u2}/bd^2 = 1.328 \text{ N/mm}^2$ $p_{t2} = 0.333$ $p_{c2} = 0.000$ $AST_2 = 273.558 \text{ mm}^2$ $ASC_2 = 0 \text{ mm}^2$
AT MIDS: $M_{um}/bd^2 = 0.665 \text{ N/mm}^2$ $p_{tm} = 0.159$ $p_{cm} = 0.000$ $ASTM = 130.7 \text{ mm}^2$ $ASCM = 0 \text{ mm}^2$
SHEAR DESIGN: $V_u = 57 \text{ KN}$. $V_c = 33 \text{ KN}$. $V_{us} = 24 \text{ KN}$.
REINFORCEMENT AT SUP1: $T_1 = 3\#12$ $C_1 = 2\#12$
REINFORCEMENT AT SUP2: $T_2 = 3\#12$ $C_2 = 2\#12$
REINFORCEMENT AT MIDS: $T_M = 2\#12$ $C_M = 2\#12$
SHEAR REINFORCEMENT: $8\#2 \text{ LEG. STR. @ } 200 \text{ mm SPACING}$
DUCTILE-SPACING OF STIRRUPS 115 mm NEAR SUPPORTS FOR $1/6 \text{ th}$ SPAN

ANALYSIS AND DESIGN FOR BEAM: I23- 1.500-I24- 1.500
SIZE OF BEAM = $230 \times 400 \text{ mm}$. TYPE: BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -25.96 FMD2 = 25.99 FML1 = 0.02 FML2 = 0.01 KN.M.
SFD1 = 37.85 SFD2 = 37.79 SFL1 = -0.01 SFL2 = 0.01 KN.
CRITICAL MIDSPAN MOMENT (DL+LL) = 12.98 KN.M. @ 2.06 M. FROM SUP.1
DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 39.0 DM2= 39.0 DMM= 19.5 KN.M.
 AT SUP1: Mu1/bd2=1.329 N/mm² pt1=0.334 pc1=0.000 AST1=273.906 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.330 N/mm² pt2=0.334 pc2=0.000 AST2=274.139 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.664 N/mm² ptm=0.159 pcm=0.000 ASTM=130.595 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 57 KN. Vc= 33 KN. Vus= 23 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: I22- 1.500-I23- 1.500
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.12 3.50
 FMD1 = -26.00 FMD2 = 25.98 FML1 = -0.07 FML2 = -0.03 KN.M.
 SFD1 = 37.86 SFD2 = 37.94 SFL1 = 0.02 SFL2 = -0.02 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 12.94 KN.M. @ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 39.1 DM2= 39.0 DMM= 19.4 KN.M.
 AT SUP1: Mu1/bd2=1.334 N/mm² pt1=0.335 pc1=0.000 AST1=274.951 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.331 N/mm² pt2=0.334 pc2=0.000 AST2=274.255 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=0.662 N/mm² ptm=0.159 pcm=0.000 ASTM=130.175 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 57 KN. Vc= 33 KN. Vus= 24 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: I30- 5.400-I31- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 2.90 4.12 2.90
 SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
 SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
 FMD1 = -37.54 FMD2 = 18.18 FML1 = -8.97 FML2 = 3.87 KN.M.
 SFD1 = 47.48 SFD2 = 38.17 SFL1 = 9.72 SFL2 = 7.26 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 25.54 KN.M. @ 2.26M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 69.8 DM2= 33.1 DMM= 38.3 KN.M.
 AT SUP1: Mu1/bd2=2.380 N/mm² pt1=0.655 pc1=0.000 AST1=537.76 mm² ASC1=0 mm²
 AT SUP2: Mu2/bd2=1.128 N/mm² pt2=0.279 pc2=0.000 AST2=229.039 mm² ASC2=0 mm²
 AT MIDS: Mum/bd2=1.307 N/mm² ptm=0.327 pcm=0.000 ASTM=268.81 mm² ASCM=0 mm²
 SHEAR DESIGN: Vu= 86 KN. Vc= 44 KN. Vus= 42 KN.
 REINFORCEMENT AT SUP1: T1=5#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=3#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR. @200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: I29- 5.400-I30- 5.400
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.12 2.90
 SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120
 FMD1 = -19.25FMD2 = 37.27FML1 = -4.14FML2 = 8.89KN.M.
 SFD1 = 38.40SFD2 = 47.25SFL1 = 7.33SFL2 = 9.65KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 24.95KN.M.@ 1.85M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 35.1DM2= 69.2DMM= 37.4KN.M.
 AT SUP1:Mu1/bd2=1.197N/mm2pt1=0.297pc1=0.000AST1=244.175mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=2.362N/mm2pt2=0.649pc2=0.000AST2=532.731mm2ASC2=0mm2
 AT MIDS:Mum/bd2=1.277N/mm2ptm=0.319pcm=0.000ASTM=262.005mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 85KN. Vc= 43KN. Vus= 42KN.
 REINFORCEMENT AT SUP1:T1=3#12C1=2#12
 REINFORCEMENT AT SUP2:T2=5#12C2=2#12
 REINFORCEMENT AT MIDS:TM=3#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:I30- 1.500-I31- 1.500
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.12 3.50
 FMD1 = -29.23FMD2 = 19.46FML1 = 0.11FML2 = 0.21KN.M.
 SFD1 = 40.23SFD2 = 35.57SFL1 = -0.08SFL2 = 0.08KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 14.64KN.M.@ 2.26M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 44.0DM2= 29.5DMM= 22.0KN.M.
 AT SUP1:Mu1/bd2=1.501N/mm2pt1=0.382pc1=0.000AST1=313.475mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.007N/mm2pt2=0.247pc2=0.000AST2=202.551mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.749N/mm2ptm=0.180pcm=0.000ASTM=148.124mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 60KN. Vc= 35KN. Vus= 25KN.
 REINFORCEMENT AT SUP1:T1=3#12C1=2#12
 REINFORCEMENT AT SUP2:T2=2#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM:I29- 1.500-I30- 1.500
 SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.12 3.50
 FMD1 = -19.55FMD2 = 29.18FML1 = -0.22FML2 = -0.12KN.M.
 SFD1 = 35.52SFD2 = 40.28SFL1 = 0.08SFL2 = -0.08KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 14.61KN.M.@ 1.85M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 29.7DM2= 44.0DMM= 21.9KN.M.
 AT SUP1:Mu1/bd2=1.012N/mm2pt1=0.248pc1=0.000AST1=203.654mm2ASC1=0mm2
 AT SUP2:Mu2/bd2=1.499N/mm2pt2=0.381pc2=0.000AST2=312.997mm2ASC2=0mm2
 AT MIDS:Mum/bd2=0.748N/mm2ptm=0.180pcm=0.000ASTM=147.806mm2ASCM=0mm2
 SHEAR DESIGN: Vu= 61KN. Vc= 35KN. Vus= 25KN.
 REINFORCEMENT AT SUP1:T1=2#12C1=2#12
 REINFORCEMENT AT SUP2:T2=3#12C2=2#12
 REINFORCEMENT AT MIDS:TM=2#12CM=2#12
 SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D28- 5.400-G28- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 3.34 2.90

FMD1 = -14.78FMD2 = 0.00FML1 = 0.00FML2 = 0.00KN.M.

SFD1 = 30.55SFD2 = 21.69SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 15.03KN.M.@ 2.00M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 22.2DM2= 0.0DMM= 22.6KN.M.

AT SUP1:Mu1/bd2=0.756N/mm2pt1=0.182pc1=0.000AST1=149.612mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.000N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.769N/mm2ptm=0.185pcm=0.000ASTM=152.273mm2ASCM=0mm2

SHEAR DESIGN: Vu= 46KN. Vc= 27KN. Vus= 19KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D28- 1.500-G28- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 3.34 3.50

FMD1 = -17.50FMD2 = 0.00FML1 = 0.00FML2 = 0.00KN.M.

SFD1 = 35.97SFD2 = 25.49SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 17.64KN.M.@ 2.00M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 26.3DM2= 0.0DMM= 26.5KN.M.

AT SUP1:Mu1/bd2=0.895N/mm2pt1=0.218pc1=0.000AST1=178.821mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.000N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.903N/mm2ptm=0.220pcm=0.000ASTM=180.34mm2ASCM=0mm2

SHEAR DESIGN: Vu= 54KN. Vc= 28KN. Vus= 26KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D30- 5.400-G30- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

FMD1 = -2.27FMD2 = 2.27FML1 = 0.00FML2 = 0.00KN.M.

SFD1 = 3.84SFD2 = 3.84SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 0.94KN.M.@ 1.67M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 3.4DM2= 3.4DMM= 1.4KN.M.

AT SUP1:Mu1/bd2=0.116N/mm2pt1=0.150pc1=0.000AST1=123.165mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.116N/mm2pt2=0.150pc2=0.000AST2=123.165mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.048N/mm2ptm=0.150pcm=0.000ASTM=123.165mm2ASCM=0mm2

SHEAR DESIGN: Vu= 6KN. Vc= 27KN. Vus= KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:D30- 1.500-G30- 1.500

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 3.50 3.34 3.50

FMD1 = -12.60FMD2 = 12.60FML1 = 0.00FML2 = 0.00KN.M.

SFD1 = 30.73SFD2 = 30.73SFL1 = 0.00SFL2 = 0.00KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 13.06KN.M.@ 1.67M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 18.9DM2= 18.9DMM= 19.6KN.M.

AT SUP1:Mu1/bd2=0.645N/mm2pt1=0.154pc1=0.000AST1=126.611mm2ASC1=0mm2

AT SUP2:Mu2/bd2=0.645N/mm2pt2=0.154pc2=0.000AST2=126.611mm2ASC2=0mm2

AT MIDS:Mum/bd2=0.668N/mm2ptm=0.160pcm=0.000ASTM=131.435mm2ASCM=0mm2

SHEAR DESIGN: Vu= 46KN. Vc= 27KN. Vus= 19KN.

REINFORCEMENT AT SUP1:T1=2#12C1=2#12

REINFORCEMENT AT SUP2:T2=2#12C2=2#12

REINFORCEMENT AT MIDS:TM=2#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H30- 5.400-H31- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.11 2.90

SLD 2 0 1.62 4.11 1.62 5.00 4.00 120

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

SLD 2 0 0.01 0.01 0.00 5.00 4.00 120

FMD1 = -49.58FMD2 = 24.85FML1 = -19.53FML2 = 8.89KN.M.

SFD1 = 65.45SFD2 = 53.35SFL1 = 24.40SFL2 = 19.21KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 39.47KN.M.@ 2.26M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 103.7DM2= 50.6DMM= 59.2KN.M.

AT SUP1:Mu1/bd2=3.536N/mm2pt1=0.992pc1=0.265AST1=814.288mm2ASC1=217.863mm2

AT SUP2:Mu2/bd2=1.727N/mm2pt2=0.447pc2=0.000AST2=367.159mm2ASC2=0mm2

AT MIDS:Mum/bd2=2.020N/mm2ptm=0.537pcm=0.000ASTM=440.687mm2ASCM=0mm2

SHEAR DESIGN: Vu= 135KN. Vc= 51KN. Vus= 84KN.

REINFORCEMENT AT SUP1:T1=2#12+3#16C1=2#12

REINFORCEMENT AT SUP2:T2=4#12C2=2#12

REINFORCEMENT AT MIDS:TM=4#12CM=2#12

SHEAR REINFORCEMENT:8#2LEG.STR.@175mm SPACING

DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H29- 5.400-H30- 5.400

SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED

LOADS ON BEAM:

WLD 0.23 0.00 2.90 4.11 2.90

SLD 2 0 1.62 4.12 1.62 5.00 4.00 120

SLD 3 0.00 0.00 2.06 2.06 4.12 0.00 5.00 4.00 120

FMD1 = -38.95FMD2 = 46.35FML1 = -13.55FML2 = 18.56KN.M.

SFD1 = 57.64SFD2 = 61.24SFL1 = 20.59SFL2 = 23.08KN.

CRITICAL MIDSPAN MOMENT(DL+LL)= 31.44KN.M.@ 2.06M. FROM SUP.1

DESIGN PROCEDURE:

DESIGN FACTORED MOMENTS: DM1= 78.8DM2= 97.4DMM= 47.2KN.M.
AT SUP1:Mu1/bd2=2.686N/mm2pt1=0.762pc1=0.008AST1=625.539mm2ASC1=6.464mm2
AT SUP2:Mu2/bd2=3.322N/mm2pt2=0.934pc2=0.200AST2=766.561mm2ASC2=164.409mm2
AT MIDS:Mum/bd2=1.609N/mm2ptm=0.413pcm=0.000ASTM=338.819mm2ASCM=0mm2
SHEAR DESIGN: Vu= 126KN. Vc= 50KN. Vus= 77KN.
REINFORCEMENT AT SUP1:T1=2#12+2#16C1=2#12
REINFORCEMENT AT SUP2:T2=2#12+3#16C2=2#12
REINFORCEMENT AT MIDS:TM=3#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H27- 5.400-H29- 5.400
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 2.90 4.23 2.90
SLD 2 0 1.62 4.23 1.62 5.00 4.00 120
SLD 2 0 0.01 0.01 0.00 5.00 4.00 120
FMD1 = -37.00FMD2 = 36.38FML1 = -11.06FML2 = 10.78KN.M.
SFD1 = 50.36SFD2 = 50.06SFL1 = 13.78SFL2 = 13.64KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 19.99KN.M.@ 2.12M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 72.1DM2= 70.7DMM= 30.0KN.M.
AT SUP1:Mu1/bd2=2.459N/mm2pt1=0.682pc1=0.000AST1=560.311mm2ASC1=0mm2
AT SUP2:Mu2/bd2=2.413N/mm2pt2=0.666pc2=0.000AST2=547.159mm2ASC2=0mm2
AT MIDS:Mum/bd2=1.023N/mm2ptm=0.251pcm=0.000ASTM=206.084mm2ASCM=0mm2
SHEAR DESIGN: Vu= 96KN. Vc= 45KN. Vus= 52KN.
REINFORCEMENT AT SUP1:T1=5#12C1=2#12
REINFORCEMENT AT SUP2:T2=5#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H30- 1.500-H31- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:
WLD 0.23 0.00 3.50 4.11 3.50
FMD1 = -28.48FMD2 = 20.06FML1 = 0.16FML2 = 0.46KN.M.
SFD1 = 39.91SFD2 = 35.73SFL1 = -0.15SFL2 = 0.15KN.
CRITICAL MIDSPAN MOMENT(DL+LL)= 14.53KN.M.@ 2.06M. FROM SUP.1
DESIGN PROCEDURE:
DESIGN FACTORED MOMENTS: DM1= 43.0DM2= 30.8DMM= 21.8KN.M.
AT SUP1:Mu1/bd2=1.466N/mm2pt1=0.372pc1=0.000AST1=305.134mm2ASC1=0mm2
AT SUP2:Mu2/bd2=1.050N/mm2pt2=0.258pc2=0.000AST2=211.955mm2ASC2=0mm2
AT MIDS:Mum/bd2=0.744N/mm2ptm=0.179pcm=0.000ASTM=146.956mm2ASCM=0mm2
SHEAR DESIGN: Vu= 60KN. Vc= 35KN. Vus= 25KN.
REINFORCEMENT AT SUP1:T1=3#12C1=2#12
REINFORCEMENT AT SUP2:T2=2#12C2=2#12
REINFORCEMENT AT MIDS:TM=2#12CM=2#12
SHEAR REINFORCEMENT:8#2LEG.STR.@200mm SPACING
DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

ANALYSIS AND DESIGN FOR BEAM:H29- 1.500-H30- 1.500
SIZE OF BEAM=230x400mm.TYPE:BOTH ENDS SUPPORTED
LOADS ON BEAM:

WLD 0.23 0.00 3.50 4.11 3.50
 FMD1 = -26.22 FMD2 = 26.32 FML1 = -0.18 FML2 = -0.16 KN.M.
 SFD1 = 37.84 SFD2 = 37.80 SFL1 = 0.08 SFL2 = -0.08 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 12.67 KN.M.@ 2.06M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 39.6 DM2= 39.7 DMM= 19.0 KN.M.
 AT SUP1: Mu1/bd2=1.351 N/mm2 pt1=0.340 pc1=0.000 AST1=278.789 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=1.355 N/mm2 pt2=0.341 pc2=0.000 AST2=279.721 mm2 ASC2=0 mm2
 AT MIDS: Mum/bd2=0.648 N/mm2 ptm=0.155 pcm=0.000 ASTM=127.344 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 57 KN. Vc= 34 KN. Vus= 23 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 ANALYSIS AND DESIGN FOR BEAM: H27- 1.500-H29- 1.500
 SIZE OF BEAM=230x400mm. TYPE:BOTH ENDS SUPPORTED
 LOADS ON BEAM:
 WLD 0.23 0.00 3.50 4.23 3.50
 FMD1 = -27.22 FMD2 = 27.16 FML1 = 0.09 FML2 = -0.05 KN.M.
 SFD1 = 38.93 SFD2 = 38.91 SFL1 = -0.01 SFL2 = 0.01 KN.
 CRITICAL MIDSPAN MOMENT(DL+LL)= 14.04 KN.M.@ 2.12M. FROM SUP.1
 DESIGN PROCEDURE:
 DESIGN FACTORED MOMENTS: DM1= 41.0 DM2= 40.8 DMM= 21.1 KN.M.
 AT SUP1: Mu1/bd2=1.397 N/mm2 pt1=0.352 pc1=0.000 AST1=289.43 mm2 ASC1=0 mm2
 AT SUP2: Mu2/bd2=1.392 N/mm2 pt2=0.351 pc2=0.000 AST2=288.256 mm2 ASC2=0 mm2
 AT MIDS: Mum/bd2=0.718 N/mm2 ptm=0.173 pcm=0.000 ASTM=141.765 mm2 ASCM=0 mm2
 SHEAR DESIGN: Vu= 58 KN. Vc= 34 KN. Vus= 24 KN.
 REINFORCEMENT AT SUP1: T1=3#12 C1=2#12
 REINFORCEMENT AT SUP2: T2=3#12 C2=2#12
 REINFORCEMENT AT MIDS: TM=2#12 CM=2#12
 SHEAR REINFORCEMENT: 8#2 LEG. STR.@200mm SPACING
 DUCTILE-SPACING OF STIRRUPS 115mm NEAR SUPPORTS FOR 1/6th SPAN

 DESIGN DETAILS OF COLUMN: C20-0-1.5
 SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 549.60 KN. PLL= 146.65 KN.
 D.L.M.FROM LOWER TO UPPER: DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER: LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER: DMD 0 -7.32 90 10.50
 L.L.M.FROM UPPER TO LOWER: LMD 0 0.32 90 -3.49
 DESIGN PROCEDURE:
 LOAD COMBINATION: 1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1044.38 KN. Mux=11.46 KN.M. Muy=20.99 KN.M.
 Short Column
 Pu/Fckbd=0.387 Mux/Fckbd2=0.014 Muy/Fckbd2=0.017
 pc=0.2% Areq= 270 mm2
 FROM CHARTS Mux1 / Fckbd2 = 0.035 Muy1 / Fckbd2 = 0.036
 Puz=1314 KN. Pu/Puz=0.795 ALFA=1.992
 (Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.398 < 1.0 HENCE SAFE
 AREA OF STEEL=1206 mm2
 MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C20-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 456.78KN. PLL= 146.78KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -6.44 90 13.62

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.72 90 4.09

D.L.M.FROM UPPER TO LOWER:DMD 0 -7.25 90 19.11

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.69 90 10.83

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=905.34KN. Mux=13.41KN.M. Muy=44.91KN.M.

Short Column

$P_u/F_{ckb_d} = 0.335$ $M_{ux}/F_{ckb_d} = 0.017$ $M_{uy}/F_{ckb_d} = 0.037$

$p_c = 0.2\%$ $A_{req} = 270mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.049$ $M_{uy1}/F_{ckb_d} = 0.050$

$P_{uz} = 1314KN$. $P_u/P_{uz} = 0.689$ $ALFA = 1.815$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.714 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C20-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 334.14KN. PLL= 103.20KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.22 90 27.45

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.93 90 18.59

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.95 90 25.82

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.75 90 16.41

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=656.01KN. Mux=18.23KN.M. Muy=69.06KN.M.

Short Column

$P_u/F_{ckb_d} = 0.243$ $M_{ux}/F_{ckb_d} = 0.023$ $M_{uy}/F_{ckb_d} = 0.057$

$p_c = 0.4\%$ $A_{req} = 540mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.073$ $M_{uy1}/F_{ckb_d} = 0.076$

$P_{uz} = 1413KN$. $P_u/P_{uz} = 0.464$ $ALFA = 1.441$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.848 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C20-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 211.93KN. PLL= 59.82KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -8.76 90 22.50

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.67 90 15.32

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.82 90 20.82

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.75 90 16.38
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=407.63KN. Mux=17.36KN.M. Muy=58.32KN.M.
 Short Column
 $Pu/Fckbd=0.151$ $Mux/Fckbd2=0.021$ $Muy/Fckbd2=0.048$
 $pc=0.4\%$ $A_{req}=540mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.073$ $Muy1 / Fckbd2 = 0.075$
 $Puz=1413KN$, $Pu/Puz=0.289$ $ALFA=1.148$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.841 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:C20-12-15.3
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 89.43KN. PLL= 16.35KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -8.45 90 29.27
 L.L.M.FROM LOWER TO UPPER:LMU 0 -2.29 90 14.25
 D.L.M.FROM UPPER TO LOWER:DMD 0 -8.04 90 39.38
 L.L.M.FROM UPPER TO LOWER:LMD 0 -1.74 90 11.05
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=158.67KN. Mux=16.11KN.M. Muy=80.45KN.M.
 Short Column
 $Pu/Fckbd=0.059$ $Mux/Fckbd2=0.020$ $Muy/Fckbd2=0.066$
 $pc=0.8\%$ $A_{req}=1080mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.083$ $Muy1 / Fckbd2 = 0.088$
 $Puz=1610KN$, $Pu/Puz=0.099$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.993 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:C19-0-1.5
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 540.68KN. PLL= 143.07KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 7.52 90 10.70
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.31 90 -3.37
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1025.63KN. Mux=11.75KN.M. Muy=21.11KN.M.
 Short Column
 $Pu/Fckbd=0.380$ $Mux/Fckbd2=0.015$ $Muy/Fckbd2=0.017$
 $pc=0.2\%$ $A_{req}=270mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.037$ $Muy1 / Fckbd2 = 0.038$
 $Puz=1314KN$, $Pu/Puz=0.781$ $ALFA=1.968$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.371 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C19-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 448.77KN. PLL= 143.24KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 6.55 90 13.39

L.L.M.FROM LOWER TO UPPER:LMU 0 0.70 90 3.93

D.L.M.FROM UPPER TO LOWER:DMD 0 7.29 90 18.52

L.L.M.FROM UPPER TO LOWER:LMD 0 1.63 90 10.37

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=888.02KN. Mux=13.38KN.M. Muy=43.34KN.M.

Short Column

$P_u/F_{ckbd}=0.329$ $M_{ux}/F_{ckbd2}=0.017$ $M_{uy}/F_{ckbd2}=0.036$

$p_c=0.2\%$ Areq= 270mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.051$ $M_{uy1}/F_{ckbd2} = 0.052$

$P_{uz}=1314KN$. $P_u/P_{uz}=0.676$ ALFA=1.793

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.649 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C19-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 328.22KN. PLL= 100.68KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 9.23 90 26.47

L.L.M.FROM LOWER TO UPPER:LMU 0 2.85 90 17.79

D.L.M.FROM UPPER TO LOWER:DMD 0 8.97 90 24.92

L.L.M.FROM UPPER TO LOWER:LMD 0 2.68 90 15.72

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=643.35KN. Mux=18.12KN.M. Muy=66.39KN.M.

Short Column

$P_u/F_{ckbd}=0.238$ $M_{ux}/F_{ckbd2}=0.022$ $M_{uy}/F_{ckbd2}=0.055$

$p_c=0.2\%$ Areq= 270mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.063$ $M_{uy1}/F_{ckbd2} = 0.065$

$P_{uz}=1314KN$. $P_u/P_{uz}=0.49$ ALFA=1.483

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.995 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C19-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 208.20KN. PLL= 58.39KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 8.79 90 21.74

L.L.M.FROM LOWER TO UPPER:LMU 0 2.59 90 14.66
 D.L.M.FROM UPPER TO LOWER:DMD 0 8.86 90 20.12
 L.L.M.FROM UPPER TO LOWER:LMD 0 2.67 90 15.67
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=399.89KN. Mux=17.3KN.M. Muy=56.12KN.M.
 Short Column
 $Pu/Fckbd=0.148$ $Mux/Fckbd2=0.021$ $Muy/Fckbd2=0.046$
 $pc=0.4\%$ Areq= 540mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.072$ $Muy1 / Fckbd2 = 0.075$
 $Puz=1413KN$. $Pu/Puz=0.283$ ALFA=1.138
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.823 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:C19-12-15.3
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 87.86KN. PLL= 15.97KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 8.45 90 28.27
 L.L.M.FROM LOWER TO UPPER:LMU 0 2.22 90 13.64
 D.L.M.FROM UPPER TO LOWER:DMD 0 7.98 90 38.04
 L.L.M.FROM UPPER TO LOWER:LMD 0 1.68 90 10.57
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=155.75KN. Mux=16.01KN.M. Muy=77.52KN.M.
 Short Column
 $Pu/Fckbd=0.058$ $Mux/Fckbd2=0.020$ $Muy/Fckbd2=0.064$
 $pc=0.8\%$ Areq= 1080mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.083$ $Muy1 / Fckbd2 = 0.088$
 $Puz=1610KN$. $Pu/Puz=0.097$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.967 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G20-0-1.5
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 662.77KN. PLL= 231.39KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -7.41 90 -10.50
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.46 90 3.51
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1341.24KN. Mux=11.81KN.M. Muy=21.02KN.M.
 Short Column
 $Pu/Fckbd=0.497$ $Mux/Fckbd2=0.015$ $Muy/Fckbd2=0.017$
 $pc=0.6\%$ Areq= 810mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.023$ $Muy1 / Fckbd2 = 0.024$

Puz=1511KN.Pu/Puz=0.887ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.887< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G20-1.5-5.4
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 570.57KN. PLL= 231.70KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -6.70 90 -13.62
L.L.M.FROM LOWER TO UPPER:LMU 0 -1.07 90 -4.09
D.L.M.FROM UPPER TO LOWER:DMD 0 -7.67 90 -19.11
L.L.M.FROM UPPER TO LOWER:LMD 0 -2.46 90 -10.82
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1203.41KN. Mux=15.2KN.M. Muy=44.9KN.M.
Short Column
Pu/Fckbd=0.446Mux/Fckbd2=0.019Muy/Fckbd2=0.037
pc=0.8% Areq= 1080mm2
FROM CHARTS Mux1 / Fckbd2 = 0.055 Muy1 / Fckbd2 = 0.058
Puz=1610KN.Pu/Puz=0.747ALFA=1.912
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.552< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G20-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 415.38KN. PLL= 162.77KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -9.95 90 -27.47
L.L.M.FROM LOWER TO UPPER:LMU 0 -4.37 90 -18.61
D.L.M.FROM UPPER TO LOWER:DMD 0 -9.72 90 -25.82
L.L.M.FROM UPPER TO LOWER:LMD 0 -4.18 90 -16.43
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=867.23KN. Mux=21.48KN.M. Muy=69.12KN.M.
Short Column
Pu/Fckbd=0.321Mux/Fckbd2=0.027Muy/Fckbd2=0.057
pc=0.6% Areq= 810mm2
FROM CHARTS Mux1 / Fckbd2 = 0.072 Muy1 / Fckbd2 = 0.076
Puz=1511KN.Pu/Puz=0.574ALFA=1.623
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.825< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G20-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 260.91KN. PLL= 94.47KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -9.58 90 -22.51
L.L.M.FROM LOWER TO UPPER:LMU 0 -4.07 90 -15.31
D.L.M.FROM UPPER TO LOWER:DMD 0 -9.66 90 -20.85
L.L.M.FROM UPPER TO LOWER:LMD 0 -4.16 90 -16.37
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=533.07KN. Mux=20.73KN.M. Muy=58.32KN.M.
Short Column
 $Pu/Fckbd=0.197$ $Mux/Fckbd2=0.026$ $Muy/Fckbd2=0.048$
 $pc=0.2\%$ Areq= 270mm²
FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.066$
 $Puz=1314KN$. $Pu/Puz=0.406$ ALFA=1.343
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.947 < 1.0$ HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G20-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 106.03KN. PLL= 25.87KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -8.88 90 -29.27
L.L.M.FROM LOWER TO UPPER:LMU 0 -3.41 90 -14.23
D.L.M.FROM UPPER TO LOWER:DMD 0 -7.99 90 -39.39
L.L.M.FROM UPPER TO LOWER:LMD 0 -2.56 90 -11.05

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=197.85KN. Mux=18.44KN.M. Muy=80.43KN.M.

Short Column

$Pu/Fckbd=0.073$ $Mux/Fckbd2=0.023$ $Muy/Fckbd2=0.066$

$pc=0.8\%$ Areq= 1080mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.086$ $Muy1 / Fckbd2 = 0.091$

$Puz=1610KN$. $Pu/Puz=0.123$ ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.993 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G19-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 651.91KN. PLL= 226.67KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 7.68 90 -10.69
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.44 90 3.37

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1317.87KN. Mux=12.18KN.M. Muy=21.09KN.M.

Short Column

$Pu/Fckbd=0.488$ $Mux/Fckbd2=0.015$ $Muy/Fckbd2=0.017$

pc=0.6% Areq= 810mm²
FROM CHARTS Mux1 / Fckbd2 = 0.027 Muy1 / Fckbd2 = 0.028
Puz=1511KN.Pu/Puz=0.872ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.696< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G19-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 561.00KN. PLL= 227.00KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 6.85 90 -13.40

L.L.M.FROM LOWER TO UPPER:LMU 0 1.05 90 -3.93

D.L.M.FROM UPPER TO LOWER:DMD 0 7.80 90 -18.54

L.L.M.FROM UPPER TO LOWER:LMD 0 2.45 90 -10.38

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1182KN. Mux=15.38KN.M. Muy=43.38KN.M.

Short Column

Pu/Fckbd=0.438Mux/Fckbd2=0.019Muy/Fckbd2=0.036

pc=0.6% Areq= 810mm²

FROM CHARTS Mux1 / Fckbd2 = 0.031 Muy1 / Fckbd2 = 0.047

Puz=1511KN.Pu/Puz=0.782ALFA=1.97

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.968< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G19-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 408.54KN. PLL= 159.43KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 10.04 90 -26.47

L.L.M.FROM LOWER TO UPPER:LMU 0 4.33 90 -17.80

D.L.M.FROM UPPER TO LOWER:DMD 0 9.82 90 -24.92

L.L.M.FROM UPPER TO LOWER:LMD 0 4.13 90 -15.73

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=851.96KN. Mux=21.56KN.M. Muy=66.41KN.M.

Short Column

Pu/Fckbd=0.316Mux/Fckbd2=0.027Muy/Fckbd2=0.055

pc=0.6% Areq= 810mm²

FROM CHARTS Mux1 / Fckbd2 = 0.073 Muy1 / Fckbd2 = 0.077

Puz=1511KN.Pu/Puz=0.564ALFA=1.606

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.777< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G19-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 256.91KN. PLL= 92.57KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 9.69 90 -21.75

L.L.M.FROM LOWER TO UPPER:LMU 0 4.04 90 -14.67

D.L.M.FROM UPPER TO LOWER:DMD 0 9.80 90 -20.13

L.L.M.FROM UPPER TO LOWER:LMD 0 4.14 90 -15.68

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=524.22KN. Mux=20.91KN.M. Muy=56.15KN.M.

Short Column

$Pu/Fckbd=0.194$ $Mux/Fckbd2=0.026$ $Muy/Fckbd2=0.046$

$pc=0.2\%$ Areq= 270mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.066$

Puz=1314KN.Pu/Puz=0.399ALFA=1.332

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.925 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G19-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 104.92KN. PLL= 25.35KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 8.91 90 -28.27

L.L.M.FROM LOWER TO UPPER:LMU 0 3.39 90 -13.65

D.L.M.FROM UPPER TO LOWER:DMD 0 7.92 90 -38.05

L.L.M.FROM UPPER TO LOWER:LMD 0 2.54 90 -10.60

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=195.41KN. Mux=18.45KN.M. Muy=77.55KN.M.

Short Column

$Pu/Fckbd=0.072$ $Mux/Fckbd2=0.023$ $Muy/Fckbd2=0.064$

$pc=0.8\%$ Areq= 1080mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.086$ $Muy1 / Fckbd2 = 0.091$

Puz=1610KN.Pu/Puz=0.121ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.969 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H2-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 399.32KN. PLL= 142.23KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.39 90 -0.51

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.05 90 0.88

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=812.33KN. Mux=2.16KN.M. Muy=2.09KN.M.

Short Column

$P_u/F_{ckbd} = 0.589$ $M_u/F_{ckbd} = 0.005$ $M_u/F_{ckbd} = 0.007$

$p_c = 1\%$ $A_{req} = 690 \text{ mm}^2$

FROM CHARTS $M_{u1} / F_{ckbd} = 0.016$ $M_{u1} / F_{ckbd} = 0.016$

$P_{uz} = 874 \text{ kN}$ $P_u/P_{uz} = 0.93$ $\alpha = 2$

$(M_u/M_{u1})^{\alpha} + (M_u/M_{u1})^{\alpha} = 0.277 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: H2-1.5-5.4

SIZE OF COLUMN: 300x230mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 346.16 kN. PLL = 142.25 kN.

D.L.M. FROM LOWER TO UPPER: DMU 0 1.09 90 -2.76

L.L.M. FROM LOWER TO UPPER: LMU 0 0.13 90 -1.27

D.L.M. FROM UPPER TO LOWER: DMD 0 1.12 90 -5.12

L.L.M. FROM UPPER TO LOWER: LMD 0 0.24 90 -3.23

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 732.62 \text{ kN}$. $M_u = 2.04 \text{ kN.M}$. $M_u = 12.53 \text{ kN.M}$.

Short Column

$P_u/F_{ckbd} = 0.531$ $M_u/F_{ckbd} = 0.005$ $M_u/F_{ckbd} = 0.039$

$p_c = 1.2\%$ $A_{req} = 828 \text{ mm}^2$

FROM CHARTS $M_{u1} / F_{ckbd} = 0.010$ $M_{u1} / F_{ckbd} = 0.051$

$P_{uz} = 924 \text{ kN}$ $P_u/P_{uz} = 0.793$ $\alpha = 1.988$

$(M_u/M_{u1})^{\alpha} + (M_u/M_{u1})^{\alpha} = 0.846 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: H2-5.4-8.7

SIZE OF COLUMN: 300x230mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 250.74 kN. PLL = 103.96 kN.

D.L.M. FROM LOWER TO UPPER: DMU 0 1.29 90 -8.33

L.L.M. FROM LOWER TO UPPER: LMU 0 0.42 90 -5.73

D.L.M. FROM UPPER TO LOWER: DMD 0 1.29 90 -7.84

L.L.M. FROM UPPER TO LOWER: LMD 0 0.42 90 -5.33

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 532.05 \text{ kN}$. $M_u = 2.57 \text{ kN.M}$. $M_u = 21.09 \text{ kN.M}$.

Short Column

$P_u/F_{ckbd} = 0.386$ $M_u/F_{ckbd} = 0.006$ $M_u/F_{ckbd} = 0.066$

$p_c = 1\%$ $A_{req} = 690 \text{ mm}^2$

FROM CHARTS $M_{u1} / F_{ckbd} = 0.081$ $M_{u1} / F_{ckbd} = 0.076$

$P_{uz} = 874 \text{ kN}$ $P_u/P_{uz} = 0.609$ $\alpha = 1.682$

$(M_u/M_{u1})^{\alpha} + (M_u/M_{u1})^{\alpha} = 0.803 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H2-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 155.47KN. PLL= 65.80KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.29 90 -7.15

L.L.M.FROM LOWER TO UPPER:LMU 0 0.39 90 -4.81

D.L.M.FROM UPPER TO LOWER:DMD 0 1.29 90 -6.95

L.L.M.FROM UPPER TO LOWER:LMD 0 0.40 90 -4.70

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=331.91KN. Mux=2.54KN.M. Muy=17.94KN.M.

Short Column

$P_u/F_{ckbd} = 0.241$ $M_{ux}/F_{ckbd} = 0.006$ $M_{uy}/F_{ckbd} = 0.057$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.063$ $M_{uy1} / F_{ckbd} = 0.062$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.494$ $\alpha = 1.49$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.91 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H2-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 60.00KN. PLL= 27.57KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.12 90 -8.56

L.L.M.FROM LOWER TO UPPER:LMU 0 0.34 90 -5.79

D.L.M.FROM UPPER TO LOWER:DMD 0 0.93 90 -10.35

L.L.M.FROM UPPER TO LOWER:LMD 0 0.24 90 -7.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=131.36KN. Mux=2.19KN.M. Muy=26.03KN.M.

Short Column

$P_u/F_{ckbd} = 0.095$ $M_{ux}/F_{ckbd} = 0.005$ $M_{uy}/F_{ckbd} = 0.082$

$p_c = 1\%$ $A_{req} = 690mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.102$ $M_{uy1} / F_{ckbd} = 0.096$

$P_{uz} = 874KN$. $P_u/P_{uz} = 0.15$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.907 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F2-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 381.53KN. PLL= 135.65KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.16 90 0.51

L.L.M.FROM UPPER TO LOWER:LMD 0 0.03 90 -0.88

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=775.77KN. Mux=1.79KN.M. Muy=2.09KN.M.

Short Column

Pu/Fckbd=0.562Mux/Fckbd2=0.004Muy/Fckbd2=0.007

pc=0.8% Areq= 552mm²

FROM CHARTS Mux1 / Fckbd2 = 0.012 Muy1 / Fckbd2 = 0.012

Puz=823KN.Pu/Puz=0.943ALFA=2

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.45< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F2-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 329.73KN. PLL= 135.50KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.80 90 2.76

L.L.M.FROM LOWER TO UPPER:LMU 0 0.06 90 1.27

D.L.M.FROM UPPER TO LOWER:DMD 0 0.70 90 5.12

L.L.M.FROM UPPER TO LOWER:LMD 0 0.08 90 3.23

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=697.85KN. Mux=1.32KN.M. Muy=12.53KN.M.

Short Column

Pu/Fckbd=0.506Mux/Fckbd2=0.003Muy/Fckbd2=0.039

pc=1.2% Areq= 828mm²

FROM CHARTS Mux1 / Fckbd2 = 0.062 Muy1 / Fckbd2 = 0.059

Puz=924KN.Pu/Puz=0.755ALFA=1.925

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.466< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F2-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 238.84KN. PLL= 99.36KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.73 90 8.33

L.L.M.FROM LOWER TO UPPER:LMU 0 0.15 90 5.73

D.L.M.FROM UPPER TO LOWER:DMD 0 0.76 90 7.84

L.L.M.FROM UPPER TO LOWER:LMD 0 0.17 90 5.33

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=507.3KN. Mux=1.4KN.M. Muy=21.09KN.M.

Short Column

Pu/Fckbd=0.368Mux/Fckbd2=0.003Muy/Fckbd2=0.066

pc=0.8% Areq= 552mm²

FROM CHARTS Mux1 / Fckbd2 = 0.041 Muy1 / Fckbd2 = 0.071

Puz=823KN.Pu/Puz=0.616ALFA=1.694

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.918< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F2-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 147.66KN. PLL= 62.99KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.77 90 7.15

L.L.M.FROM LOWER TO UPPER:LMU 0 0.17 90 4.81

D.L.M.FROM UPPER TO LOWER:DMD 0 0.77 90 6.95

L.L.M.FROM UPPER TO LOWER:LMD 0 0.16 90 4.70

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=315.98KN. Mux=1.41KN.M. Muy=17.94KN.M.

Short Column

$P_u/F_{ck}b_d=0.229$ $M_{ux}/F_{ck}b_d^2=0.003$ $M_{uy}/F_{ck}b_d^2=0.057$

$p_c=0.2\%$ $A_{req}=138mm^2$

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.064$ $M_{uy1}/F_{ck}b_d^2 = 0.062$

$P_{uz}=672KN$. $P_u/P_{uz}=0.471$ $ALFA=1.451$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.883 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F2-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 56.37KN. PLL= 26.72KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.58 90 8.56

L.L.M.FROM LOWER TO UPPER:LMU 0 0.13 90 5.79

D.L.M.FROM UPPER TO LOWER:DMD 0 0.38 90 10.35

L.L.M.FROM UPPER TO LOWER:LMD 0 0.10 90 7.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=124.64KN. Mux=1.07KN.M. Muy=26.03KN.M.

Short Column

$P_u/F_{ck}b_d=0.090$ $M_{ux}/F_{ck}b_d^2=0.003$ $M_{uy}/F_{ck}b_d^2=0.082$

$p_c=1\%$ $A_{req}=690mm^2$

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.101$ $M_{uy1}/F_{ck}b_d^2 = 0.095$

$P_{uz}=874KN$. $P_u/P_{uz}=0.143$ $ALFA=1$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.886 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D31-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 298.96KN. PLL= 39.47KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.76 90 5.37

L.L.M.FROM UPPER TO LOWER:LMD 0 0.25 90 -0.04

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=507.65KN. Mux=13.52KN.M. Muy=8.12KN.M.

Short Column

Pu/Fckbd=0.368Mux/Fckbd2=0.033Muy/Fckbd2=0.026

pc=0.4% Areq= 276mm²

FROM CHARTS Mux1 / Fckbd2 = 0.053 Muy1 / Fckbd2 = 0.051

Puz=722KN.Pu/Puz=0.703ALFA=1.838

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.695< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D31-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 236.24KN. PLL= 39.37KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -6.83 90 4.03

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.58 90 0.03

D.L.M.FROM UPPER TO LOWER:DMD 0 -6.91 90 3.91

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.34 90 0.09

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=413.42KN. Mux=12.38KN.M. Muy=6.18KN.M.

Short Column

Pu/Fckbd=0.300Mux/Fckbd2=0.030Muy/Fckbd2=0.019

pc=0.2% Areq= 138mm²

FROM CHARTS Mux1 / Fckbd2 = 0.056 Muy1 / Fckbd2 = 0.055

Puz=672KN.Pu/Puz=0.616ALFA=1.693

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.515< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D31-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 169.63KN. PLL= 27.84KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -8.15 90 4.40

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.40 90 0.16

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.04 90 4.32

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.30 90 0.13

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=296.21KN. Mux=15.83KN.M. Muy=6.84KN.M.

