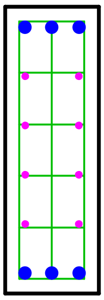
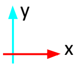
Detailed Design of Column C11 at L01 - 190



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C11 at L01 - 190
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 885.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.2385 Ref. CSA Eq. 11.11
  and ex = -0.0004513 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 470.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.84 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7616.7kN (Compression)
Factored shear, Vf = -3.9kN, Factored moment, Mf = -14.7kN

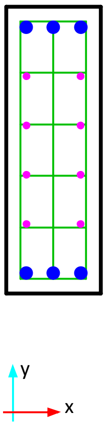
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 1032.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.2435 Ref. CSA Eq. 11.11
  and ex = -0.0004522 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 820.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.83 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7616.7kN (Compression)
Factored shear, Vf = -25.2kN, Factored moment, Mf = -29.7kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7795.35kN (Compression)
Factored moment about x, Mfx = -29.83kNm
Factored moment about y, Mfy = -16.8kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.17 Pf>Pmax Not OK**

Detailed Design of Column C11 at L02 - 11



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C11 at L02 - 11
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 580.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8118 Ref. CSA Eq. 11.11
  and ex = -0.0003382 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 454.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5674kN (Compression)
Factored shear, Vf = 1.5kN, Factored moment, Mf = 7.8kN

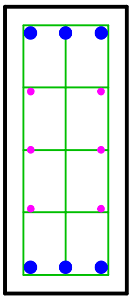
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 637kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7674 Ref. CSA Eq. 11.11
  and ex = -0.0003192 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 787.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.77 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5674kN (Compression)
Factored shear, Vf = -52.5kN, Factored moment, Mf = -107kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

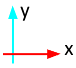
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7172.36kN (Compression)
Factored moment about x, Mfx = -64.42kNm
Factored moment about y, Mfy = 4.9kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.08 Pf>Pmax Not OK**

Detailed Design of Column C11 at L03 - 1942



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C11 at L03 - 1942
Governing Load Combo:
UW01 (Shear)
U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 559.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 1.0067 Ref. CSA Eq. 11.11
and ex = -0.0004018 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 386.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.19 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5652.1kN (Compression)
Factored shear, Vf = -13.7kN, Factored moment, Mf = -37.9kN

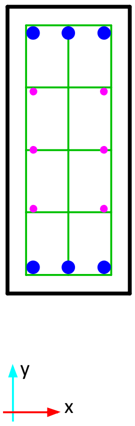
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 670kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 1.061 Ref. CSA Eq. 11.11
and ex = -0.0004153 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 617kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5652.1kN (Compression)
Factored shear, Vf = -29.6kN, Factored moment, Mf = -40.4kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6598.47kN (Compression)
Factored moment about x, Mfx = -47.83kNm
Factored moment about y, Mfy = -12.3kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.24 Pf>Pmax Not OK**

Detailed Design of Column C11 at L04 - 1827



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C11 at L04 - 1827
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 488.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8786 Ref. CSA Eq. 11.11
  and ex = -0.0003632 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 381.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.46 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4772.5kN (Compression)
Factored shear, Vf = 0.4kN, Factored moment, Mf = 0.5kN

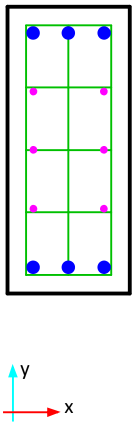
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 499.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7911 Ref. CSA Eq. 11.11
  and ex = -0.0003296 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 601kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.69 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4772.5kN (Compression)
Factored shear, Vf = -51kN, Factored moment, Mf = -98.6kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6045.44kN (Compression)
Factored moment about x, Mfx = -68.53kNm
Factored moment about y, Mfy = -4.47kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.13 Pf>Pmax Not OK**

Detailed Design of Column C11 at L05 - 1712



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C11 at L05 - 1712
Governing Load Combo:
UW01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 445.8kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8019 Ref. CSA Eq. 11.11
and ex = -0.0003341 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 378.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.66 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4717.5kN (Compression)
Factored shear, Vf = -11.8kN, Factored moment, Mf = -33.3kN

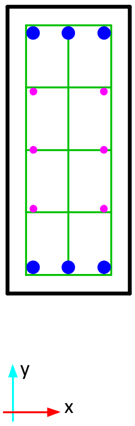
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 513.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8125 Ref. CSA Eq. 11.11
and ex = -0.0003385 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 602.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4717.5kN (Compression)
Factored shear, Vf = -37.1kN, Factored moment, Mf = -57.4kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5506.58kN (Compression)
Factored moment about x, Mfx = -68.4kNm
Factored moment about y, Mfy = -0.91kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.03 Pf>Pmax Not OK**

Detailed Design of Column C11 at L06 - 1597



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C11 at L06 - 1597
Governing Load Combo:
UW04 (Shear)
UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 397.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7152 Ref. CSA Eq. 11.11
and ex = -0.0002938 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 373.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.94 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 771.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3931.6kN (Compression)
Factored shear, Vf = 4.3kN, Factored moment, Mf = 7.2kN

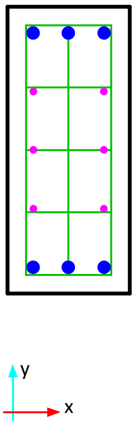
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 417.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6606 Ref. CSA Eq. 11.11
and ex = -0.000263 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 589kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.16 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3931.6kN (Compression)
Factored shear, Vf = -56.9kN, Factored moment, Mf = -104.6kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 4113.91kN (Compression)
Factored moment about x, Mfx = 66.12kNm
Factored moment about y, Mfy = -32.39kNm

Moment capacity about x, Mrx = 345.47kNm
Moment capacity about y, Mry = -169.24kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C11 at L07 - 1482



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C11 at L07 - 1482
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 360.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6485 Ref. CSA Eq. 11.11
  and ex = -0.0002554 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 369.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.21 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 730.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3710kN (Compression)
Factored shear, Vf = 14.6kN, Factored moment, Mf = 35.4kN

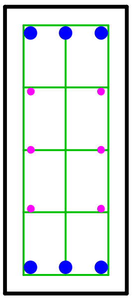
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 414.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.656 Ref. CSA Eq. 11.11
  and ex = -0.0002601 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 588.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.18 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3710kN (Compression)
Factored shear, Vf = -39kN, Factored moment, Mf = -62.2kN

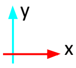
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 3688.61kN (Compression)
Factored moment about x, Mfx = 65.93kNm
Factored moment about y, Mfy = -35.79kNm

Moment capacity about x, Mrx = 345.38kNm
Moment capacity about y, Mry = -187.49kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C11 at L08 - 1367





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C11 at L08 - 1367
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 338.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6085 Ref. CSA Eq. 11.11
  and ex = -0.0002285 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 366.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.4 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 704.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3130.3kN (Compression)
Factored shear, Vf = 7.4kN, Factored moment, Mf = 12.6kN

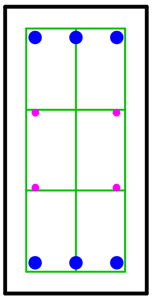
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 359.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5696 Ref. CSA Eq. 11.11
  and ex = -0.0001985 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 577.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3130.3kN (Compression)
Factored shear, Vf = -66.1kN, Factored moment, Mf = -112.4kN

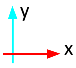
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 3271.52kN (Compression)
Factored moment about x, Mfx = 76.83kNm
Factored moment about y, Mfy = -39.75kNm

Moment capacity about x, Mrx = 373.85kNm
Moment capacity about y, Mry = -193.42kNm
Demand / Capacity, D/C = **0.21 OK**

Detailed Design of Column C11 at L09 - 1252





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C11 at L09 - 1252
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 290.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.61 Ref. CSA Eq. 11.11
  and ex = -0.0002295 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 293.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.39 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 584.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2739.8kN (Compression)
Factored shear, Vf = 7.9kN, Factored moment, Mf = 13.3kN

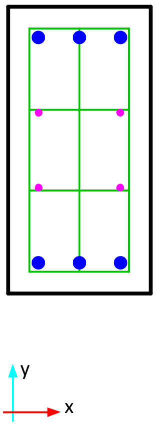
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 302.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5677 Ref. CSA Eq. 11.11
  and ex = -0.0001969 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 486.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.62 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2739.8kN (Compression)
Factored shear, Vf = -56.7kN, Factored moment, Mf = -95.3kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 2863.92kN (Compression)
Factored moment about x, Mfx = 66.36kNm
Factored moment about y, Mfy = -38.52kNm

Moment capacity about x, Mrx = 282.41kNm
Moment capacity about y, Mry = -163.93kNm
Demand / Capacity, D/C = **0.23 OK**

Detailed Design of Column C11 at L10 - 1137



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C11 at L10 - 1137
Governing Load Combo:
    UW04 (Shear)
    UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
    4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 268.6kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.5636 Ref. CSA Eq. 11.11
    and ex = -0.0001936 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 290.2kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 27.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 558.8kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2359kN (Compression)
Factored shear, Vf = 9.3kN, Factored moment, Mf = 15.9kN

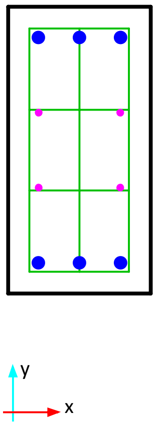
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 277.7kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.5218 Ref. CSA Eq. 11.11
    and ex = -0.0001557 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 480.8kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 27.91 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2359kN (Compression)
Factored shear, Vf = -64kN, Factored moment, Mf = -112.7kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm   **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2   **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2   **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 2463.82kN (Compression)
Factored moment about x, Mfx = 70.58kNm
Factored moment about y, Mfy = -40.59kNm

Moment capacity about x, Mrx = 293.41kNm
Moment capacity about y, Mry = -168.74kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C11 at L11 - 1022



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C11 at L11 - 1022
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 250.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5252 Ref. CSA Eq. 11.11
  and ex = -0.000159 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 287.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.89 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 537.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1984kN (Compression)
Factored shear, Vf = 10.4kN, Factored moment, Mf = 17.5kN

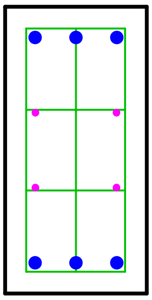
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 261.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4905 Ref. CSA Eq. 11.11
  and ex = -0.000123 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 476.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.14 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 737.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1984kN (Compression)
Factored shear, Vf = -64.7kN, Factored moment, Mf = -111.1kN

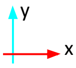
Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 2070.49kN (Compression)
Factored moment about x, Mfx = 72.8kNm
Factored moment about y, Mfy = -41.98kNm

Moment capacity about x, Mrx = 297.75kNm
Moment capacity about y, Mry = -171.7kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C11 at L12 - 907





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C11 at L12 - 907
Governing Load Combo:
    UW04 (Shear)
    UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
    4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 234.8kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.4928 Ref. CSA Eq. 11.11
    and ex = -0.0001256 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 284.5kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 28.12 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 519.3kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1613kN (Compression)
Factored shear, Vf = 10.8kN, Factored moment, Mf = 18.2kN

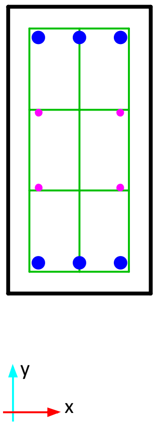
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 246.4kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.463 Ref. CSA Eq. 11.11
    and ex = -9.07E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 471.7kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 28.37 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 718.1kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1613kN (Compression)
Factored shear, Vf = -64.5kN, Factored moment, Mf = -110.1kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm   **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2   **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2   **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 1682.26kN (Compression)
Factored moment about x, Mfx = 72.76kNm
Factored moment about y, Mfy = -41.17kNm

Moment capacity about x, Mrx = 266.58kNm
Moment capacity about y, Mry = -150.84kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C11 at L13 - 792



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C11 at L13 - 792
Governing Load Combo:
UW04 (Shear)
UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 221.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.464 Ref. CSA Eq. 11.11
and ex = -9.2E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 502.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1245.3kN (Compression)
Factored shear, Vf = 11.4kN, Factored moment, Mf = 19.5kN

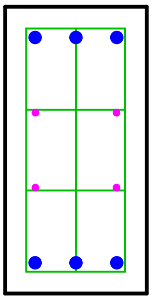
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 232.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4376 Ref. CSA Eq. 11.11
and ex = -5.73E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 467.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 700.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1245.3kN (Compression)
Factored shear, Vf = -65.3kN, Factored moment, Mf = -112.2kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

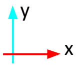
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 1298.55kN (Compression)
Factored moment about x, Mfx = 72.88kNm
Factored moment about y, Mfy = -41.31kNm

Moment capacity about x, Mrx = 263.44kNm
Moment capacity about y, Mry = -149.32kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C11 at L14 - 677



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C11 at L14 - 677
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 209.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4387 Ref. CSA Eq. 11.11
  and ex = -5.88E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 279kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.59 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 488kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 879.9kN (Compression)
Factored shear, Vf = 12.1kN, Factored moment, Mf = 20.4kN

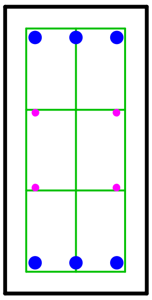
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 220.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4147 Ref. CSA Eq. 11.11
  and ex = -2.36E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 462.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.83 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 683.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 879.9kN (Compression)
Factored shear, Vf = -68.9kN, Factored moment, Mf = -114.5kN

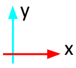
Vfx/Vrx + Vfy/Vry = **0.12 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 918.3kN (Compression)
Factored moment about x, Mfx = 79.65kNm
Factored moment about y, Mfy = -42.35kNm

Moment capacity about x, Mrx = 264.44kNm
Moment capacity about y, Mry = -140.6kNm
Demand / Capacity, D/C = **0.3 OK**

Detailed Design of Column C11 at L15 - 562





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
- Confinement Type: Tied
- Axial compression: varies
- Steel: 0.85
- Concrete: 0.65

Column: C11 at L15 - 562
Governing Load Combo:
- UW04 (Shear)
- UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
- 4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
- 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)

Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 199.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4178 Ref. CSA Eq. 11.11
  and ex = -2.84E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 276.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.8 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 475.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 515kN (Compression)
Factored shear, Vf = 10.6kN, Factored moment, Mf = 18.6kN

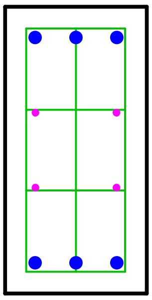
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 206.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3887 Ref. CSA Eq. 11.11
  and ex = 1.94E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 456.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.14 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 663.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 515kN (Compression)
Factored shear, Vf = -57.5kN, Factored moment, Mf = -103.6kN

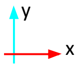
Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 558kN (Compression)
Factored moment about x, Mfx = -67.91kNm
Factored moment about y, Mfy = 36.76kNm

Moment capacity about x, Mrx = -228.88kNm
Moment capacity about y, Mry = 123.89kNm
Demand / Capacity, D/C = **0.3 OK**

Detailed Design of Column C11 at RF - 447





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C11 at RF - 447
Governing Load Combo:
    UW04 (Shear)
    UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
    4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 153.8kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.3228 Ref. CSA Eq. 11.11
    and ex = 0.0001595 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 262.1kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 30.12 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 415.9kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 132.5kN (Compression)
Factored shear, Vf = 18.5kN, Factored moment, Mf = -36.5kN

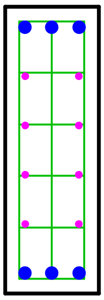
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 110.3kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.2073 Ref. CSA Eq. 11.11
    and ex = 0.0006198 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 387.1kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 33.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 497.5kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 132.5kN (Compression)
Factored shear, Vf = -102.5kN, Factored moment, Mf = 209.8kN

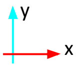
Vfx/Vrx + Vfy/Vry = **0.25 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 132.5kN (Compression)
Factored moment about x, Mfx = 209.82kNm
Factored moment about y, Mfy = -36.53kNm

Moment capacity about x, Mrx = 316.75kNm
Moment capacity about y, Mry = -55.15kNm
Demand / Capacity, D/C = **0.66 OK**

Detailed Design of Column C13 at L01 - 206





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L01 - 206
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 598.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8369 Ref. CSA Eq. 11.11
  and ex = -0.000348 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 456.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.56 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6688.7kN (Compression)
Factored shear, Vf = 42kN, Factored moment, Mf = 91kN