Short Column

Pu/Fckbd=0.215Mux/Fckbd2=0.038Muy/Fckbd2=0.022

pc=0.2% Areq= 138mm²

FROM CHARTS Mux1 / Fckbd2 = 0.064 Muy1 / Fckbd2 = 0.063

Puz=672KN.Pu/Puz=0.441ALFA=1.402

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.708< 1.0 HENCE SAFE

AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D31-8.7-12
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 102.56KN. PLL= 16.02KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -7.99 90 4.28
L.L.M.FROM LOWER TO UPPER:LMU 0 -2.24 90 0.11
D.L.M.FROM UPPER TO LOWER:DMD 0 -8.07 90 4.34
L.L.M.FROM UPPER TO LOWER:LMD 0 -2.29 90 0.12

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=177.87KN. Mux=15.54KN.M. Muy=6.69KN.M.
Short Column
 $Pu/Fckbd=0.129$ $Mux/Fckbd2=0.038$ $Muy/Fckbd2=0.021$
 $pc=0.2\%$ Areq= 138mm²
FROM CHARTS $Mux1 / Fckbd2 = 0.058$ $Muy1 / Fckbd2 = 0.057$
 $Puz=672KN$. $Pu/Puz=0.265$ ALFA=1.108
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.953 < 1.0$ HENCE SAFE
AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D31-12-15.3
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 35.87KN. PLL= 4.33KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -7.44 90 3.89
L.L.M.FROM LOWER TO UPPER:LMU 0 -1.88 90 0.12
D.L.M.FROM UPPER TO LOWER:DMD 0 -6.74 90 3.34
L.L.M.FROM UPPER TO LOWER:LMD 0 -1.40 90 0.10

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=60.3KN. Mux=13.98KN.M. Muy=6.02KN.M.
Short Column
 $Pu/Fckbd=0.044$ $Mux/Fckbd2=0.034$ $Muy/Fckbd2=0.019$
 $pc=0.6\%$ Areq= 414mm²
FROM CHARTS $Mux1 / Fckbd2 = 0.066$ $Muy1 / Fckbd2 = 0.062$
 $Puz=773KN$. $Pu/Puz=0.078$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.817 < 1.0$ HENCE SAFE
AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G31-0-1.5
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 482.81KN. PLL= 72.51KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -9.69 90 -2.08
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.71 90 0.11
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=832.98KN. Mux=15.6KN.M. Muy=3.29KN.M.
 Short Column
 $Pu/Fckbd=0.604$ $Mux/Fckbd2=0.038$ $Muy/Fckbd2=0.010$
 $pc=1.4\%$ Areq= 966mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.041$ $Muy1 / Fckbd2 = 0.039$
 $Puz=975KN$. $Pu/Puz=0.855$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.896 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G31-1.5-5.4
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 383.85KN. PLL= 72.01KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -8.64 90 -1.77
 L.L.M.FROM LOWER TO UPPER:LMU 0 -1.26 90 -0.13
 D.L.M.FROM UPPER TO LOWER:DMD 0 -9.80 90 -1.92
 L.L.M.FROM UPPER TO LOWER:LMD 0 -3.02 90 -0.32
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=683.79KN. Mux=19.23KN.M. Muy=3.36KN.M.
 Short Column
 $Pu/Fckbd=0.496$ $Mux/Fckbd2=0.046$ $Muy/Fckbd2=0.011$
 $pc=1\%$ Areq= 690mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.053$ $Muy1 / Fckbd2 = 0.050$
 $Puz=874KN$. $Pu/Puz=0.783$ ALFA=1.971
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.826 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G31-5.4-8.7
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 274.36KN. PLL= 51.17KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -12.60 90 -2.35
 L.L.M.FROM LOWER TO UPPER:LMU 0 -5.34 90 -0.51
 D.L.M.FROM UPPER TO LOWER:DMD 0 -12.24 90 -2.21
 L.L.M.FROM UPPER TO LOWER:LMD 0 -5.04 90 -0.45
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=488.3KN. Mux=26.91KN.M. Muy=4.29KN.M.
 Short Column
 $Pu/Fckbd=0.354$ $Mux/Fckbd2=0.065$ $Muy/Fckbd2=0.014$
 $pc=0.8\%$ Areq= 552mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.077$ $Muy1 / Fckbd2 = 0.073$

Puz=823KN. Pu/Puz=0.593ALFA=1.655
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.824< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G31-8.7-12
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 163.51KN. PLL= 29.21KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -12.04 90 -2.12
L.L.M.FROM LOWER TO UPPER:LMU 0 -4.88 90 -0.41
D.L.M.FROM UPPER TO LOWER:DMD 0 -12.18 90 -2.15
L.L.M.FROM UPPER TO LOWER:LMD 0 -5.01 90 -0.44
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=289.08KN. Mux=25.79KN.M. Muy=3.89KN.M.
Short Column
Pu/Fckbd=0.209Mux/Fckbd2=0.062Muy/Fckbd2=0.012
pc=0.4% Areq= 276mm²
FROM CHARTS Mux1 / Fckbd2 = 0.075 Muy1 / Fckbd2 = 0.072
Puz=722KN. Pu/Puz=0.4ALFA=1.334
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.879< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G31-12-15.3
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 52.74KN. PLL= 7.79KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -11.31 90 -2.20
L.L.M.FROM LOWER TO UPPER:LMU 0 -4.16 90 -0.40
D.L.M.FROM UPPER TO LOWER:DMD 0 -10.29 90 -2.25
L.L.M.FROM UPPER TO LOWER:LMD 0 -3.13 90 -0.32
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=90.8KN. Mux=23.21KN.M. Muy=3.98KN.M.
Short Column
Pu/Fckbd=0.066Mux/Fckbd2=0.056Muy/Fckbd2=0.013
pc=0.6% Areq= 414mm²
FROM CHARTS Mux1 / Fckbd2 = 0.071 Muy1 / Fckbd2 = 0.068
Puz=773KN. Pu/Puz=0.118ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.971< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D30-0-1.5
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 601.69KN. PLL= 119.64KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -6.01 90 8.34
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.24 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1082KN. Mux=9.38KN.M. Muy=12.51KN.M.
 Short Column
 $Pu/Fckbd=0.784$ $Mux/Fckbd2=0.023$ $Muy/Fckbd2=0.039$
 $pc=2.6\%$ Areq= 1794mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.061$ $Muy1 / Fckbd2 = 0.056$
 $Puz=1278KN$. $Pu/Puz=0.847$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.631 < 1.0$ HENCE SAFE
 AREA OF STEEL=1834mm²
 MAIN REINFORCEMENT:6#16+2#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:D30-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 476.74KN. PLL= 119.92KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -4.83 90 4.25
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.43 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -5.04 90 2.05
 L.L.M.FROM UPPER TO LOWER:LMD 0 -1.02 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=894.99KN. Mux=9.09KN.M. Muy=6.38KN.M.

Short Column

$Pu/Fckbd=0.649$ $Mux/Fckbd2=0.022$ $Muy/Fckbd2=0.020$

$pc=1.6\%$ Areq= 1104mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.039$ $Muy1 / Fckbd2 = 0.036$

$Puz=1025KN$. $Pu/Puz=0.873$ ALFA=2

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.631 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:D30-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 345.55KN. PLL= 84.05KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -6.04 90 0.23
 L.L.M.FROM LOWER TO UPPER:LMU 0 -1.78 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -5.89 90 0.64
 L.L.M.FROM UPPER TO LOWER:LMD 0 -1.68 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=644.4KN. Mux=11.73KN.M. Muy=0.96KN.M.

Short Column

$Pu/Fckbd=0.467$ $Mux/Fckbd2=0.028$ $Muy/Fckbd2=0.003$

pc=0.6% Areq= 414mm²
FROM CHARTS Mux1 / Fckbd2 = 0.035 Muy1 / Fckbd2 = 0.033
Puz=773KN.Pu/Puz=0.834ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.679< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D30-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 215.32KN. PLL= 48.92KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -5.80 90 0.91

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.62 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -5.85 90 0.80

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.67 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=396.36KN. Mux=11.28KN.M. Muy=1.37KN.M.

Short Column

Pu/Fckbd=0.287Mux/Fckbd2=0.027Muy/Fckbd2=0.004

pc=0.2% Areq= 138mm²

FROM CHARTS Mux1 / Fckbd2 = 0.058 Muy1 / Fckbd2 = 0.057

Puz=672KN.Pu/Puz=0.59ALFA=1.65

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.301< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D30-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 84.70KN. PLL= 13.45KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -5.58 90 0.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.38 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -5.27 90 1.24

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.06 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=147.23KN. Mux=10.44KN.M. Muy=1.86KN.M.

Short Column

Pu/Fckbd=0.107Mux/Fckbd2=0.025Muy/Fckbd2=0.006

pc=0.2% Areq= 138mm²

FROM CHARTS Mux1 / Fckbd2 = 0.054 Muy1 / Fckbd2 = 0.052

Puz=672KN.Pu/Puz=0.219ALFA=1.032

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.563< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G30-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 623.51KN. PLL= 197.40KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.99 90 -8.34

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.18 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1231.37KN. Mux=3.26KN.M. Muy=12.51KN.M.

Short Column

$P_u/F_{ckbd} = 0.892$ $M_{ux}/F_{ckbd} = 0.008$ $M_{uy}/F_{ckbd} = 0.039$

$p_c = 3.2\%$ $A_{req} = 2208mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd} = 0.063$ $M_{uy1}/F_{ckbd} = 0.058$

$P_{uz} = 1429KN$. $P_u/P_{uz} = 0.862$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.478 < 1.0$ HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G30-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 516.07KN. PLL= 197.66KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.78 90 -4.25

L.L.M.FROM LOWER TO UPPER:LMU 0 0.18 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 2.02 90 -2.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.46 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1070.6KN. Mux=3.72KN.M. Muy=6.38KN.M.

Short Column

$P_u/F_{ckbd} = 0.776$ $M_{ux}/F_{ckbd} = 0.009$ $M_{uy}/F_{ckbd} = 0.020$

$p_c = 2.2\%$ $A_{req} = 1518mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd} = 0.015$ $M_{uy1}/F_{ckbd} = 0.029$

$P_{uz} = 1177KN$. $P_u/P_{uz} = 0.91$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.81 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G30-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 372.48KN. PLL= 138.80KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.60 90 -0.23

L.L.M.FROM LOWER TO UPPER:LMU 0 0.80 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 2.48 90 -0.64

L.L.M.FROM UPPER TO LOWER:LMD 0 0.71 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=766.92KN. Mux=5.1KN.M. Muy=0.96KN.M.

Short Column

$P_u/F_{ckbd} = 0.556$ $M_{ux}/F_{ckbd} = 0.012$ $M_{uy}/F_{ckbd} = 0.003$

$p_c = 0.8\%$ $A_{eq} = 552 \text{ mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd} = 0.015$ $M_{uy1}/F_{ckbd} = 0.014$

$P_{uz} = 823 \text{ KN}$ $P_u/P_{uz} = 0.932$ $\alpha = 2$

$(M_{ux}/M_{ux1})^\alpha + (M_{uy}/M_{uy1})^\alpha = 0.746 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: G30-8.7-12

SIZE OF COLUMN: 300x230mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 229.74KN. PLL = 80.60KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 2.41 90 -0.91

L.L.M. FROM LOWER TO UPPER: LMU 0 0.68 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 2.47 90 -0.80

L.L.M. FROM UPPER TO LOWER: LMD 0 0.72 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 465.51 \text{ KN}$. $M_{ux} = 4.79 \text{ KN.M}$. $M_{uy} = 1.37 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.337$ $M_{ux}/F_{ckbd} = 0.012$ $M_{uy}/F_{ckbd} = 0.004$

$p_c = 0.2\%$ $A_{eq} = 138 \text{ mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd} = 0.049$ $M_{uy1}/F_{ckbd} = 0.048$

$P_{uz} = 672 \text{ KN}$ $P_u/P_{uz} = 0.693$ $\alpha = 1.822$

$(M_{ux}/M_{ux1})^\alpha + (M_{uy}/M_{uy1})^\alpha = 0.085 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: G30-12-15.3

SIZE OF COLUMN: 300x230mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 86.75KN. PLL = 22.08KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 2.37 90 -0.96

L.L.M. FROM LOWER TO UPPER: LMU 0 0.63 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 2.23 90 -1.24

L.L.M. FROM UPPER TO LOWER: LMD 0 0.48 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 163.25 \text{ KN}$. $M_{ux} = 4.5 \text{ KN.M}$. $M_{uy} = 1.86 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.118$ $M_{ux}/F_{ckbd} = 0.011$ $M_{uy}/F_{ckbd} = 0.006$

$p_c = 0.2\%$ $A_{eq} = 138 \text{ mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd} = 0.056$ $M_{uy1}/F_{ckbd} = 0.055$

$P_{uz} = 672 \text{ KN}$ $P_u/P_{uz} = 0.243$ $\alpha = 1.072$

$(M_{ux}/M_{ux1})^\alpha + (M_{uy}/M_{uy1})^\alpha = 0.263 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D28-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 400.19KN. PLL= 55.55KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 18.39 90 10.09

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.83 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=683.61KN. Mux=28.83KN.M. Muy=15.14KN.M.

Short Column

$P_u/F_{ckbd} = 0.495$ $M_{ux}/F_{ckbd} = 0.070$ $M_{uy}/F_{ckbd} = 0.048$

$p_c = 1.8\%$ $A_{req} = 1242mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.100$ $M_{uy1} / F_{ckbd} = 0.093$

$P_{uz} = 1076KN$. $P_u/P_{uz} = 0.636$ $ALFA = 1.726$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.858 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D28-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 317.41KN. PLL= 55.43KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 15.00 90 7.41

L.L.M.FROM LOWER TO UPPER:LMU 0 1.32 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 15.87 90 7.05

L.L.M.FROM UPPER TO LOWER:LMD 0 3.27 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=559.26KN. Mux=28.71KN.M. Muy=11.12KN.M.

Short Column

$P_u/F_{ckbd} = 0.405$ $M_{ux}/F_{ckbd} = 0.069$ $M_{uy}/F_{ckbd} = 0.035$

$p_c = 1.2\%$ $A_{req} = 828mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.087$ $M_{uy1} / F_{ckbd} = 0.082$

$P_{uz} = 924KN$. $P_u/P_{uz} = 0.605$ $ALFA = 1.675$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.921 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D28-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 227.79KN. PLL= 39.16KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 19.25 90 7.74

L.L.M.FROM LOWER TO UPPER:LMU 0 5.77 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 18.70 90 7.59

L.L.M.FROM UPPER TO LOWER:LMD 0 5.34 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=400.43KN. Mux=37.53KN.M. Muy=11.61KN.M.
Short Column
 $Pu/Fckbd=0.290$ $Mux/Fckbd2=0.091$ $Muy/Fckbd2=0.037$
 $pc=1.4\%$ $A_{req}=966mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.118$ $Muy1 / Fckbd2 = 0.109$
 $Puz=975KN$. $Pu/Puz=0.411$ $ALFA=1.351$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.926 < 1.0$ HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D28-8.7-12
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 137.59KN. PLL= 22.55KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 18.33 90 7.65
L.L.M.FROM LOWER TO UPPER:LMU 0 5.13 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 18.51 90 7.87
L.L.M.FROM UPPER TO LOWER:LMD 0 5.34 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=240.21KN. Mux=35.78KN.M. Muy=11.81KN.M.
Short Column

$Pu/Fckbd=0.174$ $Mux/Fckbd2=0.086$ $Muy/Fckbd2=0.037$
 $pc=1.4\%$ $A_{req}=966mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.129$ $Muy1 / Fckbd2 = 0.120$
 $Puz=975KN$. $Pu/Puz=0.246$ $ALFA=1.077$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.931 < 1.0$ HENCE SAFE
AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:D28-12-15.3
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 47.72KN. PLL= 6.10KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 17.89 90 6.75
L.L.M.FROM LOWER TO UPPER:LMU 0 4.46 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 17.07 90 5.41
L.L.M.FROM UPPER TO LOWER:LMD 0 3.40 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=80.73KN. Mux=33.53KN.M. Muy=10.13KN.M.
Short Column

$Pu/Fckbd=0.059$ $Mux/Fckbd2=0.081$ $Muy/Fckbd2=0.032$
 $pc=1.4\%$ $A_{req}=966mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.122$ $Muy1 / Fckbd2 = 0.113$
 $Puz=975KN$. $Pu/Puz=0.083$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.948 < 1.0$ HENCE SAFE
AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G29-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 622.86KN. PLL= 161.73KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -6.83 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.06 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1176.89KN. Mux=10.34KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ck}b_d=0.853$ $M_{ux}/F_{ck}b_d^2=0.025$ $M_{uy}/F_{ck}b_d^2=0.000$

$p_c=2.6\%$ Areq= 1794mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.030$ $M_{uy1}/F_{ck}b_d^2 = 0.028$

$P_{uz}=1278KN$. $P_u/P_{uz}=0.921$ ALFA=2

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.683 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G29-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 521.06KN. PLL= 161.67KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -4.21 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.24 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.14 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.48 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1024.1KN. Mux=7.04KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ck}b_d=0.742$ $M_{ux}/F_{ck}b_d^2=0.017$ $M_{uy}/F_{ck}b_d^2=0.000$

$p_c=2\%$ Areq= 1380mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.030$ $M_{uy1}/F_{ck}b_d^2 = 0.028$

$P_{uz}=1126KN$. $P_u/P_{uz}=0.909$ ALFA=2

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.317 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G29-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 374.87KN. PLL= 113.84KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -2.48 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.86 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -2.50 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.85 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=733.07KN. Mux=5.04KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.531$ $Mux/Fckbd2=0.012$ $Muy/Fckbd2=0.000$
 $pc=0.8\%$ Areq= 552mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.025$ $Muy1 / Fckbd2 = 0.024$
 $Puz=823KN$. $Pu/Puz=0.891$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.242 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G29-8.7-12
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 228.43KN. PLL= 65.84KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -2.55 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.84 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -2.59 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.83 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=441.41KN. Mux=5.15KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.320$ $Mux/Fckbd2=0.012$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.053$ $Muy1 / Fckbd2 = 0.052$
 $Puz=672KN$. $Pu/Puz=0.657$ ALFA=1.762
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.079 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G29-12-15.3
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 82.04KN. PLL= 17.92KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -2.23 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.68 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -1.81 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.52 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=149.94KN. Mux=4.37KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.109$ $Mux/Fckbd2=0.011$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.054$ $Muy1 / Fckbd2 = 0.053$
 $Puz=672KN$. $Pu/Puz=0.223$ ALFA=1.039
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.183 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G27-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 468.04KN. PLL= 91.18KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 3.64 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=838.83KN. Mux=5.48KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd}=0.608$ $M_{ux}/F_{ckbd2}=0.013$ $M_{uy}/F_{ckbd2}=0.000$

$p_c=1.2\%$ $A_{req}=828mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.024$ $M_{uy1}/F_{ckbd2}=0.023$

$P_{uz}=924KN$. $P_u/P_{uz}=0.908$ $\alpha_F=2$

$(M_{ux}/M_{ux1})^{\alpha_F}+(M_{uy}/M_{uy1})^{\alpha_F}=0.303<1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G27-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 383.07KN. PLL= 91.16KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.50 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.04 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 2.18 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.06 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=711.35KN. Mux=3.84KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd}=0.515$ $M_{ux}/F_{ckbd2}=0.009$ $M_{uy}/F_{ckbd2}=0.000$

$p_c=0.6\%$ $A_{req}=414mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.016$ $M_{uy1}/F_{ckbd2}=0.015$

$P_{uz}=773KN$. $P_u/P_{uz}=0.921$ $\alpha_F=2$

$(M_{ux}/M_{ux1})^{\alpha_F}+(M_{uy}/M_{uy1})^{\alpha_F}=0.339<1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G27-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 276.74KN. PLL= 64.17KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.17 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.09 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 2.18 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.09 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=511.37KN. Mux=3.41KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.371$ $Mux/Fckbd2=0.008$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.040$ $Muy1 / Fckbd2 = 0.040$
 $Puz=672KN$. $Pu/Puz=0.762$ ALFA=1.936
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.046 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G27-8.7-12
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 170.37KN. PLL= 37.15KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 2.21 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.09 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 2.23 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.09 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=311.28KN. Mux=3.48KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.226$ $Mux/Fckbd2=0.008$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.062$
 $Puz=672KN$. $Pu/Puz=0.464$ ALFA=1.439
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.054 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G27-12-15.3
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 63.94KN. PLL= 10.14KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 1.94 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.07 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 1.58 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.06 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=111.12KN. Mux=3.02KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.081$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.047$ $Muy1 / Fckbd2 = 0.046$

Puz=672KN.Pu/Puz=0.165ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.154< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G26-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 423.25KN. PLL= 89.92KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.47 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=769.76KN. Mux=0.72KN.M. Muy=0KN.M.

Short Column

Pu/Fckbd=0.558Mux/Fckbd2=0.002Muy/Fckbd2=0.000

pc=0.8% Areq= 552mm²

FROM CHARTS Mux1 / Fckbd2 = 0.014 Muy1 / Fckbd2 = 0.013

Puz=823KN.Pu/Puz=0.935ALFA=2

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.016< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G26-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 348.59KN. PLL= 89.92KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.34 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.33 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=657.77KN. Mux=0.54KN.M. Muy=0KN.M.

Short Column

Pu/Fckbd=0.477Mux/Fckbd2=0.001Muy/Fckbd2=0.000

pc=0.2% Areq= 138mm²

FROM CHARTS Mux1 / Fckbd2 = 0.002 Muy1 / Fckbd2 = 0.002

Puz=672KN.Pu/Puz=0.98ALFA=2

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.361< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G26-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 252.09KN. PLL= 63.27KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -0.36 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.35 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.02 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=473.04KN. Mux=0.57KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.343$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ $A_{req}=138mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.048$ $Muy1 / Fckbd2 = 0.047$
 $Puz=672KN$. $Pu/Puz=0.704$ $ALFA=1.841$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.001 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G26-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 155.59KN. PLL= 36.63KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.36 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.37 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.02 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=288.33KN. Mux=0.59KN.M. Muy=0KN.M.

Short Column

$Pu/Fckbd=0.209$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.000$

$pc=0.2\%$ $A_{req}=138mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.063$

$Puz=672KN$. $Pu/Puz=0.429$ $ALFA=1.382$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.005 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G26-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 59.15KN. PLL= 9.99KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.34 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.29 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.03 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=103.71KN. Mux=0.56KN.M. Muy=0KN.M.

Short Column

$Pu/Fckbd=0.075$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.000$

pc=0.2% Areq= 138mm²
FROM CHARTS Mux1 / Fckbd2 = 0.046 Muy1 / Fckbd2 = 0.045
Puz=672KN.Pu/Puz=0.154ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.029< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G25-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 429.35KN. PLL= 89.95KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.06 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=778.95KN. Mux=0.09KN.M. Muy=0KN.M.

Short Column

Pu/Fckbd=0.564Mux/Fckbd2=0.000Muy/Fckbd2=0.000

pc=0.8% Areq= 552mm²

FROM CHARTS Mux1 / Fckbd2 = 0.011 Muy1 / Fckbd2 = 0.011

Puz=823KN.Pu/Puz=0.946ALFA=2

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G25-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 353.55KN. PLL= 89.95KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.05 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.01 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.04 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=665.25KN. Mux=0.09KN.M. Muy=0KN.M.

Short Column

Pu/Fckbd=0.482Mux/Fckbd2=0.000Muy/Fckbd2=0.000

pc=0.4% Areq= 276mm²

FROM CHARTS Mux1 / Fckbd2 = 0.014 Muy1 / Fckbd2 = 0.014

Puz=722KN.Pu/Puz=0.921ALFA=2

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G25-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 255.70KN. PLL= 63.29KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.04 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.01 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.05 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=478.49KN. Mux=0.09KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.347$ $M_{ux}/F_{ckbd} = 0.000$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.047$ $M_{uy1} / F_{ckbd} = 0.046$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.713$ $ALFA = 1.854$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G25-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 157.87KN. PLL= 36.64KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.05 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.02 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.05 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.02 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=291.77KN. Mux=0.11KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.211$ $M_{ux}/F_{ckbd} = 0.000$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.064$ $M_{uy1} / F_{ckbd} = 0.063$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.434$ $ALFA = 1.391$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G25-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 60.01KN. PLL= 9.99KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.05 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.04 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=105KN. Mux=0.09KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckb d} = 0.076$ $M_{ux}/F_{ckb d} = 0.000$ $M_{uy}/F_{ckb d} = 0.000$

$p_c = 0.2\%$ $A_{eq} = 138\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckb d} = 0.046$ $M_{uy1}/F_{ckb d} = 0.045$

$P_{uz} = 672\text{KN}$ $P_u/P_{uz} = 0.156$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.005 < 1.0$ HENCE SAFE

AREA OF STEEL = 804mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: G24-0-1.5

SIZE OF COLUMN: 300x230mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 427.40KN. PLL = 89.80KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.00 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 0.00 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 0.07 90 0.00

L.L.M. FROM UPPER TO LOWER: LMD 0 -0.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 775.8\text{KN}$. $M_{ux} = 0.12\text{KN.M}$. $M_{uy} = 0\text{KN.M}$.

Short Column

$P_u/F_{ckb d} = 0.562$ $M_{ux}/F_{ckb d} = 0.000$ $M_{uy}/F_{ckb d} = 0.000$

$p_c = 0.8\%$ $A_{eq} = 552\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckb d} = 0.012$ $M_{uy1}/F_{ckb d} = 0.012$

$P_{uz} = 823\text{KN}$ $P_u/P_{uz} = 0.943$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.001 < 1.0$ HENCE SAFE

AREA OF STEEL = 804mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: G24-1.5-5.4

SIZE OF COLUMN: 300x230mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 351.79KN. PLL = 89.79KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.06 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 0.01 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 0.08 90 0.00

L.L.M. FROM UPPER TO LOWER: LMD 0 0.02 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 662.37\text{KN}$. $M_{ux} = 0.15\text{KN.M}$. $M_{uy} = 0\text{KN.M}$.

Short Column

$P_u/F_{ckb d} = 0.480$ $M_{ux}/F_{ckb d} = 0.000$ $M_{uy}/F_{ckb d} = 0.000$

$p_c = 0.2\%$ $A_{eq} = 138\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckb d} = 0.001$ $M_{uy1}/F_{ckb d} = 0.001$

$P_{uz} = 672\text{KN}$ $P_u/P_{uz} = 0.986$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.155 < 1.0$ HENCE SAFE

AREA OF STEEL = 804mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G24-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 254.41KN. PLL= 63.20KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.09 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.03 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.09 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.02 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=476.42KN. Mux=0.18KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.345$ $M_{ux}/F_{ckbd} = 0.000$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.047$ $M_{uy1} / F_{ckbd} = 0.046$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.709$ $ALFA = 1.849$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G24-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 156.99KN. PLL= 36.59KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.09 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.02 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.09 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.02 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=290.37KN. Mux=0.17KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.210$ $M_{ux}/F_{ckbd} = 0.000$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.064$ $M_{uy1} / F_{ckbd} = 0.063$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.432$ $ALFA = 1.387$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.001 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G24-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 59.59KN. PLL= 9.98KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.09 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.02 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.09 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=104.36KN. Mux=0.17KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.076$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS Mux1 / Fckbd2 = 0.046 Muy1 / Fckbd2 = 0.045
 $Puz=672KN$. $Pu/Puz=0.155$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.009 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G23-0-1.5
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 437.77KN. PLL= 91.84KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.57 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.03 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=794.42KN. Mux=0.9KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.576$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.000$
 $pc=0.8\%$ Areq= 552mm²
 FROM CHARTS Mux1 / Fckbd2 = 0.007 Muy1 / Fckbd2 = 0.006
 $Puz=823KN$. $Pu/Puz=0.965$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.109 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G23-1.5-5.4
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 360.69KN. PLL= 91.86KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -0.48 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.05 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.51 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.11 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=678.83KN. Mux=0.93KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.492$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.000$
 $pc=0.4\%$ Areq= 276mm²
 FROM CHARTS Mux1 / Fckbd2 = 0.010 Muy1 / Fckbd2 = 0.010
 $Puz=722KN$. $Pu/Puz=0.94$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.046 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G23-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 260.89KN. PLL= 64.62KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.63 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.18 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.61 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.16 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=488.27KN. Mux=1.22KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ck}b_d=0.354$ $M_{ux}/F_{ck}b_d^2=0.003$ $M_{uy}/F_{ck}b_d^2=0.000$

$p_c=0.2\%$ Areq= 138mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.045$ $M_{uy1}/F_{ck}b_d^2 = 0.044$

$P_{uz}=672$ KN. $P_u/P_{uz}=0.727$ ALFA=1.879

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.006 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G23-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 161.11KN. PLL= 37.42KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.62 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.16 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.63 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.17 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=297.8KN. Mux=1.2KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ck}b_d=0.216$ $M_{ux}/F_{ck}b_d^2=0.003$ $M_{uy}/F_{ck}b_d^2=0.000$

$p_c=0.2\%$ Areq= 138mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.064$ $M_{uy1}/F_{ck}b_d^2 = 0.063$

$P_{uz}=672$ KN. $P_u/P_{uz}=0.443$ ALFA=1.406

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.013 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G23-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 61.29KN. PLL= 10.21KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.59 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.14 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.55 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.11 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=107.25KN. Mux=1.1KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.078$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.047$ $Muy1 / Fckbd2 = 0.045$
 $Puz=672KN$. $Pu/Puz=0.16$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.057 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G22-0-1.5
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 353.35KN. PLL= 75.56KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 4.54 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.07 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=643.37KN. Mux=6.92KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.466$ $Mux/Fckbd2=0.017$ $Muy/Fckbd2=0.000$
 $pc=0.4\%$ Areq= 276mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.020$ $Muy1 / Fckbd2 = 0.020$
 $Puz=722KN$. $Pu/Puz=0.891$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.666 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G22-1.5-5.4
 SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 292.36KN. PLL= 75.72KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 3.41 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.26 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 3.28 90 0.00
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.57 90 0.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=552.12KN. Mux=5.97KN.M. Muy=0KN.M.
 Short Column
 $Pu/Fckbd=0.400$ $Mux/Fckbd2=0.014$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.030$ $Muy1 / Fckbd2 = 0.030$
 $Puz=672KN$. $Pu/Puz=0.822$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.224 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G22-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 211.56KN. PLL= 53.15KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 3.75 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 1.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 3.73 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.99 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=397.07KN. Mux=7.13KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd}=0.288$ $M_{ux}/F_{ckbd2}=0.017$ $M_{uy}/F_{ckbd2}=0.000$

$p_c=0.2\%$ Areq= 138mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.058$ $M_{uy1}/F_{ckbd2} = 0.057$

$P_{uz}=672KN$. $P_u/P_{uz}=0.591$ ALFA=1.652

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.134 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G22-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 131.19KN. PLL= 30.89KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 3.73 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.99 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 3.75 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 1.01 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=243.12KN. Mux=7.14KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd}=0.176$ $M_{ux}/F_{ckbd2}=0.017$ $M_{uy}/F_{ckbd2}=0.000$

$p_c=0.2\%$ Areq= 138mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.063$ $M_{uy1}/F_{ckbd2} = 0.062$

$P_{uz}=672KN$. $P_u/P_{uz}=0.362$ ALFA=1.27

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.192 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G22-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 50.65KN. PLL= 8.49KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 3.36 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.81 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 2.93 90 0.00
L.L.M.FROM UPPER TO LOWER:LMD 0 0.60 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=88.71KN. Mux=6.26KN.M. Muy=0KN.M.

Short Column

$Pu/Fckbd=0.064$ $Mux/Fckbd2=0.015$ $Muy/Fckbd2=0.000$

$pc=0.2\%$ Areq= 138mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.043$ $Muy1 / Fckbd2 = 0.042$

$Puz=672KN$. $Pu/Puz=0.132$ ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.355 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A5-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 332.71KN. PLL= 40.90KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 18.93 90 3.50

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.82 90 0.39

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=560.42KN. Mux=29.63KN.M. Muy=5.84KN.M.

Short Column

$Pu/Fckbd=0.406$ $Mux/Fckbd2=0.072$ $Muy/Fckbd2=0.018$

$pc=1\%$ Areq= 690mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.076$ $Muy1 / Fckbd2 = 0.072$

$Puz=874KN$. $Pu/Puz=0.642$ ALFA=1.736

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.985 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A5-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 261.40KN. PLL= 40.36KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 15.32 90 1.76

L.L.M.FROM LOWER TO UPPER:LMU 0 1.32 90 -0.34

D.L.M.FROM UPPER TO LOWER:DMD 0 16.10 90 0.87

L.L.M.FROM UPPER TO LOWER:LMD 0 3.23 90 -0.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=452.64KN. Mux=29KN.M. Muy=4.11KN.M.

Short Column

$Pu/Fckbd=0.328$ $Mux/Fckbd2=0.070$ $Muy/Fckbd2=0.013$

$pc=0.8\%$ Areq= 552mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.081$ $Muy1 / Fckbd2 = 0.077$

Puz=823KN. Pu/Puz=0.55ALFA=1.583
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.851< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A5-5.4-8.7
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 187.88KN. PLL= 28.91KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 19.43 90 0.29
L.L.M.FROM LOWER TO UPPER:LMU 0 5.71 90 -1.65
D.L.M.FROM UPPER TO LOWER:DMD 0 18.88 90 0.56
L.L.M.FROM UPPER TO LOWER:LMD 0 5.30 90 -1.40
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=325.19KN. Mux=37.71KN.M. Muy=3.32KN.M.
Short Column
Pu/Fckbd=0.236Mux/Fckbd2=0.091Muy/Fckbd2=0.010
pc=1% Areq= 690mm²
FROM CHARTS Mux1 / Fckbd2 = 0.104 Muy1 / Fckbd2 = 0.098
Puz=874KN. Pu/Puz=0.372ALFA=1.287
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.895< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A5-8.7-12
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 112.74KN. PLL= 16.33KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 18.52 90 0.87
L.L.M.FROM LOWER TO UPPER:LMU 0 5.07 90 -1.26
D.L.M.FROM UPPER TO LOWER:DMD 0 18.72 90 0.93
L.L.M.FROM UPPER TO LOWER:LMD 0 5.27 90 -1.39
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=193.61KN. Mux=35.99KN.M. Muy=3.48KN.M.
Short Column
Pu/Fckbd=0.140Mux/Fckbd2=0.087Muy/Fckbd2=0.011
pc=1% Areq= 690mm²
FROM CHARTS Mux1 / Fckbd2 = 0.106 Muy1 / Fckbd2 = 0.100
Puz=874KN. Pu/Puz=0.222ALFA=1.036
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.913< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A5-12-15.3
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 38.12KN. PLL= 4.28KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 18.03 90 -0.02
L.L.M.FROM LOWER TO UPPER:LMU 0 4.42 90 -1.25
D.L.M.FROM UPPER TO LOWER:DMD 0 17.15 90 -0.97
L.L.M.FROM UPPER TO LOWER:LMD 0 3.37 90 -1.00
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=63.6KN. Mux=33.68KN.M. Muy=3.33KN.M.
Short Column
 $Pu/Fckbd=0.046$ $Mux/Fckbd2=0.081$ $Muy/Fckbd2=0.010$
 $pc=1\%$ Areq= 690mm²
FROM CHARTS $Mux1 / Fckbd2 = 0.094$ $Muy1 / Fckbd2 = 0.088$
 $Puz=874KN$. $Pu/Puz=0.073$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.988 < 1.0$ HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A7-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 611.85KN. PLL= 128.82KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.09 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.16 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1111.01KN. Mux=1.88KN.M. Muy=0KN.M.

Short Column

$Pu/Fckbd=0.805$ $Mux/Fckbd2=0.005$ $Muy/Fckbd2=0.000$

$pc=2.2\%$ Areq= 1518mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.019$ $Muy1 / Fckbd2 = 0.017$

$Puz=1177KN$. $Pu/Puz=0.944$ ALFA=2

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.059 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A7-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 505.82KN. PLL= 128.99KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.14 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.14 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.45 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.37 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=952.22KN. Mux=2.73KN.M. Muy=0KN.M.

Short Column

$Pu/Fckbd=0.690$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.000$

pc=1.6% Areq= 1104mm²
FROM CHARTS Mux1 / Fckbd2 = 0.021 Muy1 / Fckbd2 = 0.019
Puz=1025KN. Pu/Puz=0.929ALFA=2
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.102< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A7-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 365.95KN. PLL= 90.55KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.92 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.59 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.77 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.52 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=684.75KN. Mux=3.77KN.M. Muy=0KN.M.

Short Column

Pu/Fckbd=0.496Mux/Fckbd2=0.009Muy/Fckbd2=0.000

pc=0.6% Areq= 414mm²

FROM CHARTS Mux1 / Fckbd2 = 0.024 Muy1 / Fckbd2 = 0.023

Puz=773KN. Pu/Puz=0.886ALFA=2

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.148< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A7-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 226.69KN. PLL= 52.59KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.67 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.47 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.69 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.50 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=418.92KN. Mux=3.29KN.M. Muy=0KN.M.

Short Column

Pu/Fckbd=0.304Mux/Fckbd2=0.008Muy/Fckbd2=0.000

pc=0.2% Areq= 138mm²

FROM CHARTS Mux1 / Fckbd2 = 0.056 Muy1 / Fckbd2 = 0.055

Puz=672KN. Pu/Puz=0.624ALFA=1.706

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.036< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A7-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 87.21KN. PLL= 14.40KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.86 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.44 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -2.03 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.36 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=152.42KN. Mux=3.71KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.110$ $M_{ux}/F_{ckbd2} = 0.009$ $M_{uy}/F_{ckbd2} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.054$ $M_{uy1} / F_{ckbd2} = 0.053$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.227$ $ALFA = 1.045$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.152 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A9-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 483.75KN. PLL= 101.72KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -7.86 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.13 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=878.21KN. Mux=11.99KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.636$ $M_{ux}/F_{ckbd2} = 0.029$ $M_{uy}/F_{ckbd2} = 0.000$

$p_c = 1.6\%$ $A_{req} = 1104mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.044$ $M_{uy1} / F_{ckbd2} = 0.041$

$P_{uz} = 1025KN$. $P_u/P_{uz} = 0.857$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.44 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A9-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 398.84KN. PLL= 101.79KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -5.88 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.48 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -5.71 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.04 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=750.95KN. Mux=10.38KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.544$ $M_u/F_{ckbd} = 0.025$ $M_u/F_{ckbd} = 0.000$

$p_c = 1\%$ $A_{eq} = 690 \text{ mm}^2$

FROM CHARTS $M_{u1} / F_{ckbd} = 0.035$ $M_{u1} / F_{ckbd} = 0.033$

$P_{uz} = 874 \text{ KN}$ $P_u/P_{uz} = 0.86$ $\alpha = 2$

$(M_u/M_{u1})^\alpha + (M_{u1}/M_{u1})^\alpha = 0.52 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: A9-5.4-8.7

SIZE OF COLUMN: $300 \times 230 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 288.51KN. PLL = 71.59KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -6.53 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 -1.83 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 -6.49 90 0.00

L.L.M. FROM UPPER TO LOWER: LMD 0 -1.81 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 540.15 \text{ KN}$. $M_u = 12.54 \text{ KN.M}$. $M_{u1} = 0 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.391$ $M_u/F_{ckbd} = 0.030$ $M_u/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{eq} = 138 \text{ mm}^2$

FROM CHARTS $M_{u1} / F_{ckbd} = 0.034$ $M_{u1} / F_{ckbd} = 0.033$

$P_{uz} = 672 \text{ KN}$ $P_u/P_{uz} = 0.804$ $\alpha = 2$

$(M_u/M_{u1})^\alpha + (M_{u1}/M_{u1})^\alpha = 0.813 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: A9-8.7-12

SIZE OF COLUMN: $300 \times 230 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 178.24KN. PLL = 41.47KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -6.51 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 -1.78 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 -6.56 90 0.00

L.L.M. FROM UPPER TO LOWER: LMD 0 -1.79 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 329.57 \text{ KN}$. $M_u = 12.53 \text{ KN.M}$. $M_{u1} = 0 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.239$ $M_u/F_{ckbd} = 0.030$ $M_u/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{eq} = 138 \text{ mm}^2$

FROM CHARTS $M_{u1} / F_{ckbd} = 0.063$ $M_{u1} / F_{ckbd} = 0.062$

$P_{uz} = 672 \text{ KN}$ $P_u/P_{uz} = 0.491$ $\alpha = 1.485$

$(M_u/M_{u1})^\alpha + (M_{u1}/M_{u1})^\alpha = 0.336 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A9-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 67.83KN. PLL= 11.33KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -5.88 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.46 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -5.18 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.10 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=118.74KN. Mux=11.01KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.086$ $M_{ux}/F_{ckbd} = 0.027$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.049$ $M_{uy1} / F_{ckbd} = 0.048$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.177$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.546 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A11-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 211.88KN. PLL= 21.17KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -4.04 90 3.23

L.L.M.FROM UPPER TO LOWER:LMD 0 0.09 90 0.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=349.58KN. Mux=6.2KN.M. Muy=5.07KN.M.

Short Column

$P_u/F_{ckbd} = 0.253$ $M_{ux}/F_{ckbd} = 0.015$ $M_{uy}/F_{ckbd} = 0.016$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.062$ $M_{uy1} / F_{ckbd} = 0.061$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.521$ $\alpha = 1.534$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.242 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A11-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 164.60KN. PLL= 20.90KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.07 90 2.09

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.25 90 -0.13

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.03 90 1.69

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.55 90 -0.36

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=278.25KN. Mux=5.43KN.M. Muy=3.68KN.M.

Short Column

$P_u/F_{ckbd}=0.202$ $M_{ux}/F_{ckbd2}=0.013$ $M_{uy}/F_{ckbd2}=0.012$

$p_c=0.2\%$ $A_{req}=138mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.064$ $M_{uy1}/F_{ckbd2}=0.063$

$P_{uz}=672KN$. $P_u/P_{uz}=0.414$ $ALFA=1.357$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.216 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A11-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 117.73KN. PLL= 14.91KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.52 90 1.65

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.00 90 -0.63

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.48 90 1.73

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.97 90 -0.55

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=198.96KN. Mux=6.78KN.M. Muy=3.54KN.M.

Short Column

$P_u/F_{ckbd}=0.144$ $M_{ux}/F_{ckbd2}=0.016$ $M_{uy}/F_{ckbd2}=0.011$

$p_c=0.2\%$ $A_{req}=138mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.060$ $M_{uy1}/F_{ckbd2}=0.059$

$P_{uz}=672KN$. $P_u/P_{uz}=0.296$ $ALFA=1.16$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.366 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A11-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 70.09KN. PLL= 8.46KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.46 90 1.87

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.95 90 -0.51

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.48 90 1.93

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.97 90 -0.55

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=117.83KN. Mux=6.68KN.M. Muy=3.72KN.M.

Short Column

$P_u/F_{ckbd}=0.085$ $M_{ux}/F_{ckbd2}=0.016$ $M_{uy}/F_{ckbd2}=0.012$

$p_c=0.2\%$ $A_{req}=138mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.049$ $M_{uy1}/F_{ckbd2}=0.047$

$P_{uz}=672KN$. $P_u/P_{uz}=0.175$ $ALFA=1$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.579 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:A11-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 22.91KN. PLL= 2.22KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.17 90 1.22

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.78 90 -0.48

D.L.M.FROM UPPER TO LOWER:DMD 0 -2.85 90 0.44

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.58 90 -0.38

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=37.7KN. Mux=5.93KN.M. Muy=2.55KN.M.

Short Column

$P_u/F_{ckb_d} = 0.027$ $M_{ux}/F_{ckb_d} = 0.014$ $M_{uy}/F_{ckb_d} = 0.008$

$p_c = 0.2\%$ $A_{eq} = 138mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.030$ $M_{uy1}/F_{ckb_d} = 0.029$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.056$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.749 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G11-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 147.22KN. PLL= 24.01KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 20.75 90 1.77

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.97 90 -0.08

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=256.85KN. Mux=32.58KN.M. Muy=2.78KN.M.

Short Column

$P_u/F_{ckb_d} = 0.186$ $M_{ux}/F_{ckb_d} = 0.079$ $M_{uy}/F_{ckb_d} = 0.009$

$p_c = 0.6\%$ $A_{eq} = 414mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.086$ $M_{uy1}/F_{ckb_d} = 0.081$

$P_{uz} = 773KN$. $P_u/P_{uz} = 0.332$ $\alpha = 1.221$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.969 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G11-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 120.49KN. PLL= 23.24KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 16.94 90 1.59

L.L.M.FROM LOWER TO UPPER:LMU 0 1.48 90 0.15

D.L.M.FROM UPPER TO LOWER:DMD 0 17.97 90 1.81

L.L.M.FROM UPPER TO LOWER:LMD 0 3.66 90 0.36

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=215.6KN. Mux=32.45KN.M. Muy=3.26KN.M.

Short Column

Pu/Fckbd=0.156Mux/Fckbd2=0.078Muy/Fckbd2=0.010

pc=0.8% Areq= 552mm²

FROM CHARTS Mux1 / Fckbd2 = 0.096 Muy1 / Fckbd2 = 0.091

Puz=823KN.Pu/Puz=0.262ALFA=1.103

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.892< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G11-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 86.90KN. PLL= 17.10KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 21.86 90 2.33

L.L.M.FROM LOWER TO UPPER:LMU 0 6.45 90 0.63

D.L.M.FROM UPPER TO LOWER:DMD 0 21.18 90 2.24

L.L.M.FROM UPPER TO LOWER:LMD 0 5.94 90 0.58

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=156KN. Mux=42.47KN.M. Muy=4.44KN.M.

Short Column

Pu/Fckbd=0.113Mux/Fckbd2=0.103Muy/Fckbd2=0.014

pc=1.4% Areq= 966mm²

FROM CHARTS Mux1 / Fckbd2 = 0.127 Muy1 / Fckbd2 = 0.119

Puz=975KN.Pu/Puz=0.16ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.923< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G11-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 50.64KN. PLL= 9.33KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 20.71 90 2.19

L.L.M.FROM LOWER TO UPPER:LMU 0 5.68 90 0.56

D.L.M.FROM UPPER TO LOWER:DMD 0 20.94 90 2.22

L.L.M.FROM UPPER TO LOWER:LMD 0 5.93 90 0.58

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=89.96KN. Mux=40.31KN.M. Muy=4.2KN.M.

Short Column

Pu/Fckbd=0.065Mux/Fckbd2=0.097Muy/Fckbd2=0.013

pc=1.4% Areq= 966mm²

FROM CHARTS Mux1 / Fckbd2 = 0.122 Muy1 / Fckbd2 = 0.114

Puz=975KN.Pu/Puz=0.092ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.911< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G11-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 15.35KN. PLL= 2.31KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 20.32 90 2.22

L.L.M.FROM LOWER TO UPPER:LMU 0 4.97 90 0.48

D.L.M.FROM UPPER TO LOWER:DMD 0 19.49 90 2.18

L.L.M.FROM UPPER TO LOWER:LMD 0 3.80 90 0.37

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=26.49KN. Mux=37.94KN.M. Muy=4.05KN.M.

Short Column

$P_u/F_{ckbd}=0.019$ $M_{ux}/F_{ckbd2}=0.092$ $M_{uy}/F_{ckbd2}=0.013$

$p_c=1.4\%$ $A_{req}=966\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.114$ $M_{uy1}/F_{ckbd2}=0.106$

$P_{uz}=975\text{KN}$. $P_u/P_{uz}=0.027$ $\alpha=1$

$(M_{ux}/M_{ux1})^{\alpha}+(M_{uy}/M_{uy1})^{\alpha}=0.921 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G13-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 544.59KN. PLL= 114.71KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.84 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.39 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=988.95KN. Mux=13.85KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd}=0.717$ $M_{ux}/F_{ckbd2}=0.033$ $M_{uy}/F_{ckbd2}=0.000$

$p_c=2\%$ $A_{req}=1380\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.041$ $M_{uy1}/F_{ckbd2}=0.039$

$P_{uz}=1126\text{KN}$. $P_u/P_{uz}=0.878$ $\alpha=2$

$(M_{ux}/M_{ux1})^{\alpha}+(M_{uy}/M_{uy1})^{\alpha}=0.65 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G13-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 450.56KN. PLL= 114.90KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -7.19 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.63 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 -7.57 90 0.00
L.L.M.FROM UPPER TO LOWER:LMD 0 -1.52 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=848.19KN. Mux=13.64KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.615$ $M_{ux}/F_{ckbd} = 0.033$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 1.4\%$ $A_{req} = 966mm^2$

FROM CHARTS $M_{ux} / F_{ckbd} = 0.037$ $M_{uy} / F_{ckbd} = 0.035$

$P_{uz} = 975KN$. $P_u/P_{uz} = 0.87$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.788 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G13-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 325.99KN. PLL= 80.60KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.18 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.71 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.92 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.50 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=609.89KN. Mux=17.84KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.442$ $M_{ux}/F_{ckbd} = 0.043$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.6\%$ $A_{req} = 414mm^2$

FROM CHARTS $M_{ux} / F_{ckbd} = 0.044$ $M_{uy} / F_{ckbd} = 0.042$

$P_{uz} = 773KN$. $P_u/P_{uz} = 0.789$ $\alpha = 1.982$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.972 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G13-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 202.18KN. PLL= 46.86KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -8.72 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.39 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.83 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.49 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=373.56KN. Mux=16.98KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.271$ $M_{ux}/F_{ckbd} = 0.041$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux} / F_{ckbd} = 0.060$ $M_{uy} / F_{ckbd} = 0.059$

Puz=672KN.Pu/Puz=0.556ALFA=1.594
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.543< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G13-12-15.3
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 78.11KN. PLL= 12.86KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -8.52 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 -2.09 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 -8.13 90 0.00
L.L.M.FROM UPPER TO LOWER:LMD 0 -1.59 90 0.00
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=136.46KN. Mux=15.92KN.M. Muy=0KN.M.
Short Column
Pu/Fckbd=0.099Mux/Fckbd2=0.038Muy/Fckbd2=0.000
pc=0.2% Areq= 138mm²
FROM CHARTS Mux1 / Fckbd2 = 0.052 Muy1 / Fckbd2 = 0.051
Puz=672KN.Pu/Puz=0.203ALFA=1.005
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.74< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G14-0-1.5
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 406.18KN. PLL= 85.11KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 1.06 90 0.00
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.10 90 0.00
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=736.93KN. Mux=1.74KN.M. Muy=0KN.M.
Short Column
Pu/Fckbd=0.534Mux/Fckbd2=0.004Muy/Fckbd2=0.000
pc=0.6% Areq= 414mm²
FROM CHARTS Mux1 / Fckbd2 = 0.009 Muy1 / Fckbd2 = 0.008
Puz=773KN.Pu/Puz=0.954ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.244< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G14-1.5-5.4
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 333.16KN. PLL= 84.99KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 1.01 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.11 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 1.21 90 0.00
L.L.M.FROM UPPER TO LOWER:LMD 0 0.27 90 0.00
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=627.23KN. Mux=2.22KN.M. Muy=0KN.M.
Short Column
 $Pu/Fckbd=0.455$ $Mux/Fckbd2=0.005$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ $A_{req}=138mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.010$ $Muy1 / Fckbd2 = 0.010$
 $Puz=672KN$ $Pu/Puz=0.934$ $ALFA=2$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.263 < 1.0$ HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G14-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 240.86KN. PLL= 59.96KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.55 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.49 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.46 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.43 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=451.23KN. Mux=3.06KN.M. Muy=0KN.M.

Short Column

$Pu/Fckbd=0.327$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.000$

$pc=0.2\%$ $A_{req}=138mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.051$ $Muy1 / Fckbd2 = 0.050$

$Puz=672KN$ $Pu/Puz=0.672$ $ALFA=1.787$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.032 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G14-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 148.09KN. PLL= 34.60KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.40 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.39 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.41 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.42 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=274.04KN. Mux=2.75KN.M. Muy=0KN.M.

Short Column

$Pu/Fckbd=0.199$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.000$

pc=0.2% Areq= 138mm²
FROM CHARTS Mux1 / Fckbd2 = 0.064 Muy1 / Fckbd2 = 0.063
Puz=672KN.Pu/Puz=0.408ALFA=1.347
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.047< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G14-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 55.49KN. PLL= 9.39KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.48 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.36 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.55 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.28 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=97.32KN. Mux=2.87KN.M. Muy=0KN.M.

Short Column

Pu/Fckbd=0.071Mux/Fckbd2=0.007Muy/Fckbd2=0.000

pc=0.2% Areq= 138mm²

FROM CHARTS Mux1 / Fckbd2 = 0.044 Muy1 / Fckbd2 = 0.044

Puz=672KN.Pu/Puz=0.145ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.156< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G15-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 431.38KN. PLL= 90.65KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.20 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.04 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=783.05KN. Mux=0.36KN.M. Muy=0KN.M.

Short Column

Pu/Fckbd=0.567Mux/Fckbd2=0.001Muy/Fckbd2=0.000

pc=0.8% Areq= 552mm²

FROM CHARTS Mux1 / Fckbd2 = 0.010 Muy1 / Fckbd2 = 0.009

Puz=823KN.Pu/Puz=0.951ALFA=2

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.008< 1.0 HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G15-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 355.41KN. PLL= 90.68KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.20 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.26 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.07 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=669.14KN. Mux=0.5KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckb_d} = 0.485$ $M_{ux}/F_{ckb_d} = 0.001$ $M_{uy}/F_{ckb_d} = 0.000$

$p_c = 0.4\%$ $A_{req} = 276mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.013$ $M_{uy1} / F_{ckb_d} = 0.013$

$P_{uz} = 722KN$. $P_u/P_{uz} = 0.927$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.008 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G15-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 257.02KN. PLL= 63.78KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.36 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.11 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.32 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.09 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=481.2KN. Mux=0.71KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckb_d} = 0.349$ $M_{ux}/F_{ckb_d} = 0.002$ $M_{uy}/F_{ckb_d} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.046$ $M_{uy1} / F_{ckb_d} = 0.045$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.717$ $ALFA = 1.861$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.002 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G15-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 158.76KN. PLL= 36.95KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.31 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.07 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.32 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.09 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=293.57KN. Mux=0.62KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.213$ $M_{ux}/F_{ckbd} = 0.001$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.064$ $M_{uy1} / F_{ckbd} = 0.063$

$P_{uz} = 672 \text{ KN}$ $P_u/P_{uz} = 0.437$ $\alpha = 1.395$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.005 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: G15-12-15.3

SIZE OF COLUMN: $300 \times 230 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: $P_{DL} = 60.47 \text{ KN}$. $P_{LL} = 10.09 \text{ KN}$.

D.L.M. FROM LOWER TO UPPER: DMU 0 -0.36 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 -0.08 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 -0.40 90 0.00

L.L.M. FROM UPPER TO LOWER: LMD 0 -0.06 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 105.84 \text{ KN}$. $M_{ux} = 0.72 \text{ KN.M}$. $M_{uy} = 0 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.077$ $M_{ux}/F_{ckbd} = 0.002$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.2\%$ $A_{req} = 138 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.046$ $M_{uy1} / F_{ckbd} = 0.045$

$P_{uz} = 672 \text{ KN}$ $P_u/P_{uz} = 0.158$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.038 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: G16-0-1.5

SIZE OF COLUMN: $300 \times 230 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: $P_{DL} = 437.56 \text{ KN}$. $P_{LL} = 91.79 \text{ KN}$.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.00 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 0.00 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 0.55 90 0.00

L.L.M. FROM UPPER TO LOWER: LMD 0 -0.03 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 794.03 \text{ KN}$. $M_{ux} = 0.87 \text{ KN.M}$. $M_{uy} = 0 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.575$ $M_{ux}/F_{ckbd} = 0.002$ $M_{uy}/F_{ckbd} = 0.000$

$p_c = 0.8\%$ $A_{req} = 552 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.007$ $M_{uy1} / F_{ckbd} = 0.006$

$P_{uz} = 823 \text{ KN}$ $P_u/P_{uz} = 0.965$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.099 < 1.0$ HENCE SAFE

AREA OF STEEL = 804 mm^2

MAIN REINFORCEMENT: 4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G16-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 360.44KN. PLL= 91.80KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.46 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.05 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.51 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.10 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=678.36KN. Mux=0.92KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.492$ $M_{ux}/F_{ckbd}^2 = 0.002$ $M_{uy}/F_{ckbd}^2 = 0.000$

$p_c = 0.4\%$ $A_{req} = 276mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd}^2 = 0.011$ $M_{uy1} / F_{ckbd}^2 = 0.010$

$P_{uz} = 722KN$. $P_u/P_{uz} = 0.94$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.043 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G16-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 260.75KN. PLL= 64.59KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.62 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.18 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.61 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.17 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=488.01KN. Mux=1.2KN.M. Muy=0KN.M.

Short Column

$P_u/F_{ckbd} = 0.354$ $M_{ux}/F_{ckbd}^2 = 0.003$ $M_{uy}/F_{ckbd}^2 = 0.000$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd}^2 = 0.045$ $M_{uy1} / F_{ckbd}^2 = 0.044$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.727$ $ALFA = 1.878$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.006 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G16-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 161.05KN. PLL= 37.40KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.58 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.17 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.59 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.17 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=297.68KN. Mux=1.14KN.M. Muy=0KN.M.
Short Column
 $Pu/Fckbd=0.216$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.000$
 $pc=0.2\%$ $A_{req}=138mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.063$
 $Puz=672KN$. $Pu/Puz=0.443$ $ALFA=1.405$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.012 < 1.0$ HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G16-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 61.33KN. PLL= 10.20KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.60 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.15 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.60 90 0.00

L.L.M.FROM UPPER TO LOWER:LMD 0 0.13 90 0.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=107.3KN. Mux=1.13KN.M. Muy=0KN.M.

Short Column

$Pu/Fckbd=0.078$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.000$

$pc=0.2\%$ $A_{req}=138mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.047$ $Muy1 / Fckbd2 = 0.045$

$Puz=672KN$. $Pu/Puz=0.16$ $ALFA=1$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.058 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G17-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 466.52KN. PLL= 94.78KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -4.28 90 -3.28

L.L.M.FROM UPPER TO LOWER:LMD 0 0.08 90 0.09

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=841.95KN. Mux=6.54KN.M. Muy=5.06KN.M.

Short Column

$Pu/Fckbd=0.610$ $Mux/Fckbd2=0.016$ $Muy/Fckbd2=0.016$

$pc=1.4\%$ $A_{req}=966mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.039$ $Muy1 / Fckbd2 = 0.037$

$Puz=975KN$. $Pu/Puz=0.864$ $ALFA=2$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.354 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G17-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 382.57KN. PLL= 94.92KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.16 90 -2.52

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.25 90 -0.16

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.07 90 -2.53

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.53 90 -0.38

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=716.24KN. Mux=5.54KN.M. Muy=4.37KN.M.

Short Column

$P_u/F_{ck}b_d=0.519$ $M_{ux}/F_{ck}b_d^2=0.013$ $M_{uy}/F_{ck}b_d^2=0.014$

$p_c=0.8\%$ Areq= 552mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.030$ $M_{uy1}/F_{ck}b_d^2 = 0.028$

$P_{uz}=823KN$. $P_u/P_{uz}=0.87$ ALFA=2

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.438 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G17-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 275.17KN. PLL= 66.66KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.51 90 -2.93

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.94 90 -0.66

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.49 90 -2.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.93 90 -0.64

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=512.75KN. Mux=6.68KN.M. Muy=5.39KN.M.

Short Column

$P_u/F_{ck}b_d=0.372$ $M_{ux}/F_{ck}b_d^2=0.016$ $M_{uy}/F_{ck}b_d^2=0.017$

$p_c=0.2\%$ Areq= 138mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.040$ $M_{uy1}/F_{ck}b_d^2 = 0.039$

$P_{uz}=672KN$. $P_u/P_{uz}=0.764$ ALFA=1.939

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.369 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G17-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 168.17KN. PLL= 38.70KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.50 90 -2.84

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.92 90 -0.61

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.50 90 -2.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.93 90 -0.62

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=310.31KN. Mux=6.65KN.M. Muy=5.24KN.M.

Short Column

$P_u/F_{ckbd} = 0.225$ $M_{ux}/F_{ckbd2} = 0.016$ $M_{uy}/F_{ckbd2} = 0.016$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.064$ $M_{uy1} / F_{ckbd2} = 0.062$

$P_{uz} = 672KN$, $P_u/P_{uz} = 0.462$ $ALFA = 1.437$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.285 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G17-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 61.01KN. PLL= 10.60KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.27 90 -2.67

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.74 90 -0.52

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.05 90 -2.42

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.55 90 -0.40

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=107.42KN. Mux=6.02KN.M. Muy=4.79KN.M.

Short Column

$P_u/F_{ckbd} = 0.078$ $M_{ux}/F_{ckbd2} = 0.015$ $M_{uy}/F_{ckbd2} = 0.015$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.047$ $M_{uy1} / F_{ckbd2} = 0.045$

$P_{uz} = 672KN$, $P_u/P_{uz} = 0.16$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.644 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E17-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 189.71KN. PLL= 17.62KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 3.01 90 3.28

L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 -0.09

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=311KN. Mux=4.52KN.M. Muy=5.06KN.M.

Short Column

$P_u/F_{ckbd} = 0.225$ $M_{ux}/F_{ckbd2} = 0.011$ $M_{uy}/F_{ckbd2} = 0.016$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.064$ $M_{uy1} / F_{ckbd2} = 0.062$

$P_{uz} = 672KN$, $P_u/P_{uz} = 0.463$ $ALFA = 1.439$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.219 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E17-1.5-5.4

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 147.75KN. PLL= 17.62KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.20 90 2.52

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.16

D.L.M.FROM UPPER TO LOWER:DMD 0 2.10 90 2.53

L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 0.38

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=248.06KN. Mux=3.3KN.M. Muy=4.37KN.M.

Short Column

$P_u/F_{ckbd}=0.180$ $M_{ux}/F_{ckbd2}=0.008$ $M_{uy}/F_{ckbd2}=0.014$

$p_c=0.2\%$ Areq= 138mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.064$ $M_{uy1}/F_{ckbd2} = 0.062$

$P_{uz}=672KN$. $P_u/P_{uz}=0.369$ ALFA=1.282

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.214 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E17-5.4-8.7

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 105.57KN. PLL= 12.40KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.32 90 2.93

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.66

D.L.M.FROM UPPER TO LOWER:DMD 0 2.27 90 2.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 0.64

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=176.96KN. Mux=3.48KN.M. Muy=5.39KN.M.

Short Column

$P_u/F_{ckbd}=0.128$ $M_{ux}/F_{ckbd2}=0.008$ $M_{uy}/F_{ckbd2}=0.017$

$p_c=0.2\%$ Areq= 138mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.058$ $M_{uy1}/F_{ckbd2} = 0.057$

$P_{uz}=672KN$. $P_u/P_{uz}=0.264$ ALFA=1.106

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.383 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E17-8.7-12

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 63.39KN. PLL= 7.18KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.28 90 2.84

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.61

D.L.M.FROM UPPER TO LOWER:DMD 0 2.35 90 2.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 0.62

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=105.86KN. Mux=3.53KN.M. Muy=5.24KN.M.

Short Column

$P_u/F_{ckbd} = 0.077$ $M_{ux}/F_{ckbd2} = 0.009$ $M_{uy}/F_{ckbd2} = 0.016$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.046$ $M_{uy1} / F_{ckbd2} = 0.045$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.158$ $\alpha_{FA} = 1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.549 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E17-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 21.21KN. PLL= 1.96KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.01 90 2.67

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.52

D.L.M.FROM UPPER TO LOWER:DMD 0 1.62 90 2.42

L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 0.40

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=34.76KN. Mux=3.02KN.M. Muy=4.79KN.M.

Short Column

$P_u/F_{ckbd} = 0.025$ $M_{ux}/F_{ckbd2} = 0.007$ $M_{uy}/F_{ckbd2} = 0.015$

$p_c = 0.2\%$ $A_{req} = 138mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.029$ $M_{uy1} / F_{ckbd2} = 0.029$

$P_{uz} = 672KN$. $P_u/P_{uz} = 0.052$ $\alpha_{FA} = 1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.774 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E18-0-1.5

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 449.67KN. PLL= 63.73KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -3.01 90 -2.89

L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 0.01

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=770.1KN. Mux=4.52KN.M. Muy=4.35KN.M.

Short Column

$P_u/F_{ckbd} = 0.558$ $M_{ux}/F_{ckbd2} = 0.011$ $M_{uy}/F_{ckbd2} = 0.014$

$p_c = 1\%$ $A_{req} = 690mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.014$ $M_{uy1} / F_{ckbd2} = 0.028$

Puz=874KN.Pu/Puz=0.882ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.87< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E18-1.5-5.4
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 361.73KN. PLL= 63.87KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -2.20 90 -1.95
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 -0.04
D.L.M.FROM UPPER TO LOWER:DMD 0 -2.10 90 -1.69
L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 -0.06
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=638.4KN. Mux=3.3KN.M. Muy=3.02KN.M.
Short Column
Pu/Fckbd=0.463Mux/Fckbd2=0.008Muy/Fckbd2=0.009
pc=0.4% Areq= 276mm²
FROM CHARTS Mux1 / Fckbd2 = 0.022 Muy1 / Fckbd2 = 0.021
Puz=722KN.Pu/Puz=0.884ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.333< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E18-5.4-8.7
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 260.66KN. PLL= 44.76KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -2.32 90 -1.65
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 -0.11
D.L.M.FROM UPPER TO LOWER:DMD 0 -2.27 90 -1.65
L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 -0.11
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=458.13KN. Mux=3.48KN.M. Muy=2.64KN.M.
Short Column
Pu/Fckbd=0.332Mux/Fckbd2=0.008Muy/Fckbd2=0.008
pc=0.2% Areq= 138mm²
FROM CHARTS Mux1 / Fckbd2 = 0.050 Muy1 / Fckbd2 = 0.049
Puz=672KN.Pu/Puz=0.682ALFA=1.804
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.08< 1.0 HENCE SAFE
AREA OF STEEL=804mm²
MAIN REINFORCEMENT:4#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:E18-8.7-12
SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 160.11KN. PLL= 26.05KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -2.28 90 -1.65
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 -0.10
 D.L.M.FROM UPPER TO LOWER:DMD 0 -2.35 90 -1.66
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 -0.10
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=279.24KN. Mux=3.53KN.M. Muy=2.64KN.M.
 Short Column
 $Pu/Fckbd=0.202$ $Mux/Fckbd2=0.009$ $Muy/Fckbd2=0.008$
 $pc=0.2\%$ Areq= 138mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.063$
 $Puz=672KN$. $Pu/Puz=0.416$ ALFA=1.36
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.128 < 1.0$ HENCE SAFE
 AREA OF STEEL=804mm²
 MAIN REINFORCEMENT:4#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:E18-12-15.3

SIZE OF COLUMN:300x230mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 59.31KN. PLL= 7.17KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -2.01 90 -1.44
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 -0.08
 D.L.M.FROM UPPER TO LOWER:DMD 0 -1.62 90 -1.19
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 -0.07

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=99.72KN. Mux=3.02KN.M. Muy=2.28KN.M.

Short Column

$Pu/Fckbd=0.072$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.007$

$pc=0.2\%$ Areq= 138mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.045$ $Muy1 / Fckbd2 = 0.044$

$Puz=672KN$. $Pu/Puz=0.149$ ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.325 < 1.0$ HENCE SAFE

AREA OF STEEL=804mm²

MAIN REINFORCEMENT:4#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:C21-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 345.76KN. PLL= 37.89KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -1.02 90 31.81
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.15 90 -1.37

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=575.48KN. Mux=1.76KN.M. Muy=49.77KN.M.

Short Column

$Pu/Fckbd=0.213$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.041$

pc=0.2% Areq= 270mm²
FROM CHARTS Mux1 / Fckbd2 = 0.064 Muy1 / Fckbd2 = 0.066
Puz=1314KN.Pu/Puz=0.438ALFA=1.397
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.526< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C21-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 272.35KN. PLL= 37.75KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.49 90 26.11

L.L.M.FROM LOWER TO UPPER:LMU 0 0.14 90 1.60

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.18 90 27.72

L.L.M.FROM UPPER TO LOWER:LMD 0 0.38 90 4.19

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=465.15KN. Mux=1.31KN.M. Muy=47.87KN.M.

Short Column

Pu/Fckbd=0.172Mux/Fckbd2=0.002Muy/Fckbd2=0.039

pc=0.2% Areq= 270mm²

FROM CHARTS Mux1 / Fckbd2 = 0.063 Muy1 / Fckbd2 = 0.065

Puz=1314KN.Pu/Puz=0.354ALFA=1.257

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.548< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C21-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 195.45KN. PLL= 26.66KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.07 90 33.24

L.L.M.FROM LOWER TO UPPER:LMU 0 0.65 90 7.17

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.05 90 31.76

L.L.M.FROM UPPER TO LOWER:LMD 0 0.56 90 6.29

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=333.17KN. Mux=1.08KN.M. Muy=60.62KN.M.

Short Column

Pu/Fckbd=0.123Mux/Fckbd2=0.001Muy/Fckbd2=0.050

pc=0.2% Areq= 270mm²

FROM CHARTS Mux1 / Fckbd2 = 0.057 Muy1 / Fckbd2 = 0.058

Puz=1314KN.Pu/Puz=0.254ALFA=1.089

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.862< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C21-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 118.11KN. PLL= 15.36KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.18 90 30.48

L.L.M.FROM LOWER TO UPPER:LMU 0 0.50 90 5.84

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.22 90 30.68

L.L.M.FROM UPPER TO LOWER:LMD 0 0.55 90 6.27

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=200.21KN. Mux=1.16KN.M. Muy=55.43KN.M.

Short Column

$Pu/Fckbd=0.074$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.046$

$pc=0.4\%$ Areq= 540mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.060$ $Muy1 / Fckbd2 = 0.062$

Puz=1413KN.Pu/Puz=0.142ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.761 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C21-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 41.06KN. PLL= 4.15KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.29 90 31.40

L.L.M.FROM LOWER TO UPPER:LMU 0 0.49 90 5.48

D.L.M.FROM UPPER TO LOWER:DMD 0 0.81 90 31.89

L.L.M.FROM UPPER TO LOWER:LMD 0 0.38 90 4.25

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=67.82KN. Mux=1.95KN.M. Muy=56.06KN.M.

Short Column

$Pu/Fckbd=0.025$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.046$

$pc=0.6\%$ Areq= 810mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.060$ $Muy1 / Fckbd2 = 0.064$

Puz=1511KN.Pu/Puz=0.045ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.765 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C18-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 203.86KN. PLL= 14.91KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.31 90 11.90

L.L.M.FROM UPPER TO LOWER:LMD 0 0.16 90 -0.30

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=328.16KN. Mux=0.71KN.M. Muy=18.3KN.M.

Short Column

$P_u/F_{ckbd} = 0.122$ $M_u/F_{ckbd} = 0.001$ $M_u/F_{ckbd} = 0.015$

$p_c = 0.2\%$ $A_{eq} = 270\text{mm}^2$

FROM CHARTS $M_{u1}/F_{ckbd} = 0.057$ $M_{u1}/F_{ckbd} = 0.058$

$P_{uz} = 1314\text{KN}$. $P_u/P_{uz} = 0.25$ $\alpha = 1.083$

$(M_u/M_{u1})^\alpha + (M_u/M_{u1})^\alpha = 0.244 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: C18-1.5-5.4

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 156.99KN. PLL = 14.70KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -0.08 90 9.19

L.L.M. FROM LOWER TO UPPER: LMU 0 -0.14 90 0.45

D.L.M. FROM UPPER TO LOWER: DMD 0 -0.38 90 9.22

L.L.M. FROM UPPER TO LOWER: LMD 0 -0.40 90 1.10

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 257.54\text{KN}$. $M_u = 1.17\text{KN.M}$. $M_u = 15.48\text{KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.095$ $M_u/F_{ckbd} = 0.001$ $M_u/F_{ckbd} = 0.013$

$p_c = 0.2\%$ $A_{eq} = 270\text{mm}^2$

FROM CHARTS $M_{u1}/F_{ckbd} = 0.051$ $M_{u1}/F_{ckbd} = 0.052$

$P_{uz} = 1314\text{KN}$. $P_u/P_{uz} = 0.196$ $\alpha = 1$

$(M_u/M_{u1})^\alpha + (M_u/M_{u1})^\alpha = 0.272 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: C18-5.4-8.7

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 112.17KN. PLL = 10.53KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -0.63 90 10.65

L.L.M. FROM LOWER TO UPPER: LMU 0 -0.67 90 1.95

D.L.M. FROM UPPER TO LOWER: DMD 0 -0.52 90 10.37

L.L.M. FROM UPPER TO LOWER: LMD 0 -0.58 90 1.79

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 184.05\text{KN}$. $M_u = 1.95\text{KN.M}$. $M_u = 18.9\text{KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.068$ $M_u/F_{ckbd} = 0.002$ $M_u/F_{ckbd} = 0.016$

$p_c = 0.2\%$ $A_{eq} = 270\text{mm}^2$

FROM CHARTS $M_{u1}/F_{ckbd} = 0.044$ $M_{u1}/F_{ckbd} = 0.045$

$P_{uz} = 1314\text{KN}$. $P_u/P_{uz} = 0.14$ $\alpha = 1$

$(M_u/M_{u1})^\alpha + (M_u/M_{u1})^\alpha = 0.402 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C18-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 66.56KN. PLL= 5.94KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.39 90 10.24

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.53 90 1.70

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.39 90 10.39

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.58 90 1.78

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=108.75KN. Mux=1.46KN.M. Muy=18.26KN.M.

Short Column

$P_u/F_{ckbd} = 0.040$ $M_{ux}/F_{ckbd2} = 0.002$ $M_{uy}/F_{ckbd2} = 0.015$

$p_c = 0.2\%$ $A_{req} = 270mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.035$ $M_{uy1} / F_{ckbd2} = 0.036$

$P_{uz} = 1314KN$. $P_u/P_{uz} = 0.083$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.473 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:C18-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 21.37KN. PLL= 1.55KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.78 90 9.88

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.52 90 1.49

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.17 90 9.25

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.41 90 1.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=34.38KN. Mux=2.54KN.M. Muy=17.06KN.M.

Short Column

$P_u/F_{ckbd} = 0.013$ $M_{ux}/F_{ckbd2} = 0.003$ $M_{uy}/F_{ckbd2} = 0.014$

$p_c = 0.2\%$ $A_{req} = 270mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.024$ $M_{uy1} / F_{ckbd2} = 0.025$

$P_{uz} = 1314KN$. $P_u/P_{uz} = 0.026$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.69 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G18-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 204.09KN. PLL= 42.02KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.82 90 -1.72

L.L.M.FROM UPPER TO LOWER:LMD 0 0.13 90 0.14

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=369.17KN. Mux=1.43KN.M. Muy=2.79KN.M.

Short Column

$Pu/Fckbd=0.137$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.002$

$pc=0.2\%$ $A_{req}=270mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.059$ $Muy1 / Fckbd2 = 0.061$

$Puz=1314KN$. $Pu/Puz=0.281$ $ALFA=1.135$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.043 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G18-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 162.13KN. PLL= 41.45KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.89 90 -1.49

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.17 90 -0.25

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.12 90 -1.66

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.42 90 -0.59

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=305.37KN. Mux=2.31KN.M. Muy=3.38KN.M.

Short Column

$Pu/Fckbd=0.113$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.003$

$pc=0.2\%$ $A_{req}=270mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.055$ $Muy1 / Fckbd2 = 0.056$

$Puz=1314KN$. $Pu/Puz=0.232$ $ALFA=1.054$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.086 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G18-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 115.09KN. PLL= 29.73KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.53 90 -2.09

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.73 90 -1.02

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.48 90 -2.05

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.68 90 -0.96

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=217.23KN. Mux=3.39KN.M. Muy=4.67KN.M.

Short Column

$Pu/Fckbd=0.080$ $Mux/Fckbd2=0.004$ $Muy/Fckbd2=0.004$

$pc=0.2\%$ $A_{req}=270mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.047$ $Muy1 / Fckbd2 = 0.048$

$Puz=1314KN$. $Pu/Puz=0.165$ $ALFA=1$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.168 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G18-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 66.59KN. PLL= 16.75KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.44 90 -2.01

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.66 90 -0.96

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.47 90 -1.99

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.69 90 -0.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=125.01KN. Mux=3.24KN.M. Muy=4.49KN.M.

Short Column

$P_u/F_{ck}b_d=0.046$ $M_{ux}/F_{ck}b_d^2=0.004$ $M_{uy}/F_{ck}b_d^2=0.004$

$p_c=0.2\%$ $A_{req}=270mm^2$

FROM CHARTS $M_{ux1}/F_{ck}b_d^2=0.037$ $M_{uy1}/F_{ck}b_d^2=0.038$

$P_{uz}=1314KN$. $P_u/P_{uz}=0.095$ $\alpha_{FA}=1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}}+(M_{uy}/M_{uy1})^{\alpha_{FA}}=0.207 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G18-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 18.78KN. PLL= 4.37KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.33 90 -1.98

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.58 90 -0.81

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.14 90 -1.97

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.45 90 -0.60

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=34.73KN. Mux=2.87KN.M. Muy=4.19KN.M.

Short Column

$P_u/F_{ck}b_d=0.013$ $M_{ux}/F_{ck}b_d^2=0.004$ $M_{uy}/F_{ck}b_d^2=0.003$

$p_c=0.2\%$ $A_{req}=270mm^2$

FROM CHARTS $M_{ux1}/F_{ck}b_d^2=0.024$ $M_{uy1}/F_{ck}b_d^2=0.025$

$P_{uz}=1314KN$. $P_u/P_{uz}=0.026$ $\alpha_{FA}=1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}}+(M_{uy}/M_{uy1})^{\alpha_{FA}}=0.283 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G21-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 417.75KN. PLL= 60.67KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.21 90 -31.81

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.10 90 1.37
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=717.63KN. Mux=0.47KN.M. Muy=49.77KN.M.
 Short Column
 $Pu/Fckbd=0.266$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.041$
 $pc=0.2\%$ Areq= 270mm²
 FROM CHARTS Mux1 / Fckbd2 = 0.061 Muy1 / Fckbd2 = 0.062
 $Puz=1314KN$. $Pu/Puz=0.546$ ALFA=1.577
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.52 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G21-1.5-5.4
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 331.32KN. PLL= 60.19KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.08 90 -26.11
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.10 90 -1.60
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.29 90 -27.72
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.26 90 -4.19
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=587.27KN. Mux=0.82KN.M. Muy=47.87KN.M.
 Short Column
 $Pu/Fckbd=0.218$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.039$
 $pc=0.2\%$ Areq= 270mm²
 FROM CHARTS Mux1 / Fckbd2 = 0.064 Muy1 / Fckbd2 = 0.066
 $Puz=1314KN$. $Pu/Puz=0.447$ ALFA=1.412
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.489 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:G21-5.4-8.7
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 237.78KN. PLL= 42.79KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.54 90 -33.24
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.43 90 -7.17
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.50 90 -31.76
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.39 90 -6.29
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=420.86KN. Mux=1.46KN.M. Muy=60.62KN.M.
 Short Column
 $Pu/Fckbd=0.156$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.050$
 $pc=0.2\%$ Areq= 270mm²
 FROM CHARTS Mux1 / Fckbd2 = 0.062 Muy1 / Fckbd2 = 0.063
 $Puz=1314KN$. $Pu/Puz=0.32$ ALFA=1.201
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.77 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G21-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 143.07KN. PLL= 24.41KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.46 90 -30.48

L.L.M.FROM LOWER TO UPPER:LMU 0 0.37 90 -5.84

D.L.M.FROM UPPER TO LOWER:DMD 0 0.47 90 -30.68

L.L.M.FROM UPPER TO LOWER:LMD 0 0.40 90 -6.27

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=251.22KN. Mux=1.31KN.M. Muy=55.43KN.M.

Short Column

$P_u/F_{ckbd}=0.093$ $M_{ux}/F_{ckbd2}=0.002$ $M_{uy}/F_{ckbd2}=0.046$

$p_c=0.2\%$ $A_{req}=270\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.051$ $M_{uy1}/F_{ckbd2}=0.052$

$P_{uz}=1314\text{KN}$. $P_u/P_{uz}=0.191$ $\alpha_F=1$

$(M_{ux}/M_{ux1})^{\alpha_F}+(M_{uy}/M_{uy1})^{\alpha_F}=0.915 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:G21-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 48.96KN. PLL= 6.48KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.60 90 -31.40

L.L.M.FROM LOWER TO UPPER:LMU 0 0.34 90 -5.48

D.L.M.FROM UPPER TO LOWER:DMD 0 0.73 90 -31.89

L.L.M.FROM UPPER TO LOWER:LMD 0 0.25 90 -4.25

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=83.16KN. Mux=1.61KN.M. Muy=56.06KN.M.

Short Column

$P_u/F_{ckbd}=0.031$ $M_{ux}/F_{ckbd2}=0.002$ $M_{uy}/F_{ckbd2}=0.046$

$p_c=0.6\%$ $A_{req}=810\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.062$ $M_{uy1}/F_{ckbd2}=0.065$

$P_{uz}=1511\text{KN}$. $P_u/P_{uz}=0.055$ $\alpha_F=1$

$(M_{ux}/M_{ux1})^{\alpha_F}+(M_{uy}/M_{uy1})^{\alpha_F}=0.739 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I31-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 489.98KN. PLL= 81.99KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -11.00 90 -30.01
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.36 90 2.01
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=857.96KN. Mux=17.04KN.M. Muy=48.03KN.M.
 Short Column
 $Pu/Fckbd=0.318$ $Mux/Fckbd2=0.021$ $Muy/Fckbd2=0.040$
 $pc=0.2\%$ Areq= 270mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.053$ $Muy1 / Fckbd2 = 0.054$
 $Puz=1314KN$. $Pu/Puz=0.653$ ALFA=1.755
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.779 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I31-1.5-5.4
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 394.65KN. PLL= 81.85KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -8.46 90 -26.33
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.57 90 -2.45
 D.L.M.FROM UPPER TO LOWER:DMD 0 -8.43 90 -29.52
 L.L.M.FROM UPPER TO LOWER:LMD 0 -1.40 90 -6.38
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=714.75KN. Mux=14.79KN.M. Muy=53.85KN.M.
 Short Column
 $Pu/Fckbd=0.265$ $Mux/Fckbd2=0.018$ $Muy/Fckbd2=0.044$
 $pc=0.2\%$ Areq= 270mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.061$ $Muy1 / Fckbd2 = 0.062$
 $Puz=1314KN$. $Pu/Puz=0.544$ ALFA=1.573
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.737 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I31-5.4-8.7
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 284.57KN. PLL= 57.79KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -9.75 90 -36.95
 L.L.M.FROM LOWER TO UPPER:LMU 0 -2.47 90 -11.01
 D.L.M.FROM UPPER TO LOWER:DMD 0 -9.54 90 -35.15
 L.L.M.FROM UPPER TO LOWER:LMD 0 -2.29 90 -9.77
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=513.54KN. Mux=18.33KN.M. Muy=71.94KN.M.
 Short Column
 $Pu/Fckbd=0.190$ $Mux/Fckbd2=0.023$ $Muy/Fckbd2=0.059$
 $pc=0.4\%$ Areq= 540mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.075$ $Muy1 / Fckbd2 = 0.078$

Puz=1413KN.Pu/Puz=0.364ALFA=1.273
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.926< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I31-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 173.95KN. PLL= 33.31KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -9.43 90 -33.40
L.L.M.FROM LOWER TO UPPER:LMU 0 -2.22 90 -9.14
D.L.M.FROM UPPER TO LOWER:DMD 0 -9.56 90 -33.46
L.L.M.FROM UPPER TO LOWER:LMD 0 -2.30 90 -9.73
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=310.89KN. Mux=17.79KN.M. Muy=64.79KN.M.
Short Column
Pu/Fckbd=0.115Mux/Fckbd2=0.022Muy/Fckbd2=0.053
pc=0.6% Areq= 810mm2
FROM CHARTS Mux1 / Fckbd2 = 0.080 Muy1 / Fckbd2 = 0.084
Puz=1511KN.Pu/Puz=0.206ALFA=1.009
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.899< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I31-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 63.47KN. PLL= 9.02KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -8.97 90 -35.09
L.L.M.FROM LOWER TO UPPER:LMU 0 -1.90 90 -8.44
D.L.M.FROM UPPER TO LOWER:DMD 0 -8.28 90 -36.70
L.L.M.FROM UPPER TO LOWER:LMD 0 -1.46 90 -6.52
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=108.74KN. Mux=16.31KN.M. Muy=67.71KN.M.
Short Column
Pu/Fckbd=0.040Mux/Fckbd2=0.020Muy/Fckbd2=0.056
pc=0.8% Areq= 1080mm2
FROM CHARTS Mux1 / Fckbd2 = 0.079 Muy1 / Fckbd2 = 0.083
Puz=1610KN.Pu/Puz=0.068ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.923< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H31-0-1.5
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 707.88KN. PLL= 131.70KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -10.54 90 18.49
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.85 90 -1.29
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1259.37KN. Mux=17.09KN.M. Muy=29.67KN.M.
 Short Column
 $Pu/Fckbd=0.466$ $Mux/Fckbd2=0.021$ $Muy/Fckbd2=0.024$
 $pc=0.6\%$ Areq= 810mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.035$ $Muy1 / Fckbd2 = 0.036$
 $Puz=1511KN$. $Pu/Puz=0.833$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.82 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H31-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 575.83KN. PLL= 131.87KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.53 90 17.19

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.31 90 2.08

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.88 90 20.16

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.22 90 5.08

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1061.55KN. Mux=21.15KN.M. Muy=37.86KN.M.

Short Column

$Pu/Fckbd=0.393$ $Mux/Fckbd2=0.026$ $Muy/Fckbd2=0.031$

$pc=0.4\%$ Areq= 540mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.046$ $Muy1 / Fckbd2 = 0.047$

$Puz=1413KN$. $Pu/Puz=0.751$ ALFA=1.919

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.789 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H31-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 414.29KN. PLL= 92.68KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -13.96 90 26.13

L.L.M.FROM LOWER TO UPPER:LMU 0 -5.67 90 8.80

D.L.M.FROM UPPER TO LOWER:DMD 0 -13.44 90 24.97

L.L.M.FROM UPPER TO LOWER:LMD 0 -5.26 90 8.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=760.46KN. Mux=29.45KN.M. Muy=52.4KN.M.

Short Column

$Pu/Fckbd=0.282$ $Mux/Fckbd2=0.036$ $Muy/Fckbd2=0.043$

pc=0.4% Areq= 540mm²
FROM CHARTS Mux1 / Fckbd2 = 0.068 Muy1 / Fckbd2 = 0.071
Puz=1413KN.Pu/Puz=0.538ALFA=1.564
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.831< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H31-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 253.20KN. PLL= 53.76KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -13.17 90 23.87

L.L.M.FROM LOWER TO UPPER:LMU 0 -5.05 90 7.59

D.L.M.FROM UPPER TO LOWER:DMD 0 -13.39 90 23.93

L.L.M.FROM UPPER TO LOWER:LMD 0 -5.25 90 7.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=460.44KN. Mux=27.96KN.M. Muy=47.87KN.M.

Short Column

Pu/Fckbd=0.171Mux/Fckbd2=0.035Muy/Fckbd2=0.039

pc=0.4% Areq= 540mm²

FROM CHARTS Mux1 / Fckbd2 = 0.074 Muy1 / Fckbd2 = 0.077

Puz=1413KN.Pu/Puz=0.326ALFA=1.21

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.841< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H31-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 92.36KN. PLL= 14.70KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -12.46 90 24.75

L.L.M.FROM LOWER TO UPPER:LMU 0 -4.40 90 6.80

D.L.M.FROM UPPER TO LOWER:DMD 0 -11.31 90 25.52

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.34 90 5.21

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=160.59KN. Mux=25.29KN.M. Muy=48.48KN.M.

Short Column

Pu/Fckbd=0.059Mux/Fckbd2=0.031Muy/Fckbd2=0.040

pc=0.6% Areq= 810mm²

FROM CHARTS Mux1 / Fckbd2 = 0.070 Muy1 / Fckbd2 = 0.073

Puz=1511KN.Pu/Puz=0.106ALFA=1

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.993< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I30-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 817.68KN. PLL= 180.48KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.00 90 -28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 0.00 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1497.24KN. Mux=0KN.M. Muy=48.95KN.M.

Short Column

$Pu/Fckbd=0.555$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$

$pc=1.2\%$ Areq= 1620mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.000$ $Muy1 / Fckbd2 = 0.048$

Puz=1808KN.Pu/Puz=0.828ALFA=2

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.696 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I30-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 676.51KN. PLL= 180.64KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.05 90 -29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 0.01 90 -4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 0.09 90 -38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 0.02 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1285.73KN. Mux=0.17KN.M. Muy=76.4KN.M.

Short Column

$Pu/Fckbd=0.476$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.063$

$pc=1.2\%$ Areq= 1620mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.002$ $Muy1 / Fckbd2 = 0.075$

Puz=1808KN.Pu/Puz=0.711ALFA=1.852

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.736 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I30-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 486.76KN. PLL= 126.91KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.17 90 -51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 0.05 90 -22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 0.17 90 -47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.04 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=920.51KN. Mux=0.33KN.M. Muy=109.88KN.M.

Short Column

$P_u/F_{ckbd} = 0.341$ $M_{ux}/F_{ckbd} = 0.000$ $M_{uy}/F_{ckbd} = 0.090$

$p_c = 1\%$ $A_{req} = 1350 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.048$ $M_{uy1} / F_{ckbd} = 0.095$

$P_{uz} = 1709 \text{ KN}$. $P_u/P_{uz} = 0.539$ $\alpha_{FA} = 1.564$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.927 < 1.0$ HENCE SAFE

AREA OF STEEL = 1608 mm^2

MAIN REINFORCEMENT: 8#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I30-8.7-12

SIZE OF COLUMN: 300x450 mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 297.63 KN. PLL = 73.64 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.17 90 -44.96

L.L.M. FROM LOWER TO UPPER: LMU 0 0.04 90 -18.16

D.L.M. FROM UPPER TO LOWER: DMD 0 0.17 90 -45.42

L.L.M. FROM UPPER TO LOWER: LMD 0 0.04 90 -19.42

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 556.91 \text{ KN}$. $M_{ux} = 0.32 \text{ KN.M}$. $M_{uy} = 97.26 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.206$ $M_{ux}/F_{ckbd} = 0.000$ $M_{uy}/F_{ckbd} = 0.080$

$p_c = 0.6\%$ $A_{req} = 810 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.064$ $M_{uy1} / F_{ckbd} = 0.090$

$P_{uz} = 1511 \text{ KN}$. $P_u/P_{uz} = 0.368$ $\alpha_{FA} = 1.281$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.865 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I30-12-15.3

SIZE OF COLUMN: 300x450 mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 108.19 KN. PLL = 20.16 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.15 90 -46.96

L.L.M. FROM LOWER TO UPPER: LMU 0 0.03 90 -16.88

D.L.M. FROM UPPER TO LOWER: DMD 0 0.13 90 -48.05

L.L.M. FROM UPPER TO LOWER: LMD 0 0.03 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 192.53 \text{ KN}$. $M_{ux} = 0.27 \text{ KN.M}$. $M_{uy} = 97.4 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.071$ $M_{ux}/F_{ckbd} = 0.000$ $M_{uy}/F_{ckbd} = 0.080$

$p_c = 0.8\%$ $A_{req} = 1080 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.045$ $M_{uy1} / F_{ckbd} = 0.091$

$P_{uz} = 1610 \text{ KN}$. $P_u/P_{uz} = 0.12$ $\alpha_{FA} = 1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.893 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H30-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 925.74KN. PLL= 274.91KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.04 90 28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.15 90 -4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1800.98KN. Mux=1.79KN.M. Muy=48.95KN.M.

Short Column

$P_u/F_{ckbd} = 0.667$ $M_{ux}/F_{ckbd} = 0.002$ $M_{uy}/F_{ckbd} = 0.040$

$p_c = 1.8\%$ $A_{req} = 2430mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.015$ $M_{uy1} / F_{ckbd} = 0.050$

$P_{uz} = 2104KN$. $P_u/P_{uz} = 0.856$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.665 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²

MAIN REINFORCEMENT:8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H30-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 787.37KN. PLL= 275.14KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.11 90 29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 0.14 90 4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 1.38 90 38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 0.36 90 12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1593.77KN. Mux=2.61KN.M. Muy=76.4KN.M.