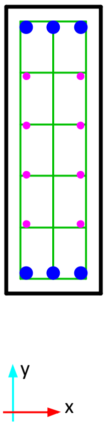
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 841.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0134 Ref. CSA Eq. 11.11
  and ex = -0.0004035 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 808.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.18 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6688.7kN (Compression)
Factored shear, Vf = -2.3kN, Factored moment, Mf = 1.1kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7101.76kN (Compression)
Factored moment about x, Mfx = 0.92kNm
Factored moment about y, Mfy = 94.81kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.07 Pf>Pmax Not OK**

Detailed Design of Column C13 at L02 - 27



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L02 - 27
Governing Load Combo:
  UW01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 531.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7436 Ref. CSA Eq. 11.11
  and ex = -0.0003081 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 450.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.84 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 982.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5570.4kN (Compression)
Factored shear, Vf = 29.9kN, Factored moment, Mf = 44.3kN

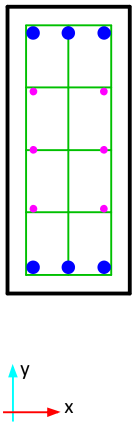
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 622.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7494 Ref. CSA Eq. 11.11
  and ex = -0.0003108 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 785.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.82 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5570.4kN (Compression)
Factored shear, Vf = -35.1kN, Factored moment, Mf = -133.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 6493.04kN (Compression)
Factored moment about x, Mfx = 11.04kNm
Factored moment about y, Mfy = -66.37kNm

Moment capacity about x, Mrx = 32.22kNm
Moment capacity about y, Mry = -193.72kNm
Demand / Capacity, D/C = **0.34 OK**

Detailed Design of Column C13 at L03 - 1958



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L03 - 1958
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 525.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9448 Ref. CSA Eq. 11.11
  and ex = -0.0003844 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 384.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.31 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5641.3kN (Compression)
Factored shear, Vf = 35.2kN, Factored moment, Mf = 56.7kN

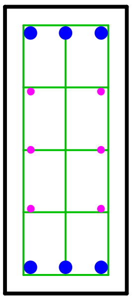
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 709.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1242 Ref. CSA Eq. 11.11
  and ex = -0.0004295 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 619.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.99 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5641.3kN (Compression)
Factored shear, Vf = -1.2kN, Factored moment, Mf = 0.5kN

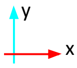
Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6053.87kN (Compression)
Factored moment about x, Mfx = 0.31kNm
Factored moment about y, Mfy = 59.63kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.14 Pf>Pmax Not OK**

Detailed Design of Column C13 at L04 - 1843





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L04 - 1843
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 470.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.847 Ref. CSA Eq. 11.11
  and ex = -0.0003518 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 380.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.54 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5215.1kN (Compression)
Factored shear, Vf = 35.1kN, Factored moment, Mf = 56.9kN

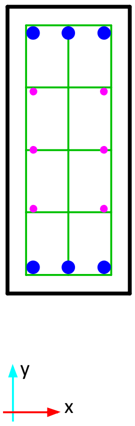
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 618.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9795 Ref. CSA Eq. 11.11
  and ex = -0.0003944 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 613.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.24 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5215.1kN (Compression)
Factored shear, Vf = -4.8kN, Factored moment, Mf = -8.1kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5595.81kN (Compression)
Factored moment about x, Mfx = -8.74kNm
Factored moment about y, Mfy = 59.04kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.05 Pf>Pmax Not OK**

Detailed Design of Column C13 at L05 - 1728



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L05 - 1728
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 429.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7725 Ref. CSA Eq. 11.11
  and ex = -0.0003215 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 377kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.75 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4793kN (Compression)
Factored shear, Vf = 33.8kN, Factored moment, Mf = 54.6kN

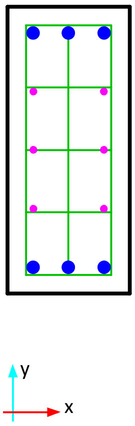
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 553.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.876 Ref. CSA Eq. 11.11
  and ex = -0.0003622 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 607kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.46 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4793kN (Compression)
Factored shear, Vf = -5.1kN, Factored moment, Mf = -8kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5142.17kN (Compression)
Factored moment about x, Mfx = -8.57kNm
Factored moment about y, Mfy = 56.64kNm

Moment capacity about x, Mrx = -24.03kNm
Moment capacity about y, Mry = 158.81kNm
Demand / Capacity, D/C = **0.36 OK**

Detailed Design of Column C13 at L06 - 1613



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L06 - 1613
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 394.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7092 Ref. CSA Eq. 11.11
  and ex = -0.0002907 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 373.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.97 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 767.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4374.6kN (Compression)
Factored shear, Vf = 33.3kN, Factored moment, Mf = 53.2kN

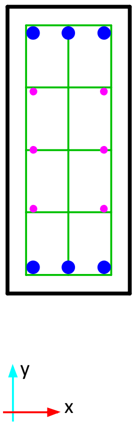
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 499.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7916 Ref. CSA Eq. 11.11
  and ex = -0.0003298 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 601.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.69 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4374.6kN (Compression)
Factored shear, Vf = -6.1kN, Factored moment, Mf = -9.6kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 4668.48kN (Compression)
Factored moment about x, Mfx = 11.49kNm
Factored moment about y, Mfy = -56.13kNm

Moment capacity about x, Mrx = 39.43kNm
Moment capacity about y, Mry = -192.63kNm
Demand / Capacity, D/C = **0.29 OK**

Detailed Design of Column C13 at L07 - 1498



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L07 - 1498
Governing Load Combo:
  U01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 363.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6544 Ref. CSA Eq. 11.11
  and ex = -0.0002591 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 370kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.19 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 733.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3958.3kN (Compression)
Factored shear, Vf = 33kN, Factored moment, Mf = 53kN

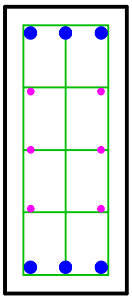
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 456.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7227 Ref. CSA Eq. 11.11
  and ex = -0.0002977 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 595.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.92 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3958.3kN (Compression)
Factored shear, Vf = -6.6kN, Factored moment, Mf = -10.7kN

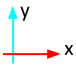
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 3832.82kN (Compression)
Factored moment about x, Mfx = -5.86kNm
Factored moment about y, Mfy = 60.6kNm

Moment capacity about x, Mrx = -23.15kNm
Moment capacity about y, Mry = 239.41kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C13 at L08 - 1383





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C13 at L08 - 1383
Governing Load Combo:
U01 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 337.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6066 Ref. CSA Eq. 11.11
and ex = -0.0002271 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 366.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.41 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 703.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3543.6kN (Compression)
Factored shear, Vf = 33.7kN, Factored moment, Mf = 53.5kN

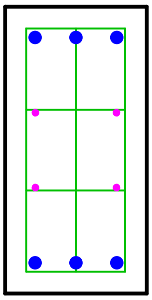
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 419.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6647 Ref. CSA Eq. 11.11
and ex = -0.0002655 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 589.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.14 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3543.6kN (Compression)
Factored shear, Vf = -8kN, Factored moment, Mf = -12.3kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

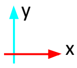
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 3408.75kN (Compression)
Factored moment about x, Mfx = 8.26kNm
Factored moment about y, Mfy = -62.59kNm

Moment capacity about x, Mrx = 33.51kNm
Moment capacity about y, Mry = -253.89kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C13 at L09 - 1268



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C13 at L09 - 1268
Governing Load Combo:
U01 (Shear)
UW04 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 291.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.611 Ref. CSA Eq. 11.11
and ex = -0.0002302 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 293.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.39 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 584.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3130.8kN (Compression)
Factored shear, Vf = 31.3kN, Factored moment, Mf = 49.6kN

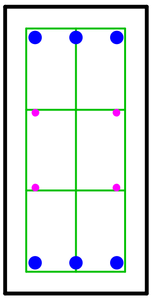
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 358.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6736 Ref. CSA Eq. 11.11
and ex = -0.0002708 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 497.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.1 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3130.8kN (Compression)
Factored shear, Vf = -7.4kN, Factored moment, Mf = -11.5kN

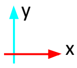
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 3010.79kN (Compression)
Factored moment about x, Mfx = 8.37kNm
Factored moment about y, Mfy = -58.38kNm

Moment capacity about x, Mrx = 30.92kNm
Moment capacity about y, Mry = -215.64kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C13 at L10 - 1153





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L10 - 1153
Governing Load Combo:
  U01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 267.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5618 Ref. CSA Eq. 11.11
  and ex = -0.000192 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 290.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.66 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 557.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2722.5kN (Compression)
Factored shear, Vf = 32.1kN, Factored moment, Mf = 52.1kN

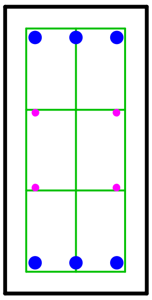
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 327.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6154 Ref. CSA Eq. 11.11
  and ex = -0.0002334 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 492kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.37 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2722.5kN (Compression)
Factored shear, Vf = -8.8kN, Factored moment, Mf = -14.6kN

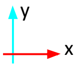
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 2614.55kN (Compression)
Factored moment about x, Mfx = 9.53kNm
Factored moment about y, Mfy = -59.1kNm

Moment capacity about x, Mrx = 36.48kNm
Moment capacity about y, Mry = -226.2kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C13 at L11 - 1038





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L11 - 1038
Governing Load Combo:
  UW01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 242.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5094 Ref. CSA Eq. 11.11
  and ex = -0.0001432 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 285.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 528.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2098.3kN (Compression)
Factored shear, Vf = 27.4kN, Factored moment, Mf = -45.5kN

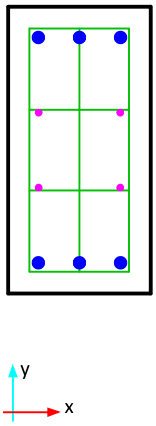
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 285.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5371 Ref. CSA Eq. 11.11
  and ex = -0.0001701 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 482.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.81 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2098.3kN (Compression)
Factored shear, Vf = -14.9kN, Factored moment, Mf = 33.9kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 2219.4kN (Compression)
Factored moment about x, Mfx = 10.47kNm
Factored moment about y, Mfy = -59.68kNm

Moment capacity about x, Mrx = 41.08kNm
Moment capacity about y, Mry = -234.16kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C13 at L12 - 923



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L12 - 923
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 227.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4771 Ref. CSA Eq. 11.11
  and ex = -0.0001078 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 283kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.25 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 510.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1825.6kN (Compression)
Factored shear, Vf = 32.4kN, Factored moment, Mf = -58.3kN

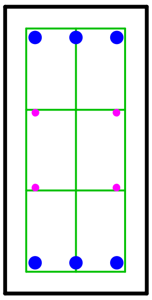
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 277.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.522 Ref. CSA Eq. 11.11
  and ex = -0.0001558 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 480.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.91 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1825.6kN (Compression)
Factored shear, Vf = -6.7kN, Factored moment, Mf = 11.3kN

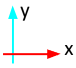
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1825.6kN (Compression)
Factored moment about x, Mfx = 11.33kNm
Factored moment about y, Mfy = -58.29kNm

Moment capacity about x, Mrx = 39.95kNm
Moment capacity about y, Mry = -205.53kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C13 at L13 - 808





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L13 - 808
Governing Load Combo:
  U02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 221.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.464 Ref. CSA Eq. 11.11
  and ex = -9.2E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 502.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1607.6kN (Compression)
Factored shear, Vf = 32.6kN, Factored moment, Mf = 54kN

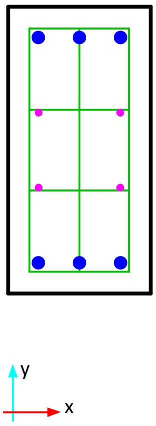
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 266.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5 Ref. CSA Eq. 11.11
  and ex = -0.0001333 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 477.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.07 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 743.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1607.6kN (Compression)
Factored shear, Vf = -10.8kN, Factored moment, Mf = -18.1kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1432.69kN (Compression)
Factored moment about x, Mfx = 11.89kNm
Factored moment about y, Mfy = -58.17kNm

Moment capacity about x, Mrx = 42.35kNm
Moment capacity about y, Mry = -207.2kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C13 at L14 - 693



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C13 at L14 - 693
Governing Load Combo:
U01 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 205.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4306 Ref. CSA Eq. 11.11
and ex = -4.73E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 483.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1096.8kN (Compression)
Factored shear, Vf = 32.7kN, Factored moment, Mf = 53.5kN

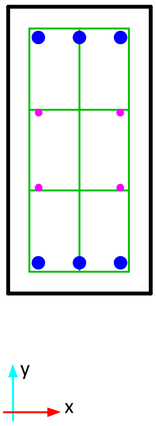
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 245.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.461 Ref. CSA Eq. 11.11
and ex = -8.83E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 471.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 716.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1096.8kN (Compression)
Factored shear, Vf = -11.1kN, Factored moment, Mf = -18kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1040.27kN (Compression)
Factored moment about x, Mfx = 13.43kNm
Factored moment about y, Mfy = -60.74kNm

Moment capacity about x, Mrx = 43.3kNm
Moment capacity about y, Mry = -195.83kNm
Demand / Capacity, D/C = **0.31 OK**

Detailed Design of Column C13 at L15 - 578



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at L15 - 578
Governing Load Combo:
  U02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 195.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.411 Ref. CSA Eq. 11.11
  and ex = -1.78E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.88 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 471.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 735.8kN (Compression)
Factored shear, Vf = 29.9kN, Factored moment, Mf = 51.2kN

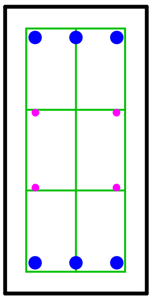
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 232.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4373 Ref. CSA Eq. 11.11
  and ex = -5.68E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 467.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 699.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 735.8kN (Compression)
Factored shear, Vf = -9.6kN, Factored moment, Mf = -17.5kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

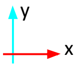
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 666.93kN (Compression)
Factored moment about x, Mfx = -11.98kNm
Factored moment about y, Mfy = 54.28kNm

Moment capacity about x, Mrx = -37.27kNm
Moment capacity about y, Mry = 168.84kNm
Demand / Capacity, D/C = **0.32 OK**

Detailed Design of Column C13 at RF - 463



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C13 at RF - 463
Governing Load Combo:
  U02 (Shear)
  UW04 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 127.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.267 Ref. CSA Eq. 11.11
  and ex = 0.000332 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 249.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 31.32 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 377kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 280.2kN (Compression)
Factored shear, Vf = 40.6kN, Factored moment, Mf = -76kN

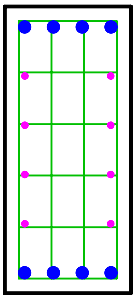
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 215kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4039 Ref. CSA Eq. 11.11
  and ex = -6.4E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 460.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.96 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 675.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 280.2kN (Compression)
Factored shear, Vf = -19.3kN, Factored moment, Mf = 40.8kN

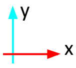
Vfx/Vrx + Vfy/Vry = **0.14 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 257.57kN (Compression)
Factored moment about x, Mfx = 26.16kNm
Factored moment about y, Mfy = -80.44kNm

Moment capacity about x, Mrx = 48.85kNm
Moment capacity about y, Mry = -150.21kNm
Demand / Capacity, D/C = **0.54 OK**

Detailed Design of Column C15 at L01 - 194





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L01 - 194
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1464.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.4633 Ref. CSA Eq. 11.11
  and ex = -0.0004844 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 666.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 11122kN (Compression)
Factored shear, Vf = 41.8kN, Factored moment, Mf = 67.7kN

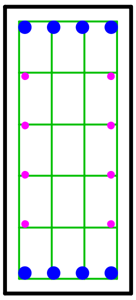
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1740.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.5725 Ref. CSA Eq. 11.11
  and ex = -0.0004971 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1109.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 11122kN (Compression)
Factored shear, Vf = 21kN, Factored moment, Mf = 80kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

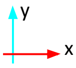
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 11647.24kN (Compression)
Factored moment about x, Mfx = 97.73kNm
Factored moment about y, Mfy = 64.33kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.34 Pf>Pmax Not OK**

Detailed Design of Column C15 at L02 - 15



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L02 - 15
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1145.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1444 Ref. CSA Eq. 11.11
  and ex = -0.0004336 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 655.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.96 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 10207.3kN (Compression)
Factored shear, Vf = 43.7kN, Factored moment, Mf = 96.7kN

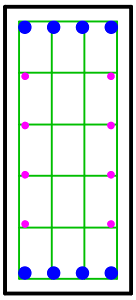
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1464kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.3228 Ref. CSA Eq. 11.11
  and ex = -0.0004651 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1098.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.74 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 10207.3kN (Compression)
Factored shear, Vf = -12.3kN, Factored moment, Mf = -5.7kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

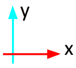
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 10756.04kN (Compression)
Factored moment about x, Mfx = -9.36kNm
Factored moment about y, Mfy = 96.06kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.23 Pf>Pmax Not OK**

Detailed Design of Column C15 at L03 - 1946



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L03 - 1946
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1106.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1052 Ref. CSA Eq. 11.11
  and ex = -0.0004254 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 654.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.02 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9410.1kN (Compression)
Factored shear, Vf = 11.9kN, Factored moment, Mf = 13.1kN

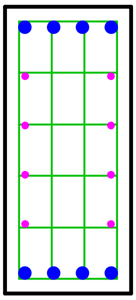
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1226.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1085 Ref. CSA Eq. 11.11
  and ex = -0.0004261 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1085kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.02 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9410.1kN (Compression)
Factored shear, Vf = -19kN, Factored moment, Mf = -21.3kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

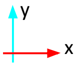
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 9915.25kN (Compression)
Factored moment about x, Mfx = -21.57kNm
Factored moment about y, Mfy = 14.93kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.14 Pf>Pmax Not OK**

Detailed Design of Column C15 at L04 - 1831



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L04 - 1831
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 934.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9338 Ref. CSA Eq. 11.11
  and ex = -0.0003811 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 645.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.33 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8622.7kN (Compression)
Factored shear, Vf = 20.8kN, Factored moment, Mf = 37.7kN

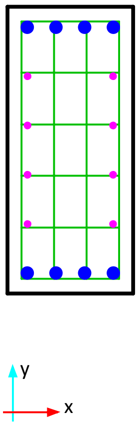
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1072.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9692 Ref. CSA Eq. 11.11
  and ex = -0.0003915 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1073.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.26 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8622.7kN (Compression)
Factored shear, Vf = -14.8kN, Factored moment, Mf = -12.7kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 9084.9kN (Compression)
Factored moment about x, Mfx = -13.52kNm
Factored moment about y, Mfy = 38.85kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.04 Pf>Pmax Not OK**

Detailed Design of Column C15 at L05 - 1716



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C15 at L05 - 1716
Governing Load Combo:
U01 (Shear)
UW02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 833.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8322 Ref. CSA Eq. 11.11
and ex = -0.0003462 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 638.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.58 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7846.5kN (Compression)
Factored shear, Vf = 22.4kN, Factored moment, Mf = 35.1kN

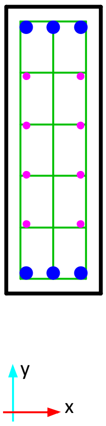
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 949.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8577 Ref. CSA Eq. 11.11
and ex = -0.0003558 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1061.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.51 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7846.5kN (Compression)
Factored shear, Vf = -15.1kN, Factored moment, Mf = -14.6kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 6962.94kN (Compression)
Factored moment about x, Mfx = 23.68kNm
Factored moment about y, Mfy = -64.39kNm

Moment capacity about x, Mrx = 177.69kNm
Moment capacity about y, Mry = -483.17kNm
Demand / Capacity, D/C = **0.13 OK**

Detailed Design of Column C15 at L06 - 1601



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L06 - 1601
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 746.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0443 Ref. CSA Eq. 11.11
  and ex = -0.0004113 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 465kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.12 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7079.6kN (Compression)
Factored shear, Vf = 16.3kN, Factored moment, Mf = 25.6kN

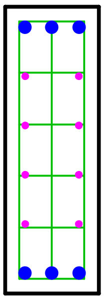
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 912.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0998 Ref. CSA Eq. 11.11
  and ex = -0.0004242 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 813.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.03 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7079.6kN (Compression)
Factored shear, Vf = -12.5kN, Factored moment, Mf = -11.8kN

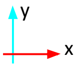
Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7457.38kN (Compression)
Factored moment about x, Mfx = -12.16kNm
Factored moment about y, Mfy = 26.51kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.12 Pf>Pmax Not OK**

Detailed Design of Column C15 at L07 - 1486





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L07 - 1486
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 624.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8735 Ref. CSA Eq. 11.11
  and ex = -0.0003614 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 458kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.47 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6339.1kN (Compression)
Factored shear, Vf = 19.7kN, Factored moment, Mf = 34.2kN

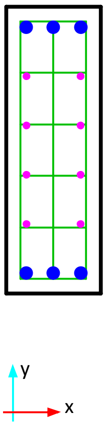
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 770kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9277 Ref. CSA Eq. 11.11
  and ex = -0.0003792 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 802.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.35 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6339.1kN (Compression)
Factored shear, Vf = -12.3kN, Factored moment, Mf = -13.6kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6676.88kN (Compression)
Factored moment about x, Mfx = -13.91kNm
Factored moment about y, Mfy = 35.42kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.01 Pf>Pmax Not OK**

Detailed Design of Column C15 at L08 - 1371



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L08 - 1371
Governing Load Combo:
  U01 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 546.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7642 Ref. CSA Eq. 11.11
  and ex = -0.0003177 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 451.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 998.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5614.2kN (Compression)
Factored shear, Vf = 20.3kN, Factored moment, Mf = 33.8kN

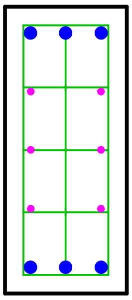
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 668.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8057 Ref. CSA Eq. 11.11
  and ex = -0.0003357 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 791.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5614.2kN (Compression)
Factored shear, Vf = -11.7kN, Factored moment, Mf = -12.3kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

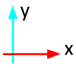
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 4984.11kN (Compression)
Factored moment about x, Mfx = 18.76kNm
Factored moment about y, Mfy = -56.38kNm

Moment capacity about x, Mrx = 95.06kNm
Moment capacity about y, Mry = -285.67kNm
Demand / Capacity, D/C = **0.2 OK**

Detailed Design of Column C15 at L09 - 1256



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L09 - 1256
Governing Load Combo:
  U01 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 466.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.839 Ref. CSA Eq. 11.11
  and ex = -0.0003488 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 380.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.56 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4902.1kN (Compression)
Factored shear, Vf = 18.5kN, Factored moment, Mf = 30.9kN

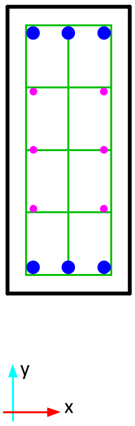
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 567.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8982 Ref. CSA Eq. 11.11
  and ex = -0.0003698 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 608.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.41 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4902.1kN (Compression)
Factored shear, Vf = -8.5kN, Factored moment, Mf = -8.9kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 4355.57kN (Compression)
Factored moment about x, Mfx = 12.54kNm
Factored moment about y, Mfy = -50.79kNm

Moment capacity about x, Mrx = 51.99kNm
Moment capacity about y, Mry = -210.56kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C15 at L10 - 1141



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L10 - 1141
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 353.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6353 Ref. CSA Eq. 11.11
  and ex = -0.0002469 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 368.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.27 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 721.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3763.4kN (Compression)
Factored shear, Vf = 23.8kN, Factored moment, Mf = 51.3kN

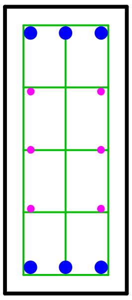
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 439.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6958 Ref. CSA Eq. 11.11
  and ex = -0.0002834 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 592.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.02 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3763.4kN (Compression)
Factored shear, Vf = -6.1kN, Factored moment, Mf = -8.8kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

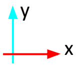
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 3741.95kN (Compression)
Factored moment about x, Mfx = 11.34kNm
Factored moment about y, Mfy = -51.39kNm

Moment capacity about x, Mrx = 52.88kNm
Moment capacity about y, Mry = -239.65kNm
Demand / Capacity, D/C = **0.21 OK**

Detailed Design of Column C15 at L11 - 1026



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L11 - 1026
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 318.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5727 Ref. CSA Eq. 11.11
  and ex = -0.0002011 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 363.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.59 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 682kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3162.9kN (Compression)
Factored shear, Vf = 25.7kN, Factored moment, Mf = 51kN

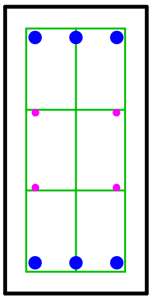
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 393.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6226 Ref. CSA Eq. 11.11
  and ex = -0.0002383 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 584.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.33 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3162.9kN (Compression)
Factored shear, Vf = -5.3kN, Factored moment, Mf = -6.8kN

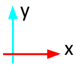
Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 3141.53kN (Compression)
Factored moment about x, Mfx = 10.56kNm
Factored moment about y, Mfy = -53.8kNm

Moment capacity about x, Mrx = 50.93kNm
Moment capacity about y, Mry = -259.45kNm
Demand / Capacity, D/C = **0.21 OK**

Detailed Design of Column C15 at L12 - 911





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L12 - 911
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 264.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5546 Ref. CSA Eq. 11.11
  and ex = -0.0001858 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 289.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.7 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 553.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2572.8kN (Compression)
Factored shear, Vf = 23.5kN, Factored moment, Mf = 45.4kN

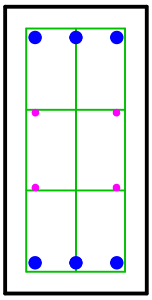
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 321.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6035 Ref. CSA Eq. 11.11
  and ex = -0.0002248 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 490.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2572.8kN (Compression)
Factored shear, Vf = -3.6kN, Factored moment, Mf = -4.5kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

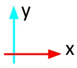
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 2554.44kN (Compression)
Factored moment about x, Mfx = 6.89kNm
Factored moment about y, Mfy = -48.02kNm

Moment capacity about x, Mrx = 26.75kNm
Moment capacity about y, Mry = -186.47kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C15 at L13 - 796



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L13 - 796
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 238.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4996 Ref. CSA Eq. 11.11
  and ex = -0.000133 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 285.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.07 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 523.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1997.7kN (Compression)
Factored shear, Vf = 25.2kN, Factored moment, Mf = 47.6kN

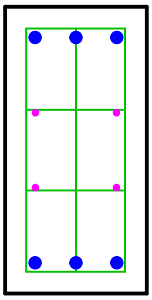
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 288kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5411 Ref. CSA Eq. 11.11
  and ex = -0.0001738 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 483.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1997.7kN (Compression)
Factored shear, Vf = -3.6kN, Factored moment, Mf = -5kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

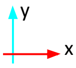
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 1979.29kN (Compression)
Factored moment about x, Mfx = 6.44kNm
Factored moment about y, Mfy = -48.06kNm

Moment capacity about x, Mrx = 27.38kNm
Moment capacity about y, Mry = -204.29kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C15 at L14 - 681



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at L14 - 681
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 217.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4572 Ref. CSA Eq. 11.11
  and ex = -8.34E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.42 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 498.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1432.2kN (Compression)
Factored shear, Vf = 26.2kN, Factored moment, Mf = 47kN

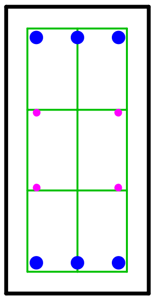
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 261.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4921 Ref. CSA Eq. 11.11
  and ex = -0.0001248 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 476.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.13 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 738.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1432.2kN (Compression)
Factored shear, Vf = -2.2kN, Factored moment, Mf = -3.3kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 1413.83kN (Compression)
Factored moment about x, Mfx = 3.51kNm
Factored moment about y, Mfy = -48.87kNm

Moment capacity about x, Mrx = 15.23kNm
Moment capacity about y, Mry = -212.08kNm
Demand / Capacity, D/C = **0.23 OK**

Detailed Design of Column C15 at L15 - 566



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C15 at L15 - 566
Governing Load Combo:
UW02 (Shear)
UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 201.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4236 Ref. CSA Eq. 11.11
and ex = -3.72E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 277.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.74 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 479.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 871.9kN (Compression)
Factored shear, Vf = 24.4kN, Factored moment, Mf = 43.4kN

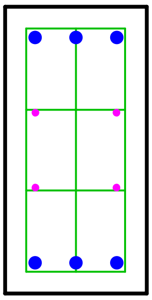
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 239.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4501 Ref. CSA Eq. 11.11
and ex = -7.42E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.48 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 709kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 871.9kN (Compression)
Factored shear, Vf = -4.8kN, Factored moment, Mf = -5.2kN

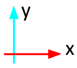
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 853.58kN (Compression)
Factored moment about x, Mfx = 10.68kNm
Factored moment about y, Mfy = -43.69kNm

Moment capacity about x, Mrx = 42.63kNm
Moment capacity about y, Mry = -174.41kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C15 at RF - 451





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C15 at RF - 451
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 162.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3403 Ref. CSA Eq. 11.11
  and ex = 0.0001171 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 265.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.82 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 427.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 319.1kN (Compression)
Factored shear, Vf = 30kN, Factored moment, Mf = 47.2kN

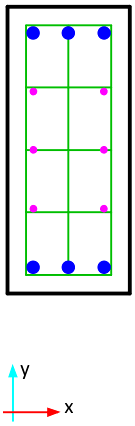
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 221kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4152 Ref. CSA Eq. 11.11
  and ex = -2.44E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 462.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.83 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 683.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 319.1kN (Compression)
Factored shear, Vf = 10.4kN, Factored moment, Mf = 5.3kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 300.76kN (Compression)
Factored moment about x, Mfx = -30.19kNm
Factored moment about y, Mfy = -56.02kNm

Moment capacity about x, Mrx = -80.14kNm
Moment capacity about y, Mry = -148.71kNm
Demand / Capacity, D/C = **0.38 OK**

Detailed Design of Column C17 at L01 - 759



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L01 - 759
Governing Load Combo:
  UW03 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 437.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7862 Ref. CSA Eq. 11.11
  and ex = -0.0003275 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 377.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.71 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4579.8kN (Compression)
Factored shear, Vf = 15.2kN, Factored moment, Mf = 27.1kN

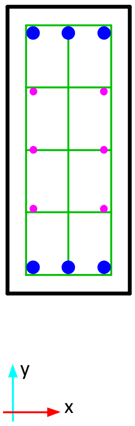
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 464.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7353 Ref. CSA Eq. 11.11
  and ex = -0.000304 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 596.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4579.8kN (Compression)
Factored shear, Vf = 52.5kN, Factored moment, Mf = 138.6kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5248.81kN (Compression)
Factored moment about x, Mfx = 126.76kNm
Factored moment about y, Mfy = 34.18kNm

Moment capacity about x, Mrx = 321.35kNm
Moment capacity about y, Mry = 86.65kNm
Demand / Capacity, D/C = **0.39 OK**

Detailed Design of Column C17 at L02 - 224



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C17 at L02 - 224
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 411.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.74 Ref. CSA Eq. 11.11
and ex = -0.0003063 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 375.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.86 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4105.8kN (Compression)
Factored shear, Vf = -7.9kN, Factored moment, Mf = 7.5kN

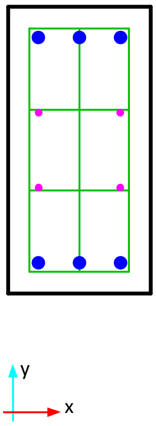
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 447.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.708 Ref. CSA Eq. 11.11
and ex = -0.00029 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 593.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.97 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4105.8kN (Compression)
Factored shear, Vf = 31kN, Factored moment, Mf = 67.8kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 4386.38kN (Compression)
Factored moment about x, Mfx = -40.77kNm
Factored moment about y, Mfy = 37.43kNm

Moment capacity about x, Mrx = -207.1kNm
Moment capacity about y, Mry = 190.13kNm
Demand / Capacity, D/C = **0.2 OK**

Detailed Design of Column C17 at L03 - 1954



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C17 at L03 - 1954
Governing Load Combo:
UW03 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 320.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6716 Ref. CSA Eq. 11.11
and ex = -0.0002696 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 296.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.11 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 617kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3588.1kN (Compression)
Factored shear, Vf = -31.3kN, Factored moment, Mf = 50.8kN