Short Column

$P_u/F_{ckbd} = 0.590$ $M_{ux}/F_{ckbd} = 0.003$ $M_{uy}/F_{ckbd} = 0.063$

$p_c = 1.6\%$ $A_{req} = 2160mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.016$ $M_{uy1} / F_{ckbd} = 0.065$

$P_{uz} = 2006KN$. $P_u/P_{uz} = 0.795$ $ALFA = 1.991$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.971 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²

MAIN REINFORCEMENT:8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H30-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 565.66KN. PLL= 193.30KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.84 90 51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 0.61 90 22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 1.70 90 47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.53 90 19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1138.44KN. Mux=3.68KN.M. Muy=109.88KN.M.
Short Column
 $Pu/Fckbd=0.422$ $Mux/Fckbd2=0.005$ $Muy/Fckbd2=0.090$
 $pc=1.4\%$ $A_{req}=1890mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.023$ $Muy1 / Fckbd2 = 0.101$
 $Puz=1907KN$. $Pu/Puz=0.597$ $ALFA=1.662$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.898 < 1.0$ HENCE SAFE
AREA OF STEEL=2512mm²
MAIN REINFORCEMENT:8#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H30-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 344.79KN. PLL= 112.16KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 1.65 90 44.96
L.L.M.FROM LOWER TO UPPER:LMU 0 0.49 90 18.16
D.L.M.FROM UPPER TO LOWER:DMD 0 1.73 90 45.42
L.L.M.FROM UPPER TO LOWER:LMD 0 0.53 90 19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=685.43KN. Mux=3.39KN.M. Muy=97.26KN.M.
Short Column

$Pu/Fckbd=0.254$ $Mux/Fckbd2=0.004$ $Muy/Fckbd2=0.080$
 $pc=0.6\%$ $A_{req}=810mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.062$ $Muy1 / Fckbd2 = 0.086$
 $Puz=1511KN$. $Pu/Puz=0.453$ $ALFA=1.422$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.925 < 1.0$ HENCE SAFE
AREA OF STEEL=1256mm²

MAIN REINFORCEMENT:4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H30-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 123.66KN. PLL= 30.70KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 1.63 90 46.96
L.L.M.FROM LOWER TO UPPER:LMU 0 0.47 90 16.88
D.L.M.FROM UPPER TO LOWER:DMD 0 1.47 90 48.05
L.L.M.FROM UPPER TO LOWER:LMD 0 0.38 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=231.54KN. Mux=3.15KN.M. Muy=97.4KN.M.
Short Column

$Pu/Fckbd=0.086$ $Mux/Fckbd2=0.004$ $Muy/Fckbd2=0.080$
 $pc=0.8\%$ $A_{req}=1080mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.049$ $Muy1 / Fckbd2 = 0.093$
 $Puz=1610KN$. $Pu/Puz=0.144$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.939 < 1.0$ HENCE SAFE
AREA OF STEEL=1256mm²

MAIN REINFORCEMENT:4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I29-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 484.95KN. PLL= 83.14KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 10.91 90 -30.79

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.39 90 2.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=852.14KN. Mux=16.95KN.M. Muy=49.41KN.M.

Short Column

$P_u/F_{ck}b_d=0.316$ $M_{ux}/F_{ck}b_d^2=0.021$ $M_{uy}/F_{ck}b_d^2=0.041$

$p_c=0.2\%$ Areq= 270mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.053$ $M_{uy1}/F_{ck}b_d^2 = 0.054$

Puz=1314KN.Pu/Puz=0.649ALFA=1.748

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.798 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I29-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 388.77KN. PLL= 83.06KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 8.64 90 -27.28

L.L.M.FROM LOWER TO UPPER:LMU 0 0.61 90 -2.51

D.L.M.FROM UPPER TO LOWER:DMD 0 8.83 90 -30.83

L.L.M.FROM UPPER TO LOWER:LMD 0 1.50 90 -6.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=707.75KN. Mux=15.5KN.M. Muy=56.22KN.M.

Short Column

$P_u/F_{ck}b_d=0.262$ $M_{ux}/F_{ck}b_d^2=0.019$ $M_{uy}/F_{ck}b_d^2=0.046$

$p_c=0.2\%$ Areq= 270mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.061$ $M_{uy1}/F_{ck}b_d^2 = 0.062$

Puz=1314KN.Pu/Puz=0.539ALFA=1.564

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.788 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I29-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 276.83KN. PLL= 58.55KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 10.42 90 -38.45

L.L.M.FROM LOWER TO UPPER:LMU 0 2.65 90 -11.38

D.L.M.FROM UPPER TO LOWER:DMD 0 10.14 90 -36.17

L.L.M.FROM UPPER TO LOWER:LMD 0 2.44 90 -9.98
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=503.07KN. Mux=19.61KN.M. Muy=74.75KN.M.
 Short Column
 $Pu/Fckbd=0.186$ $Mux/Fckbd2=0.024$ $Muy/Fckbd2=0.062$
 $pc=0.4\%$ $A_{req}=540mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.075$ $Muy1 / Fckbd2 = 0.078$
 $Puz=1413KN$, $Pu/Puz=0.356$ $ALFA=1.26$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.987 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I29-8.7-12
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 164.56KN. PLL= 33.81KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 10.00 90 -35.10
 L.L.M.FROM LOWER TO UPPER:LMU 0 2.34 90 -9.28
 D.L.M.FROM UPPER TO LOWER:DMD 0 10.12 90 -36.31
 L.L.M.FROM UPPER TO LOWER:LMD 0 2.44 90 -9.97
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=297.56KN. Mux=18.84KN.M. Muy=69.42KN.M.
 Short Column
 $Pu/Fckbd=0.110$ $Mux/Fckbd2=0.023$ $Muy/Fckbd2=0.057$
 $pc=0.6\%$ $A_{req}=810mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.080$ $Muy1 / Fckbd2 = 0.084$
 $Puz=1511KN$, $Pu/Puz=0.197$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.976 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I29-12-15.3
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 52.44KN. PLL= 9.18KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 9.60 90 -33.89
 L.L.M.FROM LOWER TO UPPER:LMU 0 2.03 90 -8.68
 D.L.M.FROM UPPER TO LOWER:DMD 0 8.93 90 -30.29
 L.L.M.FROM UPPER TO LOWER:LMD 0 1.55 90 -6.76
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=92.43KN. Mux=17.45KN.M. Muy=63.86KN.M.
 Short Column
 $Pu/Fckbd=0.034$ $Mux/Fckbd2=0.022$ $Muy/Fckbd2=0.053$
 $pc=0.8\%$ $A_{req}=1080mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.077$ $Muy1 / Fckbd2 = 0.082$
 $Puz=1610KN$, $Pu/Puz=0.057$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.919 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H29-0-1.5
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 765.70KN. PLL= 174.00KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.98 90 30.79
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.21 90 -2.15

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1409.55KN. Mux=1.79KN.M. Muy=49.41KN.M.
Short Column

$P_u/F_{ckbd}=0.522$ $M_{ux}/F_{ckbd}^2=0.002$ $M_{uy}/F_{ckbd}^2=0.041$
 $p_c=1\%$ Areq= 1350mm²
FROM CHARTS $M_{ux1}/F_{ckbd}^2 = 0.013$ $M_{uy1}/F_{ckbd}^2 = 0.045$
 $P_{uz}=1709KN$. $P_u/P_{uz}=0.825$ ALFA=2
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.826 < 1.0$ HENCE SAFE
AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H29-1.5-5.4
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 628.29KN. PLL= 173.91KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.05 90 27.28
L.L.M.FROM LOWER TO UPPER:LMU 0 0.43 90 2.51
D.L.M.FROM UPPER TO LOWER:DMD 0 0.79 90 30.83
L.L.M.FROM UPPER TO LOWER:LMD 0 1.00 90 6.65

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1203.3KN. Mux=2.69KN.M. Muy=56.22KN.M.
Short Column

$P_u/F_{ckbd}=0.446$ $M_{ux}/F_{ckbd}^2=0.003$ $M_{uy}/F_{ckbd}^2=0.046$
 $p_c=0.8\%$ Areq= 1080mm²
FROM CHARTS $M_{ux1}/F_{ckbd}^2 = 0.014$ $M_{uy1}/F_{ckbd}^2 = 0.058$
 $P_{uz}=1610KN$. $P_u/P_{uz}=0.747$ ALFA=1.912
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.719 < 1.0$ HENCE SAFE
AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H29-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 447.05KN. PLL= 122.50KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 1.77 90 38.45

L.L.M.FROM LOWER TO UPPER:LMU 0 1.78 90 11.38
D.L.M.FROM UPPER TO LOWER:DMD 0 1.67 90 36.17
L.L.M.FROM UPPER TO LOWER:LMD 0 1.71 90 9.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=854.33KN. Mux=5.33KN.M. Muy=74.75KN.M.

Short Column

$Pu/Fckbd=0.316$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.062$

$pc=0.4\%$ $A_{req}=540mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.053$ $Muy1 / Fckbd2 = 0.065$

$Puz=1413KN$. $Pu/Puz=0.605$ $ALFA=1.675$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.935 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H29-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 265.48KN. PLL= 70.82KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.55 90 35.10

L.L.M.FROM LOWER TO UPPER:LMU 0 1.67 90 9.28

D.L.M.FROM UPPER TO LOWER:DMD 0 1.50 90 36.31

L.L.M.FROM UPPER TO LOWER:LMD 0 1.70 90 9.97

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=504.45KN. Mux=4.88KN.M. Muy=69.42KN.M.

Short Column

$Pu/Fckbd=0.187$ $Mux/Fckbd2=0.006$ $Muy/Fckbd2=0.057$

$pc=0.2\%$ $A_{req}=270mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.065$

$Puz=1314KN$. $Pu/Puz=0.384$ $ALFA=1.307$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.884 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H29-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 83.94KN. PLL= 19.26KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.86 90 33.89

L.L.M.FROM LOWER TO UPPER:LMU 0 1.40 90 8.68

D.L.M.FROM UPPER TO LOWER:DMD 0 2.30 90 30.29

L.L.M.FROM UPPER TO LOWER:LMD 0 1.06 90 6.76

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=154.8KN. Mux=5.55KN.M. Muy=63.86KN.M.

Short Column

$Pu/Fckbd=0.057$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.053$

$pc=0.6\%$ $A_{req}=810mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.069$ $Muy1 / Fckbd2 = 0.073$

Puz=1511KN.Pu/Puz=0.102ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.822< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I27-0-1.5
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 486.27KN. PLL= 83.37KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 -11.11 90 -30.79
L.L.M.FROM UPPER TO LOWER:LMD 0 0.38 90 2.15
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=854.46KN. Mux=17.24KN.M. Muy=49.41KN.M.
Short Column
Pu/Fckbd=0.316Mux/Fckbd2=0.021Muy/Fckbd2=0.041
pc=0.2% Areq= 270mm2
FROM CHARTS Mux1 / Fckbd2 = 0.053 Muy1 / Fckbd2 = 0.054
Puz=1314KN.Pu/Puz=0.65ALFA=1.751
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.807< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I27-1.5-5.4
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 389.83KN. PLL= 83.30KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -8.63 90 -27.28
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.60 90 -2.51
D.L.M.FROM UPPER TO LOWER:DMD 0 -8.66 90 -30.83
L.L.M.FROM UPPER TO LOWER:LMD 0 -1.46 90 -6.65
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=709.7KN. Mux=15.18KN.M. Muy=56.22KN.M.
Short Column
Pu/Fckbd=0.263Mux/Fckbd2=0.019Muy/Fckbd2=0.046
pc=0.2% Areq= 270mm2
FROM CHARTS Mux1 / Fckbd2 = 0.061 Muy1 / Fckbd2 = 0.062
Puz=1314KN.Pu/Puz=0.54ALFA=1.567
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.784< 1.0 HENCE SAFE
AREA OF STEEL=1206mm2
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I27-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 277.58KN. PLL= 58.70KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -10.04 90 -38.45
 L.L.M.FROM LOWER TO UPPER:LMU 0 -2.56 90 -11.38
 D.L.M.FROM UPPER TO LOWER:DMD 0 -9.81 90 -36.17
 L.L.M.FROM UPPER TO LOWER:LMD 0 -2.36 90 -9.98
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=504.42KN. Mux=18.9KN.M. Muy=74.75KN.M.
 Short Column
 $Pu/Fckbd=0.187Mux/Fckbd2=0.023Muy/Fckbd2=0.062$
 $pc=0.4\%$ Areq= 540mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.075$ $Muy1 / Fckbd2 = 0.078$
 $Puz=1413KN.Pu/Puz=0.357ALFA=1.262$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.975 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I27-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 165.10KN. PLL= 33.91KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -9.68 90 -35.10
 L.L.M.FROM LOWER TO UPPER:LMU 0 -2.28 90 -9.28
 D.L.M.FROM UPPER TO LOWER:DMD 0 -9.79 90 -36.31
 L.L.M.FROM UPPER TO LOWER:LMD 0 -2.36 90 -9.97

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=298.52KN. Mux=18.23KN.M. Muy=69.42KN.M.

Short Column

$Pu/Fckbd=0.111Mux/Fckbd2=0.023Muy/Fckbd2=0.057$

$pc=0.6\%$ Areq= 810mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.080$ $Muy1 / Fckbd2 = 0.084$

$Puz=1511KN.Pu/Puz=0.198ALFA=1$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.966 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I27-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 52.76KN. PLL= 9.22KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -9.29 90 -33.89
 L.L.M.FROM LOWER TO UPPER:LMU 0 -1.96 90 -8.68
 D.L.M.FROM UPPER TO LOWER:DMD 0 -8.66 90 -30.29
 L.L.M.FROM UPPER TO LOWER:LMD 0 -1.51 90 -6.76

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=92.97KN. Mux=16.88KN.M. Muy=63.86KN.M.

Short Column

$Pu/Fckbd=0.034Mux/Fckbd2=0.021Muy/Fckbd2=0.053$

pc=0.8% Areq= 1080mm²
FROM CHARTS Mux1 / Fckbd2 = 0.077 Muy1 / Fckbd2 = 0.082
Puz=1610KN.Pu/Puz=0.058ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.91< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H27-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 769.89KN. PLL= 175.52KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.92 90 30.79

L.L.M.FROM UPPER TO LOWER:LMD 0 0.24 90 -2.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1418.12KN. Mux=1.74KN.M. Muy=49.41KN.M.

Short Column

Pu/Fckbd=0.525Mux/Fckbd2=0.002Muy/Fckbd2=0.041

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.012 Muy1 / Fckbd2 = 0.044

Puz=1709KN.Pu/Puz=0.83ALFA=2

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.875< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H27-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 632.35KN. PLL= 175.49KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.18 90 27.28

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.46 90 2.51

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.01 90 30.83

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.06 90 6.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1211.76KN. Mux=3.11KN.M. Muy=56.22KN.M.

Short Column

Pu/Fckbd=0.449Mux/Fckbd2=0.004Muy/Fckbd2=0.046

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.013 Muy1 / Fckbd2 = 0.057

Puz=1610KN.Pu/Puz=0.753ALFA=1.921

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.776< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H27-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 449.95KN. PLL= 123.53KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -2.03 90 38.45

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.91 90 11.38

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.92 90 36.17

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.80 90 9.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=860.22KN. Mux=5.91KN.M. Muy=74.75KN.M.

Short Column

$Pu/Fckbd=0.319$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.062$

$pc=0.4\%$ Areq= 540mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.053$ $Muy1 / Fckbd2 = 0.065$

Puz=1413KN.Pu/Puz=0.609ALFA=1.682

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.949 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H27-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 267.46KN. PLL= 71.49KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.78 90 35.10

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.74 90 9.28

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.73 90 36.31

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.80 90 9.97

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=508.43KN. Mux=5.37KN.M. Muy=69.42KN.M.

Short Column

$Pu/Fckbd=0.188$ $Mux/Fckbd2=0.007$ $Muy/Fckbd2=0.057$

$pc=0.2\%$ Areq= 270mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.065$

Puz=1314KN.Pu/Puz=0.387ALFA=1.312

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.888 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H27-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 84.95KN. PLL= 19.49KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -2.13 90 33.89

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.48 90 8.68

D.L.M.FROM UPPER TO LOWER:DMD 0 -2.58 90 30.29

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.11 90 6.76

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=156.66KN. Mux=6.09KN.M. Muy=63.86KN.M.

Short Column

$P_u/F_{ck}b_d = 0.058$ $M_u/F_{ck}b_d^2 = 0.008$ $M_u/F_{ck}b_d^2 = 0.053$

$p_c = 0.6\%$ $A_{req} = 810\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.069$ $M_{uy1} / F_{ck}b_d^2 = 0.073$

$P_u = 1511\text{KN}$. $P_u/P_u = 0.104$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.83 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I26-0-1.5

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 799.07KN. PLL = 177.08KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.00 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 0.00 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 1.05 90 -28.46

L.L.M. FROM UPPER TO LOWER: LMD 0 -0.11 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 1464.23\text{KN}$. $M_{ux} = 1.74\text{KN.M}$. $M_{uy} = 48.95\text{KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.542$ $M_u/F_{ck}b_d^2 = 0.002$ $M_u/F_{ck}b_d^2 = 0.040$

$p_c = 1.2\%$ $A_{req} = 1620\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.005$ $M_{uy1} / F_{ck}b_d^2 = 0.053$

$P_u = 1808\text{KN}$. $P_u/P_u = 0.81$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.748 < 1.0$ HENCE SAFE

AREA OF STEEL = 1834mm^2

MAIN REINFORCEMENT: 6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I26-1.5-5.4

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 660.40KN. PLL = 177.17KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 1.01 90 -29.99

L.L.M. FROM LOWER TO UPPER: LMU 0 0.09 90 -4.85

D.L.M. FROM UPPER TO LOWER: DMD 0 1.20 90 -38.08

L.L.M. FROM UPPER TO LOWER: LMD 0 0.23 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 1256.36\text{KN}$. $M_{ux} = 2.15\text{KN.M}$. $M_{uy} = 76.4\text{KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.465$ $M_u/F_{ck}b_d^2 = 0.003$ $M_u/F_{ck}b_d^2 = 0.063$

$p_c = 1.2\%$ $A_{req} = 1620\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.073$ $M_{uy1} / F_{ck}b_d^2 = 0.078$

$P_u = 1808\text{KN}$. $P_u/P_u = 0.695$ $\alpha = 1.825$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.678 < 1.0$ HENCE SAFE

AREA OF STEEL = 1834mm^2

MAIN REINFORCEMENT: 6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I26-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 475.07KN. PLL= 124.57KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.53 90 -51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 0.40 90 -22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 1.46 90 -47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.35 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=899.46KN. Mux=2.9KN.M. Muy=109.88KN.M.

Short Column

$P_u/F_{ckbd} = 0.333$ $M_{ux}/F_{ckbd} = 0.004$ $M_{uy}/F_{ckbd} = 0.090$

$p_c = 1\%$ $A_{req} = 1350mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.050$ $M_{uy1} / F_{ckbd} = 0.096$

$P_{uz} = 1709KN$. $P_u/P_{uz} = 0.526$ $ALFA = 1.544$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.923 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I26-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 290.05KN. PLL= 72.22KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.40 90 -44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.32 90 -18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 1.42 90 -45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 0.36 90 -19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=543.41KN. Mux=2.67KN.M. Muy=97.26KN.M.

Short Column

$P_u/F_{ckbd} = 0.201$ $M_{ux}/F_{ckbd} = 0.003$ $M_{uy}/F_{ckbd} = 0.080$

$p_c = 0.6\%$ $A_{req} = 810mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.064$ $M_{uy1} / F_{ckbd} = 0.090$

$P_{uz} = 1511KN$. $P_u/P_{uz} = 0.36$ $ALFA = 1.266$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.887 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I26-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 104.86KN. PLL= 19.74KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.47 90 -46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.31 90 -16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 1.50 90 -48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.24 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=186.9KN. Mux=2.72KN.M. Muy=97.4KN.M.
Short Column
 $Pu/Fckbd=0.069$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.080$
 $pc=0.8\%$ $A_{req}=1080mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.044$ $Muy1 / Fckbd2 = 0.090$
 $Puz=1610KN$. $Pu/Puz=0.116$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.966 < 1.0$ HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H26-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 899.33KN. PLL= 266.24KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.15 90 28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.07 90 -4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1748.36KN. Mux=0.33KN.M. Muy=48.95KN.M.

Short Column

$Pu/Fckbd=0.648$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$

$pc=1.6\%$ $A_{req}=2160mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.007$ $Muy1 / Fckbd2 = 0.042$

$Puz=2006KN$. $Pu/Puz=0.872$ $ALFA=2$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.933 < 1.0$ HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H26-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 763.22KN. PLL= 266.29KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.05 90 29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 0.07 90 4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 0.19 90 38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 0.17 90 12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1544.27KN. Mux=0.54KN.M. Muy=76.4KN.M.

Short Column

$Pu/Fckbd=0.572$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.063$

$pc=1.6\%$ $A_{req}=2160mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.008$ $Muy1 / Fckbd2 = 0.072$

$Puz=2006KN$. $Pu/Puz=0.77$ $ALFA=1.95$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.772 < 1.0$ HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H26-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 548.32KN. PLL= 187.32KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.33 90 51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 0.30 90 22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 0.29 90 47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.25 90 19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1103.46KN. Mux=0.95KN.M. Muy=109.88KN.M.

Short Column

$P_u/F_{ckb_d} = 0.409$ $M_{ux}/F_{ckb_d} = 0.001$ $M_{uy}/F_{ckb_d} = 0.090$

$p_c = 1.2\%$ $A_{req} = 1620mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.027$ $M_{uy1} / F_{ckb_d} = 0.092$

$P_{uz} = 1808KN$. $P_u/P_{uz} = 0.61$ $\alpha = 1.684$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.972 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H26-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 333.59KN. PLL= 108.50KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.24 90 44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.25 90 18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 0.23 90 45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 0.27 90 19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=663.14KN. Mux=0.77KN.M. Muy=97.26KN.M.

Short Column

$P_u/F_{ckb_d} = 0.246$ $M_{ux}/F_{ckb_d} = 0.001$ $M_{uy}/F_{ckb_d} = 0.080$

$p_c = 0.6\%$ $A_{req} = 810mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.063$ $M_{uy1} / F_{ckb_d} = 0.087$

$P_{uz} = 1511KN$. $P_u/P_{uz} = 0.439$ $\alpha = 1.398$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.893 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H26-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 118.89KN. PLL= 29.62KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.35 90 46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.23 90 16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 0.49 90 48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.18 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=222.77KN. Mux=1.08KN.M. Muy=97.4KN.M.

Short Column

Pu/Fckbd=0.083Mux/Fckbd2=0.001Muy/Fckbd2=0.080

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.048 Muy1 / Fckbd2 = 0.093

Puz=1610KN.Pu/Puz=0.138ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.893< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I25-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 776.76KN. PLL= 172.74KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.09 90 -28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 0.03 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1424.25KN. Mux=0.18KN.M. Muy=48.95KN.M.

Short Column

Pu/Fckbd=0.528Mux/Fckbd2=0.000Muy/Fckbd2=0.040

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.011 Muy1 / Fckbd2 = 0.043

Puz=1709KN.Pu/Puz=0.833ALFA=2

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.862< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I25-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 640.52KN. PLL= 172.71KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.13 90 -29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 -4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.18 90 -38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.05 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1219.85KN. Mux=0.35KN.M. Muy=76.4KN.M.

Short Column

Pu/Fckbd=0.452Mux/Fckbd2=0.000Muy/Fckbd2=0.063

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.011 Muy1 / Fckbd2 = 0.069

Puz=1709KN.Pu/Puz=0.714ALFA=1.856

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.845< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²
MAIN REINFORCEMENT:8#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I25-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 460.58KN. PLL= 121.57KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.25 90 -51.20
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.08 90 -22.05
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.22 90 -47.87
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.05 90 -19.48

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=873.23KN. Mux=0.5KN.M. Muy=109.88KN.M.
Short Column

$P_u/F_{ckbd}=0.323$ $M_{ux}/F_{ckbd2}=0.001$ $M_{uy}/F_{ckbd2}=0.090$
 $p_c=1\%$ Areq= 1350mm²
FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.052$ $M_{uy1}/F_{ckbd2} = 0.098$
 $P_{uz}=1709KN$. $P_u/P_{uz}=0.511$ ALFA=1.518
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.882 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²
MAIN REINFORCEMENT:8#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I25-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 280.54KN. PLL= 70.36KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.20 90 -44.96
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.05 90 -18.16
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.21 90 -45.42
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.07 90 -19.42

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=526.35KN. Mux=0.42KN.M. Muy=97.26KN.M.
Short Column

$P_u/F_{ckbd}=0.195$ $M_{ux}/F_{ckbd2}=0.001$ $M_{uy}/F_{ckbd2}=0.080$
 $p_c=0.6\%$ Areq= 810mm²
FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.064$ $M_{uy1}/F_{ckbd2} = 0.090$
 $P_{uz}=1511KN$. $P_u/P_{uz}=0.348$ ALFA=1.247
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.867 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I25-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 100.54KN. PLL= 19.19KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.25 90 -46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.06 90 -16.88
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.29 90 -48.05
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.06 90 -13.11
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=179.6KN. Mux=0.53KN.M. Muy=97.4KN.M.
 Short Column
 $Pu/Fckbd=0.067$ $Mux/Fckbd^2=0.001$ $Muy/Fckbd^2=0.080$
 $pc=0.8\%$ Areq= 1080mm²
 FROM CHARTS $Mux1 / Fckbd^2 = 0.043$ $Muy1 / Fckbd^2 = 0.090$
 $Puz=1610KN$. $Pu/Puz=0.112$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.91 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H25-0-1.5
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 895.19KN. PLL= 262.73KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.04 90 28.46
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.02 90 -4.17
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1736.88KN. Mux=0.09KN.M. Muy=48.95KN.M.
 Short Column
 $Pu/Fckbd=0.643$ $Mux/Fckbd^2=0.000$ $Muy/Fckbd^2=0.040$
 $pc=1.6\%$ Areq= 2160mm²
 FROM CHARTS $Mux1 / Fckbd^2 = 0.009$ $Muy1 / Fckbd^2 = 0.044$
 $Puz=2006KN$. $Pu/Puz=0.866$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.848 < 1.0$ HENCE SAFE
 AREA OF STEEL=2286mm²
 MAIN REINFORCEMENT:2#16+6#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H25-1.5-5.4
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 758.71KN. PLL= 262.72KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -0.01 90 29.99
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 4.85
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.04 90 38.08
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.04 90 12.85
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1532.15KN. Mux=0.12KN.M. Muy=76.4KN.M.
 Short Column
 $Pu/Fckbd=0.567$ $Mux/Fckbd^2=0.000$ $Muy/Fckbd^2=0.063$
 $pc=1.6\%$ Areq= 2160mm²
 FROM CHARTS $Mux1 / Fckbd^2 = 0.010$ $Muy1 / Fckbd^2 = 0.074$

Puz=2006KN.Pu/Puz=0.764ALFA=1.94
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.738< 1.0 HENCE SAFE
AREA OF STEEL=2286mm²
MAIN REINFORCEMENT:2#16+6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H25-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 544.90KN. PLL= 184.90KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.07 90 51.20
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.07 90 22.05
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.05 90 47.87
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.04 90 19.48
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1094.7KN. Mux=0.21KN.M. Muy=109.88KN.M.
Short Column

Pu/Fckbd=0.405Mux/Fckbd2=0.000Muy/Fckbd2=0.090
pc=1.2% Areq= 1620mm²
FROM CHARTS Mux1 / Fckbd2 = 0.029 Muy1 / Fckbd2 = 0.093
Puz=1808KN.Pu/Puz=0.606ALFA=1.676
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.954< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H25-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 331.05KN. PLL= 107.04KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.04 90 44.96
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.04 90 18.16
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.03 90 45.42
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.04 90 19.42
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=657.14KN. Mux=0.12KN.M. Muy=97.26KN.M.
Short Column

Pu/Fckbd=0.243Mux/Fckbd2=0.000Muy/Fckbd2=0.080
pc=0.6% Areq= 810mm²
FROM CHARTS Mux1 / Fckbd2 = 0.063 Muy1 / Fckbd2 = 0.087
Puz=1511KN.Pu/Puz=0.435ALFA=1.391
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.887< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H25-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 117.19KN. PLL= 29.20KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -0.06 90 46.96
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.04 90 16.88
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.12 90 48.05
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.05 90 13.11
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=219.59KN. Mux=0.26KN.M. Muy=97.4KN.M.
 Short Column
 $Pu/Fckbd=0.081$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.080$
 $pc=0.8\%$ $A_{req}=1080mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.047$ $Muy1 / Fckbd2 = 0.092$
 $Puz=1610KN$. $Pu/Puz=0.136$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.874 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I24-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 779.05KN. PLL= 173.16KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.04 90 -28.46
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.01 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1428.32KN. Mux=0.08KN.M. Muy=48.95KN.M.

Short Column

$Pu/Fckbd=0.529$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$

$pc=1\%$ $A_{req}=1350mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.011$ $Muy1 / Fckbd2 = 0.043$

$Puz=1709KN$. $Pu/Puz=0.836$ $ALFA=2$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.885 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I24-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 642.73KN. PLL= 173.16KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.04 90 -29.99
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 -4.85
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.07 90 -38.08
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.02 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1223.84KN. Mux=0.14KN.M. Muy=76.4KN.M.

Short Column

$Pu/Fckbd=0.453$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.063$

pc=1% Areq= 1350mm²
FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.011$ $M_{uy1} / F_{ckbd2} = 0.069$
Puz=1709KN. Pu/Puz=0.716ALFA=1.86
(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.853< 1.0 HENCE SAFE
AREA OF STEEL=1608mm²
MAIN REINFORCEMENT:8#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I24-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 462.20KN. PLL= 121.84KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.07 90 -51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 0.03 90 -22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 0.07 90 -47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.02 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=876.06KN. Mux=0.15KN.M. Muy=109.88KN.M.

Short Column

Pu/Fckbd=0.324Mux/Fckbd2=0.000Muy/Fckbd2=0.090

pc=1% Areq= 1350mm²

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.052$ $M_{uy1} / F_{ckbd2} = 0.098$

Puz=1709KN. Pu/Puz=0.513ALFA=1.521

(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.884< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I24-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 281.66KN. PLL= 70.52KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.04 90 -44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.02 90 -18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 0.04 90 -45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 0.02 90 -19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=528.27KN. Mux=0.09KN.M. Muy=97.26KN.M.

Short Column

Pu/Fckbd=0.196Mux/Fckbd2=0.000Muy/Fckbd2=0.080

pc=0.6% Areq= 810mm²

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.064$ $M_{uy1} / F_{ckbd2} = 0.090$

Puz=1511KN. Pu/Puz=0.35ALFA=1.249

(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.865< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I24-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 101.10KN. PLL= 19.17KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.09 90 -46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.03 90 -16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 0.10 90 -48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.05 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=180.41KN. Mux=0.23KN.M. Muy=97.4KN.M.

Short Column

$Pu/Fckbd=0.067$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.080$

$pc=0.8\%$ Areq= 1080mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.043$ $Muy1 / Fckbd2 = 0.090$

Puz=1610KN.Pu/Puz=0.112ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.901 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H24-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 895.10KN. PLL= 263.21KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.02 90 28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.01 90 -4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1737.47KN. Mux=0.05KN.M. Muy=48.95KN.M.

Short Column

$Pu/Fckbd=0.644$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$

$pc=1.6\%$ Areq= 2160mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.009$ $Muy1 / Fckbd2 = 0.044$

Puz=2006KN.Pu/Puz=0.866ALFA=2

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.851 < 1.0$ HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H24-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 758.79KN. PLL= 263.20KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.02 90 29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 0.03 90 38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 0.01 90 12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1532.99KN. Mux=0.06KN.M. Muy=76.4KN.M.

Short Column

$P_u/F_{ck}b_d = 0.568$ $M_u/F_{ck}b_d^2 = 0.000$ $M_u/F_{ck}b_d^2 = 0.063$

$p_c = 1.6\%$ $A_{eq} = 2160 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.010$ $M_{uy1} / F_{ck}b_d^2 = 0.073$

$P_{uz} = 2006 \text{ KN}$ $P_u/P_{uz} = 0.764$ $\alpha_{FA} = 1.941$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.739 < 1.0$ HENCE SAFE

AREA OF STEEL = 2286 mm^2

MAIN REINFORCEMENT: 2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: H24-5.4-8.7

SIZE OF COLUMN: $300 \times 450 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: $P_{DL} = 545.00 \text{ KN}$. $P_{LL} = 185.20 \text{ KN}$.

D.L.M. FROM LOWER TO UPPER: $DMU \ 0 \ 0.05 \ 90 \ 51.20$

L.L.M. FROM LOWER TO UPPER: $LMU \ 0 \ 0.03 \ 90 \ 22.05$

D.L.M. FROM UPPER TO LOWER: $DMD \ 0 \ 0.04 \ 90 \ 47.87$

L.L.M. FROM UPPER TO LOWER: $LMD \ 0 \ 0.02 \ 90 \ 19.48$

DESIGN PROCEDURE:

LOAD COMBINATION: $1.5DL + 1.5LL$

DESIGN FACTORED LOADS: $P_u = 1095.3 \text{ KN}$. $M_{ux} = 0.12 \text{ KN.M}$. $M_{uy} = 109.88 \text{ KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.406$ $M_u/F_{ck}b_d^2 = 0.000$ $M_u/F_{ck}b_d^2 = 0.090$

$p_c = 1.2\%$ $A_{eq} = 1620 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.028$ $M_{uy1} / F_{ck}b_d^2 = 0.093$

$P_{uz} = 1808 \text{ KN}$ $P_u/P_{uz} = 0.606$ $\alpha_{FA} = 1.676$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.955 < 1.0$ HENCE SAFE

AREA OF STEEL = 1834 mm^2

MAIN REINFORCEMENT: 6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: H24-8.7-12

SIZE OF COLUMN: $300 \times 450 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: $P_{DL} = 331.18 \text{ KN}$. $P_{LL} = 107.19 \text{ KN}$.

D.L.M. FROM LOWER TO UPPER: $DMU \ 0 \ 0.03 \ 90 \ 44.96$

L.L.M. FROM LOWER TO UPPER: $LMU \ 0 \ 0.02 \ 90 \ 18.16$

D.L.M. FROM UPPER TO LOWER: $DMD \ 0 \ 0.03 \ 90 \ 45.42$

L.L.M. FROM UPPER TO LOWER: $LMD \ 0 \ 0.02 \ 90 \ 19.42$

DESIGN PROCEDURE:

LOAD COMBINATION: $1.5DL + 1.5LL$

DESIGN FACTORED LOADS: $P_u = 657.56 \text{ KN}$. $M_{ux} = 0.08 \text{ KN.M}$. $M_{uy} = 97.26 \text{ KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.244$ $M_u/F_{ck}b_d^2 = 0.000$ $M_u/F_{ck}b_d^2 = 0.080$

$p_c = 0.6\%$ $A_{eq} = 810 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.063$ $M_{uy1} / F_{ck}b_d^2 = 0.087$

$P_{uz} = 1511 \text{ KN}$ $P_u/P_{uz} = 0.435$ $\alpha_{FA} = 1.392$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.888 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H24-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 117.35KN. PLL= 29.16KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.05 90 46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.04 90 16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 0.10 90 48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.05 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=219.77KN. Mux=0.23KN.M. Muy=97.4KN.M.

Short Column

$P_u/F_{ckb_d} = 0.081$ $M_{ux}/F_{ckb_d} = 0.000$ $M_{uy}/F_{ckb_d} = 0.080$

$p_c = 0.8\%$ $A_{req} = 1080mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.047$ $M_{uy1} / F_{ckb_d} = 0.092$

$P_{uz} = 1610KN$. $P_u/P_{uz} = 0.136$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.873 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I23-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 782.32KN. PLL= 174.47KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.06 90 -28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 0.04 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1435.19KN. Mux=0.15KN.M. Muy=48.95KN.M.

Short Column

$P_u/F_{ckb_d} = 0.532$ $M_{ux}/F_{ckb_d} = 0.000$ $M_{uy}/F_{ckb_d} = 0.040$

$p_c = 1\%$ $A_{req} = 1350mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.009$ $M_{uy1} / F_{ckb_d} = 0.042$

$P_{uz} = 1709KN$. $P_u/P_{uz} = 0.84$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.928 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I23-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 645.87KN. PLL= 174.50KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.09 90 -29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 -4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.16 90 -38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.06 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1230.56KN. Mux=0.33KN.M. Muy=76.4KN.M.

Short Column

Pu/Fckbd=0.456Mux/Fckbd2=0.000Muy/Fckbd2=0.063

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.010 Muy1 / Fckbd2 = 0.068

Puz=1709KN.Pu/Puz=0.72ALFA=1.867

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.871< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I23-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 464.50KN. PLL= 122.87KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.23 90 -51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.10 90 -22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.21 90 -47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.08 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=881.06KN. Mux=0.5KN.M. Muy=109.88KN.M.

Short Column

Pu/Fckbd=0.326Mux/Fckbd2=0.001Muy/Fckbd2=0.090

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.051 Muy1 / Fckbd2 = 0.098

Puz=1709KN.Pu/Puz=0.516ALFA=1.526

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.889< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I23-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 283.30KN. PLL= 71.32KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.14 90 -44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.06 90 -18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.14 90 -45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.05 90 -19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=531.93KN. Mux=0.3KN.M. Muy=97.26KN.M.

Short Column

Pu/Fckbd=0.197Mux/Fckbd2=0.000Muy/Fckbd2=0.080

pc=0.6% Areq= 810mm²

FROM CHARTS Mux1 / Fckbd2 = 0.064 Muy1 / Fckbd2 = 0.090

Puz=1511KN.Pu/Puz=0.352ALFA=1.253

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.866< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I23-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 102.14KN. PLL= 19.82KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.23 90 -46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.13 90 -16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.33 90 -48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.20 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=182.94KN. Mux=0.8KN.M. Muy=97.4KN.M.

Short Column

$P_u/F_{ck}b_d=0.068$ $M_{ux}/F_{ck}b_d^2=0.001$ $M_{uy}/F_{ck}b_d^2=0.080$

$p_c=0.8\%$ $A_{req}=1080mm^2$

FROM CHARTS $M_{ux1}/F_{ck}b_d^2=0.044$ $M_{uy1}/F_{ck}b_d^2=0.090$

$P_{uz}=1610KN$. $P_u/P_{uz}=0.114$ $ALFA=1$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.915 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H23-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 898.26KN. PLL= 264.53KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.05 90 28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 0.03 90 -4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1744.19KN. Mux=0.12KN.M. Muy=48.95KN.M.

Short Column

$P_u/F_{ck}b_d=0.646$ $M_{ux}/F_{ck}b_d^2=0.000$ $M_{uy}/F_{ck}b_d^2=0.040$

$p_c=1.6\%$ $A_{req}=2160mm^2$

FROM CHARTS $M_{ux1}/F_{ck}b_d^2=0.008$ $M_{uy1}/F_{ck}b_d^2=0.043$

$P_{uz}=2006KN$. $P_u/P_{uz}=0.87$ $ALFA=2$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.899 < 1.0$ HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H23-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 761.98KN. PLL= 264.57KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.08 90 29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.17 90 38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.07 90 12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1539.83KN. Mux=0.36KN.M. Muy=76.4KN.M.

Short Column

Pu/Fckbd=0.570Mux/Fckbd2=0.000Muy/Fckbd2=0.063

pc=1.6% Areq= 2160mm²

FROM CHARTS Mux1 / Fckbd2 = 0.009 Muy1 / Fckbd2 = 0.073

Puz=2006KN.Pu/Puz=0.768ALFA=1.946

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.757< 1.0 HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H23-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 547.35KN. PLL= 186.26KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.27 90 51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.12 90 22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.24 90 47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.10 90 19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1100.42KN. Mux=0.59KN.M. Muy=109.88KN.M.

Short Column

Pu/Fckbd=0.408Mux/Fckbd2=0.001Muy/Fckbd2=0.090

pc=1.2% Areq= 1620mm²

FROM CHARTS Mux1 / Fckbd2 = 0.028 Muy1 / Fckbd2 = 0.093

Puz=1808KN.Pu/Puz=0.609ALFA=1.681

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.964< 1.0 HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H23-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 332.90KN. PLL= 108.03KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.17 90 44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.08 90 18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.17 90 45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.07 90 19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=661.4KN. Mux=0.38KN.M. Muy=97.26KN.M.

Short Column

Pu/Fckbd=0.245Mux/Fckbd2=0.000Muy/Fckbd2=0.080

pc=0.6% Areq= 810mm²

FROM CHARTS Mux1 / Fckbd2 = 0.063 Muy1 / Fckbd2 = 0.087

Puz=1511KN.Pu/Puz=0.438ALFA=1.396

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.891< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H23-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 118.48KN. PLL= 29.85KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.27 90 46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.12 90 16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.36 90 48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.20 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=222.5KN. Mux=0.84KN.M. Muy=97.4KN.M.

Short Column

$P_u/F_{ckbd}=0.082$ $M_{ux}/F_{ckbd2}=0.001$ $M_{uy}/F_{ckbd2}=0.080$

$p_c=0.8\%$ $A_{req}=1080mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.048$ $M_{uy1}/F_{ckbd2}=0.093$

$P_{uz}=1610KN$. $P_u/P_{uz}=0.138$ $ALFA=1$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.887 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I22-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 763.10KN. PLL= 166.22KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.04 90 -28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.12 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1393.98KN. Mux=0.24KN.M. Muy=48.95KN.M.

Short Column

$P_u/F_{ckbd}=0.516$ $M_{ux}/F_{ckbd2}=0.000$ $M_{uy}/F_{ckbd2}=0.040$

$p_c=1\%$ $A_{req}=1350mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.001$ $M_{uy1}/F_{ckbd2}=0.048$

$P_{uz}=1709KN$. $P_u/P_{uz}=0.816$ $ALFA=2$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.8 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I22-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 626.88KN. PLL= 166.12KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.41 90 -29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 0.12 90 -4.85
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.86 90 -38.08
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.31 90 -12.85
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1189.5KN. Mux=1.76KN.M. Muy=76.4KN.M.
 Short Column
 $Pu/Fckbd=0.441$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.063$
 $pc=1\%$ Areq= 1350mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.016$ $Muy1 / Fckbd2 = 0.072$
 $Puz=1709KN$. $Pu/Puz=0.696$ ALFA=1.827
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.805 < 1.0$ HENCE SAFE
 AREA OF STEEL=1608mm²
 MAIN REINFORCEMENT:8#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I22-5.4-8.7
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 450.44KN. PLL= 116.45KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 1.41 90 -51.20
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.57 90 -22.05
 D.L.M.FROM UPPER TO LOWER:DMD 0 1.28 90 -47.87
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.51 90 -19.48
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=850.34KN. Mux=2.97KN.M. Muy=109.88KN.M.
 Short Column
 $Pu/Fckbd=0.315$ $Mux/Fckbd2=0.004$ $Muy/Fckbd2=0.090$
 $pc=1\%$ Areq= 1350mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.053$ $Muy1 / Fckbd2 = 0.100$
 $Puz=1709KN$. $Pu/Puz=0.498$ ALFA=1.496
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.88 < 1.0$ HENCE SAFE
 AREA OF STEEL=1608mm²
 MAIN REINFORCEMENT:8#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I22-8.7-12
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 273.48KN. PLL= 66.55KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 1.13 90 -44.96
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.42 90 -18.16
 D.L.M.FROM UPPER TO LOWER:DMD 0 1.11 90 -45.42
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.38 90 -19.42
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=510.05KN. Mux=2.33KN.M. Muy=97.26KN.M.
 Short Column
 $Pu/Fckbd=0.189$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.080$
 $pc=0.6\%$ Areq= 810mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.090$

Puz=1511KN. Pu/Puz=0.337ALFA=1.229
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.888< 1.0 HENCE SAFE
AREA OF STEEL=1608mm²
MAIN REINFORCEMENT:8#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I22-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 96.46KN. PLL= 16.54KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.42 90 -46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.64 90 -16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 1.76 90 -48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.93 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=169.5KN. Mux=4.04KN.M. Muy=97.4KN.M.

Short Column

Pu/Fckbd=0.063Mux/Fckbd2=0.005Muy/Fckbd2=0.080

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.097 Muy1 / Fckbd2 = 0.103

Puz=1709KN. Pu/Puz=0.099ALFA=1

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.829< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H22-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 876.67KN. PLL= 254.74KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.07 90 28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.15 90 -4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1697.12KN. Mux=0.33KN.M. Muy=48.95KN.M.

Short Column

Pu/Fckbd=0.629Mux/Fckbd2=0.000Muy/Fckbd2=0.040

pc=1.6% Areq= 2160mm²

FROM CHARTS Mux1 / Fckbd2 = 0.015 Muy1 / Fckbd2 = 0.050

Puz=2006KN. Pu/Puz=0.846ALFA=2

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.646< 1.0 HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H22-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 740.44KN. PLL= 254.62KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.45 90 29.99
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.14 90 4.85
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.98 90 38.08
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.40 90 12.85
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1492.59KN. Mux=2.07KN.M. Muy=76.4KN.M.
 Short Column
 $Pu/Fckbd=0.553$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.063$
 $pc=1.4\%$ $A_{req}=1890mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.016$ $Muy1 / Fckbd2 = 0.064$
 $Puz=1907KN$. $Pu/Puz=0.783$ $ALFA=1.971$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.986 < 1.0$ HENCE SAFE
 AREA OF STEEL=2060mm²
 MAIN REINFORCEMENT:4#16+4#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H22-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 531.40KN. PLL= 178.70KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.62 90 51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 0.69 90 22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 1.47 90 47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.62 90 19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1065.15KN. Mux=3.47KN.M. Muy=109.88KN.M.

Short Column

$Pu/Fckbd=0.395$ $Mux/Fckbd2=0.004$ $Muy/Fckbd2=0.090$

$pc=1.2\%$ $A_{req}=1620mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.032$ $Muy1 / Fckbd2 = 0.095$

$Puz=1808KN$. $Pu/Puz=0.589$ $ALFA=1.649$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.949 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H22-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 321.79KN. PLL= 102.50KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.31 90 44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.53 90 18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 1.29 90 45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 0.49 90 19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=636.44KN. Mux=2.76KN.M. Muy=97.26KN.M.

Short Column

$Pu/Fckbd=0.236$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.080$

pc=0.6% Areq= 810mm²
FROM CHARTS Mux1 / Fckbd2 = 0.063 Muy1 / Fckbd2 = 0.088
Puz=1511KN.Pu/Puz=0.421ALFA=1.368
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.895< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H22-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 112.13KN. PLL= 26.19KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.60 90 46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.75 90 16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 1.95 90 48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 1.04 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=207.48KN. Mux=4.49KN.M. Muy=97.4KN.M.

Short Column

Pu/Fckbd=0.077Mux/Fckbd2=0.006Muy/Fckbd2=0.080

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.046 Muy1 / Fckbd2 = 0.092

Puz=1610KN.Pu/Puz=0.129ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.995< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I20-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 895.93KN. PLL= 205.84KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.09 90 -30.79

L.L.M.FROM UPPER TO LOWER:LMD 0 0.50 90 2.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1652.66KN. Mux=2.39KN.M. Muy=49.41KN.M.

Short Column

Pu/Fckbd=0.612Mux/Fckbd2=0.003Muy/Fckbd2=0.041

pc=1.6% Areq= 2160mm²

FROM CHARTS Mux1 / Fckbd2 = 0.053 Muy1 / Fckbd2 = 0.057

Puz=2006KN.Pu/Puz=0.824ALFA=2

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.517< 1.0 HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I20-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 755.49KN. PLL= 205.91KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.50 90 -27.28

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.93 90 -2.51

D.L.M.FROM UPPER TO LOWER:DMD 0 -6.19 90 -30.83

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.23 90 -6.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1442.1KN. Mux=12.63KN.M. Muy=56.22KN.M.

Short Column

$Pu/Fckbd=0.534$ $Mux/Fckbd2=0.016$ $Muy/Fckbd2=0.046$

$pc=1.4\%$ Areq= 1890mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.066$ $Muy1 / Fckbd2 = 0.071$

Puz=1907KN.Pu/Puz=0.756ALFA=1.927

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.505 < 1.0$ HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I20-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 546.18KN. PLL= 150.52KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -10.00 90 -38.45

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.93 90 -11.38

D.L.M.FROM UPPER TO LOWER:DMD 0 -9.56 90 -36.17

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.75 90 -9.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1045.05KN. Mux=20.9KN.M. Muy=74.75KN.M.

Short Column

$Pu/Fckbd=0.387$ $Mux/Fckbd2=0.026$ $Muy/Fckbd2=0.062$

$pc=1\%$ Areq= 1350mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.080$ $Muy1 / Fckbd2 = 0.085$

Puz=1709KN.Pu/Puz=0.611ALFA=1.686

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.723 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I20-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 337.21KN. PLL= 95.28KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.09 90 -35.10

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.47 90 -9.28

D.L.M.FROM UPPER TO LOWER:DMD 0 -9.03 90 -36.31

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.35 90 -9.97

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=648.74KN. Mux=18.84KN.M. Muy=69.42KN.M.

Short Column

$P_u/F_{ck}b_d = 0.24$ $M_u/F_{ck}b_d^2 = 0.023$ $M_u/F_{ck}b_d^2 = 0.057$

$p_c = 0.4\%$ $A_{eq} = 540\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.073$ $M_{uy1} / F_{ck}b_d^2 = 0.076$

$P_{uz} = 1413\text{KN}$. $P_u/P_{uz} = 0.459$ $\alpha_{FA} = 1.432$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.862 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I20-12-15.3

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 128.26KN. PLL = 40.11KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -9.97 90 -33.89

L.L.M. FROM LOWER TO UPPER: LMU 0 -4.46 90 -8.68

D.L.M. FROM UPPER TO LOWER: DMD 0 -10.95 90 -30.29

L.L.M. FROM UPPER TO LOWER: LMD 0 -5.65 90 -6.76

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 252.56\text{KN}$. $M_{ux} = 24.9\text{KN.M}$. $M_{uy} = 63.86\text{KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.094$ $M_{ux}/F_{ck}b_d^2 = 0.031$ $M_{uy}/F_{ck}b_d^2 = 0.053$

$p_c = 0.8\%$ $A_{eq} = 1080\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.090$ $M_{uy1} / F_{ck}b_d^2 = 0.095$

$P_{uz} = 1610\text{KN}$. $P_u/P_{uz} = 0.157$ $\alpha_{FA} = 1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.898 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: H20-0-1.5

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 1021.36KN. PLL = 302.12KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.00 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 0.00 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 -1.07 90 30.79

L.L.M. FROM UPPER TO LOWER: LMD 0 0.56 90 -2.15

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 1985.22\text{KN}$. $M_{ux} = 2.45\text{KN.M}$. $M_{uy} = 49.41\text{KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.735$ $M_{ux}/F_{ck}b_d^2 = 0.003$ $M_{uy}/F_{ck}b_d^2 = 0.041$

$p_c = 2.2\%$ $A_{eq} = 2970\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.017$ $M_{uy1} / F_{ck}b_d^2 = 0.054$

$P_{uz} = 2302\text{KN}$. $P_u/P_{uz} = 0.862$ $\alpha_{FA} = 2$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.609 < 1.0$ HENCE SAFE

AREA OF STEEL = 3219mm^2

MAIN REINFORCEMENT: 4#20+4#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H20-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 880.92KN. PLL= 302.21KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -3.56 90 27.28

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.00 90 2.51

D.L.M.FROM UPPER TO LOWER:DMD 0 -6.32 90 30.83

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.39 90 6.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1774.7KN. Mux=13.07KN.M. Muy=56.22KN.M.

Short Column

$P_u/F_{ckbd} = 0.657$ $M_{ux}/F_{ckbd} = 0.016$ $M_{uy}/F_{ckbd} = 0.046$

$p_c = 2\%$ $A_{req} = 2700mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.065$ $M_{uy1} / F_{ckbd} = 0.070$

$P_{uz} = 2203KN$. $P_u/P_{uz} = 0.806$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.498 < 1.0$ HENCE SAFE

AREA OF STEEL=2865mm²

MAIN REINFORCEMENT:6#20+2#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H20-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 635.72KN. PLL= 218.34KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -10.26 90 38.45

L.L.M.FROM LOWER TO UPPER:LMU 0 -4.30 90 11.38

D.L.M.FROM UPPER TO LOWER:DMD 0 -9.83 90 36.17

L.L.M.FROM UPPER TO LOWER:LMD 0 -4.10 90 9.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1281.09KN. Mux=21.84KN.M. Muy=74.75KN.M.

Short Column

$P_u/F_{ckbd} = 0.474$ $M_{ux}/F_{ckbd} = 0.027$ $M_{uy}/F_{ckbd} = 0.062$

$p_c = 1.2\%$ $A_{req} = 1620mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.071$ $M_{uy1} / F_{ckbd} = 0.075$

$P_{uz} = 1808KN$. $P_u/P_{uz} = 0.709$ $\alpha = 1.848$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.855 < 1.0$ HENCE SAFE

AREA OF STEEL=1884mm²

MAIN REINFORCEMENT:6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H20-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 390.94KN. PLL= 134.68KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.39 90 35.10

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.82 90 9.28

D.L.M.FROM UPPER TO LOWER:DMD 0 -9.34 90 36.31

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.73 90 9.97

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=788.43KN. Mux=19.82KN.M. Muy=69.42KN.M.
Short Column
 $Pu/Fckbd=0.292$ $Mux/Fckbd2=0.024$ $Muy/Fckbd2=0.057$
 $pc=0.4\%$ $A_{req}=540mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.067$ $Muy1 / Fckbd2 = 0.069$
 $Puz=1413KN$. $Pu/Puz=0.558$ $ALFA=1.597$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.933 < 1.0$ HENCE SAFE
AREA OF STEEL=1256mm²
MAIN REINFORCEMENT:4#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H20-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 146.19KN. PLL= 51.09KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -10.09 90 33.89
L.L.M.FROM LOWER TO UPPER:LMU 0 -4.67 90 8.68
D.L.M.FROM UPPER TO LOWER:DMD 0 -10.87 90 30.29
L.L.M.FROM UPPER TO LOWER:LMD 0 -5.68 90 6.76

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=295.92KN. Mux=24.83KN.M. Muy=63.86KN.M.
Short Column
 $Pu/Fckbd=0.110$ $Mux/Fckbd2=0.031$ $Muy/Fckbd2=0.053$
 $pc=0.8\%$ $A_{req}=1080mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.092$ $Muy1 / Fckbd2 = 0.097$
 $Puz=1610KN$. $Pu/Puz=0.184$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.875 < 1.0$ HENCE SAFE
AREA OF STEEL=1256mm²
MAIN REINFORCEMENT:4#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I19-0-1.5
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 898.70KN. PLL= 206.88KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 1.13 90 -30.79
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.50 90 2.15

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1658.37KN. Mux=2.45KN.M. Muy=49.41KN.M.
Short Column
 $Pu/Fckbd=0.614$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.041$
 $pc=1.6\%$ $A_{req}=2160mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.006$ $Muy1 / Fckbd2 = 0.056$
 $Puz=2006KN$. $Pu/Puz=0.827$ $ALFA=2$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.799 < 1.0$ HENCE SAFE
AREA OF STEEL=2286mm²
MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I19-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 758.17KN. PLL= 206.97KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 3.42 90 -27.28

L.L.M.FROM LOWER TO UPPER:LMU 0 0.88 90 -2.51

D.L.M.FROM UPPER TO LOWER:DMD 0 6.00 90 -30.83

L.L.M.FROM UPPER TO LOWER:LMD 0 2.13 90 -6.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1447.71KN. Mux=12.2KN.M. Muy=56.22KN.M.

Short Column

$P_u/F_{ckb_d} = 0.536$ $M_{ux}/F_{ckb_d} = 0.015$ $M_{uy}/F_{ckb_d} = 0.046$

$p_c = 1.4\%$ $A_{req} = 1890mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.066$ $M_{uy1}/F_{ckb_d} = 0.070$

$P_{uz} = 1907KN$. $P_u/P_{uz} = 0.759$ $ALFA = 1.932$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.509 < 1.0$ HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I19-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 548.14KN. PLL= 151.34KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 9.68 90 -38.45

L.L.M.FROM LOWER TO UPPER:LMU 0 3.81 90 -11.38

D.L.M.FROM UPPER TO LOWER:DMD 0 9.29 90 -36.17

L.L.M.FROM UPPER TO LOWER:LMD 0 3.63 90 -9.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1049.22KN. Mux=20.24KN.M. Muy=74.75KN.M.

Short Column

$P_u/F_{ckb_d} = 0.389$ $M_{ux}/F_{ckb_d} = 0.025$ $M_{uy}/F_{ckb_d} = 0.062$

$p_c = 1\%$ $A_{req} = 1350mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.080$ $M_{uy1}/F_{ckb_d} = 0.085$

$P_{uz} = 1709KN$. $P_u/P_{uz} = 0.614$ $ALFA = 1.69$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.718 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I19-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 338.57KN. PLL= 95.90KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 8.85 90 -35.10

L.L.M.FROM LOWER TO UPPER:LMU 0 3.36 90 -9.28

D.L.M.FROM UPPER TO LOWER:DMD 0 8.77 90 -36.31

L.L.M.FROM UPPER TO LOWER:LMD 0 3.26 90 -9.97

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=651.71KN. Mux=18.32KN.M. Muy=69.42KN.M.

Short Column

Pu/Fckbd=0.241Mux/Fckbd2=0.023Muy/Fckbd2=0.057

pc=0.4% Areq= 540mm²

FROM CHARTS Mux1 / Fckbd2 = 0.073 Muy1 / Fckbd2 = 0.076

Puz=1413KN.Pu/Puz=0.461ALFA=1.436

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.854< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I19-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 129.05KN. PLL= 40.56KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 9.64 90 -33.89

L.L.M.FROM LOWER TO UPPER:LMU 0 4.31 90 -8.68

D.L.M.FROM UPPER TO LOWER:DMD 0 10.56 90 -30.29

L.L.M.FROM UPPER TO LOWER:LMD 0 5.45 90 -6.76

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=254.42KN. Mux=24.02KN.M. Muy=63.86KN.M.

Short Column

Pu/Fckbd=0.094Mux/Fckbd2=0.030Muy/Fckbd2=0.053

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.090 Muy1 / Fckbd2 = 0.095

Puz=1610KN.Pu/Puz=0.158ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.885< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H19-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 1020.96KN. PLL= 301.77KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.07 90 30.79

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.56 90 -2.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1984.1KN. Mux=2.45KN.M. Muy=49.41KN.M.

Short Column

Pu/Fckbd=0.735Mux/Fckbd2=0.003Muy/Fckbd2=0.041

pc=2.2% Areq= 2970mm²

FROM CHARTS Mux1 / Fckbd2 = 0.017 Muy1 / Fckbd2 = 0.054

Puz=2302KN.Pu/Puz=0.862ALFA=2

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.604< 1.0 HENCE SAFE

AREA OF STEEL=3219mm²
MAIN REINFORCEMENT:4#20+4#25
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H19-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 880.44KN. PLL= 301.86KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 3.56 90 27.28

L.L.M.FROM LOWER TO UPPER:LMU 0 0.99 90 2.51

D.L.M.FROM UPPER TO LOWER:DMD 0 6.33 90 30.83

L.L.M.FROM UPPER TO LOWER:LMD 0 2.38 90 6.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1773.45KN. Mux=13.07KN.M. Muy=56.22KN.M.

Short Column

$P_u/F_{ckbd}=0.657$ $M_{ux}/F_{ckbd2}=0.016$ $M_{uy}/F_{ckbd2}=0.046$

$p_c=2\%$ Areq= 2700mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.065$ $M_{uy1}/F_{ckbd2} = 0.070$

$P_{uz}=2203KN$. $P_u/P_{uz}=0.805$ ALFA=2

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.495 < 1.0$ HENCE SAFE

AREA OF STEEL=2865mm²

MAIN REINFORCEMENT:6#20+2#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H19-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 635.35KN. PLL= 218.07KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 10.25 90 38.45

L.L.M.FROM LOWER TO UPPER:LMU 0 4.31 90 11.38

D.L.M.FROM UPPER TO LOWER:DMD 0 9.83 90 36.17

L.L.M.FROM UPPER TO LOWER:LMD 0 4.10 90 9.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1280.13KN. Mux=21.84KN.M. Muy=74.75KN.M.

Short Column

$P_u/F_{ckbd}=0.474$ $M_{ux}/F_{ckbd2}=0.027$ $M_{uy}/F_{ckbd2}=0.062$

$p_c=1.2\%$ Areq= 1620mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.071$ $M_{uy1}/F_{ckbd2} = 0.075$

$P_{uz}=1808KN$. $P_u/P_{uz}=0.708$ ALFA=1.847

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.854 < 1.0$ HENCE SAFE

AREA OF STEEL=1884mm²

MAIN REINFORCEMENT:6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H19-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 390.68KN. PLL= 134.49KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 9.37 90 35.10

L.L.M.FROM LOWER TO UPPER:LMU 0 3.82 90 9.28
 D.L.M.FROM UPPER TO LOWER:DMD 0 9.32 90 36.31
 L.L.M.FROM UPPER TO LOWER:LMD 0 3.73 90 9.97
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=787.76KN. Mux=19.79KN.M. Muy=69.42KN.M.
 Short Column
 $Pu/Fckbd=0.292$ $Mux/Fckbd2=0.024$ $Muy/Fckbd2=0.057$
 $pc=0.4\%$ Areq= 540mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.067$ $Muy1 / Fckbd2 = 0.069$
 $Puz=1413KN$. $Pu/Puz=0.558$ ALFA=1.596
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.932 < 1.0$ HENCE SAFE
 AREA OF STEEL=1256mm²
 MAIN REINFORCEMENT:4#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H19-12-15.3
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 146.03KN. PLL= 50.98KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 10.09 90 33.89
 L.L.M.FROM LOWER TO UPPER:LMU 0 4.67 90 8.68
 D.L.M.FROM UPPER TO LOWER:DMD 0 10.86 90 30.29
 L.L.M.FROM UPPER TO LOWER:LMD 0 5.69 90 6.76
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=295.52KN. Mux=24.83KN.M. Muy=63.86KN.M.
 Short Column
 $Pu/Fckbd=0.109$ $Mux/Fckbd2=0.031$ $Muy/Fckbd2=0.053$
 $pc=0.8\%$ Areq= 1080mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.092$ $Muy1 / Fckbd2 = 0.097$
 $Puz=1610KN$. $Pu/Puz=0.184$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.875 < 1.0$ HENCE SAFE
 AREA OF STEEL=1256mm²
 MAIN REINFORCEMENT:4#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I17-0-1.5
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 761.14KN. PLL= 165.39KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.07 90 -28.46
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.12 90 4.17
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1389.8KN. Mux=0.29KN.M. Muy=48.95KN.M.
 Short Column
 $Pu/Fckbd=0.515$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$
 $pc=1\%$ Areq= 1350mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.002$ $Muy1 / Fckbd2 = 0.048$

Puz=1709KN. Pu/Puz=0.813ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.743< 1.0 HENCE SAFE
AREA OF STEEL=1608mm²
MAIN REINFORCEMENT:8#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I17-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 624.93KN. PLL= 165.28KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.45 90 -29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.12 90 -4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.95 90 -38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.35 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1185.32KN. Mux=1.95KN.M. Muy=76.4KN.M.

Short Column

Pu/Fckbd=0.439Mux/Fckbd2=0.002Muy/Fckbd2=0.063

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.016 Muy1 / Fckbd2 = 0.073

Puz=1709KN. Pu/Puz=0.694ALFA=1.823

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.801< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I17-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 449.00KN. PLL= 115.81KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.53 90 -51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.61 90 -22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.40 90 -47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.55 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=847.22KN. Mux=3.21KN.M. Muy=109.88KN.M.

Short Column

Pu/Fckbd=0.314Mux/Fckbd2=0.004Muy/Fckbd2=0.090

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.054 Muy1 / Fckbd2 = 0.100

Puz=1709KN. Pu/Puz=0.496ALFA=1.493

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.88< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I17-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 272.50KN. PLL= 66.09KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -1.23 90 -44.96
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.47 90 -18.16
D.L.M.FROM UPPER TO LOWER:DMD 0 -1.21 90 -45.42
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.43 90 -19.42
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=507.89KN. Mux=2.55KN.M. Muy=97.26KN.M.
Short Column
 $Pu/Fckbd=0.188$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.080$
 $pc=0.6\%$ $A_{req}=810mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.090$
 $Puz=1511KN$. $Pu/Puz=0.336$ $ALFA=1.227$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.891 < 1.0$ HENCE SAFE
AREA OF STEEL=1608mm²
MAIN REINFORCEMENT:8#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I17-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 95.94KN. PLL= 16.24KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -1.52 90 -46.96
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.70 90 -16.88
D.L.M.FROM UPPER TO LOWER:DMD 0 -1.88 90 -48.05
L.L.M.FROM UPPER TO LOWER:LMD 0 -1.01 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=168.27KN. Mux=4.34KN.M. Muy=97.4KN.M.

Short Column

$Pu/Fckbd=0.062$ $Mux/Fckbd2=0.005$ $Muy/Fckbd2=0.080$

$pc=1\%$ $A_{req}=1350mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.097$ $Muy1 / Fckbd2 = 0.103$

$Puz=1709KN$. $Pu/Puz=0.098$ $ALFA=1$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.834 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H17-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 876.11KN. PLL= 254.73KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 0.08 90 28.46
L.L.M.FROM UPPER TO LOWER:LMD 0 0.15 90 -4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1696.26KN. Mux=0.35KN.M. Muy=48.95KN.M.

Short Column

$Pu/Fckbd=0.628$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$

pc=1.6% Areq= 2160mm²
FROM CHARTS Mux1 / Fckbd2 = 0.015 Muy1 / Fckbd2 = 0.050
Puz=2006KN.Pu/Puz=0.846ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.643< 1.0 HENCE SAFE
AREA OF STEEL=2286mm²
MAIN REINFORCEMENT:2#16+6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H17-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 740.04KN. PLL= 254.62KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.46 90 29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.14 90 4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.99 90 38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.38 90 12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1491.99KN. Mux=2.06KN.M. Muy=76.4KN.M.

Short Column

Pu/Fckbd=0.553Mux/Fckbd2=0.003Muy/Fckbd2=0.063

pc=1.4% Areq= 1890mm²

FROM CHARTS Mux1 / Fckbd2 = 0.016 Muy1 / Fckbd2 = 0.064

Puz=1907KN.Pu/Puz=0.782ALFA=1.971

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.983< 1.0 HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H17-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 531.13KN. PLL= 178.70KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.63 90 51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.70 90 22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.47 90 47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.63 90 19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1064.75KN. Mux=3.5KN.M. Muy=109.88KN.M.

Short Column

Pu/Fckbd=0.394Mux/Fckbd2=0.004Muy/Fckbd2=0.090

pc=1.2% Areq= 1620mm²

FROM CHARTS Mux1 / Fckbd2 = 0.033 Muy1 / Fckbd2 = 0.096

Puz=1808KN.Pu/Puz=0.589ALFA=1.648

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.949< 1.0 HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H17-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 321.65KN. PLL= 102.50KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.31 90 44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.54 90 18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.29 90 45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.50 90 19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=636.23KN. Mux=2.78KN.M. Muy=97.26KN.M.

Short Column

$Pu/Fckbd=0.236$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.080$

$pc=0.6\%$ Areq= 810mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.063$ $Muy1 / Fckbd2 = 0.088$

Puz=1511KN.Pu/Puz=0.421ALFA=1.368

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.895 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H17-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 112.13KN. PLL= 26.19KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.61 90 46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.76 90 16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.95 90 48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.06 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=207.48KN. Mux=4.52KN.M. Muy=97.4KN.M.

Short Column

$Pu/Fckbd=0.077$ $Mux/Fckbd2=0.006$ $Muy/Fckbd2=0.080$

$pc=0.8\%$ Areq= 1080mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.046$ $Muy1 / Fckbd2 = 0.092$

Puz=1610KN.Pu/Puz=0.129ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.996 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I16-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 781.96KN. PLL= 174.56KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.06 90 -28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.04 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1434.78KN. Mux=0.15KN.M. Muy=48.95KN.M.

Short Column

$P_u/F_{ckbd} = 0.531$ $M_u/F_{ckbd} = 0.000$ $M_u/F_{ckbd} = 0.040$

$p_c = 1\%$ $A_{req} = 1350 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.010$ $M_{uy1} / F_{ckbd} = 0.042$

$P_u = 1709 \text{ KN}$, $P_u/P_u = 0.839$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.925 < 1.0$ HENCE SAFE

AREA OF STEEL = 1608 mm^2

MAIN REINFORCEMENT: 8#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I16-1.5-5.4

SIZE OF COLUMN: 300x450 mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 645.67 KN. PLL = 174.60 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.09 90 -29.99

L.L.M. FROM LOWER TO UPPER: LMU 0 0.02 90 -4.85

D.L.M. FROM UPPER TO LOWER: DMD 0 0.17 90 -38.08

L.L.M. FROM UPPER TO LOWER: LMD 0 0.06 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 1230.41 \text{ KN}$. $M_{ux} = 0.35 \text{ KN.M}$. $M_{uy} = 76.4 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.456$ $M_u/F_{ckbd} = 0.000$ $M_u/F_{ckbd} = 0.063$

$p_c = 1\%$ $A_{req} = 1350 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.010$ $M_{uy1} / F_{ckbd} = 0.068$

$P_u = 1709 \text{ KN}$, $P_u/P_u = 0.72$ $\alpha = 1.867$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.871 < 1.0$ HENCE SAFE

AREA OF STEEL = 1608 mm^2

MAIN REINFORCEMENT: 8#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I16-5.4-8.7

SIZE OF COLUMN: 300x450 mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 464.37 KN. PLL = 122.95 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.26 90 -51.20

L.L.M. FROM LOWER TO UPPER: LMU 0 0.10 90 -22.05

D.L.M. FROM UPPER TO LOWER: DMD 0 0.22 90 -47.87

L.L.M. FROM UPPER TO LOWER: LMD 0 0.08 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 880.98 \text{ KN}$. $M_{ux} = 0.54 \text{ KN.M}$. $M_{uy} = 109.88 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.326$ $M_u/F_{ckbd} = 0.001$ $M_u/F_{ckbd} = 0.090$

$p_c = 1\%$ $A_{req} = 1350 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.051$ $M_{uy1} / F_{ckbd} = 0.098$

$P_u = 1709 \text{ KN}$, $P_u/P_u = 0.515$ $\alpha = 1.526$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.89 < 1.0$ HENCE SAFE

AREA OF STEEL = 1608 mm^2

MAIN REINFORCEMENT: 8#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I16-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 283.25KN. PLL= 71.38KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.16 90 -44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.06 90 -18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 0.16 90 -45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 0.04 90 -19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=531.95KN. Mux=0.33KN.M. Muy=97.26KN.M.

Short Column

$P_u/F_{ckb_d} = 0.197$ $M_{ux}/F_{ckb_d} = 0.000$ $M_{uy}/F_{ckb_d} = 0.080$

$p_c = 0.6\%$ $A_{req} = 810mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.064$ $M_{uy1} / F_{ckb_d} = 0.090$

$P_{uz} = 1511KN$. $P_u/P_{uz} = 0.352$ $ALFA = 1.253$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.866 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I16-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 102.17KN. PLL= 19.87KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.26 90 -46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.12 90 -16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 0.37 90 -48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.20 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=183.06KN. Mux=0.86KN.M. Muy=97.4KN.M.

Short Column

$P_u/F_{ckb_d} = 0.068$ $M_{ux}/F_{ckb_d} = 0.001$ $M_{uy}/F_{ckb_d} = 0.080$

$p_c = 0.8\%$ $A_{req} = 1080mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.044$ $M_{uy1} / F_{ckb_d} = 0.090$

$P_{uz} = 1610KN$. $P_u/P_{uz} = 0.114$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.917 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H16-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 899.11KN. PLL= 264.74KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.05 90 28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.03 90 -4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1745.78KN. Mux=0.12KN.M. Muy=48.95KN.M.
Short Column
Pu/Fckbd=0.647Mux/Fckbd2=0.000Muy/Fckbd2=0.040
pc=1.6% Areq= 2160mm²
FROM CHARTS Mux1 / Fckbd2 = 0.008 Muy1 / Fckbd2 = 0.042
Puz=2006KN.Pu/Puz=0.87ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.91< 1.0 HENCE SAFE
AREA OF STEEL=2286mm²
MAIN REINFORCEMENT:2#16+6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H16-1.5-5.4
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 762.67KN. PLL= 264.77KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.07 90 29.99
L.L.M.FROM LOWER TO UPPER:LMU 0 0.02 90 4.85
D.L.M.FROM UPPER TO LOWER:DMD 0 0.16 90 38.08
L.L.M.FROM UPPER TO LOWER:LMD 0 0.07 90 12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1541.16KN. Mux=0.35KN.M. Muy=76.4KN.M.
Short Column
Pu/Fckbd=0.571Mux/Fckbd2=0.000Muy/Fckbd2=0.063
pc=1.6% Areq= 2160mm²
FROM CHARTS Mux1 / Fckbd2 = 0.009 Muy1 / Fckbd2 = 0.073
Puz=2006KN.Pu/Puz=0.768ALFA=1.947
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.76< 1.0 HENCE SAFE
AREA OF STEEL=2286mm²
MAIN REINFORCEMENT:2#16+6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H16-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 547.84KN. PLL= 186.40KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.28 90 51.20
L.L.M.FROM LOWER TO UPPER:LMU 0 0.12 90 22.05
D.L.M.FROM UPPER TO LOWER:DMD 0 0.24 90 47.87
L.L.M.FROM UPPER TO LOWER:LMD 0 0.10 90 19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1101.36KN. Mux=0.6KN.M. Muy=109.88KN.M.
Short Column
Pu/Fckbd=0.408Mux/Fckbd2=0.001Muy/Fckbd2=0.090
pc=1.2% Areq= 1620mm²
FROM CHARTS Mux1 / Fckbd2 = 0.028 Muy1 / Fckbd2 = 0.092
Puz=1808KN.Pu/Puz=0.609ALFA=1.682
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.966< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H16-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 333.18KN. PLL= 108.11KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.17 90 44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.08 90 18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 0.17 90 45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 0.07 90 19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=661.93KN. Mux=0.38KN.M. Muy=97.26KN.M.

Short Column

$P_u/F_{ck}b_d=0.245$ $M_{ux}/F_{ck}b_d^2=0.000$ $M_{uy}/F_{ck}b_d^2=0.080$

$p_c=0.6\%$ Areq= 810mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.063$ $M_{uy1}/F_{ck}b_d^2 = 0.087$

Puz=1511KN.Pu/Puz=0.438ALFA=1.397

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.891 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H16-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 118.56KN. PLL= 29.88KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.27 90 46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.13 90 16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 0.36 90 48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.21 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=222.66KN. Mux=0.86KN.M. Muy=97.4KN.M.

Short Column

$P_u/F_{ck}b_d=0.082$ $M_{ux}/F_{ck}b_d^2=0.001$ $M_{uy}/F_{ck}b_d^2=0.080$

$p_c=0.8\%$ Areq= 1080mm²

FROM CHARTS $M_{ux1}/F_{ck}b_d^2 = 0.048$ $M_{uy1}/F_{ck}b_d^2 = 0.093$

Puz=1610KN.Pu/Puz=0.138ALFA=1

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.887 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I15-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 779.62KN. PLL= 173.14KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.04 90 -28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 0.01 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1429.14KN. Mux=0.08KN.M. Muy=48.95KN.M.

Short Column

Pu/Fckbd=0.529Mux/Fckbd2=0.000Muy/Fckbd2=0.040

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.010 Muy1 / Fckbd2 = 0.043

Puz=1709KN.Pu/Puz=0.836ALFA=2

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.89< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I15-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 643.13KN. PLL= 173.13KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.04 90 -29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 -4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.07 90 -38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.02 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1224.39KN. Mux=0.14KN.M. Muy=76.4KN.M.

Short Column

Pu/Fckbd=0.453Mux/Fckbd2=0.000Muy/Fckbd2=0.063

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.011 Muy1 / Fckbd2 = 0.068

Puz=1709KN.Pu/Puz=0.716ALFA=1.861

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.854< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I15-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 462.48KN. PLL= 121.80KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.07 90 -51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.04 90 -22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.07 90 -47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.02 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=876.42KN. Mux=0.17KN.M. Muy=109.88KN.M.

Short Column

Pu/Fckbd=0.325Mux/Fckbd2=0.000Muy/Fckbd2=0.090

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.052 Muy1 / Fckbd2 = 0.098

Puz=1709KN.Pu/Puz=0.513ALFA=1.521

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.884< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²
MAIN REINFORCEMENT:8#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I15-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 281.82KN. PLL= 70.49KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.04 90 -44.96
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.01 90 -18.16
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.03 90 -45.42
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.01 90 -19.42

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=528.47KN. Mux=0.08KN.M. Muy=97.26KN.M.
Short Column

$P_u/F_{ckbd}=0.196$ $M_{ux}/F_{ckbd2}=0.000$ $M_{uy}/F_{ckbd2}=0.080$
 $p_c=0.6\%$ Areq= 810mm²
FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.064$ $M_{uy1}/F_{ckbd2} = 0.090$
 $P_{uz}=1511KN$. $P_u/P_{uz}=0.35$ ALFA=1.249
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.865 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I15-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 101.13KN. PLL= 19.15KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.08 90 -46.96
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.03 90 -16.88
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.12 90 -48.05
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.05 90 -13.11

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=180.42KN. Mux=0.26KN.M. Muy=97.4KN.M.
Short Column

$P_u/F_{ckbd}=0.067$ $M_{ux}/F_{ckbd2}=0.000$ $M_{uy}/F_{ckbd2}=0.080$
 $p_c=0.8\%$ Areq= 1080mm²
FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.043$ $M_{uy1}/F_{ckbd2} = 0.090$
 $P_{uz}=1610KN$. $P_u/P_{uz}=0.112$ ALFA=1
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.902 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H15-0-1.5
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 895.36KN. PLL= 263.26KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.02 90 28.46
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.01 90 -4.17
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1737.93KN. Mux=0.05KN.M. Muy=48.95KN.M.
 Short Column
 $Pu/Fckbd=0.644$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$
 $pc=1.6\%$ Areq= 2160mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.009$ $Muy1 / Fckbd2 = 0.044$
 $Puz=2006KN$. $Pu/Puz=0.867$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.855 < 1.0$ HENCE SAFE
 AREA OF STEEL=2286mm²
 MAIN REINFORCEMENT:2#16+6#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H15-1.5-5.4
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 759.04KN. PLL= 263.26KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -0.02 90 29.99
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 4.85
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.05 90 38.08
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.02 90 12.85
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1533.45KN. Mux=0.11KN.M. Muy=76.4KN.M.
 Short Column
 $Pu/Fckbd=0.568$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.063$
 $pc=1.6\%$ Areq= 2160mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.010$ $Muy1 / Fckbd2 = 0.073$
 $Puz=2006KN$. $Pu/Puz=0.765$ ALFA=1.941
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.74 < 1.0$ HENCE SAFE
 AREA OF STEEL=2286mm²
 MAIN REINFORCEMENT:2#16+6#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H15-5.4-8.7
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 545.17KN. PLL= 185.24KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -0.07 90 51.20
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.03 90 22.05
 D.L.M.FROM UPPER TO LOWER:DMD 0 -0.07 90 47.87
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.02 90 19.48
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1095.62KN. Mux=0.15KN.M. Muy=109.88KN.M.
 Short Column
 $Pu/Fckbd=0.406$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.090$
 $pc=1.2\%$ Areq= 1620mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.028$ $Muy1 / Fckbd2 = 0.093$

Puz=1808KN.Pu/Puz=0.606ALFA=1.677
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.955< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H15-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 331.29KN. PLL= 107.22KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.06 90 44.96
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.02 90 18.16
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.05 90 45.42
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.02 90 19.42
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=657.77KN. Mux=0.12KN.M. Muy=97.26KN.M.
Short Column
Pu/Fckbd=0.244Mux/Fckbd2=0.000Muy/Fckbd2=0.080
pc=0.6% Areq= 810mm²
FROM CHARTS Mux1 / Fckbd2 = 0.063 Muy1 / Fckbd2 = 0.087
Puz=1511KN.Pu/Puz=0.435ALFA=1.392
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.888< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H15-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 117.39KN. PLL= 29.17KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -0.07 90 46.96
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.04 90 16.88
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.12 90 48.05
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.05 90 13.11
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=219.84KN. Mux=0.26KN.M. Muy=97.4KN.M.
Short Column
Pu/Fckbd=0.081Mux/Fckbd2=0.000Muy/Fckbd2=0.080
pc=0.8% Areq= 1080mm²
FROM CHARTS Mux1 / Fckbd2 = 0.047 Muy1 / Fckbd2 = 0.092
Puz=1610KN.Pu/Puz=0.137ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.874< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H14-0-1.5
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 893.74KN. PLL= 262.54KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.05 90 28.46
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.03 90 -4.17
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1734.42KN. Mux=0.12KN.M. Muy=48.95KN.M.
 Short Column
 $Pu/Fckbd=0.642$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$
 $pc=1.6\%$ $A_{req}=2160mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.009$ $Muy1 / Fckbd2 = 0.044$
 $Puz=2006KN$. $Pu/Puz=0.865$ $ALFA=2$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.832 < 1.0$ HENCE SAFE
 AREA OF STEEL=2286mm²
 MAIN REINFORCEMENT:2#16+6#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H14-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 757.40KN. PLL= 262.51KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.08 90 29.99
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.02 90 4.85
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.15 90 38.08
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.06 90 12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1529.87KN. Mux=0.32KN.M. Muy=76.4KN.M.

Short Column

$Pu/Fckbd=0.567$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.063$

$pc=1.6\%$ $A_{req}=2160mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.010$ $Muy1 / Fckbd2 = 0.074$

$Puz=2006KN$. $Pu/Puz=0.763$ $ALFA=1.938$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.734 < 1.0$ HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H14-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 543.99KN. PLL= 184.77KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.22 90 51.20
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.10 90 22.05
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.18 90 47.87
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.08 90 19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1093.14KN. Mux=0.48KN.M. Muy=109.88KN.M.

Short Column

$Pu/Fckbd=0.405$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.090$

pc=1.2% Areq= 1620mm²
FROM CHARTS Mux1 / Fckbd2 = 0.029 Muy1 / Fckbd2 = 0.093
Puz=1808KN. Pu/Puz=0.605ALFA=1.674
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.953< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H14-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 330.48KN. PLL= 106.95KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.17 90 44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.08 90 18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 0.18 90 45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 0.08 90 19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=656.15KN. Mux=0.39KN.M. Muy=97.26KN.M.

Short Column

Pu/Fckbd=0.243Mux/Fckbd2=0.000Muy/Fckbd2=0.080

pc=0.6% Areq= 810mm²

FROM CHARTS Mux1 / Fckbd2 = 0.063 Muy1 / Fckbd2 = 0.087

Puz=1511KN. Pu/Puz=0.434ALFA=1.39

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.888< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H14-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 117.01KN. PLL= 29.17KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.21 90 46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 0.08 90 16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 0.24 90 48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 0.07 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=219.27KN. Mux=0.48KN.M. Muy=97.4KN.M.

Short Column

Pu/Fckbd=0.081Mux/Fckbd2=0.001Muy/Fckbd2=0.080

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.047 Muy1 / Fckbd2 = 0.092

Puz=1610KN. Pu/Puz=0.136ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.88< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I14-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 776.91KN. PLL= 172.76KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.09 90 -28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.03 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1424.51KN. Mux=0.18KN.M. Muy=48.95KN.M.

Short Column

$Pu/Fckbd=0.528$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.040$

$pc=1\%$ Areq= 1350mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.011$ $Muy1 / Fckbd2 = 0.043$

$Puz=1709KN$. $Pu/Puz=0.833$ ALFA=2

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.863 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I14-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 640.67KN. PLL= 172.74KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.13 90 -29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 0.02 90 -4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 0.18 90 -38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 0.04 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1220.12KN. Mux=0.33KN.M. Muy=76.4KN.M.

Short Column

$Pu/Fckbd=0.452$ $Mux/Fckbd2=0.000$ $Muy/Fckbd2=0.063$

$pc=1\%$ Areq= 1350mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.011$ $Muy1 / Fckbd2 = 0.069$

$Puz=1709KN$. $Pu/Puz=0.714$ ALFA=1.856

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.846 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I14-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 460.69KN. PLL= 121.60KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.24 90 -51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 0.06 90 -22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 0.22 90 -47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 0.05 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=873.43KN. Mux=0.45KN.M. Muy=109.88KN.M.

Short Column

$P_u/F_{ck}b_d = 0.323$ $M_u/F_{ck}b_d^2 = 0.001$ $M_u/F_{ck}b_d^2 = 0.090$

$p_c = 1\%$ $A_{req} = 1350 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.052$ $M_{uy1} / F_{ck}b_d^2 = 0.098$

$P_{uz} = 1709 \text{ KN}$ $P_u/P_{uz} = 0.511$ $\alpha_{FA} = 1.518$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.882 < 1.0$ HENCE SAFE

AREA OF STEEL = 1608 mm^2

MAIN REINFORCEMENT: 8#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I14-8.7-12

SIZE OF COLUMN: $300 \times 450 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 280.60 KN. PLL = 70.38 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.20 90 -44.96

L.L.M. FROM LOWER TO UPPER: LMU 0 0.06 90 -18.16

D.L.M. FROM UPPER TO LOWER: DMD 0 0.20 90 -45.42

L.L.M. FROM UPPER TO LOWER: LMD 0 0.07 90 -19.42

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 526.47 \text{ KN}$. $M_{ux} = 0.41 \text{ KN.M}$. $M_{uy} = 97.26 \text{ KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.195$ $M_u/F_{ck}b_d^2 = 0.001$ $M_u/F_{ck}b_d^2 = 0.080$

$p_c = 0.6\%$ $A_{req} = 810 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.064$ $M_{uy1} / F_{ck}b_d^2 = 0.090$

$P_{uz} = 1511 \text{ KN}$ $P_u/P_{uz} = 0.348$ $\alpha_{FA} = 1.247$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.867 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I14-12-15.3

SIZE OF COLUMN: $300 \times 450 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 100.55 KN. PLL = 19.20 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.23 90 -46.96

L.L.M. FROM LOWER TO UPPER: LMU 0 0.06 90 -16.88

D.L.M. FROM UPPER TO LOWER: DMD 0 0.27 90 -48.05

L.L.M. FROM UPPER TO LOWER: LMD 0 0.06 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 179.63 \text{ KN}$. $M_{ux} = 0.5 \text{ KN.M}$. $M_{uy} = 97.4 \text{ KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.067$ $M_u/F_{ck}b_d^2 = 0.001$ $M_u/F_{ck}b_d^2 = 0.080$

$p_c = 0.8\%$ $A_{req} = 1080 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.043$ $M_{uy1} / F_{ck}b_d^2 = 0.090$

$P_{uz} = 1610 \text{ KN}$ $P_u/P_{uz} = 0.112$ $\alpha_{FA} = 1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.909 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H13-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 911.98KN. PLL= 269.04KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.53 90 28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 0.14 90 -4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1771.53KN. Mux=1.01KN.M. Muy=48.95KN.M.

Short Column

$P_u/F_{ckb_d} = 0.656$ $M_{ux}/F_{ckb_d} = 0.001$ $M_{uy}/F_{ckb_d} = 0.040$

$p_c = 1.8\%$ $A_{eq} = 2430mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.004$ $M_{uy1} / F_{ckb_d} = 0.055$

$P_{uz} = 2104KN$. $P_u/P_{uz} = 0.842$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.66 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²

MAIN REINFORCEMENT:8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H13-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 774.21KN. PLL= 269.14KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.67 90 29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.13 90 4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.93 90 38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.34 90 12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1565.03KN. Mux=1.91KN.M. Muy=76.4KN.M.

Short Column

$P_u/F_{ckb_d} = 0.580$ $M_{ux}/F_{ckb_d} = 0.002$ $M_{uy}/F_{ckb_d} = 0.063$

$p_c = 1.8\%$ $A_{eq} = 2430mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.078$ $M_{uy1} / F_{ckb_d} = 0.083$

$P_{uz} = 2104KN$. $P_u/P_{uz} = 0.744$ $ALFA = 1.906$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.587 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²

MAIN REINFORCEMENT:8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H13-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 556.12KN. PLL= 189.28KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.31 90 51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.60 90 22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.22 90 47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.54 90 19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1118.1KN. Mux=2.87KN.M. Muy=109.88KN.M.

Short Column

$Pu/Fckbd=0.414$ $Mux/Fckbd2=0.004$ $Muy/Fckbd2=0.090$

$pc=1.4\%$ $A_{req}=1890mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.096$ $Muy1 / Fckbd2 = 0.103$

$Puz=1907KN$. $Pu/Puz=0.586$ $ALFA=1.644$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.812 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²

MAIN REINFORCEMENT:8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H13-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 338.34KN. PLL= 109.68KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.16 90 44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.51 90 18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.18 90 45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.54 90 19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=672.03KN. Mux=2.58KN.M. Muy=97.26KN.M.

Short Column

$Pu/Fckbd=0.249$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.080$

$pc=0.6\%$ $A_{req}=810mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.062$ $Muy1 / Fckbd2 = 0.087$

$Puz=1511KN$. $Pu/Puz=0.445$ $ALFA=1.408$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.911 < 1.0$ HENCE SAFE

AREA OF STEEL=1256mm²

MAIN REINFORCEMENT:4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H13-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 120.43KN. PLL= 29.96KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.20 90 46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.47 90 16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.20 90 48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.37 90 13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=225.59KN. Mux=2.51KN.M. Muy=97.4KN.M.

Short Column

$Pu/Fckbd=0.084$ $Mux/Fckbd2=0.003$ $Muy/Fckbd2=0.080$

$pc=0.8\%$ $A_{req}=1080mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.048$ $Muy1 / Fckbd2 = 0.093$

$Puz=1610KN$. $Pu/Puz=0.14$ $ALFA=1$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.927 < 1.0$ HENCE SAFE

AREA OF STEEL=1256mm²

MAIN REINFORCEMENT:4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I13-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 798.34KN. PLL= 176.81KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.06 90 -28.46

L.L.M.FROM UPPER TO LOWER:LMD 0 0.11 90 4.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1462.73KN. Mux=1.76KN.M. Muy=48.95KN.M.

Short Column

$P_u/F_{ckb_d} = 0.542$ $M_{ux}/F_{ckb_d} = 0.002$ $M_{uy}/F_{ckb_d} = 0.040$

$p_c = 1.2\%$ $A_{req} = 1620mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.005$ $M_{uy1} / F_{ckb_d} = 0.053$

$P_{uz} = 1808KN$. $P_u/P_{uz} = 0.809$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.732 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I13-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 659.53KN. PLL= 176.90KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.99 90 -29.99

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.09 90 -4.85

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.16 90 -38.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.23 90 -12.85

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1254.65KN. Mux=2.09KN.M. Muy=76.4KN.M.