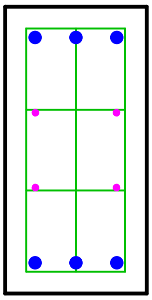
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 388.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7296 Ref. CSA Eq. 11.11
and ex = -0.0003012 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 502.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.89 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3588.1kN (Compression)
Factored shear, Vf = 18.5kN, Factored moment, Mf = -33.4kN

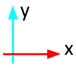
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4078.83kN (Compression)
Factored moment about x, Mfx = 27.52kNm
Factored moment about y, Mfy = -64.25kNm

Moment capacity about x, Mrx = 68.33kNm
Moment capacity about y, Mry = -159.53kNm
Demand / Capacity, D/C = **0.4 OK**

Detailed Design of Column C17 at L04 - 1839





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L04 - 1839
Governing Load Combo:
  UW03 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 304kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.638 Ref. CSA Eq. 11.11
  and ex = -0.0002487 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 295.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.26 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 599.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3303.7kN (Compression)
Factored shear, Vf = -27kN, Factored moment, Mf = 46.6kN

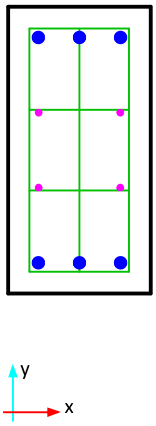
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 360.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6771 Ref. CSA Eq. 11.11
  and ex = -0.0002728 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 497.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3303.7kN (Compression)
Factored shear, Vf = 23.3kN, Factored moment, Mf = -40kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 3753.43kN (Compression)
Factored moment about x, Mfx = 38.23kNm
Factored moment about y, Mfy = -51.11kNm

Moment capacity about x, Mrx = 128.59kNm
Moment capacity about y, Mry = -171.91kNm
Demand / Capacity, D/C = **0.3 OK**

Detailed Design of Column C17 at L05 - 1724



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L05 - 1724
Governing Load Combo:
  UW03 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 287.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6025 Ref. CSA Eq. 11.11
  and ex = -0.0002241 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 292.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 580kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3025.2kN (Compression)
Factored shear, Vf = -27.4kN, Factored moment, Mf = 46.6kN

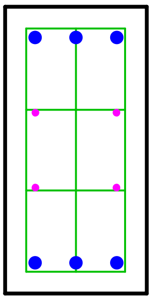
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 338.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6356 Ref. CSA Eq. 11.11
  and ex = -0.0002471 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 494.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.27 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3025.2kN (Compression)
Factored shear, Vf = 23.7kN, Factored moment, Mf = -42.8kN

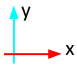
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 3435.5kN (Compression)
Factored moment about x, Mfx = 36.77kNm
Factored moment about y, Mfy = -52.37kNm

Moment capacity about x, Mrx = 131.31kNm
Moment capacity about y, Mry = -187.03kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C17 at L06 - 1609





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L06 - 1609
Governing Load Combo:
  UW03 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 272.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5714 Ref. CSA Eq. 11.11
  and ex = -0.0002 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 290.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 563.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2751kN (Compression)
Factored shear, Vf = -27.2kN, Factored moment, Mf = 46.5kN

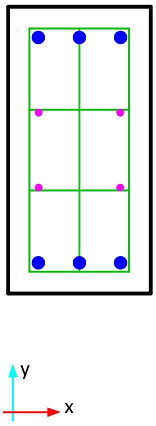
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 318.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5991 Ref. CSA Eq. 11.11
  and ex = -0.0002216 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 490.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.45 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2751kN (Compression)
Factored shear, Vf = 25.1kN, Factored moment, Mf = -45.9kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2805.8kN (Compression)
Factored moment about x, Mfx = 35.78kNm
Factored moment about y, Mfy = -54.16kNm

Moment capacity about x, Mrx = 136.49kNm
Moment capacity about y, Mry = -206.6kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C17 at L07 - 1494



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L07 - 1494
Governing Load Combo:
  UW03 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 259.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5454 Ref. CSA Eq. 11.11
  and ex = -0.0001777 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 288.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.76 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 548.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2498.6kN (Compression)
Factored shear, Vf = -27.3kN, Factored moment, Mf = -46.5kN

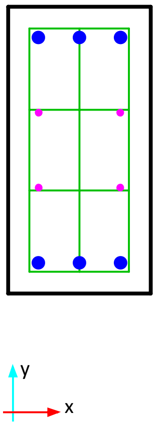
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 301.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5667 Ref. CSA Eq. 11.11
  and ex = -0.0001961 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 486.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2498.6kN (Compression)
Factored shear, Vf = 25.9kN, Factored moment, Mf = 54.3kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2527.69kN (Compression)
Factored moment about x, Mfx = 35.83kNm
Factored moment about y, Mfy = -54kNm

Moment capacity about x, Mrx = 140.35kNm
Moment capacity about y, Mry = -211.52kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C17 at L08 - 1379



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L08 - 1379
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 258.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5418 Ref. CSA Eq. 11.11
  and ex = -0.0001745 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 288.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 546.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2510.7kN (Compression)
Factored shear, Vf = -30kN, Factored moment, Mf = -51.1kN

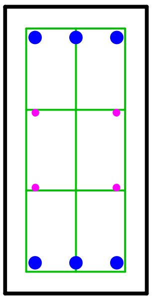
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 306.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5761 Ref. CSA Eq. 11.11
  and ex = -0.0002038 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 487.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.57 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2510.7kN (Compression)
Factored shear, Vf = 20.9kN, Factored moment, Mf = 38.6kN

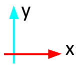
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 2510.75kN (Compression)
Factored moment about x, Mfx = 38.6kNm
Factored moment about y, Mfy = -51.06kNm

Moment capacity about x, Mrx = 157.14kNm
Moment capacity about y, Mry = -207.87kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C17 at L09 - 1264





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L09 - 1264
Governing Load Combo:
  U01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 239.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5026 Ref. CSA Eq. 11.11
  and ex = -0.0001361 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 285.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.05 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 524.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2060.1kN (Compression)
Factored shear, Vf = -29.3kN, Factored moment, Mf = -49.6kN

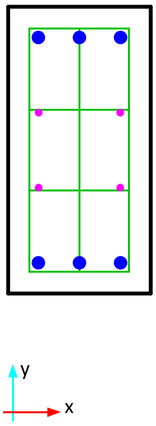
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 282.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5309 Ref. CSA Eq. 11.11
  and ex = -0.0001644 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 482kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.85 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2060.1kN (Compression)
Factored shear, Vf = 20.6kN, Factored moment, Mf = 37.7kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1981.92kN (Compression)
Factored moment about x, Mfx = 36.02kNm
Factored moment about y, Mfy = -53.13kNm

Moment capacity about x, Mrx = 146.73kNm
Moment capacity about y, Mry = -216.44kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C17 at L10 - 1149



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C17 at L10 - 1149
Governing Load Combo:
    U01 (Shear)
    UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
    4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 228.8kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.4801 Ref. CSA Eq. 11.11
    and ex = -0.0001112 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 283.3kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 28.22 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 512kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1782.7kN (Compression)
Factored shear, Vf = -29.5kN, Factored moment, Mf = -50.1kN

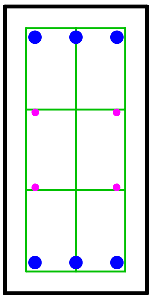
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 269.3kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.5061 Ref. CSA Eq. 11.11
    and ex = -0.0001397 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 478.5kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 28.02 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 747.9kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1782.7kN (Compression)
Factored shear, Vf = 20.9kN, Factored moment, Mf = 38kN

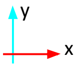
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1713.29kN (Compression)
Factored moment about x, Mfx = 36.09kNm
Factored moment about y, Mfy = -52.88kNm

Moment capacity about x, Mrx = 147.06kNm
Moment capacity about y, Mry = -215.48kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C17 at L11 - 1034





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C17 at L11 - 1034
Governing Load Combo:
    UW03 (Shear)
    UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
    4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 217.9kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.4573 Ref. CSA Eq. 11.11
    and ex = -8.36E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 28.42 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 498.9kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1442.8kN (Compression)
Factored shear, Vf = -28.1kN, Factored moment, Mf = -47.5kN

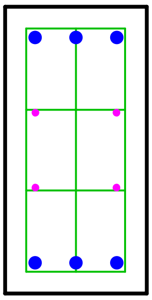
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 251.7kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.4729 Ref. CSA Eq. 11.11
    and ex = -0.0001028 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 473.4kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 28.28 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 725.1kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1442.8kN (Compression)
Factored shear, Vf = 28.7kN, Factored moment, Mf = 53.3kN

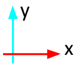
Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 1428.76kN (Compression)
Factored moment about x, Mfx = -35.85kNm
Factored moment about y, Mfy = 54.34kNm

Moment capacity about x, Mrx = -139.57kNm
Moment capacity about y, Mry = 211.56kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C17 at L12 - 919





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L12 - 919
Governing Load Combo:
  U01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 210.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4416 Ref. CSA Eq. 11.11
  and ex = -6.28E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 279.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.56 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 489.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1233.3kN (Compression)
Factored shear, Vf = -29.6kN, Factored moment, Mf = -49.9kN

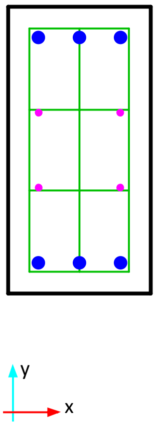
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 246.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4635 Ref. CSA Eq. 11.11
  and ex = -9.13E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 471.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 718.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1233.3kN (Compression)
Factored shear, Vf = 21.2kN, Factored moment, Mf = 37.6kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm   **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2   **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2   **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 1164.6kN (Compression)
Factored moment about x, Mfx = -35.19kNm
Factored moment about y, Mfy = 52.92kNm

Moment capacity about x, Mrx = -124.08kNm
Moment capacity about y, Mry = 186.59kNm
Demand / Capacity, D/C =   **0.28 OK**

Detailed Design of Column C17 at L13 - 804



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C17 at L13 - 804
Governing Load Combo:
UW03 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 202kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4239 Ref. CSA Eq. 11.11
and ex = -3.76E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 277.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.74 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 479.3kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 924.6kN (Compression)
Factored shear, Vf = -28kN, Factored moment, Mf = -47.8kN

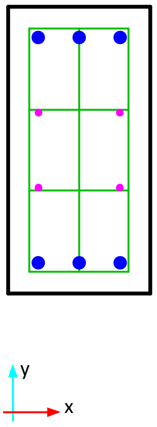
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 233kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4378 Ref. CSA Eq. 11.11
and ex = -5.75E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 467.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 700.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 924.6kN (Compression)
Factored shear, Vf = 28.9kN, Factored moment, Mf = 51.8kN

Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 902.2kN (Compression)
Factored moment about x, Mfx = -35.13kNm
Factored moment about y, Mfy = 52.64kNm

Moment capacity about x, Mrx = -120.3kNm
Moment capacity about y, Mry = 180.27kNm
Demand / Capacity, D/C = **0.29 OK**

Detailed Design of Column C17 at L14 - 689



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L14 - 689
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 195.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4093 Ref. CSA Eq. 11.11
  and ex = -1.52E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.89 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 470.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 735.5kN (Compression)
Factored shear, Vf = -32.1kN, Factored moment, Mf = -53.9kN

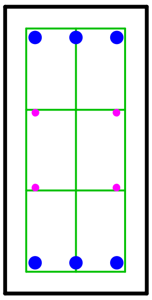
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 228.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.43 Ref. CSA Eq. 11.11
  and ex = -4.65E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 465.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 694.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 735.5kN (Compression)
Factored shear, Vf = 22.8kN, Factored moment, Mf = 39.3kN

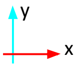
Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 714.84kN (Compression)
Factored moment about x, Mfx = -39.43kNm
Factored moment about y, Mfy = 55.42kNm

Moment capacity about x, Mrx = -123.32kNm
Moment capacity about y, Mry = 173.33kNm
Demand / Capacity, D/C = **0.32 OK**

Detailed Design of Column C17 at L15 - 574





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C17 at L15 - 574
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 176.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3701 Ref. CSA Eq. 11.11
  and ex = 5.38E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 270.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 446.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 443.1kN (Compression)
Factored shear, Vf = -29.1kN, Factored moment, Mf = -50.4kN

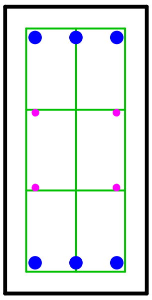
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 220kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4134 Ref. CSA Eq. 11.11
  and ex = -2.16E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 462.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.85 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 682.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 443.1kN (Compression)
Factored shear, Vf = 21.7kN, Factored moment, Mf = 37.3kN

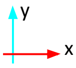
Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 443.15kN (Compression)
Factored moment about x, Mfx = 37.28kNm
Factored moment about y, Mfy = -50.37kNm

Moment capacity about x, Mrx = 112.1kNm
Moment capacity about y, Mry = -151.47kNm
Demand / Capacity, D/C = **0.33 OK**

Detailed Design of Column C17 at RF - 459





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
 Confinement Type: Tied
 Axial compression: varies
 Steel: 0.85
 Concrete: 0.65
Column: C17 at RF - 459
Governing Load Combo:
 UW03 (Shear)
 U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
 4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 124.8kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.262 Ref. CSA Eq. 11.11
 and ex = 0.0003512 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 248.5kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 31.46 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 373.3kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 135.6kN (Compression)
Factored shear, Vf = -34.7kN, Factored moment, Mf = 64.8kN

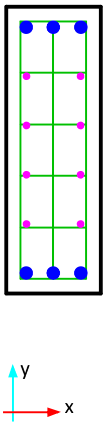
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 169.2kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.3178 Ref. CSA Eq. 11.11
 and ex = 0.0001724 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 437.5kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 30.21 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 606.6kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 135.6kN (Compression)
Factored shear, Vf = 39kN, Factored moment, Mf = -77.1kN

Vfx/Vrx + Vfy/Vry = **0.16 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 131.67kN (Compression)
Factored moment about x, Mfx = -45.76kNm
Factored moment about y, Mfy = 73.18kNm

Moment capacity about x, Mrx = -85.37kNm
Moment capacity about y, Mry = 136.52kNm
Demand / Capacity, D/C = **0.54 OK**

Detailed Design of Column C19 at L01 - 207



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C19 at L01 - 207
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 634.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8878 Ref. CSA Eq. 11.11
and ex = -0.0003663 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 458.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.44 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6652kN (Compression)
Factored shear, Vf = 26.6kN, Factored moment, Mf = 57.7kN

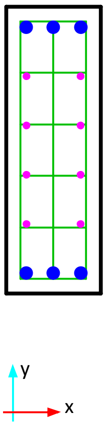
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 828.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.9984 Ref. CSA Eq. 11.11
and ex = -0.0003996 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 807.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.2 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6652kN (Compression)
Factored shear, Vf = -11.8kN, Factored moment, Mf = -4.9kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7066.23kN (Compression)
Factored moment about x, Mfx = -4.63kNm
Factored moment about y, Mfy = 55.95kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.06 Pf>Pmax Not OK**

Detailed Design of Column C19 at L02 - 28



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C19 at L02 - 28
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 578.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8098 Ref. CSA Eq. 11.11
  and ex = -0.0003374 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 454.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.64 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6054kN (Compression)
Factored shear, Vf = 31.7kN, Factored moment, Mf = 43.7kN

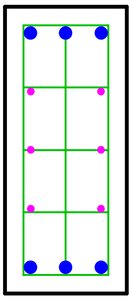
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 716.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8629 Ref. CSA Eq. 11.11
  and ex = -0.0003576 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 796.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6054kN (Compression)
Factored shear, Vf = -11.6kN, Factored moment, Mf = -41.2kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

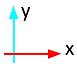
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 6468.79kN (Compression)
Factored moment about x, Mfx = -2.19kNm
Factored moment about y, Mfy = -62.95kNm

Moment capacity about x, Mrx = -6.9kNm
Moment capacity about y, Mry = -198.24kNm
Demand / Capacity, D/C = **0.32 OK**

Detailed Design of Column C19 at L03 - 1959



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C19 at L03 - 1959
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 520kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9354 Ref. CSA Eq. 11.11
  and ex = -0.0003816 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 384kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.33 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5618kN (Compression)
Factored shear, Vf = 35.6kN, Factored moment, Mf = 58.1kN