Short Column

$P_u/F_{ckb_d} = 0.465$ $M_{ux}/F_{ckb_d} = 0.003$ $M_{uy}/F_{ckb_d} = 0.063$

$p_c = 1.2\%$ $A_{req} = 1620mm^2$

FROM CHARTS $M_{ux1} / F_{ckb_d} = 0.074$ $M_{uy1} / F_{ckb_d} = 0.078$

$P_{uz} = 1808KN$. $P_u/P_{uz} = 0.694$ $ALFA = 1.823$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.675 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I13-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 474.40KN. PLL= 124.38KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.44 90 -51.20

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.40 90 -22.05

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.35 90 -47.87

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.34 90 -19.48

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=898.17KN. Mux=2.76KN.M. Muy=109.88KN.M.

Short Column

$P_u/F_{ckbd} = 0.333$ $M_{ux}/F_{ckbd2} = 0.003$ $M_{uy}/F_{ckbd2} = 0.090$

$p_c = 1\%$ $A_{req} = 1350mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.050$ $M_{uy1} / F_{ckbd2} = 0.097$

$P_{uz} = 1709KN$, $P_u/P_{uz} = 0.526$ $ALFA = 1.543$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.92 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I13-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 289.63KN. PLL= 72.11KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.29 90 -44.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.30 90 -18.16

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.32 90 -45.42

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.33 90 -19.42

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=542.61KN. Mux=2.48KN.M. Muy=97.26KN.M.

Short Column

$P_u/F_{ckbd} = 0.201$ $M_{ux}/F_{ckbd2} = 0.003$ $M_{uy}/F_{ckbd2} = 0.080$

$p_c = 0.6\%$ $A_{req} = 810mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.064$ $M_{uy1} / F_{ckbd2} = 0.090$

$P_{uz} = 1511KN$, $P_u/P_{uz} = 0.359$ $ALFA = 1.265$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.885 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I13-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 104.71KN. PLL= 19.71KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.39 90 -46.96

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.28 90 -16.88

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.45 90 -48.05

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.23 90 -13.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=186.63KN. Mux=2.6KN.M. Muy=97.4KN.M.

Short Column

$P_u/F_{ckbd} = 0.069$ $M_{ux}/F_{ckbd2} = 0.003$ $M_{uy}/F_{ckbd2} = 0.080$

$p_c = 0.8\%$ $A_{req} = 1080mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.044$ $M_{uy1} / F_{ckbd2} = 0.090$

$P_{uz} = 1610KN$, $P_u/P_{uz} = 0.116$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.963 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I12-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 487.10KN. PLL= 83.56KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 11.01 90 -30.79

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.41 90 2.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=855.99KN. Mux=17.13KN.M. Muy=49.41KN.M.

Short Column

$P_u/F_{ckbd}=0.317$ $M_{ux}/F_{ckbd2}=0.021$ $M_{uy}/F_{ckbd2}=0.041$

$p_c=0.2\%$ $A_{req}=270\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.053$ $M_{uy1}/F_{ckbd2}=0.054$

$P_{uz}=1314\text{KN}$. $P_u/P_{uz}=0.652$ $\alpha=1.753$

$(M_{ux}/M_{ux1})^{\alpha}+(M_{uy}/M_{uy1})^{\alpha}=0.807<1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I12-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 390.73KN. PLL= 83.49KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 8.79 90 -27.28

L.L.M.FROM LOWER TO UPPER:LMU 0 0.63 90 -2.51

D.L.M.FROM UPPER TO LOWER:DMD 0 9.05 90 -30.83

L.L.M.FROM UPPER TO LOWER:LMD 0 1.56 90 -6.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=711.33KN. Mux=15.92KN.M. Muy=56.22KN.M.

Short Column

$P_u/F_{ckbd}=0.263$ $M_{ux}/F_{ckbd2}=0.020$ $M_{uy}/F_{ckbd2}=0.046$

$p_c=0.2\%$ $A_{req}=270\text{mm}^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.061$ $M_{uy1}/F_{ckbd2}=0.062$

$P_{uz}=1314\text{KN}$. $P_u/P_{uz}=0.541$ $\alpha=1.569$

$(M_{ux}/M_{ux1})^{\alpha}+(M_{uy}/M_{uy1})^{\alpha}=0.796<1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I12-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 278.26KN. PLL= 58.84KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 10.74 90 -38.45

L.L.M.FROM LOWER TO UPPER:LMU 0 2.71 90 -11.38
 D.L.M.FROM UPPER TO LOWER:DMD 0 10.43 90 -36.17
 L.L.M.FROM UPPER TO LOWER:LMD 0 2.51 90 -9.98
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=505.65KN. Mux=20.18KN.M. Muy=74.75KN.M.
 Short Column
 $Pu/Fckbd=0.187$ $Mux/Fckbd^2=0.025$ $Muy/Fckbd^2=0.062$
 $pc=0.4\%$ Areq= 540mm²
 FROM CHARTS $Mux1 / Fckbd^2 = 0.075$ $Muy1 / Fckbd^2 = 0.078$
 $Puz=1413KN$. $Pu/Puz=0.358$ ALFA=1.263
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.994 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I12-8.7-12
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 165.52KN. PLL= 33.99KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 10.23 90 -35.10
 L.L.M.FROM LOWER TO UPPER:LMU 0 2.40 90 -9.28
 D.L.M.FROM UPPER TO LOWER:DMD 0 10.37 90 -36.31
 L.L.M.FROM UPPER TO LOWER:LMD 0 2.49 90 -9.97
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=299.27KN. Mux=19.29KN.M. Muy=69.42KN.M.
 Short Column
 $Pu/Fckbd=0.111$ $Mux/Fckbd^2=0.024$ $Muy/Fckbd^2=0.057$
 $pc=0.6\%$ Areq= 810mm²
 FROM CHARTS $Mux1 / Fckbd^2 = 0.080$ $Muy1 / Fckbd^2 = 0.084$
 $Puz=1511KN$. $Pu/Puz=0.198$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.981 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I12-12-15.3
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 52.90KN. PLL= 9.24KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 9.91 90 -33.89
 L.L.M.FROM LOWER TO UPPER:LMU 0 2.11 90 -8.68
 D.L.M.FROM UPPER TO LOWER:DMD 0 9.32 90 -30.29
 L.L.M.FROM UPPER TO LOWER:LMD 0 1.62 90 -6.76
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=93.21KN. Mux=18.03KN.M. Muy=63.86KN.M.
 Short Column
 $Pu/Fckbd=0.035$ $Mux/Fckbd^2=0.022$ $Muy/Fckbd^2=0.053$
 $pc=0.8\%$ Areq= 1080mm²
 FROM CHARTS $Mux1 / Fckbd^2 = 0.077$ $Muy1 / Fckbd^2 = 0.082$

Puz=1610KN.Pu/Puz=0.058ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.928< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H12-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 651.78KN. PLL= 148.07KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 6.13 90 30.79

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.46 90 -2.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1199.78KN. Mux=9.89KN.M. Muy=49.41KN.M.

Short Column

Pu/Fckbd=0.444Mux/Fckbd2=0.012Muy/Fckbd2=0.041

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.056 Muy1 / Fckbd2 = 0.058

Puz=1610KN.Pu/Puz=0.745ALFA=1.908

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.56< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H12-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 534.20KN. PLL= 147.94KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 5.62 90 27.28

L.L.M.FROM LOWER TO UPPER:LMU 0 0.91 90 2.51

D.L.M.FROM UPPER TO LOWER:DMD 0 6.50 90 30.83

L.L.M.FROM UPPER TO LOWER:LMD 0 2.10 90 6.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1023.21KN. Mux=12.9KN.M. Muy=56.22KN.M.

Short Column

Pu/Fckbd=0.379Mux/Fckbd2=0.016Muy/Fckbd2=0.046

pc=0.6% Areq= 810mm²

FROM CHARTS Mux1 / Fckbd2 = 0.061 Muy1 / Fckbd2 = 0.063

Puz=1511KN.Pu/Puz=0.677ALFA=1.795

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.657< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H12-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 380.13KN. PLL= 104.25KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 8.43 90 38.45
 L.L.M.FROM LOWER TO UPPER:LMU 0 3.69 90 11.38
 D.L.M.FROM UPPER TO LOWER:DMD 0 8.21 90 36.17
 L.L.M.FROM UPPER TO LOWER:LMD 0 3.51 90 9.98
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=726.57KN. Mux=18.18KN.M. Muy=74.75KN.M.
 Short Column
 $Pu/Fckbd=0.269$ $Mux/Fckbd2=0.022$ $Muy/Fckbd2=0.062$
 $pc=0.4\%$ Areq= 540mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.070$ $Muy1 / Fckbd2 = 0.073$
 $Puz=1413KN$. $Pu/Puz=0.514$ ALFA=1.524
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.954 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H12-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 225.64KN. PLL= 60.23KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 8.05 90 35.10
 L.L.M.FROM LOWER TO UPPER:LMU 0 3.42 90 9.28
 D.L.M.FROM UPPER TO LOWER:DMD 0 8.14 90 36.31
 L.L.M.FROM UPPER TO LOWER:LMD 0 3.50 90 9.97

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=428.81KN. Mux=17.46KN.M. Muy=69.42KN.M.

Short Column

$Pu/Fckbd=0.159$ $Mux/Fckbd2=0.022$ $Muy/Fckbd2=0.057$

$pc=0.4\%$ Areq= 540mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.073$ $Muy1 / Fckbd2 = 0.076$

$Puz=1413KN$. $Pu/Puz=0.304$ ALFA=1.173

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.951 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H12-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 71.26KN. PLL= 16.37KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 7.58 90 33.89
 L.L.M.FROM LOWER TO UPPER:LMU 0 2.89 90 8.68
 D.L.M.FROM UPPER TO LOWER:DMD 0 6.95 90 30.29
 L.L.M.FROM UPPER TO LOWER:LMD 0 2.19 90 6.76

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=131.45KN. Mux=15.71KN.M. Muy=63.86KN.M.

Short Column

$Pu/Fckbd=0.049$ $Mux/Fckbd2=0.019$ $Muy/Fckbd2=0.053$

pc=0.8% Areq= 1080mm²
FROM CHARTS Mux1 / Fckbd2 = 0.081 Muy1 / Fckbd2 = 0.085
Puz=1610KN.Pu/Puz=0.082ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.855< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H10-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 718.44KN. PLL= 177.66KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -6.50 90 30.73

L.L.M.FROM UPPER TO LOWER:LMD 0 0.52 90 -2.18

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1344.15KN. Mux=10.53KN.M. Muy=49.37KN.M.

Short Column

Pu/Fckbd=0.498Mux/Fckbd2=0.013Muy/Fckbd2=0.041

pc=1% Areq= 1350mm²

FROM CHARTS Mux1 / Fckbd2 = 0.023 Muy1 / Fckbd2 = 0.055

Puz=1709KN.Pu/Puz=0.786ALFA=1.977

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.881< 1.0 HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H10-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 599.17KN. PLL= 177.67KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -6.23 90 27.35

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.08 90 2.55

D.L.M.FROM UPPER TO LOWER:DMD 0 -7.49 90 30.98

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.53 90 6.76

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1165.26KN. Mux=15.03KN.M. Muy=56.61KN.M.

Short Column

Pu/Fckbd=0.432Mux/Fckbd2=0.019Muy/Fckbd2=0.047

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.059 Muy1 / Fckbd2 = 0.062

Puz=1610KN.Pu/Puz=0.724ALFA=1.873

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.702< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H10-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 428.38KN. PLL= 125.01KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.95 90 38.69

L.L.M.FROM LOWER TO UPPER:LMU 0 -4.51 90 11.58

D.L.M.FROM UPPER TO LOWER:DMD 0 -9.66 90 36.41

L.L.M.FROM UPPER TO LOWER:LMD 0 -4.27 90 10.16

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=830.09KN. Mux=21.69KN.M. Muy=75.41KN.M.

Short Column

$Pu/Fckbd=0.307$ $Mux/Fckbd2=0.027$ $Muy/Fckbd2=0.062$

$pc=0.6\%$ Areq= 810mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.074$ $Muy1 / Fckbd2 = 0.078$

Puz=1511KN.Pu/Puz=0.549ALFA=1.582

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.893 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H10-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 257.72KN. PLL= 72.40KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.46 90 35.28

L.L.M.FROM LOWER TO UPPER:LMU 0 -4.16 90 9.43

D.L.M.FROM UPPER TO LOWER:DMD 0 -9.56 90 36.47

L.L.M.FROM UPPER TO LOWER:LMD 0 -4.27 90 10.14

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=495.18KN. Mux=20.75KN.M. Muy=69.92KN.M.

Short Column

$Pu/Fckbd=0.183$ $Mux/Fckbd2=0.026$ $Muy/Fckbd2=0.058$

$pc=0.4\%$ Areq= 540mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.075$ $Muy1 / Fckbd2 = 0.078$

Puz=1413KN.Pu/Puz=0.351ALFA=1.251

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.949 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H10-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 87.10KN. PLL= 19.76KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.04 90 34.15

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.51 90 8.84

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.44 90 30.62

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.65 90 6.87

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=160.29KN. Mux=18.83KN.M. Muy=64.49KN.M.

Short Column

$P_u/F_{ckbd} = 0.059$ $M_{ux}/F_{ckbd} = 0.023$ $M_{uy}/F_{ckbd} = 0.053$

$p_c = 0.8\%$ $A_{req} = 1080 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.083$ $M_{uy1} / F_{ckbd} = 0.088$

$P_{uz} = 1610 \text{ KN}$. $P_u/P_{uz} = 0.1$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.882 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I10-0-1.5

SIZE OF COLUMN: 300x450 mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 496.69 KN. PLL = 86.54 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.00 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 0.00 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 -11.76 90 -30.74

L.L.M. FROM UPPER TO LOWER: LMD 0 0.50 90 2.18

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 874.85 \text{ KN}$. $M_{ux} = 18.39 \text{ KN.M}$. $M_{uy} = 49.38 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.324$ $M_{ux}/F_{ckbd} = 0.023$ $M_{uy}/F_{ckbd} = 0.041$

$p_c = 0.2\%$ $A_{req} = 270 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.052$ $M_{uy1} / F_{ckbd} = 0.053$

$P_{uz} = 1314 \text{ KN}$. $P_u/P_{uz} = 0.666$ $\alpha = 1.776$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.863 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I10-1.5-5.4

SIZE OF COLUMN: 300x450 mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 399.14 KN. PLL = 86.48 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -9.48 90 -27.33

L.L.M. FROM LOWER TO UPPER: LMU 0 -0.73 90 -2.55

D.L.M. FROM UPPER TO LOWER: DMD 0 -9.90 90 -30.98

L.L.M. FROM UPPER TO LOWER: LMD 0 -1.79 90 -6.77

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 728.43 \text{ KN}$. $M_{ux} = 17.54 \text{ KN.M}$. $M_{uy} = 56.63 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.270$ $M_{ux}/F_{ckbd} = 0.022$ $M_{uy}/F_{ckbd} = 0.047$

$p_c = 0.2\%$ $A_{req} = 270 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.060$ $M_{uy1} / F_{ckbd} = 0.062$

$P_{uz} = 1314 \text{ KN}$. $P_u/P_{uz} = 0.554$ $\alpha = 1.591$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.838 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206 mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I10-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 284.41KN. PLL= 60.92KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -11.84 90 -38.71

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.09 90 -11.59

D.L.M.FROM UPPER TO LOWER:DMD 0 -11.45 90 -36.42

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.83 90 -10.17

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=518KN. Mux=22.4KN.M. Muy=75.45KN.M.

Short Column

$P_u/F_{ckbd} = 0.192$ $M_{ux}/F_{ckbd} = 0.028$ $M_{uy}/F_{ckbd} = 0.062$

$p_c = 0.6\%$ $A_{req} = 810mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.085$ $M_{uy1} / F_{ckbd} = 0.090$

$P_{uz} = 1511KN$. $P_u/P_{uz} = 0.343$ $ALFA = 1.238$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.879 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I10-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 169.47KN. PLL= 35.21KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -11.20 90 -35.29

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.68 90 -9.44

D.L.M.FROM UPPER TO LOWER:DMD 0 -11.33 90 -36.48

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.81 90 -10.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=307.02KN. Mux=21.21KN.M. Muy=69.94KN.M.

Short Column

$P_u/F_{ckbd} = 0.114$ $M_{ux}/F_{ckbd} = 0.026$ $M_{uy}/F_{ckbd} = 0.058$

$p_c = 0.8\%$ $A_{req} = 1080mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.092$ $M_{uy1} / F_{ckbd} = 0.098$

$P_{uz} = 1610KN$. $P_u/P_{uz} = 0.191$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.872 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I10-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 54.64KN. PLL= 9.58KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -10.98 90 -34.16

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.40 90 -8.86

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.51 90 -30.63

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.82 90 -6.88

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=96.33KN. Mux=20.07KN.M. Muy=64.53KN.M.
Short Column
 $Pu/Fckbd=0.036$ $Mux/Fckbd2=0.025$ $Muy/Fckbd2=0.053$
 $pc=0.8\%$ $A_{req}=1080mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.078$ $Muy1 / Fckbd2 = 0.082$
 $Puz=1610KN$. $Pu/Puz=0.06$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.964 < 1.0$ HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I8-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 798.64KN. PLL= 178.09KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.77 90 -28.35

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.25 90 4.24

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1465.1KN. Mux=3.03KN.M. Muy=48.89KN.M.

Short Column

$Pu/Fckbd=0.543$ $Mux/Fckbd2=0.004$ $Muy/Fckbd2=0.040$

$pc=1.4\%$ $A_{req}=1890mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.068$

$Puz=1907KN$. $Pu/Puz=0.768$ $ALFA=1.947$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.365 < 1.0$ HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I8-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 659.36KN. PLL= 178.09KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.85 90 -30.12

L.L.M.FROM LOWER TO UPPER:LMU 0 0.19 90 -4.93

D.L.M.FROM UPPER TO LOWER:DMD 0 2.25 90 -38.39

L.L.M.FROM UPPER TO LOWER:LMD 0 0.56 90 -13.08

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1256.18KN. Mux=4.22KN.M. Muy=77.21KN.M.

Short Column

$Pu/Fckbd=0.465$ $Mux/Fckbd2=0.005$ $Muy/Fckbd2=0.064$

$pc=1.2\%$ $A_{req}=1620mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.073$ $Muy1 / Fckbd2 = 0.078$

$Puz=1808KN$. $Pu/Puz=0.695$ $ALFA=1.825$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.697 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I8-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 474.26KN. PLL= 125.32KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 3.00 90 -51.75

L.L.M.FROM LOWER TO UPPER:LMU 0 0.94 90 -22.51

D.L.M.FROM UPPER TO LOWER:DMD 0 2.80 90 -48.35

L.L.M.FROM UPPER TO LOWER:LMD 0 0.79 90 -19.88

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=899.37KN. Mux=5.91KN.M. Muy=111.39KN.M.

Short Column

$P_u/F_{ckb_d} = 0.333$ $M_{ux}/F_{ckb_d} = 0.007$ $M_{uy}/F_{ckb_d} = 0.092$

$p_c = 1\%$ $A_{eq} = 1350mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.050$ $M_{uy1}/F_{ckb_d} = 0.096$

$P_{uz} = 1709KN$. $P_u/P_{uz} = 0.526$ $ALFA = 1.544$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.976 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I8-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 289.24KN. PLL= 72.57KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.61 90 -45.40

L.L.M.FROM LOWER TO UPPER:LMU 0 0.74 90 -18.51

D.L.M.FROM UPPER TO LOWER:DMD 0 2.65 90 -45.81

L.L.M.FROM UPPER TO LOWER:LMD 0 0.81 90 -19.81

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=542.72KN. Mux=5.19KN.M. Muy=98.43KN.M.

Short Column

$P_u/F_{ckb_d} = 0.201$ $M_{ux}/F_{ckb_d} = 0.006$ $M_{uy}/F_{ckb_d} = 0.081$

$p_c = 0.6\%$ $A_{eq} = 810mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.064$ $M_{uy1}/F_{ckb_d} = 0.090$

$P_{uz} = 1511KN$. $P_u/P_{uz} = 0.359$ $ALFA = 1.265$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.931 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I8-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 104.15KN. PLL= 19.81KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 2.91 90 -47.51

L.L.M.FROM LOWER TO UPPER:LMU 0 0.71 90 -17.21

D.L.M.FROM UPPER TO LOWER:DMD 0 3.13 90 -48.80

L.L.M.FROM UPPER TO LOWER:LMD 0 0.56 90 -13.36
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=185.94KN. Mux=5.76KN.M. Muy=99.01KN.M.
 Short Column
 $P_u/F_{ckbd} = 0.069$ $M_{ux}/F_{ckbd2} = 0.007$ $M_{uy}/F_{ckbd2} = 0.081$
 $p_c = 1\%$ $A_{req} = 1350mm^2$
 FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.098$ $M_{uy1} / F_{ckbd2} = 0.104$
 $P_{uz} = 1709KN$. $P_u/P_{uz} = 0.109$ $ALFA = 1$
 $(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.855 < 1.0$ HENCE SAFE
 AREA OF STEEL=1608mm²
 MAIN REINFORCEMENT:8#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H8-0-1.5
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 969.72KN. PLL= 297.40KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 1.10 90 28.35
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.34 90 -4.25
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1900.68KN. Mux=2.16KN.M. Muy=48.9KN.M.
 Short Column
 $P_u/F_{ckbd} = 0.704$ $M_{ux}/F_{ckbd2} = 0.003$ $M_{uy}/F_{ckbd2} = 0.040$
 $p_c = 2\%$ $A_{req} = 2700mm^2$
 FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.015$ $M_{uy1} / F_{ckbd2} = 0.051$
 $P_{uz} = 2203KN$. $P_u/P_{uz} = 0.863$ $ALFA = 2$
 $(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.667 < 1.0$ HENCE SAFE
 AREA OF STEEL=2865mm²
 MAIN REINFORCEMENT:6#20+2#25
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H8-1.5-5.4
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 831.40KN. PLL= 297.33KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 1.62 90 30.12
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.33 90 4.94
 D.L.M.FROM UPPER TO LOWER:DMD 0 2.37 90 38.36
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.92 90 13.09
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1693.1KN. Mux=4.94KN.M. Muy=77.18KN.M.
 Short Column
 $P_u/F_{ckbd} = 0.627$ $M_{ux}/F_{ckbd2} = 0.006$ $M_{uy}/F_{ckbd2} = 0.064$
 $p_c = 2\%$ $A_{req} = 2700mm^2$
 FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.076$ $M_{uy1} / F_{ckbd2} = 0.082$
 $P_{uz} = 2203KN$. $P_u/P_{uz} = 0.768$ $ALFA = 1.947$
 $(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.62 < 1.0$ HENCE SAFE

AREA OF STEEL=2865mm²
MAIN REINFORCEMENT:6#20+2#25
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H8-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 599.15KN. PLL= 209.30KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 3.39 90 51.73
L.L.M.FROM LOWER TO UPPER:LMU 0 1.61 90 22.47
D.L.M.FROM UPPER TO LOWER:DMD 0 3.18 90 48.35
L.L.M.FROM UPPER TO LOWER:LMD 0 1.42 90 19.86

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1212.68KN. Mux=7.5KN.M. Muy=111.3KN.M.
Short Column

$P_u/F_{ckbd}=0.449$ $M_{ux}/F_{ckbd2}=0.009$ $M_{uy}/F_{ckbd2}=0.092$
 $p_c=1.6\%$ Areq= 2160mm²
FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.099$ $M_{uy1}/F_{ckbd2} = 0.107$
 $P_{uz}=2006KN$. $P_u/P_{uz}=0.605$ ALFA=1.674
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.793 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²
MAIN REINFORCEMENT:8#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H8-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 366.66KN. PLL= 121.11KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 2.98 90 45.38
L.L.M.FROM LOWER TO UPPER:LMU 0 1.34 90 18.50
D.L.M.FROM UPPER TO LOWER:DMD 0 3.01 90 45.80
L.L.M.FROM UPPER TO LOWER:LMD 0 1.43 90 19.79

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=731.66KN. Mux=6.66KN.M. Muy=98.38KN.M.
Short Column

$P_u/F_{ckbd}=0.271$ $M_{ux}/F_{ckbd2}=0.008$ $M_{uy}/F_{ckbd2}=0.081$
 $p_c=0.8\%$ Areq= 1080mm²
FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.090$ $M_{uy1}/F_{ckbd2} = 0.095$
 $P_{uz}=1610KN$. $P_u/P_{uz}=0.454$ ALFA=1.424
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.824 < 1.0$ HENCE SAFE

AREA OF STEEL=1884mm²
MAIN REINFORCEMENT:6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H8-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 134.20KN. PLL= 33.00KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 3.19 90 47.49

L.L.M.FROM LOWER TO UPPER:LMU 0 1.23 90 17.21
 D.L.M.FROM UPPER TO LOWER:DMD 0 3.32 90 48.78
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.96 90 13.34
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=250.8KN. Mux=6.83KN.M. Muy=98.99KN.M.
 Short Column
 $Pu/Fckbd=0.093$ $Mux/Fckbd2=0.008$ $Muy/Fckbd2=0.081$
 $pc=1\%$ $Areq=1350mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.102$ $Muy1 / Fckbd2 = 0.108$
 $Puz=1709KN$. $Pu/Puz=0.147$ $ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.835 < 1.0$ HENCE SAFE
 AREA OF STEEL=1884mm²
 MAIN REINFORCEMENT:6#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:F11-0-1.5
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 687.41KN. PLL= 129.73KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -4.93 90 -16.74
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.16 90 0.53
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1225.71KN. Mux=7.63KN.M. Muy=25.91KN.M.
 Short Column
 $Pu/Fckbd=0.454$ $Mux/Fckbd2=0.009$ $Muy/Fckbd2=0.021$
 $pc=0.6\%$ $Areq=810mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.039$ $Muy1 / Fckbd2 = 0.041$
 $Puz=1511KN$. $Pu/Puz=0.811$ $ALFA=2$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.328 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:F11-1.5-5.4
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 559.65KN. PLL= 130.19KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -4.02 90 -14.26
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.49 90 -1.29
 D.L.M.FROM UPPER TO LOWER:DMD 0 -4.22 90 -15.64
 L.L.M.FROM UPPER TO LOWER:LMD 0 -1.09 90 -2.94
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1034.76KN. Mux=7.97KN.M. Muy=27.87KN.M.
 Short Column
 $Pu/Fckbd=0.383$ $Mux/Fckbd2=0.010$ $Muy/Fckbd2=0.023$
 $pc=0.2\%$ $Areq=270mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.036$ $Muy1 / Fckbd2 = 0.037$

Puz=1314KN.Pu/Puz=0.788ALFA=1.979
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.466< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F11-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 403.50KN. PLL= 91.21KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -5.17 90 -19.64
L.L.M.FROM LOWER TO UPPER:LMU 0 -1.92 90 -5.13
D.L.M.FROM UPPER TO LOWER:DMD 0 -5.12 90 -19.12
L.L.M.FROM UPPER TO LOWER:LMD 0 -1.87 90 -4.84
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=742.07KN. Mux=10.64KN.M. Muy=37.16KN.M.
Short Column

Pu/Fckbd=0.275Mux/Fckbd2=0.013Muy/Fckbd2=0.031
pc=0.2% Areq= 270mm²
FROM CHARTS Mux1 / Fckbd2 = 0.060 Muy1 / Fckbd2 = 0.061
Puz=1314KN.Pu/Puz=0.565ALFA=1.608
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.418< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F11-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 249.06KN. PLL= 53.10KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -5.13 90 -18.76
L.L.M.FROM LOWER TO UPPER:LMU 0 -1.84 90 -4.70
D.L.M.FROM UPPER TO LOWER:DMD 0 -5.20 90 -18.92
L.L.M.FROM UPPER TO LOWER:LMD 0 -1.86 90 -4.83
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=453.24KN. Mux=10.59KN.M. Muy=35.63KN.M.
Short Column

Pu/Fckbd=0.168Mux/Fckbd2=0.013Muy/Fckbd2=0.029
pc=0.2% Areq= 270mm²
FROM CHARTS Mux1 / Fckbd2 = 0.063 Muy1 / Fckbd2 = 0.064
Puz=1314KN.Pu/Puz=0.345ALFA=1.242
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.521< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F11-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 94.13KN. PLL= 14.60KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 -4.53 90 -17.96
 L.L.M.FROM LOWER TO UPPER:LMU 0 -1.51 90 -4.01
 D.L.M.FROM UPPER TO LOWER:DMD 0 -3.79 90 -16.87
 L.L.M.FROM UPPER TO LOWER:LMD 0 -1.13 90 -3.05
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=163.1KN. Mux=9.06KN.M. Muy=32.96KN.M.
 Short Column
 $Pu/Fckbd=0.060Mux/Fckbd2=0.011Muy/Fckbd2=0.027$
 $pc=0.2\% Areq= 270mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.041$ $Muy1 / Fckbd2 = 0.042$
 $Puz=1314KN.Pu/Puz=0.124ALFA=1$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.909 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:B11-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 554.70KN. PLL= 91.62KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -5.66 90 15.94

L.L.M.FROM UPPER TO LOWER:LMD 0 0.12 90 -0.98

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=969.48KN. Mux=8.67KN.M. Muy=25.38KN.M.

Short Column

$Pu/Fckbd=0.359Mux/Fckbd2=0.011Muy/Fckbd2=0.021$

$pc=0.2\% Areq= 270mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.043$ $Muy1 / Fckbd2 = 0.044$

$Puz=1314KN.Pu/Puz=0.738ALFA=1.897$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.313 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:B11-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 430.08KN. PLL= 91.52KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -2.90 90 14.50

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.40 90 1.69

D.L.M.FROM UPPER TO LOWER:DMD 0 -1.41 90 16.74

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.87 90 4.09

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=782.4KN. Mux=5.66KN.M. Muy=31.25KN.M.

Short Column

$Pu/Fckbd=0.290Mux/Fckbd2=0.007Muy/Fckbd2=0.026$

pc=0.2% Areq= 270mm²
FROM CHARTS Mux1 / Fckbd2 = 0.058 Muy1 / Fckbd2 = 0.059
Puz=1314KN.Pu/Puz=0.596ALFA=1.659
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.283< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B11-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 311.62KN. PLL= 64.56KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.24 90 21.58

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.57 90 7.10

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.52 90 20.76

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.53 90 6.52

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=564.27KN. Mux=3.14KN.M. Muy=43.02KN.M.

Short Column

Pu/Fckbd=0.209Mux/Fckbd2=0.004Muy/Fckbd2=0.035

pc=0.2% Areq= 270mm²

FROM CHARTS Mux1 / Fckbd2 = 0.064 Muy1 / Fckbd2 = 0.066

Puz=1314KN.Pu/Puz=0.429ALFA=1.382

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.446< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B11-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 193.35KN. PLL= 37.26KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -0.61 90 20.04

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.50 90 6.24

D.L.M.FROM UPPER TO LOWER:DMD 0 -0.40 90 20.13

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.53 90 6.52

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=345.92KN. Mux=3.21KN.M. Muy=39.98KN.M.

Short Column

Pu/Fckbd=0.128Mux/Fckbd2=0.004Muy/Fckbd2=0.033

pc=0.2% Areq= 270mm²

FROM CHARTS Mux1 / Fckbd2 = 0.058 Muy1 / Fckbd2 = 0.059

Puz=1314KN.Pu/Puz=0.263ALFA=1.105

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.576< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B11-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 74.86KN. PLL= 10.12KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -1.18 90 20.23

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.23 90 5.49

D.L.M.FROM UPPER TO LOWER:DMD 0 -2.18 90 20.23

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.91 90 4.19

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=127.47KN. Mux=5.12KN.M. Muy=38.58KN.M.

Short Column

$Pu/Fckbd=0.047$ $Mux/Fckbd2=0.006$ $Muy/Fckbd2=0.032$

$pc=0.4\%$ Areq= 540mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.052$ $Muy1 / Fckbd2 = 0.054$

$Puz=1413KN$. $Pu/Puz=0.09$ ALFA=1

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.705 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B9-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 905.02KN. PLL= 288.67KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.61 90 28.41

L.L.M.FROM UPPER TO LOWER:LMD 0 0.49 90 -4.13

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1790.54KN. Mux=13.65KN.M. Muy=48.81KN.M.

Short Column

$Pu/Fckbd=0.663$ $Mux/Fckbd2=0.017$ $Muy/Fckbd2=0.040$

$pc=1.8\%$ Areq= 2430mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.032$ $Muy1 / Fckbd2 = 0.052$

$Puz=2104KN$. $Pu/Puz=0.851$ ALFA=2

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.871 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²

MAIN REINFORCEMENT:8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B9-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 759.72KN. PLL= 288.79KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -8.56 90 30.05

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.20 90 4.81

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.49 90 38.21

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.72 90 12.75

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1572.77KN. Mux=19.82KN.M. Muy=76.44KN.M.

Short Column

$P_u/F_{ck}b_d = 0.583$ $M_u/F_{ck}b_d^2 = 0.024$ $M_u/F_{ck}b_d^2 = 0.063$

$p_c = 1.8\%$ $A_{eq} = 2430 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.077$ $M_{uy1} / F_{ck}b_d^2 = 0.082$

$P_{uz} = 2104 \text{ kN}$, $P_u/P_{uz} = 0.747$ $\alpha_{FA} = 1.912$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.71 < 1.0$ HENCE SAFE

AREA OF STEEL = 2512 mm^2

MAIN REINFORCEMENT: 8#20

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: B9-5.4-8.7

SIZE OF COLUMN: 300x450 mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 550.20 kN. PLL = 203.12 kN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -14.20 90 51.42

L.L.M. FROM LOWER TO UPPER: LMU 0 -4.85 90 21.91

D.L.M. FROM UPPER TO LOWER: DMD 0 -13.81 90 48.07

L.L.M. FROM UPPER TO LOWER: LMD 0 -4.68 90 19.34

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 1129.98 \text{ kN}$. $M_{ux} = 28.58 \text{ kN.M}$. $M_{uy} = 110 \text{ kN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.419$ $M_{ux}/F_{ck}b_d^2 = 0.035$ $M_{uy}/F_{ck}b_d^2 = 0.091$

$p_c = 1.6\%$ $A_{eq} = 2160 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.105$ $M_{uy1} / F_{ck}b_d^2 = 0.114$

$P_{uz} = 2006 \text{ kN}$, $P_u/P_{uz} = 0.563$ $\alpha_{FA} = 1.606$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.864 < 1.0$ HENCE SAFE

AREA OF STEEL = 2512 mm^2

MAIN REINFORCEMENT: 8#20

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: B9-8.7-12

SIZE OF COLUMN: 300x450 mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 340.44 kN. PLL = 117.67 kN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -13.67 90 45.14

L.L.M. FROM LOWER TO UPPER: LMU 0 -4.59 90 18.03

D.L.M. FROM UPPER TO LOWER: DMD 0 -13.93 90 45.58

L.L.M. FROM UPPER TO LOWER: LMD 0 -4.66 90 19.29

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL + 1.5LL

DESIGN FACTORED LOADS: $P_u = 687.17 \text{ kN}$. $M_{ux} = 27.89 \text{ kN.M}$. $M_{uy} = 97.31 \text{ kN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.255$ $M_{ux}/F_{ck}b_d^2 = 0.034$ $M_{uy}/F_{ck}b_d^2 = 0.080$

$p_c = 1\%$ $A_{eq} = 1350 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.102$ $M_{uy1} / F_{ck}b_d^2 = 0.110$

$P_{uz} = 1709 \text{ kN}$, $P_u/P_{uz} = 0.402$ $\alpha_{FA} = 1.337$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.889 < 1.0$ HENCE SAFE

AREA OF STEEL = 1884 mm^2

MAIN REINFORCEMENT: 6#20

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B9-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 130.86KN. PLL= 32.12KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -11.96 90 47.18

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.79 90 16.77

D.L.M.FROM UPPER TO LOWER:DMD 0 -9.72 90 48.35

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.85 90 13.02

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=244.47KN. Mux=23.63KN.M. Muy=97.68KN.M.

Short Column

$P_u/F_{ckbd} = 0.091$ $M_{ux}/F_{ckbd} = 0.029$ $M_{uy}/F_{ckbd} = 0.080$

$p_c = 1.2\%$ $A_{req} = 1620mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.114$ $M_{uy1} / F_{ckbd} = 0.122$

$P_{uz} = 1808KN$. $P_u/P_{uz} = 0.135$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.918 < 1.0$ HENCE SAFE

AREA OF STEEL=1884mm²

MAIN REINFORCEMENT:6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F9-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 1041.98KN. PLL= 320.63KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.93 90 -28.41

L.L.M.FROM UPPER TO LOWER:LMD 0 0.55 90 4.14

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=2043.92KN. Mux=14.22KN.M. Muy=48.83KN.M.

Short Column

$P_u/F_{ckbd} = 0.757$ $M_{ux}/F_{ckbd} = 0.018$ $M_{uy}/F_{ckbd} = 0.040$

$p_c = 2.4\%$ $A_{req} = 3240mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.056$ $M_{uy1} / F_{ckbd} = 0.061$

$P_{uz} = 2401KN$. $P_u/P_{uz} = 0.851$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.53 < 1.0$ HENCE SAFE

AREA OF STEEL=3572mm²

MAIN REINFORCEMENT:2#20+6#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F9-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 896.86KN. PLL= 320.79KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -8.07 90 -30.05

L.L.M.FROM LOWER TO UPPER:LMU 0 -1.36 90 -4.82

D.L.M.FROM UPPER TO LOWER:DMD 0 -9.28 90 -38.21

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.11 90 -12.76

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1826.48KN. Mux=18.59KN.M. Muy=76.46KN.M.

Short Column

$P_u/F_{ckbd}=0.676$ $M_{ux}/F_{ckbd2}=0.023$ $M_{uy}/F_{ckbd2}=0.063$

$p_c=2.4\%$ $A_{req}=3240mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.086$ $M_{uy1}/F_{ckbd2}=0.093$

$P_{uz}=2401KN$. $P_u/P_{uz}=0.761$ $ALFA=1.935$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.543 < 1.0$ HENCE SAFE

AREA OF STEEL=3572mm²

MAIN REINFORCEMENT:2#20+6#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F9-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 646.85KN. PLL= 225.59KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -12.18 90 -51.43

L.L.M.FROM LOWER TO UPPER:LMU 0 -5.55 90 -21.92

D.L.M.FROM UPPER TO LOWER:DMD 0 -11.93 90 -48.08

L.L.M.FROM UPPER TO LOWER:LMD 0 -5.34 90 -19.36

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1308.66KN. Mux=26.6KN.M. Muy=110.03KN.M.

Short Column

$P_u/F_{ckbd}=0.485$ $M_{ux}/F_{ckbd2}=0.033$ $M_{uy}/F_{ckbd2}=0.091$

$p_c=1.8\%$ $A_{req}=2430mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.102$ $M_{uy1}/F_{ckbd2}=0.110$

$P_{uz}=2104KN$. $P_u/P_{uz}=0.622$ $ALFA=1.703$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.862 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²

MAIN REINFORCEMENT:8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F9-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 397.28KN. PLL= 130.75KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -11.76 90 -45.15

L.L.M.FROM LOWER TO UPPER:LMU 0 -5.23 90 -18.04

D.L.M.FROM UPPER TO LOWER:DMD 0 -11.83 90 -45.58

L.L.M.FROM UPPER TO LOWER:LMD 0 -5.33 90 -19.31

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=792.05KN. Mux=25.74KN.M. Muy=97.34KN.M.

Short Column

$P_u/F_{ckbd}=0.293$ $M_{ux}/F_{ckbd2}=0.032$ $M_{uy}/F_{ckbd2}=0.080$

$p_c=1\%$ $A_{req}=1350mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.097$ $M_{uy1}/F_{ckbd2}=0.104$

$P_{uz}=1709KN$. $P_u/P_{uz}=0.463$ $ALFA=1.439$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.892 < 1.0$ HENCE SAFE

AREA OF STEEL=1884mm²

MAIN REINFORCEMENT:6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F9-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 147.46KN. PLL= 35.72KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -11.07 90 -47.19

L.L.M.FROM LOWER TO UPPER:LMU 0 -4.35 90 -16.78

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.28 90 -48.36

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.25 90 -13.01

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=274.77KN. Mux=23.13KN.M. Muy=97.71KN.M.

Short Column

$P_u/F_{ckb_d} = 0.102$ $M_{ux}/F_{ckb_d} = 0.029$ $M_{uy}/F_{ckb_d} = 0.080$

$p_c = 1.2\%$ $A_{req} = 1620mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.115$ $M_{uy1}/F_{ckb_d} = 0.123$

$P_{uz} = 1808KN$. $P_u/P_{uz} = 0.152$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.902 < 1.0$ HENCE SAFE

AREA OF STEEL=1884mm²

MAIN REINFORCEMENT:6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B7-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 1176.52KN. PLL= 365.97KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.25 90 27.59

L.L.M.FROM UPPER TO LOWER:LMD 0 0.08 90 -4.73

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=2313.74KN. Mux=0.5KN.M. Muy=48.48KN.M.

Short Column

$P_u/F_{ckb_d} = 0.857$ $M_{ux}/F_{ckb_d} = 0.001$ $M_{uy}/F_{ckb_d} = 0.040$

$p_c = 2.8\%$ $A_{req} = 3780mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.012$ $M_{uy1}/F_{ckb_d} = 0.049$

$P_{uz} = 2598KN$. $P_u/P_{uz} = 0.89$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.675 < 1.0$ HENCE SAFE

AREA OF STEEL=4475mm²

MAIN REINFORCEMENT:8#20+4#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B7-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 1010.52KN. PLL= 366.18KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.21 90 31.00

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.06 90 5.51

D.L.M.FROM UPPER TO LOWER:DMD 0 0.25 90 40.74

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.15 90 14.61
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=2065.05KN. Mux=0.6KN.M. Muy=83.03KN.M.
 Short Column
 $P_u/F_{ckbd} = 0.765$ $M_{ux}/F_{ckbd2} = 0.001$ $M_{uy}/F_{ckbd2} = 0.068$
 $p_c = 2.6\%$ $A_{req} = 3510mm^2$
 FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.004$ $M_{uy1} / F_{ckbd2} = 0.074$
 $P_{uz} = 2500KN$. $P_u/P_{uz} = 0.826$ $ALFA = 2$
 $(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.886 < 1.0$ HENCE SAFE
 AREA OF STEEL=3572mm²
 MAIN REINFORCEMENT:2#20+6#25
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:B7-5.4-8.7
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 727.80KN. PLL= 257.42KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.33 90 55.75
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.25 90 25.04
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.32 90 52.01
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.21 90 22.11
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1477.83KN. Mux=0.87KN.M. Muy=121.19KN.M.
 Short Column
 $P_u/F_{ckbd} = 0.547$ $M_{ux}/F_{ckbd2} = 0.001$ $M_{uy}/F_{ckbd2} = 0.100$
 $p_c = 2.2\%$ $A_{req} = 2970mm^2$
 FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.109$ $M_{uy1} / F_{ckbd2} = 0.119$
 $P_{uz} = 2302KN$. $P_u/P_{uz} = 0.642$ $ALFA = 1.737$
 $(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.741 < 1.0$ HENCE SAFE
 AREA OF STEEL=3219mm²
 MAIN REINFORCEMENT:4#20+4#25
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:B7-8.7-12
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 445.97KN. PLL= 149.23KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.37 90 48.47
 L.L.M.FROM LOWER TO UPPER:LMU 0 -0.19 90 20.63
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.40 90 48.69
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.22 90 22.06
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=892.8KN. Mux=0.93KN.M. Muy=106.13KN.M.
 Short Column
 $P_u/F_{ckbd} = 0.331$ $M_{ux}/F_{ckbd2} = 0.001$ $M_{uy}/F_{ckbd2} = 0.087$
 $p_c = 1\%$ $A_{req} = 1350mm^2$
 FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.050$ $M_{uy1} / F_{ckbd2} = 0.097$
 $P_{uz} = 1709KN$. $P_u/P_{uz} = 0.522$ $ALFA = 1.537$
 $(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.855 < 1.0$ HENCE SAFE

AREA OF STEEL=1884mm²
MAIN REINFORCEMENT:6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B7-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 163.72KN. PLL= 40.78KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.19 90 51.56
L.L.M.FROM LOWER TO UPPER:LMU 0 -0.19 90 19.17
D.L.M.FROM UPPER TO LOWER:DMD 0 -0.10 90 54.24
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.15 90 14.86

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=306.75KN. Mux=0.57KN.M. Muy=110.12KN.M.
Short Column

$P_u/F_{ckbd}=0.114$ $M_{ux}/F_{ckbd2}=0.001$ $M_{uy}/F_{ckbd2}=0.091$
 $p_c=0.8\%$ Areq= 1080mm²
FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.055$ $M_{uy1}/F_{ckbd2} = 0.098$
 $P_{uz}=1610KN$. $P_u/P_{uz}=0.19$ ALFA=1
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.94 < 1.0$ HENCE SAFE
AREA OF STEEL=1256mm²

MAIN REINFORCEMENT:4#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F7-0-1.5
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 1247.44KN. PLL= 400.51KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 0.27 90 -27.59
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.07 90 4.73

DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=2471.93KN. Mux=0.51KN.M. Muy=48.48KN.M.
Short Column

$P_u/F_{ckbd}=0.916$ $M_{ux}/F_{ckbd2}=0.001$ $M_{uy}/F_{ckbd2}=0.040$
 $p_c=3.2\%$ Areq= 4320mm²
FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.002$ $M_{uy1}/F_{ckbd2} = 0.056$
 $P_{uz}=2796KN$. $P_u/P_{uz}=0.884$ ALFA=2
 $(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.617 < 1.0$ HENCE SAFE
AREA OF STEEL=4475mm²

MAIN REINFORCEMENT:8#20+4#25
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F7-1.5-5.4
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 1081.46KN. PLL= 400.67KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.37 90 -31.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.09 90 -5.51
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.49 90 -40.74
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.19 90 -14.61
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=2223.2KN. Mux=1.02KN.M. Muy=83.03KN.M.
 Short Column
 $Pu/Fckbd=0.823$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.068$
 $pc=3\%$ Areq= 4050mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.010$ $Muy1 / Fckbd2 = 0.082$
 $Puz=2697KN$. $Pu/Puz=0.824$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.709 < 1.0$ HENCE SAFE
 AREA OF STEEL=4475mm²
 MAIN REINFORCEMENT:8#20+4#25
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:F7-5.4-8.7
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 781.71KN. PLL= 281.79KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.67 90 -55.75
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.35 90 -25.04
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.63 90 -52.01
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.32 90 -22.11
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1595.25KN. Mux=1.53KN.M. Muy=121.19KN.M.
 Short Column
 $Pu/Fckbd=0.591$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.100$
 $pc=2.2\%$ Areq= 2970mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.016$ $Muy1 / Fckbd2 = 0.106$
 $Puz=2302KN$. $Pu/Puz=0.693$ ALFA=1.822
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.912 < 1.0$ HENCE SAFE
 AREA OF STEEL=3219mm²
 MAIN REINFORCEMENT:4#20+4#25
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:F7-8.7-12
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 482.38KN. PLL= 163.28KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.60 90 -48.47
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.29 90 -20.63
 D.L.M.FROM UPPER TO LOWER:DMD 0 0.60 90 -48.69
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.30 90 -22.06
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=968.49KN. Mux=1.35KN.M. Muy=106.13KN.M.
 Short Column
 $Pu/Fckbd=0.359$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.087$
 $pc=1\%$ Areq= 1350mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.043$ $Muy1 / Fckbd2 = 0.091$

Puz=1709KN. Pu/Puz=0.567ALFA=1.611
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.935< 1.0 HENCE SAFE
AREA OF STEEL=1884mm²
MAIN REINFORCEMENT:6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F7-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 182.91KN. PLL= 44.59KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.62 90 -51.56

L.L.M.FROM LOWER TO UPPER:LMU 0 0.26 90 -19.17

D.L.M.FROM UPPER TO LOWER:DMD 0 0.64 90 -54.24

L.L.M.FROM UPPER TO LOWER:LMD 0 0.20 90 -14.86

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=341.25KN. Mux=1.35KN.M. Muy=110.12KN.M.