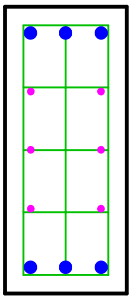
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 697.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1047 Ref. CSA Eq. 11.11
  and ex = -0.0004253 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 618.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.02 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5618kN (Compression)
Factored shear, Vf = 4.1kN, Factored moment, Mf = 7.9kN

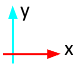
Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6030.71kN (Compression)
Factored moment about x, Mfx = 7.56kNm
Factored moment about y, Mfy = 60.7kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.13 Pf>Pmax Not OK**

Detailed Design of Column C19 at L04 - 1844





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C19 at L04 - 1844
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 469.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8443 Ref. CSA Eq. 11.11
  and ex = -0.0003508 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 380.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.54 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5192.6kN (Compression)
Factored shear, Vf = 34.5kN, Factored moment, Mf = 56kN

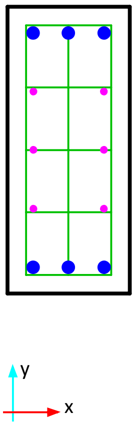
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 615.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9741 Ref. CSA Eq. 11.11
  and ex = -0.0003929 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 612.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.25 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5192.6kN (Compression)
Factored shear, Vf = 4.4kN, Factored moment, Mf = 7.5kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5573.45kN (Compression)
Factored moment about x, Mfx = 7.86kNm
Factored moment about y, Mfy = 58.18kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.05 Pf>Pmax Not OK**

Detailed Design of Column C19 at L05 - 1729



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C19 at L05 - 1729
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 428kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7698 Ref. CSA Eq. 11.11
and ex = -0.0003203 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 376.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.76 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4771.5kN (Compression)
Factored shear, Vf = 33.4kN, Factored moment, Mf = 54.1kN

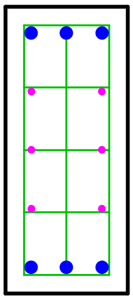
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 549.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8699 Ref. CSA Eq. 11.11
and ex = -0.0003601 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 606.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.48 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4771.5kN (Compression)
Factored shear, Vf = 5.4kN, Factored moment, Mf = 9.6kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5120.81kN (Compression)
Factored moment about x, Mfx = 9.91kNm
Factored moment about y, Mfy = 56.14kNm

Moment capacity about x, Mrx = 28.26kNm
Moment capacity about y, Mry = 160.09kNm
Demand / Capacity, D/C = **0.35 OK**

Detailed Design of Column C19 at L06 - 1614



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C19 at L06 - 1614
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 393.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7071 Ref. CSA Eq. 11.11
and ex = -0.0002896 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 373.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.97 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 766.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4354.3kN (Compression)
Factored shear, Vf = 32.8kN, Factored moment, Mf = 52.7kN

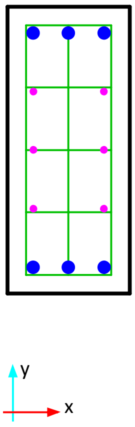
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 497kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.787 Ref. CSA Eq. 11.11
and ex = -0.0003278 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 600.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.71 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4354.3kN (Compression)
Factored shear, Vf = 6.3kN, Factored moment, Mf = 11.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 4648.21kN (Compression)
Factored moment about x, Mfx = -11.01kNm
Factored moment about y, Mfy = -55.49kNm

Moment capacity about x, Mrx = -38.51kNm
Moment capacity about y, Mry = -194.07kNm
Demand / Capacity, D/C = **0.29 OK**

Detailed Design of Column C19 at L07 - 1499



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C19 at L07 - 1499
Governing Load Combo:
U01 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 362.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6528 Ref. CSA Eq. 11.11
and ex = -0.0002582 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 369.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.19 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 732.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3939.2kN (Compression)
Factored shear, Vf = 32.5kN, Factored moment, Mf = 52.4kN

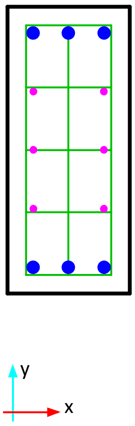
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 454kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7189 Ref. CSA Eq. 11.11
and ex = -0.0002957 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 594.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.93 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3939.2kN (Compression)
Factored shear, Vf = 7kN, Factored moment, Mf = 12.4kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 3816.66kN (Compression)
Factored moment about x, Mfx = 8.52kNm
Factored moment about y, Mfy = 60.34kNm

Moment capacity about x, Mrx = 33.73kNm
Moment capacity about y, Mry = 238.87kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C19 at L08 - 1384



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C19 at L08 - 1384
Governing Load Combo:
U01 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 336.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6056 Ref. CSA Eq. 11.11
and ex = -0.0002263 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 366.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.42 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 703kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3525.9kN (Compression)
Factored shear, Vf = 33.2kN, Factored moment, Mf = 52.8kN

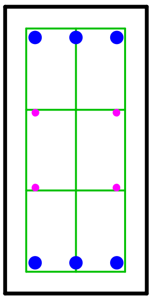
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 417.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6615 Ref. CSA Eq. 11.11
and ex = -0.0002635 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 589.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.16 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3525.9kN (Compression)
Factored shear, Vf = 8.5kN, Factored moment, Mf = 14.3kN

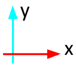
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 3393.82kN (Compression)
Factored moment about x, Mfx = -10.41kNm
Factored moment about y, Mfy = -62.25kNm

Moment capacity about x, Mrx = -42.35kNm
Moment capacity about y, Mry = -253.23kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C19 at L09 - 1269





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C19 at L09 - 1269
Governing Load Combo:
  U01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 290.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6098 Ref. CSA Eq. 11.11
  and ex = -0.0002294 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 293.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.39 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 584kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3114.6kN (Compression)
Factored shear, Vf = 30.8kN, Factored moment, Mf = 49kN

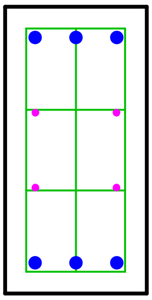
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 356.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.67 Ref. CSA Eq. 11.11
  and ex = -0.0002686 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 497.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.12 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3114.6kN (Compression)
Factored shear, Vf = 8kN, Factored moment, Mf = 13.2kN

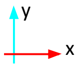
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm   **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2   **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2   **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 2997.2kN (Compression)
Factored moment about x, Mfx = -10.4kNm
Factored moment about y, Mfy = -58.03kNm

Moment capacity about x, Mrx = -38.54kNm
Moment capacity about y, Mry = -215.05kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C19 at L10 - 1154





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C19 at L10 - 1154
Governing Load Combo:
  U01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 267.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5611 Ref. CSA Eq. 11.11
  and ex = -0.0001914 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 290kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.66 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 557.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2708kN (Compression)
Factored shear, Vf = 31.6kN, Factored moment, Mf = 51.4kN

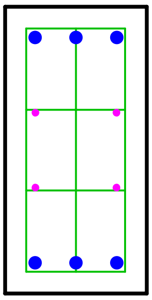
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 326kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6125 Ref. CSA Eq. 11.11
  and ex = -0.0002313 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 491.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2708kN (Compression)
Factored shear, Vf = 9.4kN, Factored moment, Mf = 16.5kN

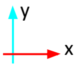
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 2602.38kN (Compression)
Factored moment about x, Mfx = -11.74kNm
Factored moment about y, Mfy = -58.7kNm

Moment capacity about x, Mrx = -45.03kNm
Moment capacity about y, Mry = -225.16kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C19 at L11 - 1039





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C19 at L11 - 1039
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 241.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5071 Ref. CSA Eq. 11.11
  and ex = -0.0001408 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 285.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.01 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 527.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2208.7kN (Compression)
Factored shear, Vf = 32.6kN, Factored moment, Mf = -59.2kN

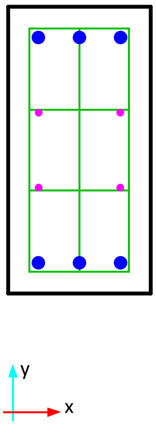
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 297.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5582 Ref. CSA Eq. 11.11
  and ex = -0.000189 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 485.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.68 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2208.7kN (Compression)
Factored shear, Vf = 7.2kN, Factored moment, Mf = -12.8kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 2208.73kN (Compression)
Factored moment about x, Mfx = -12.79kNm
Factored moment about y, Mfy = -59.23kNm

Moment capacity about x, Mrx = -50.24kNm
Moment capacity about y, Mry = -232.64kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C19 at L12 - 924



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C19 at L12 - 924
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 227.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4768 Ref. CSA Eq. 11.11
  and ex = -0.0001074 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 282.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.25 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 510.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1816.5kN (Compression)
Factored shear, Vf = 32.1kN, Factored moment, Mf = -57.8kN

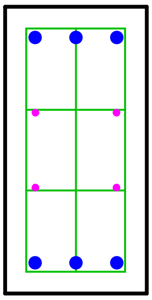
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 276.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5201 Ref. CSA Eq. 11.11
  and ex = -0.0001539 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 480.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.92 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1816.5kN (Compression)
Factored shear, Vf = 7.7kN, Factored moment, Mf = -13.7kN

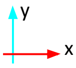
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1816.51kN (Compression)
Factored moment about x, Mfx = -13.65kNm
Factored moment about y, Mfy = -57.79kNm

Moment capacity about x, Mrx = -48.21kNm
Moment capacity about y, Mry = -204.09kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C19 at L13 - 809





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C19 at L13 - 809
Governing Load Combo:
U02 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 221.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.464 Ref. CSA Eq. 11.11
and ex = -9.19E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 502.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1598.6kN (Compression)
Factored shear, Vf = 32.1kN, Factored moment, Mf = 53.2kN

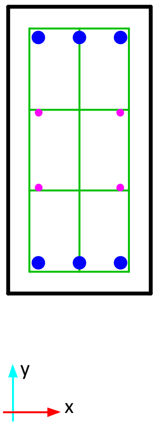
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 265.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4985 Ref. CSA Eq. 11.11
and ex = -0.0001317 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 477.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.08 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 742.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1598.6kN (Compression)
Factored shear, Vf = 11.5kN, Factored moment, Mf = 20kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1425.26kN (Compression)
Factored moment about x, Mfx = -14.2kNm
Factored moment about y, Mfy = -57.62kNm

Moment capacity about x, Mrx = -50.62kNm
Moment capacity about y, Mry = -205.4kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C19 at L14 - 694



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C19 at L14 - 694
Governing Load Combo:
U01 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 205.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4307 Ref. CSA Eq. 11.11
and ex = -4.75E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 483.3kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1090kN (Compression)
Factored shear, Vf = 32.1kN, Factored moment, Mf = 52.7kN

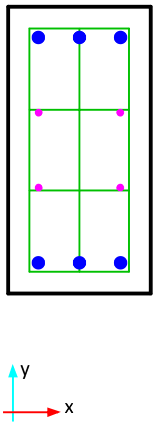
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 244.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4598 Ref. CSA Eq. 11.11
and ex = -8.67E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 471.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.39 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 715.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1090kN (Compression)
Factored shear, Vf = 12kN, Factored moment, Mf = 20.1kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1034.55kN (Compression)
Factored moment about x, Mfx = -15.73kNm
Factored moment about y, Mfy = -60.14kNm

Moment capacity about x, Mrx = -50.88kNm
Moment capacity about y, Mry = -194.52kNm
Demand / Capacity, D/C = **0.31 OK**

Detailed Design of Column C19 at L15 - 579



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C19 at L15 - 579
Governing Load Combo:
  U02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 195.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4112 Ref. CSA Eq. 11.11
  and ex = -1.81E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 471.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 731.1kN (Compression)
Factored shear, Vf = 29.4kN, Factored moment, Mf = 50.4kN

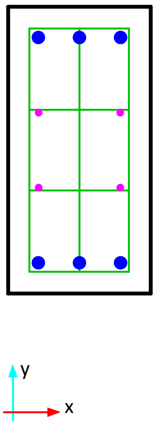
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 232.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4363 Ref. CSA Eq. 11.11
  and ex = -5.55E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 466.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 699.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 731.1kN (Compression)
Factored shear, Vf = 10.6kN, Factored moment, Mf = 19.6kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 662.92kN (Compression)
Factored moment about x, Mfx = 13.98kNm
Factored moment about y, Mfy = 53.72kNm

Moment capacity about x, Mrx = 43.68kNm
Moment capacity about y, Mry = 167.83kNm
Demand / Capacity, D/C = **0.32 OK**

Detailed Design of Column C19 at RF - 464



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C19 at RF - 464
Governing Load Combo:
UW04 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 122kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.2561 Ref. CSA Eq. 11.11
and ex = 0.0003747 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 246.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 31.62 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 368.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 255.4kN (Compression)
Factored shear, Vf = 42.1kN, Factored moment, Mf = -80kN

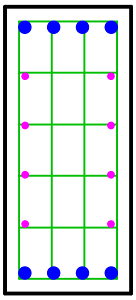
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 215.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4053 Ref. CSA Eq. 11.11
and ex = -8.6E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 460.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.94 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 676.3kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 255.4kN (Compression)
Factored shear, Vf = 14.5kN, Factored moment, Mf = -31kN

Vfx/Vrx + Vfy/Vry = **0.14 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 255.39kN (Compression)
Factored moment about x, Mfx = -30.99kNm
Factored moment about y, Mfy = -80.04kNm

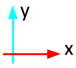
Moment capacity about x, Mrx = -57.67kNm
Moment capacity about y, Mry = -148.96kNm
Demand / Capacity, D/C = **0.54 OK**

Detailed Design of Column C2 at L01 - 181



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L01 - 181
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm



SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1980.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.9785 Ref. CSA Eq. 11.11
  and ex = -0.0005319 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 676.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.28 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 12047.1kN (Compression)
Factored shear, Vf = 30.3kN, Factored moment, Mf = 54.2kN

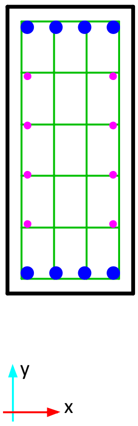
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 2280.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 2.0608 Ref. CSA Eq. 11.11
  and ex = -0.0005373 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1123.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.24 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 12047.1kN (Compression)
Factored shear, Vf = -29kN, Factored moment, Mf = -91.5kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 12530.69kN (Compression)
Factored moment about x, Mfx = -96.81kNm
Factored moment about y, Mfy = 50.29kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.44 Pf>Pmax Not OK**

Detailed Design of Column C2 at L02 - 2



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L02 - 2
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1495.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.4939 Ref. CSA Eq. 11.11
  and ex = -0.0004882 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 667kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.58 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 10973.3kN (Compression)
Factored shear, Vf = 13.6kN, Factored moment, Mf = 41.4kN

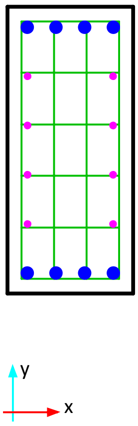
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1654kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.4945 Ref. CSA Eq. 11.11
  and ex = -0.0004882 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1106.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.58 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 10973.3kN (Compression)
Factored shear, Vf = 31.6kN, Factored moment, Mf = 88.9kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 11456.65kN (Compression)
Factored moment about x, Mfx = 90.49kNm
Factored moment about y, Mfy = 43.31kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.31 Pf>Pmax Not OK**

Detailed Design of Column C2 at L03 - 1933



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L03 - 1933
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1267.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.2666 Ref. CSA Eq. 11.11
  and ex = -0.0004561 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 660.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.81 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 10161.2kN (Compression)
Factored shear, Vf = -12kN, Factored moment, Mf = -25kN

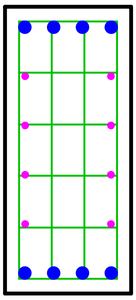
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1425.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.2882 Ref. CSA Eq. 11.11
  and ex = -0.0004597 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1096.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 10161.2kN (Compression)
Factored shear, Vf = 12.9kN, Factored moment, Mf = 32.5kN

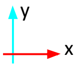
Vfx/Vrx + Vfy/Vry = **0.01 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 10608.58kN (Compression)
Factored moment about x, Mfx = 31.95kNm
Factored moment about y, Mfy = -21.18kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.22 Pf>Pmax Not OK**

Detailed Design of Column C2 at L04 - 1818





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L04 - 1818
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1101kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0999 Ref. CSA Eq. 11.11
  and ex = -0.0004242 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 653.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.03 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9357.7kN (Compression)
Factored shear, Vf = -6.6kN, Factored moment, Mf = -10.6kN

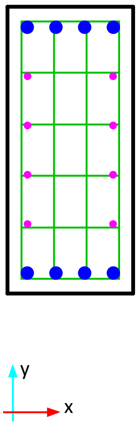
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1198.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0831 Ref. CSA Eq. 11.11
  and ex = -0.0004205 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1083.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.06 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9357.7kN (Compression)
Factored shear, Vf = 19.4kN, Factored moment, Mf = 47.7kN

Vfx/Vrx + Vfy/Vry = **0.01 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 9769.35kN (Compression)
Factored moment about x, Mfx = 47.85kNm
Factored moment about y, Mfy = -7.19kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.12 Pf>Pmax Not OK**

Detailed Design of Column C2 at L05 - 1703



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L05 - 1703
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 951kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.95 Ref. CSA Eq. 11.11
  and ex = -0.000386 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 646.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8561.3kN (Compression)
Factored shear, Vf = -9.7kN, Factored moment, Mf = -15.7kN

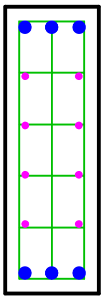
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1041.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9412 Ref. CSA Eq. 11.11
  and ex = -0.0003833 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1070.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.32 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8561.3kN (Compression)
Factored shear, Vf = 23.2kN, Factored moment, Mf = 50.6kN

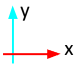
Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 8937.4kN (Compression)
Factored moment about x, Mfx = 50.68kNm
Factored moment about y, Mfy = -11.89kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.03 Pf>Pmax Not OK**

Detailed Design of Column C2 at L06 - 1588





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L06 - 1588
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 934.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.3069 Ref. CSA Eq. 11.11
  and ex = -0.0004626 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 472.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.76 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7771.3kN (Compression)
Factored shear, Vf = -6.8kN, Factored moment, Mf = -10.6kN

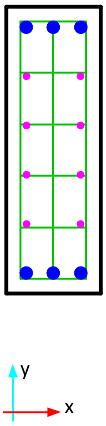
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 1064.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.2821 Ref. CSA Eq. 11.11
  and ex = -0.0004587 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 822kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.79 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7771.3kN (Compression)
Factored shear, Vf = 23.8kN, Factored moment, Mf = 48.8kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 8112.01kN (Compression)
Factored moment about x, Mfx = 49.07kNm
Factored moment about y, Mfy = -7.93kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.22 Pf>Pmax Not OK**

Detailed Design of Column C2 at L07 - 1473



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L07 - 1473
Governing Load Combo:
  UW03 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 627kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8772 Ref. CSA Eq. 11.11
  and ex = -0.0003627 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 458.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.46 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6093.6kN (Compression)
Factored shear, Vf = -4.8kN, Factored moment, Mf = -8.6kN

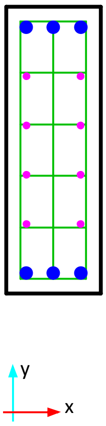
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 697.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8399 Ref. CSA Eq. 11.11
  and ex = -0.0003492 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 794.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.56 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6093.6kN (Compression)
Factored shear, Vf = 36.2kN, Factored moment, Mf = 90.4kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7305.6kN (Compression)
Factored moment about x, Mfx = 57.21kNm
Factored moment about y, Mfy = -11.82kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.1 Pf>Pmax Not OK**

Detailed Design of Column C2 at L08 - 1358



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C2 at L08 - 1358
Governing Load Combo:
UW03 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 552.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7735 Ref. CSA Eq. 11.11
and ex = -0.0003219 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 452.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.75 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1005.4kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5426.9kN (Compression)
Factored shear, Vf = -5.4kN, Factored moment, Mf = -9.3kN

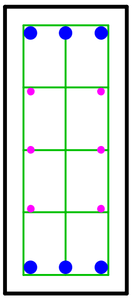
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 614.8kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7407 Ref. CSA Eq. 11.11
and ex = -0.0003067 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 784.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.85 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5426.9kN (Compression)
Factored shear, Vf = 47.3kN, Factored moment, Mf = 96kN

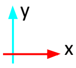
Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 6476.02kN (Compression)
Factored moment about x, Mfx = -68.43kNm
Factored moment about y, Mfy = 13.77kNm

Moment capacity about x, Mrx = -542.63kNm
Moment capacity about y, Mry = 109.19kNm
Demand / Capacity, D/C = **0.13 OK**

Detailed Design of Column C2 at L09 - 1243





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L09 - 1243
Governing Load Combo:
  UW03 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 477.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8586 Ref. CSA Eq. 11.11
  and ex = -0.0003561 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 381kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.51 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4765.7kN (Compression)
Factored shear, Vf = -5.2kN, Factored moment, Mf = -8.8kN

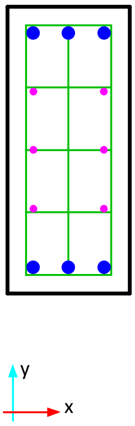
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 511.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8102 Ref. CSA Eq. 11.11
  and ex = -0.0003375 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 602.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.64 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4765.7kN (Compression)
Factored shear, Vf = 37.7kN, Factored moment, Mf = 74.3kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5714.89kN (Compression)
Factored moment about x, Mfx = 51.9kNm
Factored moment about y, Mfy = -12.04kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.07 Pf>Pmax Not OK**

Detailed Design of Column C2 at L10 - 1128



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L10 - 1128
Governing Load Combo:
  UW03 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 410.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7383 Ref. CSA Eq. 11.11
  and ex = -0.0003055 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 375.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.86 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 785.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4117.1kN (Compression)
Factored shear, Vf = -6.1kN, Factored moment, Mf = -10.3kN

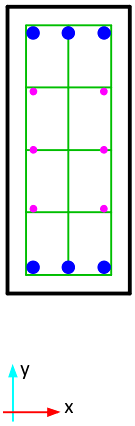
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 436.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6918 Ref. CSA Eq. 11.11
  and ex = -0.0002812 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 592.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.03 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4117.1kN (Compression)
Factored shear, Vf = 46.9kN, Factored moment, Mf = 95.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4937.38kN (Compression)
Factored moment about x, Mfx = 69.61kNm
Factored moment about y, Mfy = -13.98kNm

Moment capacity about x, Mrx = 403.33kNm
Moment capacity about y, Mry = -81kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C2 at L11 - 1013



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L11 - 1013
Governing Load Combo:
  UW03 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 360.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6488 Ref. CSA Eq. 11.11
  and ex = -0.0002556 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 369.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.21 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 730.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3473.9kN (Compression)
Factored shear, Vf = -6.9kN, Factored moment, Mf = -11.3kN

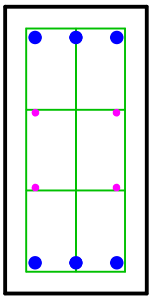
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 385.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6111 Ref. CSA Eq. 11.11
  and ex = -0.0002303 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 583.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.39 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3473.9kN (Compression)
Factored shear, Vf = 54.4kN, Factored moment, Mf = 97.9kN

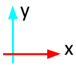
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 3452.47kN (Compression)
Factored moment about x, Mfx = -109.37kNm
Factored moment about y, Mfy = 12.14kNm

Moment capacity about x, Mrx = -631.98kNm
Moment capacity about y, Mry = 70.15kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C2 at L12 - 898





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L12 - 898
Governing Load Combo:
  UW03 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 296.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6224 Ref. CSA Eq. 11.11
  and ex = -0.0002382 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 294.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.33 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 590.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2816.6kN (Compression)
Factored shear, Vf = -6.5kN, Factored moment, Mf = 11.3kN

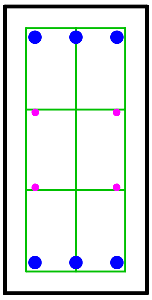
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 308.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5792 Ref. CSA Eq. 11.11
  and ex = -0.0002063 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 488.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.56 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2816.6kN (Compression)
Factored shear, Vf = 46.2kN, Factored moment, Mf = -93.3kN

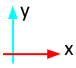
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 3381.29kN (Compression)
Factored moment about x, Mfx = -71.44kNm
Factored moment about y, Mfy = 15.2kNm

Moment capacity about x, Mrx = -300.65kNm
Moment capacity about y, Mry = 63.97kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C2 at L13 - 783





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L13 - 783
Governing Load Combo:
  UW03 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 262.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5517 Ref. CSA Eq. 11.11
  and ex = -0.0001833 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 289.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.72 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 552.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2203.5kN (Compression)
Factored shear, Vf = -7.4kN, Factored moment, Mf = -12.1kN

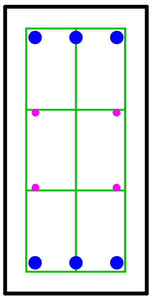
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 274kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5147 Ref. CSA Eq. 11.11
  and ex = -0.0001486 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 479.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.96 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2203.5kN (Compression)
Factored shear, Vf = 54.2kN, Factored moment, Mf = 99.2kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

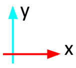
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 2185.12kN (Compression)
Factored moment about x, Mfx = -99kNm
Factored moment about y, Mfy = 12.8kNm

Moment capacity about x, Mrx = -438.29kNm
Moment capacity about y, Mry = 56.67kNm
Demand / Capacity, D/C = **0.23 OK**

Detailed Design of Column C2 at L14 - 668



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L14 - 668
Governing Load Combo:
  UW03 (Shear)
  UW03 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 236kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4953 Ref. CSA Eq. 11.11
  and ex = -0.0001283 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 284.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.1 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 520.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1575.2kN (Compression)
Factored shear, Vf = -6.6kN, Factored moment, Mf = -11.7kN

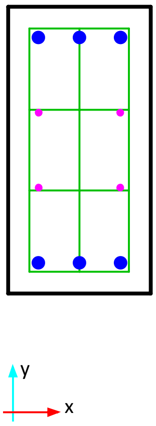
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 247.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4646 Ref. CSA Eq. 11.11
  and ex = -9.27E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 472kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.35 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 719.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1575.2kN (Compression)
Factored shear, Vf = 57.2kN, Factored moment, Mf = 98.9kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 1556.8kN (Compression)
Factored moment about x, Mfx = -105.36kNm
Factored moment about y, Mfy = 10.65kNm

Moment capacity about x, Mrx = -479.12kNm
Moment capacity about y, Mry = 48.43kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C2 at L15 - 553



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at L15 - 553
Governing Load Combo:
  UW03 (Shear)
  U01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 212.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4456 Ref. CSA Eq. 11.11
  and ex = -6.82E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 279.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 492.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 948.8kN (Compression)
Factored shear, Vf = -12kN, Factored moment, Mf = -16.4kN

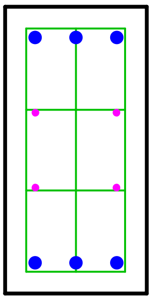
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 226.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.426 Ref. CSA Eq. 11.11
  and ex = -4.07E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 464.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.71 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 691.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 948.8kN (Compression)
Factored shear, Vf = 51.3kN, Factored moment, Mf = 92.8kN

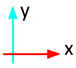
Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 3
Factored axial force, Pf = 1075.79kN (Compression)
Factored moment about x, Mfx = -68.72kNm
Factored moment about y, Mfy = 33.09kNm

Moment capacity about x, Mrx = -257.87kNm
Moment capacity about y, Mry = 124.17kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C2 at RF - 438





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C2 at RF - 438
Governing Load Combo:
  UW03 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 157.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3303 Ref. CSA Eq. 11.11
  and ex = 0.0001408 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 263.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.99 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 420.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 303.9kN (Compression)
Factored shear, Vf = 18.2kN, Factored moment, Mf = -52kN

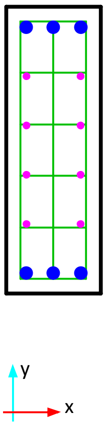
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 135kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2537 Ref. CSA Eq. 11.11
  and ex = 0.0003844 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 412.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 31.69 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 547.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 303.9kN (Compression)
Factored shear, Vf = 84.7kN, Factored moment, Mf = -173.4kN

Vfx/Vrx + Vfy/Vry = **0.2 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 303.87kN (Compression)
Factored moment about x, Mfx = -173.44kNm
Factored moment about y, Mfy = -52.01kNm

Moment capacity about x, Mrx = -290.58kNm
Moment capacity about y, Mry = -87.14kNm
Demand / Capacity, D/C = **0.6 OK**

Detailed Design of Column C21 at L01 - 208



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L01 - 208
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 670.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9377 Ref. CSA Eq. 11.11
  and ex = -0.0003823 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 460.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.32 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7186.8kN (Compression)
Factored shear, Vf = 40.3kN, Factored moment, Mf = 83.9kN

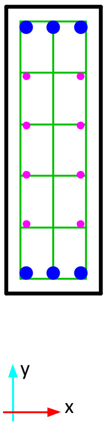
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 950.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1452 Ref. CSA Eq. 11.11
  and ex = -0.0004338 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 815.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.96 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7186.8kN (Compression)
Factored shear, Vf = -1.8kN, Factored moment, Mf = -0.3kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7626.89kN (Compression)
Factored moment about x, Mfx = -0.65kNm
Factored moment about y, Mfy = 82.36kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.15 Pf>Pmax Not OK**

Detailed Design of Column C21 at L02 - 29



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L02 - 29
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 610.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8537 Ref. CSA Eq. 11.11
  and ex = -0.0003543 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 457kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6544.6kN (Compression)
Factored shear, Vf = 41.2kN, Factored moment, Mf = 64.4kN

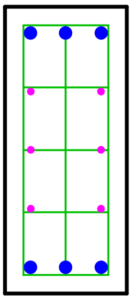
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 813.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9797 Ref. CSA Eq. 11.11
  and ex = -0.0003945 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 805.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.24 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6544.6kN (Compression)
Factored shear, Vf = -0.8kN, Factored moment, Mf = -4.4kN

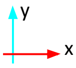
Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7017.43kN (Compression)
Factored moment about x, Mfx = -4.35kNm
Factored moment about y, Mfy = 64.76kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.06 Pf>Pmax Not OK**

Detailed Design of Column C21 at L03 - 1960





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L03 - 1960
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 590kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0612 Ref. CSA Eq. 11.11
  and ex = -0.0004154 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 388kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6102.8kN (Compression)
Factored shear, Vf = 38.7kN, Factored moment, Mf = 61.9kN

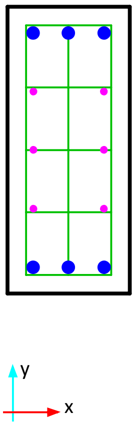
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 829.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.3142 Ref. CSA Eq. 11.11
  and ex = -0.0004638 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 626.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.75 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6102.8kN (Compression)
Factored shear, Vf = -1.6kN, Factored moment, Mf = -3.5kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6542.56kN (Compression)
Factored moment about x, Mfx = -3.7kNm
Factored moment about y, Mfy = 64.96kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.23 Pf>Pmax Not OK**

Detailed Design of Column C21 at L04 - 1845



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L04 - 1845
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 516.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9289 Ref. CSA Eq. 11.11
  and ex = -0.0003796 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 383.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5667.3kN (Compression)
Factored shear, Vf = 40.1kN, Factored moment, Mf = 65.3kN

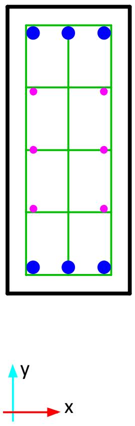
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 716.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1344 Ref. CSA Eq. 11.11
  and ex = -0.0004316 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 620.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.98 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5667.3kN (Compression)
Factored shear, Vf = -0.2kN, Factored moment, Mf = 0.5kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6074.6kN (Compression)
Factored moment about x, Mfx = 0.34kNm
Factored moment about y, Mfy = 67.85kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.14 Pf>Pmax Not OK**

Detailed Design of Column C21 at L05 - 1730



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C21 at L05 - 1730
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 464.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.835 Ref. CSA Eq. 11.11
and ex = -0.0003473 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 380kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.57 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5231.1kN (Compression)
Factored shear, Vf = 39.5kN, Factored moment, Mf = 64.1kN

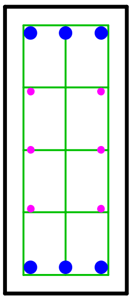
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 627.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.9939 Ref. CSA Eq. 11.11
and ex = -0.0003984 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 613.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.21 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5231.1kN (Compression)
Factored shear, Vf = -0.5kN, Factored moment, Mf = -0.3kN

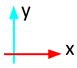
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5606.07kN (Compression)
Factored moment about x, Mfx = -0.52kNm
Factored moment about y, Mfy = 66.6kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.05 Pf>Pmax Not OK**