Short Column

Pu/Fckbd=0.126Mux/Fckbd2=0.002Muy/Fckbd2=0.091

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.057 Muy1 / Fckbd2 = 0.099

Puz=1610KN. Pu/Puz=0.212ALFA=1.02

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.938< 1.0 HENCE SAFE

AREA OF STEEL=1256mm²

MAIN REINFORCEMENT:4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H6-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 1136.35KN. PLL= 359.65KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.32 90 27.95

L.L.M.FROM UPPER TO LOWER:LMD 0 0.82 90 -4.51

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=2244KN. Mux=13.71KN.M. Muy=48.69KN.M.

Short Column

Pu/Fckbd=0.831Mux/Fckbd2=0.017Muy/Fckbd2=0.040

pc=2.8% Areq= 3780mm²

FROM CHARTS Mux1 / Fckbd2 = 0.057 Muy1 / Fckbd2 = 0.061

Puz=2598KN. Pu/Puz=0.864ALFA=2

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.516< 1.0 HENCE SAFE

AREA OF STEEL=4475mm²

MAIN REINFORCEMENT:8#20+4#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H6-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 981.55KN. PLL= 359.76KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -8.26 90 30.59
L.L.M.FROM LOWER TO UPPER:LMU 0 -1.48 90 5.24
D.L.M.FROM UPPER TO LOWER:DMD 0 -10.12 90 39.62
L.L.M.FROM UPPER TO LOWER:LMD 0 -3.57 90 13.92
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=2011.97KN. Mux=20.54KN.M. Muy=80.31KN.M.
Short Column
 $Pu/Fckbd=0.745$ $Mux/Fckbd2=0.025$ $Muy/Fckbd2=0.066$
 $pc=2.6\%$ Areq= 3510mm²
FROM CHARTS $Mux1 / Fckbd2 = 0.076$ $Muy1 / Fckbd2 = 0.082$
Puz=2500KN.Pu/Puz=0.805ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.76 < 1.0$ HENCE SAFE
AREA OF STEEL=3572mm²
MAIN REINFORCEMENT:2#20+6#25
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H6-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 708.72KN. PLL= 253.06KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -13.73 90 53.94
L.L.M.FROM LOWER TO UPPER:LMU 0 -6.32 90 23.89
D.L.M.FROM UPPER TO LOWER:DMD 0 -13.26 90 50.36
L.L.M.FROM UPPER TO LOWER:LMD 0 -5.97 90 21.11

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1442.67KN. Mux=30.08KN.M. Muy=116.75KN.M.

Short Column

$Pu/Fckbd=0.534$ $Mux/Fckbd2=0.037$ $Muy/Fckbd2=0.096$

$pc=2\%$ Areq= 2700mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.101$ $Muy1 / Fckbd2 = 0.109$

Puz=2203KN.Pu/Puz=0.655ALFA=1.758

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.966 < 1.0$ HENCE SAFE

AREA OF STEEL=2865mm²

MAIN REINFORCEMENT:6#20+2#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H6-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 436.18KN. PLL= 146.59KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 -12.92 90 47.07
L.L.M.FROM LOWER TO UPPER:LMU 0 -5.79 90 19.67
D.L.M.FROM UPPER TO LOWER:DMD 0 -13.03 90 47.38
L.L.M.FROM UPPER TO LOWER:LMD 0 -5.96 90 21.03

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=874.16KN. Mux=28.49KN.M. Muy=102.62KN.M.

Short Column

$Pu/Fckbd=0.324$ $Mux/Fckbd2=0.035$ $Muy/Fckbd2=0.084$

pc=1.2% Areq= 1620mm²
FROM CHARTS Mux1 / Fckbd2 = 0.102 Muy1 / Fckbd2 = 0.110
Puz=1808KN. Pu/Puz=0.484ALFA=1.473
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.886< 1.0 HENCE SAFE
AREA OF STEEL=1884mm²
MAIN REINFORCEMENT:6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H6-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 163.53KN. PLL= 40.01KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -12.64 90 49.71

L.L.M.FROM LOWER TO UPPER:LMU 0 -4.92 90 18.29

D.L.M.FROM UPPER TO LOWER:DMD 0 -12.15 90 51.76

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.73 90 14.19

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=305.31KN. Mux=26.34KN.M. Muy=105.08KN.M.

Short Column

Pu/Fckbd=0.113Mux/Fckbd2=0.033Muy/Fckbd2=0.086

pc=1.2% Areq= 1620mm²

FROM CHARTS Mux1 / Fckbd2 = 0.116 Muy1 / Fckbd2 = 0.124

Puz=1808KN. Pu/Puz=0.169ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.976< 1.0 HENCE SAFE

AREA OF STEEL=1884mm²

MAIN REINFORCEMENT:6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I6-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 919.28KN. PLL= 213.63KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.87 90 -27.95

L.L.M.FROM UPPER TO LOWER:LMD 0 0.50 90 4.51

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1699.37KN. Mux=14.06KN.M. Muy=48.69KN.M.

Short Column

Pu/Fckbd=0.629Mux/Fckbd2=0.017Muy/Fckbd2=0.040

pc=1.6% Areq= 2160mm²

FROM CHARTS Mux1 / Fckbd2 = 0.031 Muy1 / Fckbd2 = 0.050

Puz=2006KN. Pu/Puz=0.847ALFA=2

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.966< 1.0 HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I6-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 764.37KN. PLL= 213.70KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -7.68 90 -30.59

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.87 90 -5.24

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.48 90 -39.64

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.10 90 -13.92

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1467.11KN. Mux=15.87KN.M. Muy=80.34KN.M.

Short Column

$Pu/Fckbd=0.543$ $Mux/Fckbd2=0.020$ $Muy/Fckbd2=0.066$

$pc=1.6\%$ Areq= 2160mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.076$ $Muy1 / Fckbd2 = 0.081$

Puz=2006KN.Pu/Puz=0.732ALFA=1.886

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.757 < 1.0$ HENCE SAFE

AREA OF STEEL=2286mm²

MAIN REINFORCEMENT:2#16+6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I6-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 551.21KN. PLL= 150.31KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -10.66 90 -53.94

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.67 90 -23.88

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.32 90 -50.35

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.44 90 -21.10

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1052.28KN. Mux=21.5KN.M. Muy=116.73KN.M.

Short Column

$Pu/Fckbd=0.390$ $Mux/Fckbd2=0.027$ $Muy/Fckbd2=0.096$

$pc=1.4\%$ Areq= 1890mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.101$ $Muy1 / Fckbd2 = 0.108$

Puz=1907KN.Pu/Puz=0.552ALFA=1.586

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.946 < 1.0$ HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I6-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 338.21KN. PLL= 87.08KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -10.07 90 -47.08

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.32 90 -19.67

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.14 90 -47.38

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.42 90 -21.04

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=637.93KN. Mux=20.34KN.M. Muy=102.63KN.M.

Short Column

$P_u/F_{ck}b_d = 0.236$ $M_{ux}/F_{ck}b_d^2 = 0.025$ $M_{uy}/F_{ck}b_d^2 = 0.084$

$p_c = 0.8\%$ $A_{req} = 1080 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.094$ $M_{uy1} / F_{ck}b_d^2 = 0.100$

$P_{uz} = 1610 \text{ KN}$. $P_u/P_{uz} = 0.396$ $\alpha_{FA} = 1.327$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.974 < 1.0$ HENCE SAFE

AREA OF STEEL = 1834 mm^2

MAIN REINFORCEMENT: 6#16+2#20

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I6-12-15.3

SIZE OF COLUMN: $300 \times 450 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 125.14 KN. PLL = 23.77 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 -10.03 90 -49.72

L.L.M. FROM LOWER TO UPPER: LMU 0 -2.85 90 -18.31

D.L.M. FROM UPPER TO LOWER: DMD 0 -9.90 90 -51.78

L.L.M. FROM UPPER TO LOWER: LMD 0 -2.17 90 -14.20

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 223.37 \text{ KN}$. $M_{ux} = 19.32 \text{ KN.M}$. $M_{uy} = 105.14 \text{ KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.083$ $M_{ux}/F_{ck}b_d^2 = 0.024$ $M_{uy}/F_{ck}b_d^2 = 0.087$

$p_c = 1.2\%$ $A_{req} = 1620 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.113$ $M_{uy1} / F_{ck}b_d^2 = 0.120$

$P_{uz} = 1808 \text{ KN}$. $P_u/P_{uz} = 0.124$ $\alpha_{FA} = 1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.93 < 1.0$ HENCE SAFE

AREA OF STEEL = 1834 mm^2

MAIN REINFORCEMENT: 6#16+2#20

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: I4-0-1.5

SIZE OF COLUMN: $300 \times 450 \text{ mm}$. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 861.15 KN. PLL = 196.53 KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 0.00 90 0.00

L.L.M. FROM LOWER TO UPPER: LMU 0 0.00 90 0.00

D.L.M. FROM UPPER TO LOWER: DMD 0 11.76 90 -28.22

L.L.M. FROM UPPER TO LOWER: LMD 0 -0.60 90 4.29

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 1586.52 \text{ KN}$. $M_{ux} = 18.54 \text{ KN.M}$. $M_{uy} = 48.77 \text{ KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.588$ $M_{ux}/F_{ck}b_d^2 = 0.023$ $M_{uy}/F_{ck}b_d^2 = 0.040$

$p_c = 1.6\%$ $A_{req} = 2160 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.062$ $M_{uy1} / F_{ck}b_d^2 = 0.066$

$P_{uz} = 2006 \text{ KN}$. $P_u/P_{uz} = 0.791$ $\alpha_{FA} = 1.985$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.508 < 1.0$ HENCE SAFE

AREA OF STEEL = 2286 mm^2

MAIN REINFORCEMENT: 2#16+6#20

LATERAL REINFORCEMENT: #8 TIES @ 200 mm. SPACING

DUCTILE REINFORCEMENT: #8 TIES @ 110 mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I4-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 713.99KN. PLL= 196.53KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 9.86 90 -30.27

L.L.M.FROM LOWER TO UPPER:LMU 0 1.05 90 -4.99

D.L.M.FROM UPPER TO LOWER:DMD 0 10.65 90 -38.77

L.L.M.FROM UPPER TO LOWER:LMD 0 2.53 90 -13.23

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1365.78KN. Mux=19.77KN.M. Muy=78KN.M.

Short Column

$P_u/F_{ckbd} = 0.506$ $M_{ux}/F_{ckbd} = 0.024$ $M_{uy}/F_{ckbd} = 0.064$

$p_c = 1.4\%$ $A_{req} = 1890mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.074$ $M_{uy1} / F_{ckbd} = 0.079$

$P_{uz} = 1907KN$. $P_u/P_{uz} = 0.716$ $ALFA = 1.86$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.803 < 1.0$ HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I4-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 514.40KN. PLL= 138.31KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 13.16 90 -52.45

L.L.M.FROM LOWER TO UPPER:LMU 0 4.44 90 -22.70

D.L.M.FROM UPPER TO LOWER:DMD 0 12.78 90 -49.00

L.L.M.FROM UPPER TO LOWER:LMD 0 4.16 90 -20.07

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=979.07KN. Mux=26.4KN.M. Muy=112.73KN.M.

Short Column

$P_u/F_{ckbd} = 0.363$ $M_{ux}/F_{ckbd} = 0.033$ $M_{uy}/F_{ckbd} = 0.093$

$p_c = 1.4\%$ $A_{req} = 1890mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.106$ $M_{uy1} / F_{ckbd} = 0.114$

$P_{uz} = 1907KN$. $P_u/P_{uz} = 0.513$ $ALFA = 1.522$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.896 < 1.0$ HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I4-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 314.73KN. PLL= 80.06KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 12.50 90 -45.94

L.L.M.FROM LOWER TO UPPER:LMU 0 4.02 90 -18.70

D.L.M.FROM UPPER TO LOWER:DMD 0 12.58 90 -46.31

L.L.M.FROM UPPER TO LOWER:LMD 0 4.16 90 -20.00

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=592.19KN. Mux=25.11KN.M. Muy=99.47KN.M.
Short Column
Pu/Fckbd=0.219Mux/Fckbd2=0.031Muy/Fckbd2=0.082
pc=1% Areq= 1350mm²
FROM CHARTS Mux1 / Fckbd2 = 0.106 Muy1 / Fckbd2 = 0.113
Puz=1709KN.Pu/Puz=0.346ALFA=1.244
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.885< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I4-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 115.08KN. PLL= 21.82KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 12.34 90 -48.22
L.L.M.FROM LOWER TO UPPER:LMU 0 3.44 90 -17.40
D.L.M.FROM UPPER TO LOWER:DMD 0 12.03 90 -49.76
L.L.M.FROM UPPER TO LOWER:LMD 0 2.61 90 -13.51

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=205.35KN. Mux=23.67KN.M. Muy=100.74KN.M.
Short Column
Pu/Fckbd=0.076Mux/Fckbd2=0.029Muy/Fckbd2=0.083
pc=1.2% Areq= 1620mm²
FROM CHARTS Mux1 / Fckbd2 = 0.112 Muy1 / Fckbd2 = 0.120
Puz=1808KN.Pu/Puz=0.114ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.955< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H4-0-1.5
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 1094.56KN. PLL= 343.25KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
D.L.M.FROM UPPER TO LOWER:DMD 0 10.37 90 28.22
L.L.M.FROM UPPER TO LOWER:LMD 0 -0.83 90 -4.29

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=2156.72KN. Mux=16.8KN.M. Muy=48.77KN.M.
Short Column
Pu/Fckbd=0.799Mux/Fckbd2=0.021Muy/Fckbd2=0.040
pc=2.6% Areq= 3510mm²
FROM CHARTS Mux1 / Fckbd2 = 0.055 Muy1 / Fckbd2 = 0.059
Puz=2500KN.Pu/Puz=0.863ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.608< 1.0 HENCE SAFE
AREA OF STEEL=3572mm²
MAIN REINFORCEMENT:2#20+6#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H4-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 945.08KN. PLL= 343.49KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 9.81 90 30.27

L.L.M.FROM LOWER TO UPPER:LMU 0 1.68 90 4.99

D.L.M.FROM UPPER TO LOWER:DMD 0 11.65 90 38.77

L.L.M.FROM UPPER TO LOWER:LMD 0 3.97 90 13.22

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1932.86KN. Mux=23.43KN.M. Muy=77.99KN.M.

Short Column

$P_u/F_{ckb_d} = 0.716$ $M_{ux}/F_{ckb_d} = 0.029$ $M_{uy}/F_{ckb_d} = 0.064$

$p_c = 2.6\%$ $A_{req} = 3510mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.087$ $M_{uy1}/F_{ckb_d} = 0.094$

$P_{uz} = 2500KN$. $P_u/P_{uz} = 0.773$ $ALFA = 1.955$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.594 < 1.0$ HENCE SAFE

AREA OF STEEL=3572mm²

MAIN REINFORCEMENT:2#20+6#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H4-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 682.17KN. PLL= 241.44KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 15.53 90 52.43

L.L.M.FROM LOWER TO UPPER:LMU 0 7.06 90 22.70

D.L.M.FROM UPPER TO LOWER:DMD 0 15.10 90 48.99

L.L.M.FROM UPPER TO LOWER:LMD 0 6.70 90 20.06

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1385.42KN. Mux=33.89KN.M. Muy=112.7KN.M.

Short Column

$P_u/F_{ckb_d} = 0.513$ $M_{ux}/F_{ckb_d} = 0.042$ $M_{uy}/F_{ckb_d} = 0.093$

$p_c = 2\%$ $A_{req} = 2700mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.106$ $M_{uy1}/F_{ckb_d} = 0.115$

$P_{uz} = 2203KN$. $P_u/P_{uz} = 0.629$ $ALFA = 1.715$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.892 < 1.0$ HENCE SAFE

AREA OF STEEL=2865mm²

MAIN REINFORCEMENT:6#20+2#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H4-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 420.00KN. PLL= 139.99KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 14.78 90 45.92

L.L.M.FROM LOWER TO UPPER:LMU 0 6.52 90 18.70

D.L.M.FROM UPPER TO LOWER:DMD 0 14.90 90 46.31

L.L.M.FROM UPPER TO LOWER:LMD 0 6.68 90 20.00
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=839.99KN. Mux=32.37KN.M. Muy=99.47KN.M.
 Short Column
 $Pu/Fckbd=0.311$ $Mux/Fckbd2=0.040$ $Muy/Fckbd2=0.082$
 $pc=1.2\%$ Areq= 1620mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.104$ $Muy1 / Fckbd2 = 0.112$
 $Puz=1808KN$. $Pu/Puz=0.465$ ALFA=1.441
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.885 < 1.0$ HENCE SAFE
 AREA OF STEEL=1884mm²
 MAIN REINFORCEMENT:6#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H4-12-15.3
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 157.66KN. PLL= 38.26KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 14.20 90 48.21
 L.L.M.FROM LOWER TO UPPER:LMU 0 5.50 90 17.39
 D.L.M.FROM UPPER TO LOWER:DMD 0 13.37 90 49.73
 L.L.M.FROM UPPER TO LOWER:LMD 0 4.15 90 13.49
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=293.88KN. Mux=29.55KN.M. Muy=100.68KN.M.
 Short Column
 $Pu/Fckbd=0.109$ $Mux/Fckbd2=0.036$ $Muy/Fckbd2=0.083$
 $pc=1.2\%$ Areq= 1620mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.116$ $Muy1 / Fckbd2 = 0.124$
 $Puz=1808KN$. $Pu/Puz=0.163$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.983 < 1.0$ HENCE SAFE
 AREA OF STEEL=1884mm²
 MAIN REINFORCEMENT:6#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:B5-0-1.5
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 1141.98KN. PLL= 278.16KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 6.40 90 14.56
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.75 90 -2.80
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=2130.21KN. Mux=10.73KN.M. Muy=26.04KN.M.
 Short Column
 $Pu/Fckbd=0.789$ $Mux/Fckbd2=0.013$ $Muy/Fckbd2=0.021$
 $pc=2.2\%$ Areq= 2970mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.026$ $Muy1 / Fckbd2 = 0.028$
 $Puz=2302KN$. $Pu/Puz=0.925$ ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.86 < 1.0$ HENCE SAFE

AREA OF STEEL=3219mm²
MAIN REINFORCEMENT:4#20+4#25
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B5-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 951.66KN. PLL= 278.62KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 6.78 90 18.61

L.L.M.FROM LOWER TO UPPER:LMU 0 1.52 90 4.37

D.L.M.FROM UPPER TO LOWER:DMD 0 8.64 90 26.05

L.L.M.FROM UPPER TO LOWER:LMD 0 3.58 90 10.86

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1845.42KN. Mux=18.33KN.M. Muy=55.37KN.M.

Short Column

$P_u/F_{ckbd}=0.683$ $M_{ux}/F_{ckbd2}=0.023$ $M_{uy}/F_{ckbd2}=0.046$

$p_c=2.2\%$ Areq= 2970mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.070$ $M_{uy1}/F_{ckbd2} = 0.075$

$P_{uz}=2302KN$. $P_u/P_{uz}=0.802$ ALFA=2

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.471 < 1.0$ HENCE SAFE

AREA OF STEEL=3219mm²

MAIN REINFORCEMENT:4#20+4#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B5-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 684.25KN. PLL= 195.66KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 11.96 90 37.42

L.L.M.FROM LOWER TO UPPER:LMU 0 6.29 90 18.85

D.L.M.FROM UPPER TO LOWER:DMD 0 11.61 90 35.17

L.L.M.FROM UPPER TO LOWER:LMD 0 5.97 90 17.10

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1319.87KN. Mux=27.38KN.M. Muy=84.41KN.M.

Short Column

$P_u/F_{ckbd}=0.489$ $M_{ux}/F_{ckbd2}=0.034$ $M_{uy}/F_{ckbd2}=0.069$

$p_c=1.4\%$ Areq= 1890mm²

FROM CHARTS $M_{ux1}/F_{ckbd2} = 0.079$ $M_{uy1}/F_{ckbd2} = 0.084$

$P_{uz}=1907KN$. $P_u/P_{uz}=0.692$ ALFA=1.82

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.921 < 1.0$ HENCE SAFE

AREA OF STEEL=2512mm²

MAIN REINFORCEMENT:8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B5-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 418.07KN. PLL= 113.61KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 11.33 90 33.17

L.L.M.FROM LOWER TO UPPER:LMU 0 5.82 90 16.19
 D.L.M.FROM UPPER TO LOWER:DMD 0 11.42 90 33.41
 L.L.M.FROM UPPER TO LOWER:LMD 0 5.97 90 17.05
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=797.52KN. Mux=26.09KN.M. Muy=75.69KN.M.
 Short Column
 $Pu/Fckbd=0.295$ $Mux/Fckbd2=0.032$ $Muy/Fckbd2=0.062$
 $pc=0.6\%$ Areq= 810mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.076$ $Muy1 / Fckbd2 = 0.080$
 $Puz=1511KN$. $Pu/Puz=0.528$ ALFA=1.546
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.941 < 1.0$ HENCE SAFE
 AREA OF STEEL=1256mm²
 MAIN REINFORCEMENT:4#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:B5-12-15.3
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 151.58KN. PLL= 31.12KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 10.68 90 34.19
 L.L.M.FROM LOWER TO UPPER:LMU 0 4.92 90 14.50
 D.L.M.FROM UPPER TO LOWER:DMD 0 9.86 90 34.73
 L.L.M.FROM UPPER TO LOWER:LMD 0 3.71 90 11.11
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=274.05KN. Mux=23.4KN.M. Muy=73.85KN.M.
 Short Column
 $Pu/Fckbd=0.102$ $Mux/Fckbd2=0.029$ $Muy/Fckbd2=0.061$
 $pc=0.8\%$ Areq= 1080mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.091$ $Muy1 / Fckbd2 = 0.096$
 $Puz=1610KN$. $Pu/Puz=0.17$ ALFA=1
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.952 < 1.0$ HENCE SAFE
 AREA OF STEEL=1256mm²
 MAIN REINFORCEMENT:4#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:F5-0-1.5
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:
 AXIAL LOADS: PDL= 1099.89KN. PLL= 348.09KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 5.93 90 -27.24
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.35 90 4.16
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=2171.97KN. Mux=9.42KN.M. Muy=47.1KN.M.
 Short Column
 $Pu/Fckbd=0.804$ $Mux/Fckbd2=0.012$ $Muy/Fckbd2=0.039$
 $pc=2.6\%$ Areq= 3510mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.019$ $Muy1 / Fckbd2 = 0.056$

Puz=2500KN.Pu/Puz=0.869ALFA=2
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.855< 1.0 HENCE SAFE
AREA OF STEEL=3572mm2
MAIN REINFORCEMENT:2#20+6#25
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F5-1.5-5.4
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 948.78KN. PLL= 348.04KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 5.32 90 -29.36
L.L.M.FROM LOWER TO UPPER:LMU 0 0.87 90 -5.07
D.L.M.FROM UPPER TO LOWER:DMD 0 6.09 90 -37.73
L.L.M.FROM UPPER TO LOWER:LMD 0 2.00 90 -13.29
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1945.23KN. Mux=12.14KN.M. Muy=76.53KN.M.
Short Column

Pu/Fckbd=0.720Mux/Fckbd2=0.015Muy/Fckbd2=0.063
pc=2.6% Areq= 3510mm2
FROM CHARTS Mux1 / Fckbd2 = 0.085 Muy1 / Fckbd2 = 0.092
Puz=2500KN.Pu/Puz=0.778ALFA=1.964
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.509< 1.0 HENCE SAFE
AREA OF STEEL=3572mm2
MAIN REINFORCEMENT:2#20+6#25
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F5-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 684.95KN. PLL= 245.03KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 7.91 90 -51.34
L.L.M.FROM LOWER TO UPPER:LMU 0 3.51 90 -22.98
D.L.M.FROM UPPER TO LOWER:DMD 0 7.77 90 -48.15
L.L.M.FROM UPPER TO LOWER:LMD 0 3.39 90 -20.51
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1394.97KN. Mux=17.13KN.M. Muy=111.48KN.M.
Short Column

Pu/Fckbd=0.517Mux/Fckbd2=0.021Muy/Fckbd2=0.092
pc=2% Areq= 2700mm2
FROM CHARTS Mux1 / Fckbd2 = 0.106 Muy1 / Fckbd2 = 0.114
Puz=2203KN.Pu/Puz=0.633ALFA=1.722
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.748< 1.0 HENCE SAFE
AREA OF STEEL=2865mm2
MAIN REINFORCEMENT:6#20+2#25
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F5-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 420.81KN. PLL= 141.77KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 7.69 90 -45.39
 L.L.M.FROM LOWER TO UPPER:LMU 0 3.33 90 -19.25
 D.L.M.FROM UPPER TO LOWER:DMD 0 7.74 90 -45.80
 L.L.M.FROM UPPER TO LOWER:LMD 0 3.39 90 -20.44
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=843.87KN. Mux=16.7KN.M. Muy=99.36KN.M.
 Short Column
 $Pu/Fckbd=0.313$ $Mux/Fckbd2=0.021$ $Muy/Fckbd2=0.082$
 $pc=1\%$ $A_{req}=1350mm^2$
 FROM CHARTS $Mux1 / Fckbd2 = 0.094$ $Muy1 / Fckbd2 = 0.100$
 $Puz=1709KN$. $Pu/Puz=0.494$ $ALFA=1.49$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.843 < 1.0$ HENCE SAFE
 AREA OF STEEL=1884mm²
 MAIN REINFORCEMENT:6#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:F5-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 156.71KN. PLL= 38.63KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 7.20 90 -47.17
 L.L.M.FROM LOWER TO UPPER:LMU 0 2.75 90 -17.63
 D.L.M.FROM UPPER TO LOWER:DMD 0 6.63 90 -48.18
 L.L.M.FROM UPPER TO LOWER:LMD 0 2.07 90 -13.63

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=293.01KN. Mux=14.93KN.M. Muy=98.72KN.M.

Short Column

$Pu/Fckbd=0.109$ $Mux/Fckbd2=0.018$ $Muy/Fckbd2=0.081$

$pc=1\%$ $A_{req}=1350mm^2$

FROM CHARTS $Mux1 / Fckbd2 = 0.104$ $Muy1 / Fckbd2 = 0.111$

$Puz=1709KN$. $Pu/Puz=0.171$ $ALFA=1$

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.913 < 1.0$ HENCE SAFE

AREA OF STEEL=1884mm²

MAIN REINFORCEMENT:6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:B3-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 849.16KN. PLL= 187.77KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 -5.34 90 27.37
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.53 90 -4.03

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1555.4KN. Mux=8.81KN.M. Muy=47.1KN.M.

Short Column

$Pu/Fckbd=0.576$ $Mux/Fckbd2=0.011$ $Muy/Fckbd2=0.039$

pc=1.4% Areq= 1890mm²
FROM CHARTS $Mux1 / Fckbd2 = 0.052$ $Muy1 / Fckbd2 = 0.055$
Puz=1907KN. Pu/Puz=0.816ALFA=2
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.535< 1.0 HENCE SAFE
AREA OF STEEL=2060mm²
MAIN REINFORCEMENT:4#16+4#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B3-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 703.05KN. PLL= 187.68KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -5.12 90 29.11

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.67 90 4.89

D.L.M.FROM UPPER TO LOWER:DMD 0 -6.09 90 37.14

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.72 90 12.81

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1336.1KN. Mux=11.72KN.M. Muy=74.93KN.M.

Short Column

Pu/Fckbd=0.495Mux/Fckbd2=0.014Muy/Fckbd2=0.062

pc=1.4% Areq= 1890mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.077$ $Muy1 / Fckbd2 = 0.082$

Puz=1907KN. Pu/Puz=0.701ALFA=1.835

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.635< 1.0 HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B3-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 506.71KN. PLL= 132.09KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -8.01 90 50.41

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.96 90 22.16

D.L.M.FROM UPPER TO LOWER:DMD 0 -7.61 90 47.37

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.70 90 19.78

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=958.2KN. Mux=16.46KN.M. Muy=108.86KN.M.

Short Column

Pu/Fckbd=0.355Mux/Fckbd2=0.020Muy/Fckbd2=0.090

pc=1.2% Areq= 1620mm²

FROM CHARTS $Mux1 / Fckbd2 = 0.097$ $Muy1 / Fckbd2 = 0.104$

Puz=1808KN. Pu/Puz=0.53ALFA=1.55

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.884< 1.0 HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B3-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 310.08KN. PLL= 76.21KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -7.28 90 44.68

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.55 90 18.64

D.L.M.FROM UPPER TO LOWER:DMD 0 -7.36 90 45.04

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.67 90 19.89

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=579.43KN. Mux=15.05KN.M. Muy=97.4KN.M.

Short Column

$P_u/F_{ckbd} = 0.215$ $M_{ux}/F_{ckbd} = 0.019$ $M_{uy}/F_{ckbd} = 0.080$

$p_c = 0.8\%$ $A_{req} = 1080mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.096$ $M_{uy1} / F_{ckbd} = 0.101$

$P_{uz} = 1610KN$. $P_u/P_{uz} = 0.36$ $\alpha = 1.266$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.868 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B3-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 113.53KN. PLL= 20.44KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -7.48 90 46.42

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.29 90 16.87

D.L.M.FROM UPPER TO LOWER:DMD 0 -7.51 90 47.48

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.77 90 12.61

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=200.96KN. Mux=14.7KN.M. Muy=96.52KN.M.

Short Column

$P_u/F_{ckbd} = 0.074$ $M_{ux}/F_{ckbd} = 0.018$ $M_{uy}/F_{ckbd} = 0.079$

$p_c = 1\%$ $A_{req} = 1350mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.099$ $M_{uy1} / F_{ckbd} = 0.105$

$P_{uz} = 1709KN$. $P_u/P_{uz} = 0.118$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.938 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F3-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 1059.34KN. PLL= 285.54KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 3.39 90 -13.90

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.33 90 2.65

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=2017.32KN. Mux=5.58KN.M. Muy=24.83KN.M.

Short Column

$P_u/F_{ckbd} = 0.747$ $M_u/F_{ckbd} = 0.007$ $M_{uy}/F_{ckbd} = 0.020$

$p_c = 2\%$ $A_{req} = 2700 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.012$ $M_{uy1} / F_{ckbd} = 0.030$

$P_{uz} = 2203 \text{ KN}$, $P_u/P_{uz} = 0.916$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.807 < 1.0$ HENCE SAFE

AREA OF STEEL = 2865 mm^2

MAIN REINFORCEMENT: 6#20+2#25

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: F3-1.5-5.4

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 889.54KN. PLL = 285.65KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 3.57 90 -16.70

L.L.M. FROM LOWER TO UPPER: LMU 0 0.84 90 -3.53

D.L.M. FROM UPPER TO LOWER: DMD 0 4.54 90 -22.70

L.L.M. FROM UPPER TO LOWER: LMD 0 1.88 90 -9.04

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 1762.79 \text{ KN}$. $M_{ux} = 9.63 \text{ KN.M}$. $M_{uy} = 47.61 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.653$ $M_u/F_{ckbd} = 0.012$ $M_{uy}/F_{ckbd} = 0.039$

$p_c = 1.8\%$ $A_{req} = 2430 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.052$ $M_{uy1} / F_{ckbd} = 0.056$

$P_{uz} = 2104 \text{ KN}$, $P_u/P_{uz} = 0.838$ $\alpha = 2$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.54 < 1.0$ HENCE SAFE

AREA OF STEEL = 2512 mm^2

MAIN REINFORCEMENT: 8#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: F3-5.4-8.7

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 637.22KN. PLL = 203.30KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 6.33 90 -32.01

L.L.M. FROM LOWER TO UPPER: LMU 0 3.32 90 -15.73

D.L.M. FROM UPPER TO LOWER: DMD 0 6.19 90 -30.14

L.L.M. FROM UPPER TO LOWER: LMD 0 3.21 90 -14.21

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 1260.78 \text{ KN}$. $M_{ux} = 14.48 \text{ KN.M}$. $M_{uy} = 71.61 \text{ KN.M}$.

Short Column

$P_u/F_{ckbd} = 0.467$ $M_u/F_{ckbd} = 0.018$ $M_{uy}/F_{ckbd} = 0.059$

$p_c = 1.2\%$ $A_{req} = 1620 \text{ mm}^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.073$ $M_{uy1} / F_{ckbd} = 0.077$

$P_{uz} = 1808 \text{ KN}$, $P_u/P_{uz} = 0.697$ $\alpha = 1.829$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.683 < 1.0$ HENCE SAFE

AREA OF STEEL = 1884 mm^2

MAIN REINFORCEMENT: 6#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F3-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 385.43KN. PLL= 121.33KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 6.07 90 -28.36

L.L.M.FROM LOWER TO UPPER:LMU 0 3.16 90 -13.61

D.L.M.FROM UPPER TO LOWER:DMD 0 6.10 90 -28.48

L.L.M.FROM UPPER TO LOWER:LMD 0 3.22 90 -14.51

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=760.14KN. Mux=13.98KN.M. Muy=64.49KN.M.

Short Column

$P_u/F_{ckbd} = 0.282$ $M_{ux}/F_{ckbd} = 0.017$ $M_{uy}/F_{ckbd} = 0.053$

$p_c = 0.2\%$ $A_{req} = 270mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.059$ $M_{uy1} / F_{ckbd} = 0.060$

$P_{uz} = 1314KN$. $P_u/P_{uz} = 0.579$ $ALFA = 1.631$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.954 < 1.0$ HENCE SAFE

AREA OF STEEL=1256mm²

MAIN REINFORCEMENT:4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F3-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 133.62KN. PLL= 39.22KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 5.90 90 -29.94

L.L.M.FROM LOWER TO UPPER:LMU 0 2.60 90 -11.35

D.L.M.FROM UPPER TO LOWER:DMD 0 5.63 90 -31.24

L.L.M.FROM UPPER TO LOWER:LMD 0 1.96 90 -7.28

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=259.26KN. Mux=12.75KN.M. Muy=63.89KN.M.

Short Column

$P_u/F_{ckbd} = 0.096$ $M_{ux}/F_{ckbd} = 0.016$ $M_{uy}/F_{ckbd} = 0.053$

$p_c = 0.6\%$ $A_{req} = 810mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.077$ $M_{uy1} / F_{ckbd} = 0.081$

$P_{uz} = 1511KN$. $P_u/P_{uz} = 0.172$ $ALFA = 1$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.851 < 1.0$ HENCE SAFE

AREA OF STEEL=1256mm²

MAIN REINFORCEMENT:4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H3-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 966.42KN. PLL= 248.70KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 0.38 90 14.02

L.L.M.FROM UPPER TO LOWER:LMD 0 0.01 90 -2.55

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1822.68KN. Mux=0.59KN.M. Muy=24.86KN.M.
Short Column
 $Pu/Fckbd=0.675$ $Mux/Fckbd2=0.001$ $Muy/Fckbd2=0.020$
 $pc=1.6\%$ $A_{req}=2160mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.011$ $Muy1 / Fckbd2 = 0.029$
 $Puz=2006KN$. $Pu/Puz=0.909$ $ALFA=2$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.502 < 1.0$ HENCE SAFE
AREA OF STEEL=2286mm²
MAIN REINFORCEMENT:2#16+6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H3-1.5-5.4
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 805.14KN. PLL= 248.56KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 0.50 90 16.50
L.L.M.FROM LOWER TO UPPER:LMU 0 0.29 90 3.37
D.L.M.FROM UPPER TO LOWER:DMD 0 0.68 90 22.20
L.L.M.FROM UPPER TO LOWER:LMD 0 0.53 90 8.64

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1580.55KN. Mux=1.82KN.M. Muy=46.26KN.M.
Short Column
 $Pu/Fckbd=0.585$ $Mux/Fckbd2=0.002$ $Muy/Fckbd2=0.038$
 $pc=1.6\%$ $A_{req}=2160mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.063$ $Muy1 / Fckbd2 = 0.067$
 $Puz=2006KN$. $Pu/Puz=0.788$ $ALFA=1.98$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.327 < 1.0$ HENCE SAFE
AREA OF STEEL=2286mm²
MAIN REINFORCEMENT:2#16+6#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H3-5.4-8.7
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 575.75KN. PLL= 177.49KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 1.14 90 31.12
L.L.M.FROM LOWER TO UPPER:LMU 0 0.94 90 15.01
D.L.M.FROM UPPER TO LOWER:DMD 0 1.18 90 29.31
L.L.M.FROM UPPER TO LOWER:LMD 0 0.99 90 13.55

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=1129.86KN. Mux=3.26KN.M. Muy=69.2KN.M.
Short Column
 $Pu/Fckbd=0.418$ $Mux/Fckbd2=0.004$ $Muy/Fckbd2=0.057$
 $pc=0.8\%$ $A_{req}=1080mm^2$
FROM CHARTS $Mux1 / Fckbd2 = 0.024$ $Muy1 / Fckbd2 = 0.066$
 $Puz=1610KN$. $Pu/Puz=0.702$ $ALFA=1.836$
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.81 < 1.0$ HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H3-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 346.09KN. PLL= 106.18KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.21 90 27.60

L.L.M.FROM LOWER TO UPPER:LMU 0 1.00 90 12.97

D.L.M.FROM UPPER TO LOWER:DMD 0 1.19 90 27.74

L.L.M.FROM UPPER TO LOWER:LMD 0 0.97 90 13.84

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=678.41KN. Mux=3.32KN.M. Muy=62.37KN.M.

Short Column

$P_u/F_{ckb_d} = 0.251$ $M_{ux}/F_{ckb_d} = 0.004$ $M_{uy}/F_{ckb_d} = 0.051$

$p_c = 0.2\%$ $A_{req} = 270mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.062$ $M_{uy1}/F_{ckb_d} = 0.064$

$P_{uz} = 1314KN$. $P_u/P_{uz} = 0.516$ $\alpha = 1.527$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.738 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H3-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 116.50KN. PLL= 35.02KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.12 90 29.03

L.L.M.FROM LOWER TO UPPER:LMU 0 0.76 90 10.80

D.L.M.FROM UPPER TO LOWER:DMD 0 1.06 90 30.20

L.L.M.FROM UPPER TO LOWER:LMD 0 0.55 90 6.88

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=227.28KN. Mux=2.82KN.M. Muy=61.5KN.M.

Short Column

$P_u/F_{ckb_d} = 0.084$ $M_{ux}/F_{ckb_d} = 0.003$ $M_{uy}/F_{ckb_d} = 0.051$

$p_c = 0.4\%$ $A_{req} = 540mm^2$

FROM CHARTS $M_{ux1}/F_{ckb_d} = 0.048$ $M_{uy1}/F_{ckb_d} = 0.064$

$P_{uz} = 1413KN$. $P_u/P_{uz} = 0.161$ $\alpha = 1$

$(M_{ux}/M_{ux1})^{\alpha} + (M_{uy}/M_{uy1})^{\alpha} = 0.858 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I3-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 800.58KN. PLL= 176.32KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.74 90 -27.60

L.L.M.FROM UPPER TO LOWER:LMD 0 0.54 90 3.81

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1465.35KN. Mux=13.92KN.M. Muy=47.12KN.M.

Short Column

$P_u/F_{ckbd} = 0.543$ $M_{ux}/F_{ckbd2} = 0.017$ $M_{uy}/F_{ckbd2} = 0.039$

$p_c = 1.4\%$ $A_{req} = 1890mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.064$ $M_{uy1} / F_{ckbd2} = 0.068$

$P_{uz} = 1907KN$. $P_u/P_{uz} = 0.769$ $ALFA = 1.948$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.415 < 1.0$ HENCE SAFE

AREA OF STEEL=2060mm²

MAIN REINFORCEMENT:4#16+4#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I3-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 661.89KN. PLL= 176.28KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -7.64 90 -28.82

L.L.M.FROM LOWER TO UPPER:LMU 0 -0.77 90 -4.64

D.L.M.FROM UPPER TO LOWER:DMD 0 -8.48 90 -36.38

L.L.M.FROM UPPER TO LOWER:LMD 0 -1.97 90 -12.18

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1257.26KN. Mux=15.68KN.M. Muy=72.84KN.M.

Short Column

$P_u/F_{ckbd} = 0.466$ $M_{ux}/F_{ckbd2} = 0.019$ $M_{uy}/F_{ckbd2} = 0.060$

$p_c = 1.2\%$ $A_{req} = 1620mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.073$ $M_{uy1} / F_{ckbd2} = 0.078$

$P_{uz} = 1808KN$. $P_u/P_{uz} = 0.695$ $ALFA = 1.826$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.709 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I3-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 476.49KN. PLL= 124.04KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -10.67 90 -49.02

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.47 90 -21.07

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.28 90 -46.10

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.16 90 -18.79

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=900.79KN. Mux=21.21KN.M. Muy=105.14KN.M.

Short Column

$P_u/F_{ckbd} = 0.334$ $M_{ux}/F_{ckbd2} = 0.026$ $M_{uy}/F_{ckbd2} = 0.087$

$p_c = 1.2\%$ $A_{req} = 1620mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd2} = 0.101$ $M_{uy1} / F_{ckbd2} = 0.108$

$P_{uz} = 1808KN$. $P_u/P_{uz} = 0.498$ $ALFA = 1.497$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.85 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I3-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 290.87KN. PLL= 71.59KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -9.94 90 -43.58

L.L.M.FROM LOWER TO UPPER:LMU 0 -3.01 90 -17.72

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.02 90 -43.99

L.L.M.FROM UPPER TO LOWER:LMD 0 -3.16 90 -18.92

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=543.69KN. Mux=19.77KN.M. Muy=94.37KN.M.

Short Column

$P_u/F_{ckbd}=0.201$ $M_{ux}/F_{ckbd2}=0.024$ $M_{uy}/F_{ckbd2}=0.078$

$p_c=0.8\%$ $A_{req}=1080mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.096$ $M_{uy1}/F_{ckbd2}=0.102$

$P_{uz}=1610KN$. $P_u/P_{uz}=0.338$ $ALFA=1.229$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.901 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I3-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 105.31KN. PLL= 19.20KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 -10.06 90 -45.03

L.L.M.FROM LOWER TO UPPER:LMU 0 -2.66 90 -16.03

D.L.M.FROM UPPER TO LOWER:DMD 0 -10.04 90 -45.69

L.L.M.FROM UPPER TO LOWER:LMD 0 -2.03 90 -11.97

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=186.77KN. Mux=19.08KN.M. Muy=92.58KN.M.

Short Column

$P_u/F_{ckbd}=0.069$ $M_{ux}/F_{ckbd2}=0.024$ $M_{uy}/F_{ckbd2}=0.076$

$p_c=1\%$ $A_{req}=1350mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd2}=0.098$ $M_{uy1}/F_{ckbd2}=0.104$

$P_{uz}=1709KN$. $P_u/P_{uz}=0.109$ $ALFA=1$

$(M_{ux}/M_{ux1})^{ALFA}+(M_{uy}/M_{uy1})^{ALFA}=0.971 < 1.0$ HENCE SAFE

AREA OF STEEL=1608mm²

MAIN REINFORCEMENT:8#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I1-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 561.15KN. PLL= 100.82KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 17.18 90 -29.50
 L.L.M.FROM UPPER TO LOWER:LMD 0 -0.94 90 2.15
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=992.96KN. Mux=27.18KN.M. Muy=47.48KN.M.
 Short Column
 $Pu/Fckbd=0.368$ $Mux/Fckbd2=0.034$ $Muy/Fckbd2=0.039$
 $pc=0.4\%$ Areq= 540mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.053$ $Muy1 / Fckbd2 = 0.054$
 $Puz=1413KN$. $Pu/Puz=0.703$ ALFA=1.838
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.986 < 1.0$ HENCE SAFE
 AREA OF STEEL=1834mm²
 MAIN REINFORCEMENT:6#16+2#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I1-1.5-5.4
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 457.05KN. PLL= 100.70KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 14.54 90 -26.52
 L.L.M.FROM LOWER TO UPPER:LMU 0 1.27 90 -2.63
 D.L.M.FROM UPPER TO LOWER:DMD 0 15.82 90 -30.29
 L.L.M.FROM UPPER TO LOWER:LMD 0 3.23 90 -6.90

DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=836.63KN. Mux=28.58KN.M. Muy=55.79KN.M.
 Short Column
 $Pu/Fckbd=0.310$ $Mux/Fckbd2=0.035$ $Muy/Fckbd2=0.046$
 $pc=0.4\%$ Areq= 540mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.064$ $Muy1 / Fckbd2 = 0.066$
 $Puz=1413KN$. $Pu/Puz=0.592$ ALFA=1.654
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.913 < 1.0$ HENCE SAFE
 AREA OF STEEL=1834mm²
 MAIN REINFORCEMENT:6#16+2#20
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:I1-5.4-8.7
 SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
 RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 330.29KN. PLL= 70.98KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 19.47 90 -38.37
 L.L.M.FROM LOWER TO UPPER:LMU 0 5.61 90 -11.86
 D.L.M.FROM UPPER TO LOWER:DMD 0 18.71 90 -36.50
 L.L.M.FROM UPPER TO LOWER:LMD 0 5.08 90 -10.53

DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=601.91KN. Mux=37.62KN.M. Muy=75.35KN.M.
 Short Column
 $Pu/Fckbd=0.223$ $Mux/Fckbd2=0.046$ $Muy/Fckbd2=0.062$
 $pc=0.8\%$ Areq= 1080mm²
 FROM CHARTS $Mux1 / Fckbd2 = 0.095$ $Muy1 / Fckbd2 = 0.101$

Puz=1610KN.Pu/Puz=0.374ALFA=1.29
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.932< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I1-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 202.93KN. PLL= 40.85KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 18.10 90 -34.55

L.L.M.FROM LOWER TO UPPER:LMU 0 4.80 90 -9.91

D.L.M.FROM UPPER TO LOWER:DMD 0 18.26 90 -34.49

L.L.M.FROM UPPER TO LOWER:LMD 0 5.07 90 -10.62

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=365.67KN. Mux=35KN.M. Muy=67.76KN.M.

Short Column

Pu/Fckbd=0.135Mux/Fckbd2=0.043Muy/Fckbd2=0.056

pc=0.8% Areq= 1080mm²

FROM CHARTS Mux1 / Fckbd2 = 0.094 Muy1 / Fckbd2 = 0.100

Puz=1610KN.Pu/Puz=0.227ALFA=1.045

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.984< 1.0 HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:I1-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 75.64KN. PLL= 10.88KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 18.21 90 -36.61

L.L.M.FROM LOWER TO UPPER:LMU 0 4.31 90 -9.01

D.L.M.FROM UPPER TO LOWER:DMD 0 18.01 90 -38.78

L.L.M.FROM UPPER TO LOWER:LMD 0 3.32 90 -6.69

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=129.78KN. Mux=33.78KN.M. Muy=71.69KN.M.

Short Column

Pu/Fckbd=0.048Mux/Fckbd2=0.042Muy/Fckbd2=0.059

pc=1.2% Areq= 1620mm²

FROM CHARTS Mux1 / Fckbd2 = 0.107 Muy1 / Fckbd2 = 0.114

Puz=1808KN.Pu/Puz=0.072ALFA=1

(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.906< 1.0 HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H1-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 611.29KN. PLL= 102.36KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00
 D.L.M.FROM UPPER TO LOWER:DMD 0 1.62 90 15.38
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.01 90 -1.41
 DESIGN PROCEDURE:
 LOAD COMBINATION:1.5DL+1.5LL
 DESIGN FACTORED LOADS: Pu=1070.48KN. Mux=2.45KN.M. Muy=25.19KN.M.
 Short Column
 $Pu/Fckbd=0.396$ Mux/Fckbd2=0.003 Muy/Fckbd2=0.021
 $pc=0.2\%$ Areq= 270mm²
 FROM CHARTS Mux1 / Fckbd2 = 0.032 Muy1 / Fckbd2 = 0.032
 Puz=1314KN.Pu/Puz=0.815ALFA=2
 $(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.421 < 1.0$ HENCE SAFE
 AREA OF STEEL=1206mm²
 MAIN REINFORCEMENT:6#16
 LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
 DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H1-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 493.61KN. PLL= 102.38KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 1.13 90 14.73
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.04 90 1.87
 D.L.M.FROM UPPER TO LOWER:DMD 0 1.01 90 17.63
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.06 90 4.75

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=893.99KN. Mux=1.79KN.M. Muy=33.57KN.M.

Short Column

$Pu/Fckbd=0.331$ Mux/Fckbd2=0.002 Muy/Fckbd2=0.028

$pc=0.2\%$ Areq= 270mm²

FROM CHARTS Mux1 / Fckbd2 = 0.050 Muy1 / Fckbd2 = 0.051

Puz=1314KN.Pu/Puz=0.68ALFA=1.801

$(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.334 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

 DESIGN DETAILS OF COLUMN:H1-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 355.43KN. PLL= 73.61KN.
 D.L.M.FROM LOWER TO UPPER:DMU 0 1.04 90 23.07
 L.L.M.FROM LOWER TO UPPER:LMU 0 0.12 90 8.17
 D.L.M.FROM UPPER TO LOWER:DMD 0 1.03 90 21.89
 L.L.M.FROM UPPER TO LOWER:LMD 0 0.12 90 7.31

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=643.56KN. Mux=1.74KN.M. Muy=46.86KN.M.

Short Column

$Pu/Fckbd=0.238$ Mux/Fckbd2=0.002 Muy/Fckbd2=0.039

pc=0.2% Areq= 270mm²
FROM CHARTS Mux1 / Fckbd2 = 0.063 Muy1 / Fckbd2 = 0.065
Puz=1314KN.Pu/Puz=0.49ALFA=1.483
(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.472< 1.0 HENCE SAFE
AREA OF STEEL=1206mm²
MAIN REINFORCEMENT:6#16
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H1-8.7-12

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 217.47KN. PLL= 44.95KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.05 90 20.65

L.L.M.FROM LOWER TO UPPER:LMU 0 0.11 90 6.99

D.L.M.FROM UPPER TO LOWER:DMD 0 1.07 90 20.59

L.L.M.FROM UPPER TO LOWER:LMD 0 0.11 90 7.53

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=393.63KN. Mux=1.77KN.M. Muy=42.27KN.M.

Short Column

Pu/Fckbd=0.146Mux/Fckbd2=0.002Muy/Fckbd2=0.035

pc=0.2% Areq= 270mm²

FROM CHARTS Mux1 / Fckbd2 = 0.060 Muy1 / Fckbd2 = 0.062

Puz=1314KN.Pu/Puz=0.3ALFA=1.166

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.533< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:H1-12-15.3

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 79.69KN. PLL= 16.28KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.80 90 22.11

L.L.M.FROM LOWER TO UPPER:LMU 0 0.07 90 5.73

D.L.M.FROM UPPER TO LOWER:DMD 0 0.53 90 23.74

L.L.M.FROM UPPER TO LOWER:LMD 0 0.07 90 3.37

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=143.96KN. Mux=1.31KN.M. Muy=44.21KN.M.

Short Column

Pu/Fckbd=0.053Mux/Fckbd2=0.002Muy/Fckbd2=0.036

pc=0.2% Areq= 270mm²

FROM CHARTS Mux1 / Fckbd2 = 0.039 Muy1 / Fckbd2 = 0.040

Puz=1314KN.Pu/Puz=0.11ALFA=1

(Mux/Mux1)^{ALFA}+(Muy/Muy1)^{ALFA}=0.946< 1.0 HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F1-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 615.50KN. PLL= 103.87KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 1.68 90 -15.38

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.03 90 1.41

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=1079.06KN. Mux=2.57KN.M. Muy=25.19KN.M.

Short Column

$P_u/F_{ckbd} = 0.400$ $M_{ux}/F_{ckbd} = 0.003$ $M_{uy}/F_{ckbd} = 0.021$

$p_c = 0.2\%$ $A_{req} = 270mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd} = 0.031$ $M_{uy1}/F_{ckbd} = 0.031$

$P_{uz} = 1314KN$. $P_u/P_{uz} = 0.821$ $ALFA = 2$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.453 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F1-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 497.53KN. PLL= 103.95KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.24 90 -14.73

L.L.M.FROM LOWER TO UPPER:LMU 0 0.05 90 -1.87

D.L.M.FROM UPPER TO LOWER:DMD 0 1.17 90 -17.63

L.L.M.FROM UPPER TO LOWER:LMD 0 0.13 90 -4.75

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=902.22KN. Mux=2.06KN.M. Muy=33.57KN.M.

Short Column

$P_u/F_{ckbd} = 0.334$ $M_{ux}/F_{ckbd} = 0.003$ $M_{uy}/F_{ckbd} = 0.028$

$p_c = 0.2\%$ $A_{req} = 270mm^2$

FROM CHARTS $M_{ux1}/F_{ckbd} = 0.050$ $M_{uy1}/F_{ckbd} = 0.050$

$P_{uz} = 1314KN$. $P_u/P_{uz} = 0.687$ $ALFA = 1.811$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.341 < 1.0$ HENCE SAFE

AREA OF STEEL=1206mm²

MAIN REINFORCEMENT:6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:F1-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 358.27KN. PLL= 74.67KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 1.29 90 -23.07

L.L.M.FROM LOWER TO UPPER:LMU 0 0.23 90 -8.17

D.L.M.FROM UPPER TO LOWER:DMD 0 1.26 90 -21.89

L.L.M.FROM UPPER TO LOWER:LMD 0 0.21 90 -7.31

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=649.41KN. Mux=2.28KN.M. Muy=46.86KN.M.

Short Column

$P_u/F_{ck}b_d = 0.241$ $M_u/F_{ck}b_d^2 = 0.003$ $M_u/F_{ck}b_d^2 = 0.039$

$p_c = 0.2\%$ $A_{req} = 270\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.063$ $M_{uy1} / F_{ck}b_d^2 = 0.064$

$P_{uz} = 1314\text{KN}$. $P_u/P_{uz} = 0.494$ $\alpha_{FA} = 1.49$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.475 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: F1-8.7-12

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 219.35KN. PLL = 45.61KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 1.25 90 -20.65

L.L.M. FROM LOWER TO UPPER: LMU 0 0.20 90 -6.99

D.L.M. FROM UPPER TO LOWER: DMD 0 1.29 90 -20.59

L.L.M. FROM UPPER TO LOWER: LMD 0 0.20 90 -7.53

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 397.44\text{KN}$. $M_{ux} = 2.24\text{KN.M}$. $M_{uy} = 42.27\text{KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.147$ $M_u/F_{ck}b_d^2 = 0.003$ $M_u/F_{ck}b_d^2 = 0.035$

$p_c = 0.2\%$ $A_{req} = 270\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.061$ $M_{uy1} / F_{ck}b_d^2 = 0.062$

$P_{uz} = 1314\text{KN}$. $P_u/P_{uz} = 0.303$ $\alpha_{FA} = 1.171$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.536 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN: F1-12-15.3

SIZE OF COLUMN: 300x450mm. ANGLE OF ORIENTATION: 0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL = 80.58KN. PLL = 16.48KN.

D.L.M. FROM LOWER TO UPPER: DMU 0 1.05 90 -22.11

L.L.M. FROM LOWER TO UPPER: LMU 0 0.17 90 -5.73

D.L.M. FROM UPPER TO LOWER: DMD 0 0.78 90 -23.74

L.L.M. FROM UPPER TO LOWER: LMD 0 0.14 90 -3.37

DESIGN PROCEDURE:

LOAD COMBINATION: 1.5DL+1.5LL

DESIGN FACTORED LOADS: $P_u = 145.59\text{KN}$. $M_{ux} = 1.83\text{KN.M}$. $M_{uy} = 44.21\text{KN.M}$.

Short Column

$P_u/F_{ck}b_d = 0.054$ $M_u/F_{ck}b_d^2 = 0.002$ $M_u/F_{ck}b_d^2 = 0.036$

$p_c = 0.2\%$ $A_{req} = 270\text{mm}^2$

FROM CHARTS $M_{ux1} / F_{ck}b_d^2 = 0.039$ $M_{uy1} / F_{ck}b_d^2 = 0.040$

$P_{uz} = 1314\text{KN}$. $P_u/P_{uz} = 0.111$ $\alpha_{FA} = 1$

$(M_{ux}/M_{ux1})^{\alpha_{FA}} + (M_{uy}/M_{uy1})^{\alpha_{FA}} = 0.958 < 1.0$ HENCE SAFE

AREA OF STEEL = 1206mm^2

MAIN REINFORCEMENT: 6#16

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B1-0-1.5

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 558.24KN. PLL= 100.46KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 0.00 90 0.00

L.L.M.FROM LOWER TO UPPER:LMU 0 0.00 90 0.00

D.L.M.FROM UPPER TO LOWER:DMD 0 16.85 90 29.50

L.L.M.FROM UPPER TO LOWER:LMD 0 -0.90 90 -2.15

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=988.05KN. Mux=26.63KN.M. Muy=47.48KN.M.

Short Column

$P_u/F_{ckbd} = 0.366$ $M_{ux}/F_{ckbd} = 0.033$ $M_{uy}/F_{ckbd} = 0.039$

$p_c = 0.4\%$ $A_{req} = 540mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.053$ $M_{uy1} / F_{ckbd} = 0.055$

$P_{uz} = 1413KN$. $P_u/P_{uz} = 0.699$ $ALFA = 1.832$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.957 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B1-1.5-5.4

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 454.59KN. PLL= 100.34KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 14.23 90 26.52

L.L.M.FROM LOWER TO UPPER:LMU 0 1.25 90 2.63

D.L.M.FROM UPPER TO LOWER:DMD 0 15.45 90 30.29

L.L.M.FROM UPPER TO LOWER:LMD 0 3.18 90 6.90

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL

DESIGN FACTORED LOADS: Pu=832.4KN. Mux=27.95KN.M. Muy=55.79KN.M.

Short Column

$P_u/F_{ckbd} = 0.308$ $M_{ux}/F_{ckbd} = 0.035$ $M_{uy}/F_{ckbd} = 0.046$

$p_c = 0.4\%$ $A_{req} = 540mm^2$

FROM CHARTS $M_{ux1} / F_{ckbd} = 0.065$ $M_{uy1} / F_{ckbd} = 0.067$

$P_{uz} = 1413KN$. $P_u/P_{uz} = 0.589$ $ALFA = 1.649$

$(M_{ux}/M_{ux1})^{ALFA} + (M_{uy}/M_{uy1})^{ALFA} = 0.895 < 1.0$ HENCE SAFE

AREA OF STEEL=1834mm²

MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING

DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B1-5.4-8.7

SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0

RESULTS AFTER ANALYSIS:

AXIAL LOADS: PDL= 328.48KN. PLL= 70.72KN.

D.L.M.FROM LOWER TO UPPER:DMU 0 18.98 90 38.37

L.L.M.FROM LOWER TO UPPER:LMU 0 5.51 90 11.86

D.L.M.FROM UPPER TO LOWER:DMD 0 18.26 90 36.50

L.L.M.FROM UPPER TO LOWER:LMD 0 5.00 90 10.53

DESIGN PROCEDURE:

LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=598.8KN. Mux=36.74KN.M. Muy=75.35KN.M.
Short Column
Pu/Fckbd=0.222Mux/Fckbd2=0.045Muy/Fckbd2=0.062
pc=0.8% Areq= 1080mm²
FROM CHARTS Mux1 / Fckbd2 = 0.095 Muy1 / Fckbd2 = 0.101
Puz=1610KN.Pu/Puz=0.372ALFA=1.286
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.92< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B1-8.7-12
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 201.76KN. PLL= 40.70KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 17.69 90 34.55
L.L.M.FROM LOWER TO UPPER:LMU 0 4.74 90 9.91
D.L.M.FROM UPPER TO LOWER:DMD 0 17.83 90 34.49
L.L.M.FROM UPPER TO LOWER:LMD 0 4.98 90 10.62
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=363.69KN. Mux=34.22KN.M. Muy=67.76KN.M.
Short Column
Pu/Fckbd=0.135Mux/Fckbd2=0.042Muy/Fckbd2=0.056
pc=0.8% Areq= 1080mm²
FROM CHARTS Mux1 / Fckbd2 = 0.094 Muy1 / Fckbd2 = 0.100
Puz=1610KN.Pu/Puz=0.226ALFA=1.043
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.976< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20
LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN DETAILS OF COLUMN:B1-12-15.3
SIZE OF COLUMN:300x450mm.ANGLE OF ORIENTATION:0
RESULTS AFTER ANALYSIS:
AXIAL LOADS: PDL= 75.12KN. PLL= 10.84KN.
D.L.M.FROM LOWER TO UPPER:DMU 0 17.73 90 36.61
L.L.M.FROM LOWER TO UPPER:LMU 0 4.25 90 9.01
D.L.M.FROM UPPER TO LOWER:DMD 0 17.47 90 38.78
L.L.M.FROM UPPER TO LOWER:LMD 0 3.26 90 6.69
DESIGN PROCEDURE:
LOAD COMBINATION:1.5DL+1.5LL
DESIGN FACTORED LOADS: Pu=128.94KN. Mux=32.97KN.M. Muy=71.69KN.M.
Short Column
Pu/Fckbd=0.048Mux/Fckbd2=0.041Muy/Fckbd2=0.059
pc=1.2% Areq= 1620mm²
FROM CHARTS Mux1 / Fckbd2 = 0.107 Muy1 / Fckbd2 = 0.114
Puz=1808KN.Pu/Puz=0.071ALFA=1
(Mux/Mux1)^ALFA+(Muy/Muy1)^ALFA=0.897< 1.0 HENCE SAFE
AREA OF STEEL=1834mm²
MAIN REINFORCEMENT:6#16+2#20

LATERAL REINFORCEMENT: #8TIES @200mm. SPACING
DUCTILE REINFORCEMENT: #8TIES @ 110mm. SPACING 1/6 th Height of column

DESIGN OF FOOTING:B1

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 659KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.90x 1.90M. SOIL PRESSURE= 182.47KN/M2
MOMENT ALONG X-DIRN.= 110.94KN.M.
MOMENT ALONG Y-DIRN.= 91.12KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=19#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=19#10@100mm.

DESIGN OF FOOTING:F1

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 719KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.00x 2.00M. SOIL PRESSURE= 179.84KN/M2
MOMENT ALONG X-DIRN.= 129.93KN.M.
MOMENT ALONG Y-DIRN.= 108.02KN.M.
DEPTH OF FOOTING= 400mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 660x 810mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=20#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=20#10@100mm.

DESIGN OF FOOTING:H1

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 714KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.00x 2.00M. SOIL PRESSURE= 178.41KN/M2
MOMENT ALONG X-DIRN.= 128.90KN.M.
MOMENT ALONG Y-DIRN.= 107.16KN.M.
DEPTH OF FOOTING= 400mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 660x 810mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=20#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=20#10@100mm.

DESIGN OF FOOTING:I1

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 662KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.90x 1.90M. SOIL PRESSURE= 183.37KN/M2
MOMENT ALONG X-DIRN.= 111.49KN.M.
MOMENT ALONG Y-DIRN.= 91.56KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=19#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=19#10@100mm.

DESIGN OF FOOTING:I3

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 977KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 184.67KN/M2
MOMENT ALONG X-DIRN.= 212.37KN.M.
MOMENT ALONG Y-DIRN.= 181.71KN.M.
DEPTH OF FOOTING= 500mm. EDGE DEPTH= 250mm.
TOP SIZE OF FOOTING= 760x 910mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H3

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1215KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.60x 2.60M. SOIL PRESSURE= 179.75KN/M2
MOMENT ALONG X-DIRN.= 309.04KN.M.
MOMENT ALONG Y-DIRN.= 270.04KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=21#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=21#12@125mm.

DESIGN OF FOOTING:F3

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1345KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.70x 2.70M. SOIL PRESSURE= 184.48KN/M2
MOMENT ALONG X-DIRN.= 358.63KN.M.
MOMENT ALONG Y-DIRN.= 315.20KN.M.
DEPTH OF FOOTING= 600mm. EDGE DEPTH= 300mm.
TOP SIZE OF FOOTING= 860x 1010mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=22#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=22#12@125mm.

DESIGN OF FOOTING:B3

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1037KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.40x 2.40M. SOIL PRESSURE= 180.02KN/M2
MOMENT ALONG X-DIRN.= 238.17KN.M.
MOMENT ALONG Y-DIRN.= 205.36KN.M.
DEPTH OF FOOTING= 500mm. EDGE DEPTH= 250mm.
TOP SIZE OF FOOTING= 760x 910mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=24#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=24#10@100mm.

DESIGN OF FOOTING:F5

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1448KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.80x 2.80M. SOIL PRESSURE= 184.69KN/M2
MOMENT ALONG X-DIRN.= 404.01KN.M.
MOMENT ALONG Y-DIRN.= 356.98KN.M.
DEPTH OF FOOTING= 650mm. EDGE DEPTH= 325mm.
TOP SIZE OF FOOTING= 910x 1060mm.
SIZE OF COLUMN= 300x 450mm.

REINFORCEMENT ALONG X-DIRECTION=22#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=22#12@125mm.

DESIGN OF FOOTING:B5

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1420KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.80x 2.80M. SOIL PRESSURE= 181.14KN/M2
MOMENT ALONG X-DIRN.= 396.24KN.M.
MOMENT ALONG Y-DIRN.= 350.12KN.M.
DEPTH OF FOOTING= 650mm. EDGE DEPTH= 325mm.
TOP SIZE OF FOOTING= 910x 1060mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=28#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=28#10@100mm.

DESIGN OF FOOTING:H4

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1438KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.80x 2.80M. SOIL PRESSURE= 183.39KN/M2
MOMENT ALONG X-DIRN.= 401.17KN.M.
MOMENT ALONG Y-DIRN.= 354.47KN.M.
DEPTH OF FOOTING= 650mm. EDGE DEPTH= 325mm.
TOP SIZE OF FOOTING= 910x 1060mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=22#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=22#12@125mm.

DESIGN OF FOOTING:I4

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1058KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.40x 2.40M. SOIL PRESSURE= 183.63KN/M2
MOMENT ALONG X-DIRN.= 242.94KN.M.
MOMENT ALONG Y-DIRN.= 209.48KN.M.
DEPTH OF FOOTING= 500mm. EDGE DEPTH= 250mm.
TOP SIZE OF FOOTING= 760x 910mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=24#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=24#10@100mm.

DESIGN OF FOOTING:I6

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1133KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 181.27KN/M2
MOMENT ALONG X-DIRN.= 274.17KN.M.
MOMENT ALONG Y-DIRN.= 238.06KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:H6

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1496KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 2.90x 2.90M. SOIL PRESSURE= 177.88KN/M2
MOMENT ALONG X-DIRN.= 435.90KN.M.
MOMENT ALONG Y-DIRN.= 387.05KN.M.
DEPTH OF FOOTING= 650mm. EDGE DEPTH= 325mm.
TOP SIZE OF FOOTING= 910x 1060mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=23#12@125mm.

DESIGN OF FOOTING:F7

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1648KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 3.00x 3.00M. SOIL PRESSURE= 183.11KN/M2
MOMENT ALONG X-DIRN.= 500.58KN.M.
MOMENT ALONG Y-DIRN.= 446.50KN.M.
DEPTH OF FOOTING= 700mm. EDGE DEPTH= 350mm.
TOP SIZE OF FOOTING= 960x 1110mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=24#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=24#12@125mm.

DESIGN OF FOOTING:B7

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1542KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.90x 2.90M. SOIL PRESSURE= 183.41KN/M2
MOMENT ALONG X-DIRN.= 449.45KN.M.
MOMENT ALONG Y-DIRN.= 399.08KN.M.
DEPTH OF FOOTING= 650mm. EDGE DEPTH= 325mm.
TOP SIZE OF FOOTING= 910x 1060mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=23#12@125mm.

DESIGN OF FOOTING:F9

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1363KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.70x 2.70M. SOIL PRESSURE= 186.91KN/M2
MOMENT ALONG X-DIRN.= 363.35KN.M.
MOMENT ALONG Y-DIRN.= 319.35KN.M.
DEPTH OF FOOTING= 600mm. EDGE DEPTH= 300mm.
TOP SIZE OF FOOTING= 860x 1010mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=22#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=22#12@125mm.

DESIGN OF FOOTING:B9

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1194KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.60x 2.60M. SOIL PRESSURE= 176.58KN/M2
MOMENT ALONG X-DIRN.= 303.59KN.M.
MOMENT ALONG Y-DIRN.= 265.28KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.

REINFORCEMENT ALONG X-DIRECTION=26#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=26#10@100mm.

DESIGN OF FOOTING:B11

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 646KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.90x 1.90M. SOIL PRESSURE= 179.04KN/M2
MOMENT ALONG X-DIRN.= 108.86KN.M.
MOMENT ALONG Y-DIRN.= 89.40KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=19#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=19#10@100mm.

DESIGN OF FOOTING:H8

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1267KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.60x 2.60M. SOIL PRESSURE= 187.44KN/M2
MOMENT ALONG X-DIRN.= 322.26KN.M.
MOMENT ALONG Y-DIRN.= 281.59KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=21#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=21#12@125mm.

DESIGN OF FOOTING:I8

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 977KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 184.64KN/M2
MOMENT ALONG X-DIRN.= 212.34KN.M.
MOMENT ALONG Y-DIRN.= 181.68KN.M.
DEPTH OF FOOTING= 500mm. EDGE DEPTH= 250mm.
TOP SIZE OF FOOTING= 760x 910mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:I10

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 583KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.80x 1.80M. SOIL PRESSURE= 180.01KN/M2
MOMENT ALONG X-DIRN.= 91.13KN.M.
MOMENT ALONG Y-DIRN.= 73.82KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:H10

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 896KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 2.20x 2.20M. SOIL PRESSURE= 185.14KN/M2
MOMENT ALONG X-DIRN.= 183.80KN.M.
MOMENT ALONG Y-DIRN.= 155.92KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=22#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=22#10@100mm.

DESIGN OF FOOTING:H12

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 800KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.10x 2.10M. SOIL PRESSURE= 181.37KN/M2
MOMENT ALONG X-DIRN.= 154.26KN.M.
MOMENT ALONG Y-DIRN.= 129.62KN.M.
DEPTH OF FOOTING= 400mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 660x 810mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=21#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=21#10@100mm.

DESIGN OF FOOTING:I12

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 571KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.80x 1.80M. SOIL PRESSURE= 176.13KN/M2
MOMENT ALONG X-DIRN.= 89.17KN.M.
MOMENT ALONG Y-DIRN.= 72.22KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:I13

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 975KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 184.34KN/M2
MOMENT ALONG X-DIRN.= 211.99KN.M.
MOMENT ALONG Y-DIRN.= 181.38KN.M.
DEPTH OF FOOTING= 500mm. EDGE DEPTH= 250mm.
TOP SIZE OF FOOTING= 760x 910mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H13

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1181KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 188.96KN/M2
MOMENT ALONG X-DIRN.= 285.80KN.M.
MOMENT ALONG Y-DIRN.= 248.16KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.

REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I14

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 950KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 179.52KN/M2
MOMENT ALONG X-DIRN.= 206.45KN.M.
MOMENT ALONG Y-DIRN.= 176.64KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H14

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1156KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 185.00KN/M2
MOMENT ALONG X-DIRN.= 279.81KN.M.
MOMENT ALONG Y-DIRN.= 242.96KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:H15

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1159KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 185.38KN/M2
MOMENT ALONG X-DIRN.= 280.39KN.M.
MOMENT ALONG Y-DIRN.= 243.46KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I15

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 953KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 180.11KN/M2
MOMENT ALONG X-DIRN.= 207.13KN.M.
MOMENT ALONG Y-DIRN.= 177.22KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H16

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1164KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 186.22KN/M2
MOMENT ALONG X-DIRN.= 281.66KN.M.
MOMENT ALONG Y-DIRN.= 244.56KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I16

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 957KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 180.82KN/M2
MOMENT ALONG X-DIRN.= 207.94KN.M.
MOMENT ALONG Y-DIRN.= 177.92KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H17

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1131KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 180.93KN/M2
MOMENT ALONG X-DIRN.= 273.66KN.M.
MOMENT ALONG Y-DIRN.= 237.61KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I17

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 927KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 175.15KN/M2
MOMENT ALONG X-DIRN.= 201.42KN.M.
MOMENT ALONG Y-DIRN.= 172.34KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H19

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1323KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.70x 2.70M. SOIL PRESSURE= 181.44KN/M2
MOMENT ALONG X-DIRN.= 352.72KN.M.
MOMENT ALONG Y-DIRN.= 310.01KN.M.
DEPTH OF FOOTING= 600mm. EDGE DEPTH= 300mm.
TOP SIZE OF FOOTING= 860x 1010mm.
SIZE OF COLUMN= 300x 450mm.

REINFORCEMENT ALONG X-DIRECTION=22#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=22#12@125mm.

DESIGN OF FOOTING:I19

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1106KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 176.89KN/M2
MOMENT ALONG X-DIRN.= 267.55KN.M.
MOMENT ALONG Y-DIRN.= 232.31KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:H20

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1323KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.70x 2.70M. SOIL PRESSURE= 181.55KN/M2
MOMENT ALONG X-DIRN.= 352.93KN.M.
MOMENT ALONG Y-DIRN.= 310.20KN.M.
DEPTH OF FOOTING= 600mm. EDGE DEPTH= 300mm.
TOP SIZE OF FOOTING= 860x 1010mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=22#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=22#12@125mm.

DESIGN OF FOOTING:I20

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1102KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 176.28KN/M2
MOMENT ALONG X-DIRN.= 266.62KN.M.
MOMENT ALONG Y-DIRN.= 231.51KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:H22

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1131KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 181.03KN/M2
MOMENT ALONG X-DIRN.= 273.81KN.M.
MOMENT ALONG Y-DIRN.= 237.74KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I22

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 929KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 175.67KN/M2
MOMENT ALONG X-DIRN.= 202.02KN.M.
MOMENT ALONG Y-DIRN.= 172.85KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H23

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1163KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 186.05KN/M2
MOMENT ALONG X-DIRN.= 281.40KN.M.
MOMENT ALONG Y-DIRN.= 244.34KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I23

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 957KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 180.87KN/M2
MOMENT ALONG X-DIRN.= 208.00KN.M.
MOMENT ALONG Y-DIRN.= 177.97KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H24

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1158KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 185.33KN/M2
MOMENT ALONG X-DIRN.= 280.31KN.M.
MOMENT ALONG Y-DIRN.= 243.39KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I24

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 952KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 180.00KN/M2
MOMENT ALONG X-DIRN.= 207.00KN.M.
MOMENT ALONG Y-DIRN.= 177.11KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.

REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H25

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1158KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 185.27KN/M2
MOMENT ALONG X-DIRN.= 280.22KN.M.
MOMENT ALONG Y-DIRN.= 243.31KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I25

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 950KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 179.49KN/M2
MOMENT ALONG X-DIRN.= 206.41KN.M.
MOMENT ALONG Y-DIRN.= 176.61KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H26

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1166KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.50x 2.50M. SOIL PRESSURE= 186.49KN/M2
MOMENT ALONG X-DIRN.= 282.07KN.M.
MOMENT ALONG Y-DIRN.= 244.91KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=25#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=25#10@100mm.

DESIGN OF FOOTING:I26

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 976KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 184.53KN/M2
MOMENT ALONG X-DIRN.= 212.21KN.M.
MOMENT ALONG Y-DIRN.= 181.57KN.M.
DEPTH OF FOOTING= 500mm. EDGE DEPTH= 250mm.
TOP SIZE OF FOOTING= 760x 910mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H27

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 945KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 178.72KN/M2
MOMENT ALONG X-DIRN.= 205.53KN.M.
MOMENT ALONG Y-DIRN.= 175.85KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:I27

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 570KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.80x 1.80M. SOIL PRESSURE= 175.81KN/M2
MOMENT ALONG X-DIRN.= 89.00KN.M.
MOMENT ALONG Y-DIRN.= 72.09KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:H29

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 940KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 177.64KN/M2
MOMENT ALONG X-DIRN.= 204.29KN.M.
MOMENT ALONG Y-DIRN.= 174.79KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:I29

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 568KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.80x 1.80M. SOIL PRESSURE= 175.34KN/M2
MOMENT ALONG X-DIRN.= 88.77KN.M.
MOMENT ALONG Y-DIRN.= 71.90KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:H30

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 1201KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.60x 2.60M. SOIL PRESSURE= 177.61KN/M2
MOMENT ALONG X-DIRN.= 305.36KN.M.
MOMENT ALONG Y-DIRN.= 266.83KN.M.
DEPTH OF FOOTING= 550mm. EDGE DEPTH= 275mm.
TOP SIZE OF FOOTING= 810x 960mm.
SIZE OF COLUMN= 300x 450mm.

REINFORCEMENT ALONG X-DIRECTION=21#12@125mm.
REINFORCEMENT ALONG Y-DIRECTION=21#12@125mm.

DESIGN OF FOOTING:I30

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 998KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.30x 2.30M. SOIL PRESSURE= 188.69KN/M2
MOMENT ALONG X-DIRN.= 216.99KN.M.
MOMENT ALONG Y-DIRN.= 185.67KN.M.
DEPTH OF FOOTING= 500mm. EDGE DEPTH= 250mm.
TOP SIZE OF FOOTING= 760x 910mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=23#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=23#10@100mm.

DESIGN OF FOOTING:H31

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 840KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.10x 2.10M. SOIL PRESSURE= 190.38KN/M2
MOMENT ALONG X-DIRN.= 161.92KN.M.
MOMENT ALONG Y-DIRN.= 136.06KN.M.
DEPTH OF FOOTING= 400mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 660x 810mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=21#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=21#10@100mm.

DESIGN OF FOOTING:I31

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 572KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.80x 1.80M. SOIL PRESSURE= 176.53KN/M2
MOMENT ALONG X-DIRN.= 89.37KN.M.
MOMENT ALONG Y-DIRN.= 72.39KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:G21

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 478KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.60x 1.60M. SOIL PRESSURE= 186.88KN/M2
MOMENT ALONG X-DIRN.= 63.17KN.M.
MOMENT ALONG Y-DIRN.= 49.43KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 710mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=13#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=13#10@125mm.

DESIGN OF FOOTING:G18

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 246KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 1.20x 1.20M. SOIL PRESSURE= 170.91KN/M2
MOMENT ALONG X-DIRN.= 20.77KN.M.
MOMENT ALONG Y-DIRN.= 14.42KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 710mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=8#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=8#10@150mm.

DESIGN OF FOOTING:C18

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 219KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.10x 1.10M. SOIL PRESSURE= 180.80KN/M2
MOMENT ALONG X-DIRN.= 15.91KN.M.
MOMENT ALONG Y-DIRN.= 10.50KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 710mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=7#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=7#10@150mm.

DESIGN OF FOOTING:C21

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 384KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.50x 1.50M. SOIL PRESSURE= 170.51KN/M2
MOMENT ALONG X-DIRN.= 46.04KN.M.
MOMENT ALONG Y-DIRN.= 35.25KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 710mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=10#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=10#10@150mm.

DESIGN OF FOOTING:E18

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 513KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 177.65KN/M2
MOMENT ALONG X-DIRN.= 73.99KN.M.
MOMENT ALONG Y-DIRN.= 73.99KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=11#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=11#10@150mm.

DESIGN OF FOOTING:E17

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 207KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.10x 1.10M. SOIL PRESSURE= 171.35KN/M2
MOMENT ALONG X-DIRN.= 15.08KN.M.
MOMENT ALONG Y-DIRN.= 15.08KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 560mm.
SIZE OF COLUMN= 300x 300mm.

REINFORCEMENT ALONG X-DIRECTION=7#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=7#10@150mm.

DESIGN OF FOOTING:G17

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 561KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.80x 1.80M. SOIL PRESSURE= 173.24KN/M2
MOMENT ALONG X-DIRN.= 87.70KN.M.
MOMENT ALONG Y-DIRN.= 87.70KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:G16

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 529KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 183.17KN/M2
MOMENT ALONG X-DIRN.= 76.29KN.M.
MOMENT ALONG Y-DIRN.= 76.29KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:G15

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 522KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 180.63KN/M2
MOMENT ALONG X-DIRN.= 75.23KN.M.
MOMENT ALONG Y-DIRN.= 75.23KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=11#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=11#10@150mm.

DESIGN OF FOOTING:G14

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 491KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.60x 1.60M. SOIL PRESSURE= 191.91KN/M2
MOMENT ALONG X-DIRN.= 64.87KN.M.
MOMENT ALONG Y-DIRN.= 64.87KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 560mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=13#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=13#10@125mm.

DESIGN OF FOOTING:G13

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 659KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 1.90x 1.90M. SOIL PRESSURE= 182.63KN/M2
MOMENT ALONG X-DIRN.= 111.04KN.M.
MOMENT ALONG Y-DIRN.= 111.04KN.M.
DEPTH OF FOOTING= 400mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 660x 660mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=15#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=15#10@125mm.

DESIGN OF FOOTING:A11

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 233KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.10x 1.10M. SOIL PRESSURE= 192.60KN/M2
MOMENT ALONG X-DIRN.= 16.95KN.M.
MOMENT ALONG Y-DIRN.= 16.95KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 560mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=7#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=7#10@150mm.

DESIGN OF FOOTING:A9

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 585KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.80x 1.80M. SOIL PRESSURE= 180.70KN/M2
MOMENT ALONG X-DIRN.= 91.48KN.M.
MOMENT ALONG Y-DIRN.= 91.48KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:A7

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 741KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.00x 2.00M. SOIL PRESSURE= 185.17KN/M2
MOMENT ALONG X-DIRN.= 133.79KN.M.
MOMENT ALONG Y-DIRN.= 133.79KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 710mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=16#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=16#10@125mm.

DESIGN OF FOOTING:A5

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 374KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.40x 1.40M. SOIL PRESSURE= 190.62KN/M2
MOMENT ALONG X-DIRN.= 40.36KN.M.
MOMENT ALONG Y-DIRN.= 40.36KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 560mm.
SIZE OF COLUMN= 300x 300mm.

REINFORCEMENT ALONG X-DIRECTION=9#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=9#10@150mm.

DESIGN OF FOOTING:G22

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 429KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.50x 1.50M. SOIL PRESSURE= 190.63KN/M2
MOMENT ALONG X-DIRN.= 51.47KN.M.
MOMENT ALONG Y-DIRN.= 51.47KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 560mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=10#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=10#10@150mm.

DESIGN OF FOOTING:G23

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 530KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 183.26KN/M2
MOMENT ALONG X-DIRN.= 76.33KN.M.
MOMENT ALONG Y-DIRN.= 76.33KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:G24

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 517KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 178.96KN/M2
MOMENT ALONG X-DIRN.= 74.54KN.M.
MOMENT ALONG Y-DIRN.= 74.54KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=11#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=11#10@150mm.

DESIGN OF FOOTING:G25

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 519KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 179.69KN/M2
MOMENT ALONG X-DIRN.= 74.84KN.M.
MOMENT ALONG Y-DIRN.= 74.84KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=11#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=11#10@150mm.

DESIGN OF FOOTING:G26

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 513KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 177.57KN/M2
MOMENT ALONG X-DIRN.= 73.96KN.M.
MOMENT ALONG Y-DIRN.= 73.96KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=11#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=11#10@150mm.

DESIGN OF FOOTING:G27

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 559KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.80x 1.80M. SOIL PRESSURE= 172.60KN/M2
MOMENT ALONG X-DIRN.= 87.38KN.M.
MOMENT ALONG Y-DIRN.= 87.38KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:G29

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 785KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.10x 2.10M. SOIL PRESSURE= 177.91KN/M2
MOMENT ALONG X-DIRN.= 151.31KN.M.
MOMENT ALONG Y-DIRN.= 151.31KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 710mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=17#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=17#10@125mm.

DESIGN OF FOOTING:D28

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 456KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.60x 1.60M. SOIL PRESSURE= 178.02KN/M2
MOMENT ALONG X-DIRN.= 60.17KN.M.
MOMENT ALONG Y-DIRN.= 60.17KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 560mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=13#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=13#10@125mm.

DESIGN OF FOOTING:G30

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 821KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.10x 2.10M. SOIL PRESSURE= 186.15KN/M2
MOMENT ALONG X-DIRN.= 158.32KN.M.
MOMENT ALONG Y-DIRN.= 158.32KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 710mm.
SIZE OF COLUMN= 300x 300mm.

REINFORCEMENT ALONG X-DIRECTION=21#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=21#10@100mm.

DESIGN OF FOOTING:D30

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 721KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.00x 2.00M. SOIL PRESSURE= 180.33KN/M2
MOMENT ALONG X-DIRN.= 130.29KN.M.
MOMENT ALONG Y-DIRN.= 130.29KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 710mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=16#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=16#10@125mm.

DESIGN OF FOOTING:G31

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 555KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 192.15KN/M2
MOMENT ALONG X-DIRN.= 80.03KN.M.
MOMENT ALONG Y-DIRN.= 80.03KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:D31

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 338KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.40x 1.40M. SOIL PRESSURE= 172.67KN/M2
MOMENT ALONG X-DIRN.= 36.56KN.M.
MOMENT ALONG Y-DIRN.= 36.56KN.M.
DEPTH OF FOOTING= 300mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 560x 560mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=9#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=9#10@150mm.

DESIGN OF FOOTING:F2

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 517KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 178.96KN/M2
MOMENT ALONG X-DIRN.= 74.54KN.M.
MOMENT ALONG Y-DIRN.= 74.54KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=11#10@150mm.
REINFORCEMENT ALONG Y-DIRECTION=11#10@150mm.

DESIGN OF FOOTING:H2

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 542KN. SBC OF SOIL= 200.00KN/M2

SIZE OF FOOTING= 1.70x 1.70M. SOIL PRESSURE= 187.39KN/M2
MOMENT ALONG X-DIRN.= 78.05KN.M.
MOMENT ALONG Y-DIRN.= 78.05KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 610mm.
SIZE OF COLUMN= 300x 300mm.
REINFORCEMENT ALONG X-DIRECTION=14#10@125mm.
REINFORCEMENT ALONG Y-DIRECTION=14#10@125mm.

DESIGN OF FOOTING:G19

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 879KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.20x 2.20M. SOIL PRESSURE= 181.52KN/M2
MOMENT ALONG X-DIRN.= 180.20KN.M.
MOMENT ALONG Y-DIRN.= 152.87KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=22#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=22#10@100mm.

DESIGN OF FOOTING:G20

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 894KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.20x 2.20M. SOIL PRESSURE= 184.74KN/M2
MOMENT ALONG X-DIRN.= 183.40KN.M.
MOMENT ALONG Y-DIRN.= 155.59KN.M.
DEPTH OF FOOTING= 450mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 710x 860mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=22#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=22#10@100mm.

DESIGN OF FOOTING:C19

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 684KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 1.90x 1.90M. SOIL PRESSURE= 189.40KN/M2
MOMENT ALONG X-DIRN.= 115.16KN.M.
MOMENT ALONG Y-DIRN.= 94.58KN.M.
DEPTH OF FOOTING= 350mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 610x 760mm.
SIZE OF COLUMN= 300x 450mm.
REINFORCEMENT ALONG X-DIRECTION=19#10@100mm.
REINFORCEMENT ALONG Y-DIRECTION=19#10@100mm.

DESIGN OF FOOTING:C20

TYPE OF FOOTING: ISOLATED SQUARE FOOTING
LOAD ON FOOTING= 696KN. SBC OF SOIL= 200.00KN/M2
SIZE OF FOOTING= 2.00x 2.00M. SOIL PRESSURE= 174.06KN/M2
MOMENT ALONG X-DIRN.= 125.76KN.M.
MOMENT ALONG Y-DIRN.= 104.54KN.M.
DEPTH OF FOOTING= 400mm. EDGE DEPTH= 200mm.
TOP SIZE OF FOOTING= 660x 810mm.
SIZE OF COLUMN= 300x 450mm.

REINFORCEMENT ALONG X-DIRECTION=16#10@125mm.

REINFORCEMENT ALONG Y-DIRECTION=16#10@125mm.