Detailed Design of Column C21 at L06 - 1615





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C21 at L06 - 1615
Governing Load Combo:
    U01 (Shear)
    U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
    5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 420.2kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.7559 Ref. CSA Eq. 11.11
    and ex = -0.0003139 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 376.1kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 26.8 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4794.4kN (Compression)
Factored shear, Vf = 39.9kN, Factored moment, Mf = 64.2kN

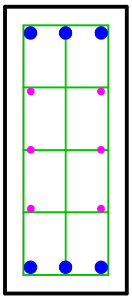
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 558.6kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.8845 Ref. CSA Eq. 11.11
    and ex = -0.0003652 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 607.6kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 26.44 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4794.4kN (Compression)
Factored shear, Vf = -0.4kN, Factored moment, Mf = 0kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

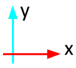
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 5113kN (Compression)
Factored moment about x, Mfx = 1.43kNm
Factored moment about y, Mfy = -68.16kNm

Moment capacity about x, Mrx = 3.43kNm
Moment capacity about y, Mry = -163.31kNm
Demand / Capacity, D/C = **0.42 OK**

Detailed Design of Column C21 at L07 - 1500



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L07 - 1500
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 382.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6886 Ref. CSA Eq. 11.11
  and ex = -0.0002794 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 372.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.04 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 755kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4355.7kN (Compression)
Factored shear, Vf = 40.5kN, Factored moment, Mf = 65.6kN

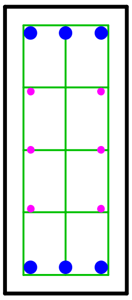
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 502.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7962 Ref. CSA Eq. 11.11
  and ex = -0.0003317 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 601.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.68 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4355.7kN (Compression)
Factored shear, Vf = -0.5kN, Factored moment, Mf = -0.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

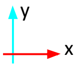
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4666.06kN (Compression)
Factored moment about x, Mfx = -0.27kNm
Factored moment about y, Mfy = 68.07kNm

Moment capacity about x, Mrx = -0.78kNm
Moment capacity about y, Mry = 196.8kNm
Demand / Capacity, D/C = **0.35 OK**

Detailed Design of Column C21 at L08 - 1385



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L08 - 1385
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 350.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6311 Ref. CSA Eq. 11.11
  and ex = -0.0002442 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 368.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.29 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 719.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3915.2kN (Compression)
Factored shear, Vf = 42.2kN, Factored moment, Mf = 67.6kN

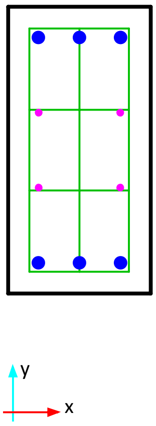
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 457kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7237 Ref. CSA Eq. 11.11
  and ex = -0.0002982 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 595.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.91 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3915.2kN (Compression)
Factored shear, Vf = -0.4kN, Factored moment, Mf = 0kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 4169kN (Compression)
Factored moment about x, Mfx = 1.34kNm
Factored moment about y, Mfy = -72.78kNm

Moment capacity about x, Mrx = 4.16kNm
Moment capacity about y, Mry = -225.78kNm
Demand / Capacity, D/C = **0.32 OK**

Detailed Design of Column C21 at L09 - 1270



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L09 - 1270
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 303kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6358 Ref. CSA Eq. 11.11
  and ex = -0.0002473 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 294.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.27 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 597.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3473.5kN (Compression)
Factored shear, Vf = 40kN, Factored moment, Mf = 63.9kN

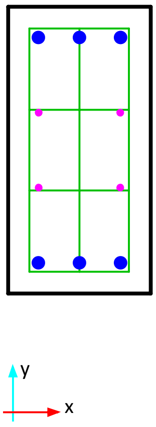
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 394kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7403 Ref. CSA Eq. 11.11
  and ex = -0.0003065 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 503kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.85 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3473.5kN (Compression)
Factored shear, Vf = -0.4kN, Factored moment, Mf = 0kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 3698.22kN (Compression)
Factored moment about x, Mfx = 1.03kNm
Factored moment about y, Mfy = -69.05kNm

Moment capacity about x, Mrx = 2.83kNm
Moment capacity about y, Mry = -189.53kNm
Demand / Capacity, D/C = **0.36 OK**

Detailed Design of Column C21 at L10 - 1155



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C21 at L10 - 1155
Governing Load Combo:
UW04 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 262.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5507 Ref. CSA Eq. 11.11
and ex = -0.0001824 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 289.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.72 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 551.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2848.7kN (Compression)
Factored shear, Vf = 41.6kN, Factored moment, Mf = -75.4kN

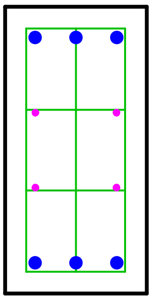
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 341.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.642 Ref. CSA Eq. 11.11
and ex = -0.0002513 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 494.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.24 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2848.7kN (Compression)
Factored shear, Vf = -0.3kN, Factored moment, Mf = 0.1kN

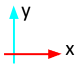
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 3246.24kN (Compression)
Factored moment about x, Mfx = -0.36kNm
Factored moment about y, Mfy = 71.02kNm

Moment capacity about x, Mrx = -1.07kNm
Moment capacity about y, Mry = 210.89kNm
Demand / Capacity, D/C = **0.34 OK**

Detailed Design of Column C21 at L11 - 1040





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L11 - 1040
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 243kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5098 Ref. CSA Eq. 11.11
  and ex = -0.0001436 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 286kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.99 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 528.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2427.7kN (Compression)
Factored shear, Vf = 42.7kN, Factored moment, Mf = -77.2kN

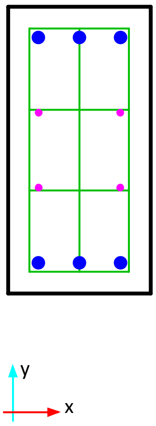
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 313.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5893 Ref. CSA Eq. 11.11
  and ex = -0.0002142 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 489.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2427.7kN (Compression)
Factored shear, Vf = -0.3kN, Factored moment, Mf = 0.1kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 2427.69kN (Compression)
Factored moment about x, Mfx = 0.1kNm
Factored moment about y, Mfy = -77.19kNm

Moment capacity about x, Mrx = 0.31kNm
Moment capacity about y, Mry = -237.15kNm
Demand / Capacity, D/C = **0.33 OK**

Detailed Design of Column C21 at L12 - 925



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L12 - 925
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 234.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4929 Ref. CSA Eq. 11.11
  and ex = -0.0001256 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 284.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.12 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 519.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2146.5kN (Compression)
Factored shear, Vf = 42.2kN, Factored moment, Mf = 69kN

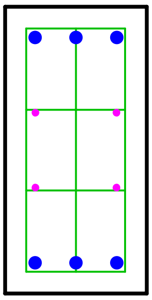
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 297.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5587 Ref. CSA Eq. 11.11
  and ex = -0.0001893 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 485.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2146.5kN (Compression)
Factored shear, Vf = -0.4kN, Factored moment, Mf = -0.1kN

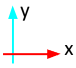
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 2274.61kN (Compression)
Factored moment about x, Mfx = 0.85kNm
Factored moment about y, Mfy = -73.09kNm

Moment capacity about x, Mrx = 2.32kNm
Moment capacity about y, Mry = -199.67kNm
Demand / Capacity, D/C = **0.37 OK**

Detailed Design of Column C21 at L13 - 810





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C21 at L13 - 810
Governing Load Combo:
U02 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 221.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4639 Ref. CSA Eq. 11.11
and ex = -9.19E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 502.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1817.2kN (Compression)
Factored shear, Vf = 44.5kN, Factored moment, Mf = 74.2kN

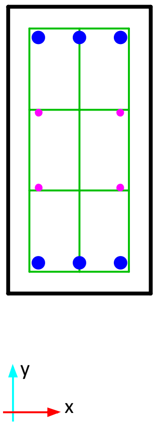
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 280.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5265 Ref. CSA Eq. 11.11
and ex = -0.0001602 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 481.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.88 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1817.2kN (Compression)
Factored shear, Vf = -0.4kN, Factored moment, Mf = -0.3kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1582.48kN (Compression)
Factored moment about x, Mfx = 0.06kNm
Factored moment about y, Mfy = -76.76kNm

Moment capacity about x, Mrx = 0.17kNm
Moment capacity about y, Mry = -218.07kNm
Demand / Capacity, D/C = **0.35 OK**

Detailed Design of Column C21 at L14 - 695



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C21 at L14 - 695
Governing Load Combo:
  U01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 203.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4272 Ref. CSA Eq. 11.11
  and ex = -4.24E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 277.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.7 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 481.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1253.4kN (Compression)
Factored shear, Vf = 44.8kN, Factored moment, Mf = 73.8kN

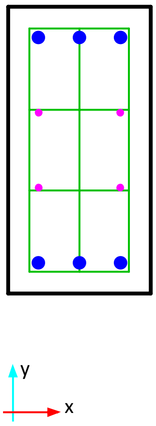
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 255.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4795 Ref. CSA Eq. 11.11
  and ex = -0.0001105 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 474.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.23 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 729.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1253.4kN (Compression)
Factored shear, Vf = -0.3kN, Factored moment, Mf = -0.1kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1158kN (Compression)
Factored moment about x, Mfx = 0.26kNm
Factored moment about y, Mfy = -80.98kNm

Moment capacity about x, Mrx = 0.66kNm
Moment capacity about y, Mry = -206.54kNm
Demand / Capacity, D/C = **0.39 OK**

Detailed Design of Column C21 at L15 - 580



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C21 at L15 - 580
Governing Load Combo:
U02 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 193.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4065 Ref. CSA Eq. 11.11
and ex = -1.06E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.93 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 468.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 856.8kN (Compression)
Factored shear, Vf = 41kN, Factored moment, Mf = 70.7kN

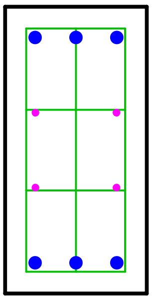
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 240.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4512 Ref. CSA Eq. 11.11
and ex = -7.56E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.47 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 709.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 856.8kN (Compression)
Factored shear, Vf = 0kN, Factored moment, Mf = 0kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 751.57kN (Compression)
Factored moment about x, Mfx = -0.25kNm
Factored moment about y, Mfy = 72.24kNm

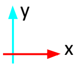
Moment capacity about x, Mrx = -0.61kNm
Moment capacity about y, Mry = 177.13kNm
Demand / Capacity, D/C = **0.41 OK**

Detailed Design of Column C21 at RF - 465



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
- Confinement Type: Tied
- Axial compression: varies
- Steel: 0.85
- Concrete: 0.65

Column: C21 at RF - 465
Governing Load Combo:
- UW04 (Shear)
- UW04 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
- 4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
- 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)

Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 103.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2165 Ref. CSA Eq. 11.11
  and ex = 0.0005648 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 234.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 32.95 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 337.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 307.7kN (Compression)
Factored shear, Vf = 59kN, Factored moment, Mf = -113.2kN

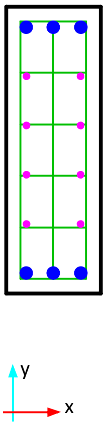
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 221.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4167 Ref. CSA Eq. 11.11
  and ex = -2.67E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 463kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.81 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 684.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 307.7kN (Compression)
Factored shear, Vf = -0.7kN, Factored moment, Mf = 1kN

Vfx/Vrx + Vfy/Vry = **0.18 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 307.74kN (Compression)
Factored moment about x, Mfx = 1.02kNm
Factored moment about y, Mfy = -113.16kNm

Moment capacity about x, Mrx = 1.43kNm
Moment capacity about y, Mry = -158.56kNm
Demand / Capacity, D/C = **0.71 OK**

Detailed Design of Column C23 at L01 - 209



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C23 at L01 - 209
Governing Load Combo:
UW01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 567.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7935 Ref. CSA Eq. 11.11
and ex = -0.0003306 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 453.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.69 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6057.2kN (Compression)
Factored shear, Vf = 30.5kN, Factored moment, Mf = -56.4kN

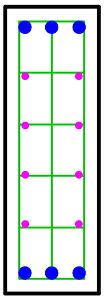
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 714.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8608 Ref. CSA Eq. 11.11
and ex = -0.0003569 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 796.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6057.2kN (Compression)
Factored shear, Vf = 10.3kN, Factored moment, Mf = -48.1kN

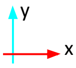
Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7247.16kN (Compression)
Factored moment about x, Mfx = 3.42kNm
Factored moment about y, Mfy = 72kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.09 Pf>Pmax Not OK**

Detailed Design of Column C23 at L02 - 30





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L02 - 30
Governing Load Combo:
  UW01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 518.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7253 Ref. CSA Eq. 11.11
  and ex = -0.000299 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 449.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.91 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 967.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5579.8kN (Compression)
Factored shear, Vf = 37.3kN, Factored moment, Mf = 59.9kN

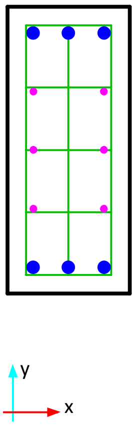
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 637kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7674 Ref. CSA Eq. 11.11
  and ex = -0.0003192 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 787.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.77 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5579.8kN (Compression)
Factored shear, Vf = -20.4kN, Factored moment, Mf = -95.7kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6612.11kN (Compression)
Factored moment about x, Mfx = -2.99kNm
Factored moment about y, Mfy = 80.97kNm

Moment capacity about x, Mrx = -6.85kNm
Moment capacity about y, Mry = 185.44kNm
Demand / Capacity, D/C = **0.44 OK**

Detailed Design of Column C23 at L03 - 1961



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L03 - 1961
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 543.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9772 Ref. CSA Eq. 11.11
  and ex = -0.0003938 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 385.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.24 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5732.6kN (Compression)
Factored shear, Vf = 34.2kN, Factored moment, Mf = 53.5kN

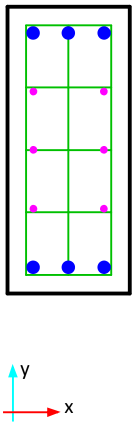
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 723.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1463 Ref. CSA Eq. 11.11
  and ex = -0.000434 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 620.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.96 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5732.6kN (Compression)
Factored shear, Vf = -3.9kN, Factored moment, Mf = -7.9kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6144.92kN (Compression)
Factored moment about x, Mfx = -8.01kNm
Factored moment about y, Mfy = 56.33kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.15 Pf>Pmax Not OK**

Detailed Design of Column C23 at L04 - 1846



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L04 - 1846
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 477.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8581 Ref. CSA Eq. 11.11
  and ex = -0.0003559 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 381kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.51 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5306.8kN (Compression)
Factored shear, Vf = 37kN, Factored moment, Mf = 60.6kN

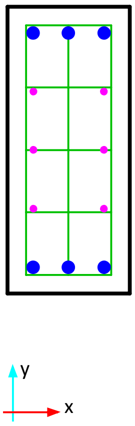
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 640.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0142 Ref. CSA Eq. 11.11
  and ex = -0.0004037 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 614.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.17 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5306.8kN (Compression)
Factored shear, Vf = -1.6kN, Factored moment, Mf = -1.2kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5687.39kN (Compression)
Factored moment about x, Mfx = -1.7kNm
Factored moment about y, Mfy = 62.8kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.07 Pf>Pmax Not OK**

Detailed Design of Column C23 at L05 - 1731



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L05 - 1731
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 435.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7831 Ref. CSA Eq. 11.11
  and ex = -0.0003261 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 377.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.72 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4883.3kN (Compression)
Factored shear, Vf = 35.5kN, Factored moment, Mf = 57.4kN

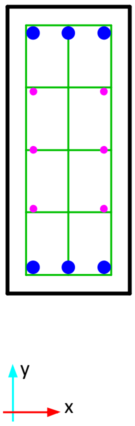
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 568kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8995 Ref. CSA Eq. 11.11
  and ex = -0.0003702 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 608.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.41 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4883.3kN (Compression)
Factored shear, Vf = -3.3kN, Factored moment, Mf = -5kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 5208.37kN (Compression)
Factored moment about x, Mfx = 6.64kNm
Factored moment about y, Mfy = -60.05kNm

Moment capacity about x, Mrx = 17.01kNm
Moment capacity about y, Mry = -153.83kNm
Demand / Capacity, D/C = **0.39 OK**

Detailed Design of Column C23 at L06 - 1616



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C23 at L06 - 1616
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 398.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7162 Ref. CSA Eq. 11.11
and ex = -0.0002943 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 373.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.94 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 772.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4462.1kN (Compression)
Factored shear, Vf = 35.3kN, Factored moment, Mf = 57kN

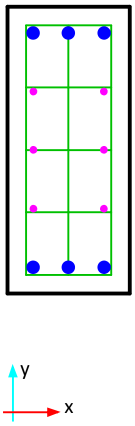
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 512.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8115 Ref. CSA Eq. 11.11
and ex = -0.000338 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 602.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4462.1kN (Compression)
Factored shear, Vf = -3.5kN, Factored moment, Mf = -5.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4780.04kN (Compression)
Factored moment about x, Mfx = -5.68kNm
Factored moment about y, Mfy = 59kNm

Moment capacity about x, Mrx = -18.02kNm
Moment capacity about y, Mry = 187.19kNm
Demand / Capacity, D/C = **0.32 OK**

Detailed Design of Column C23 at L07 - 1501



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C23 at L07 - 1501
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 366.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6594 Ref. CSA Eq. 11.11
and ex = -0.0002622 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 370.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.16 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 736.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4041.4kN (Compression)
Factored shear, Vf = 35.2kN, Factored moment, Mf = 57.1kN

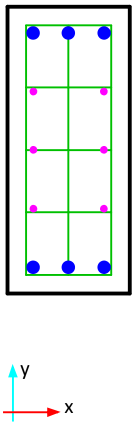
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 466.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7386 Ref. CSA Eq. 11.11
and ex = -0.0003056 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 596.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.86 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4041.4kN (Compression)
Factored shear, Vf = -4.1kN, Factored moment, Mf = -6.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4328.28kN (Compression)
Factored moment about x, Mfx = -6.74kNm
Factored moment about y, Mfy = 59.13kNm

Moment capacity about x, Mrx = -24.51kNm
Moment capacity about y, Mry = 215.02kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C23 at L08 - 1386



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L08 - 1386
Governing Load Combo:
  U01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 338.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6097 Ref. CSA Eq. 11.11
  and ex = -0.0002293 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 366.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.4 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 705.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3620.9kN (Compression)
Factored shear, Vf = 36.3kN, Factored moment, Mf = 58.2kN

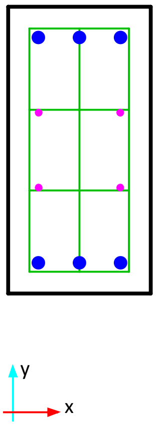
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 428kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6778 Ref. CSA Eq. 11.11
  and ex = -0.0002732 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 590.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3620.9kN (Compression)
Factored shear, Vf = -4.9kN, Factored moment, Mf = -7.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 3476.39kN (Compression)
Factored moment about x, Mfx = 3.94kNm
Factored moment about y, Mfy = -68.15kNm

Moment capacity about x, Mrx = 14.69kNm
Moment capacity about y, Mry = -254.02kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C23 at L09 - 1271



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C23 at L09 - 1271
Governing Load Combo:
U01 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 292.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.614 Ref. CSA Eq. 11.11
and ex = -0.0002323 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 293.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.37 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 586.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3201.3kN (Compression)
Factored shear, Vf = 33.8kN, Factored moment, Mf = 54.1kN

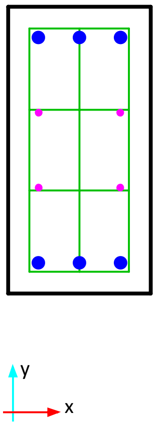
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 366.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6884 Ref. CSA Eq. 11.11
and ex = -0.0002793 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 498.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.04 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3201.3kN (Compression)
Factored shear, Vf = -4.6kN, Factored moment, Mf = -6.6kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 3071.73kN (Compression)
Factored moment about x, Mfx = 4.32kNm
Factored moment about y, Mfy = -63.66kNm

Moment capacity about x, Mrx = 14.64kNm
Moment capacity about y, Mry = -215.74kNm
Demand / Capacity, D/C = **0.3 OK**

Detailed Design of Column C23 at L10 - 1156



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L10 - 1156
Governing Load Combo:
  U02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 276.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5795 Ref. CSA Eq. 11.11
  and ex = -0.0002065 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 291.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.55 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 567.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2959.3kN (Compression)
Factored shear, Vf = 36kN, Factored moment, Mf = -59.1kN

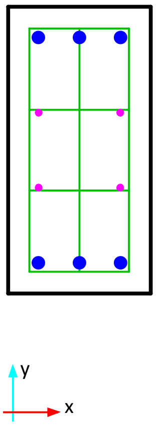
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 345.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6498 Ref. CSA Eq. 11.11
  and ex = -0.0002563 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 495.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.21 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2959.3kN (Compression)
Factored shear, Vf = -6kN, Factored moment, Mf = 10.4kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 2667.99kN (Compression)
Factored moment about x, Mfx = 5.08kNm
Factored moment about y, Mfy = -64.69kNm

Moment capacity about x, Mrx = 17.88kNm
Moment capacity about y, Mry = -227.7kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C23 at L11 - 1041



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L11 - 1041
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 241.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5063 Ref. CSA Eq. 11.11
  and ex = -0.00014 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 285.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.02 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 526.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2264.5kN (Compression)
Factored shear, Vf = 36kN, Factored moment, Mf = -65.5kN

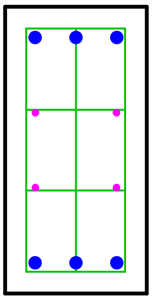
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 302.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5679 Ref. CSA Eq. 11.11
  and ex = -0.0001971 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 486.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.62 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2264.5kN (Compression)
Factored shear, Vf = -3.5kN, Factored moment, Mf = 5.8kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 2264.54kN (Compression)
Factored moment about x, Mfx = 5.82kNm
Factored moment about y, Mfy = -65.46kNm

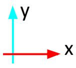
Moment capacity about x, Mrx = 21.07kNm
Moment capacity about y, Mry = -237.01kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C23 at L12 - 926



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L12 - 926
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm



SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 226.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4755 Ref. CSA Eq. 11.11
  and ex = -0.0001058 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 282.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.26 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 509.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1862kN (Compression)
Factored shear, Vf = 35.5kN, Factored moment, Mf = -63.9kN

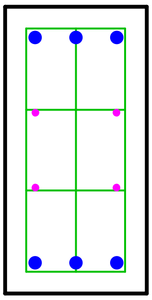
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 280.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5277 Ref. CSA Eq. 11.11
  and ex = -0.0001613 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 481.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1862kN (Compression)
Factored shear, Vf = -3.8kN, Factored moment, Mf = 6.4kN

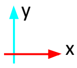
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1861.96kN (Compression)
Factored moment about x, Mfx = 6.36kNm
Factored moment about y, Mfy = -63.94kNm

Moment capacity about x, Mrx = 20.73kNm
Moment capacity about y, Mry = -208.45kNm
Demand / Capacity, D/C = **0.31 OK**

Detailed Design of Column C23 at L13 - 811





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L13 - 811
Governing Load Combo:
  U01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 217.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4561 Ref. CSA Eq. 11.11
  and ex = -8.2E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 280.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 498.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1536.3kN (Compression)
Factored shear, Vf = 34.8kN, Factored moment, Mf = 58.1kN

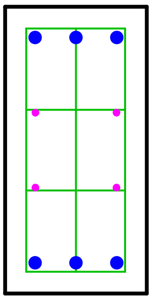
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 264.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4975 Ref. CSA Eq. 11.11
  and ex = -0.0001306 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 477.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 742.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1536.3kN (Compression)
Factored shear, Vf = -6.4kN, Factored moment, Mf = -10.4kN

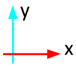
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1459.85kN (Compression)
Factored moment about x, Mfx = 7.01kNm
Factored moment about y, Mfy = -63.87kNm

Moment capacity about x, Mrx = 23.23kNm
Moment capacity about y, Mry = -211.68kNm
Demand / Capacity, D/C = **0.3 OK**

Detailed Design of Column C23 at L14 - 696





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C23 at L14 - 696
Governing Load Combo:
U01 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 204kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4282 Ref. CSA Eq. 11.11
and ex = -4.39E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 277.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.69 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 481.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1119.3kN (Compression)
Factored shear, Vf = 36kN, Factored moment, Mf = 59.4kN

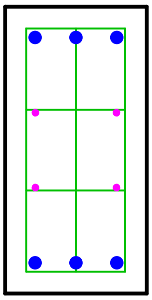
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 247.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4653 Ref. CSA Eq. 11.11
and ex = -9.36E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 472.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 719.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1119.3kN (Compression)
Factored shear, Vf = -6.9kN, Factored moment, Mf = -10.8kN

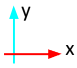
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 1057.87kN (Compression)
Factored moment about x, Mfx = 7.49kNm
Factored moment about y, Mfy = -66.54kNm

Moment capacity about x, Mrx = 22.46kNm
Moment capacity about y, Mry = -199.55kNm
Demand / Capacity, D/C = **0.33 OK**

Detailed Design of Column C23 at L15 - 581





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at L15 - 581
Governing Load Combo:
  U01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 193.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4069 Ref. CSA Eq. 11.11
  and ex = -1.14E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.92 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 469.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 702.1kN (Compression)
Factored shear, Vf = 32kN, Factored moment, Mf = 55kN

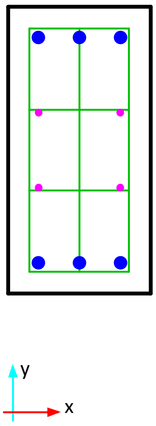
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 233kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4378 Ref. CSA Eq. 11.11
  and ex = -5.76E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 467.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 700.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 702.1kN (Compression)
Factored shear, Vf = -5kN, Factored moment, Mf = -9.6kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 674.84kN (Compression)
Factored moment about x, Mfx = -7.54kNm
Factored moment about y, Mfy = 59.67kNm

Moment capacity about x, Mrx = -21.64kNm
Moment capacity about y, Mry = 171.26kNm
Demand / Capacity, D/C = **0.35 OK**

Detailed Design of Column C23 at RF - 466



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C23 at RF - 466
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 116.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2452 Ref. CSA Eq. 11.11
  and ex = 0.0004209 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 243.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 31.95 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 360.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 255.9kN (Compression)
Factored shear, Vf = 46kN, Factored moment, Mf = -86.8kN

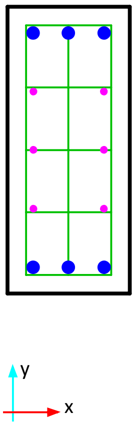
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 217.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.409 Ref. CSA Eq. 11.11
  and ex = -1.46E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 461.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 679.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 255.9kN (Compression)
Factored shear, Vf = -8.4kN, Factored moment, Mf = 17.7kN

Vfx/Vrx + Vfy/Vry = **0.14 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 255.92kN (Compression)
Factored moment about x, Mfx = 17.74kNm
Factored moment about y, Mfy = -86.85kNm

Moment capacity about x, Mrx = 31.13kNm
Moment capacity about y, Mry = -152.42kNm
Demand / Capacity, D/C = **0.57 OK**

Detailed Design of Column C25 at L01 - 204



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L01 - 204
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 316.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5696 Ref. CSA Eq. 11.11
  and ex = -0.0001985 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 363.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 680kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3108.1kN (Compression)
Factored shear, Vf = -23.1kN, Factored moment, Mf = -49.3kN

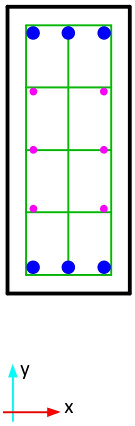
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 389.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.617 Ref. CSA Eq. 11.11
  and ex = -0.0002344 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 584kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3108.1kN (Compression)
Factored shear, Vf = 5.8kN, Factored moment, Mf = 5.5kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 3108.06kN (Compression)
Factored moment about x, Mfx = 5.48kNm
Factored moment about y, Mfy = -49.28kNm

Moment capacity about x, Mrx = 29.28kNm
Moment capacity about y, Mry = -263.35kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C25 at L02 - 25



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C25 at L02 - 25
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 305.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5495 Ref. CSA Eq. 11.11
and ex = -0.0001814 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 361.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.73 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 667kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2975.3kN (Compression)
Factored shear, Vf = -28.5kN, Factored moment, Mf = -58kN

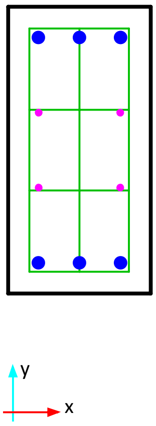
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 371.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5882 Ref. CSA Eq. 11.11
and ex = -0.0002133 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 580.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.51 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2975.3kN (Compression)
Factored shear, Vf = 21.1kN, Factored moment, Mf = 38.1kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2975.3kN (Compression)
Factored moment about x, Mfx = 38.08kNm
Factored moment about y, Mfy = -57.95kNm

Moment capacity about x, Mrx = 162.63kNm
Moment capacity about y, Mry = -247.49kNm
Demand / Capacity, D/C = **0.23 OK**

Detailed Design of Column C25 at L03 - 1956



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L03 - 1956
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 274.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.577 Ref. CSA Eq. 11.11
  and ex = -0.0002045 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 291.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.57 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 566.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2731.6kN (Compression)
Factored shear, Vf = -20.7kN, Factored moment, Mf = -40.3kN

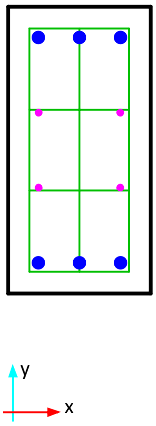
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 326kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6125 Ref. CSA Eq. 11.11
  and ex = -0.0002313 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 491.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2731.6kN (Compression)
Factored shear, Vf = 12.6kN, Factored moment, Mf = 20.7kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2731.55kN (Compression)
Factored moment about x, Mfx = 20.68kNm
Factored moment about y, Mfy = -40.34kNm

Moment capacity about x, Mrx = 108.87kNm
Moment capacity about y, Mry = -212.38kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C25 at L04 - 1841



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C25 at L04 - 1841
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 262.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5501 Ref. CSA Eq. 11.11
and ex = -0.0001819 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 289.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.73 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 551.4kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2500.3kN (Compression)
Factored shear, Vf = -21.8kN, Factored moment, Mf = -42.7kN

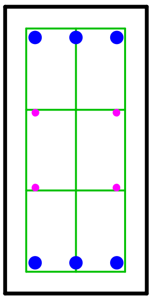
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 310.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5832 Ref. CSA Eq. 11.11
and ex = -0.0002094 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 488.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.53 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2500.3kN (Compression)
Factored shear, Vf = 13.7kN, Factored moment, Mf = 24.2kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

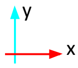
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2500.29kN (Compression)
Factored moment about x, Mfx = 24.18kNm
Factored moment about y, Mfy = -42.67kNm

Moment capacity about x, Mrx = 121.87kNm
Moment capacity about y, Mry = -215.07kNm
Demand / Capacity, D/C = **0.2 OK**

Detailed Design of Column C25 at L05 - 1726



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L05 - 1726
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 252.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.529 Ref. CSA Eq. 11.11
  and ex = -0.0001626 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 287.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.86 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 539.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2270.6kN (Compression)
Factored shear, Vf = -21.5kN, Factored moment, Mf = -41.6kN

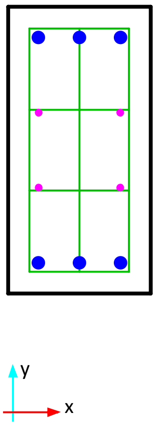
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 297.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5594 Ref. CSA Eq. 11.11
  and ex = -0.0001899 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 485.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2270.6kN (Compression)
Factored shear, Vf = 12.5kN, Factored moment, Mf = 22.5kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2270.63kN (Compression)
Factored moment about x, Mfx = 22.48kNm
Factored moment about y, Mfy = -41.56kNm

Moment capacity about x, Mrx = 118.48kNm
Moment capacity about y, Mry = -219.04kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C25 at L06 - 1611



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L06 - 1611
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 242.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5098 Ref. CSA Eq. 11.11
  and ex = -0.0001436 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 286kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 528.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2045kN (Compression)
Factored shear, Vf = -21.2kN, Factored moment, Mf = -40.6kN

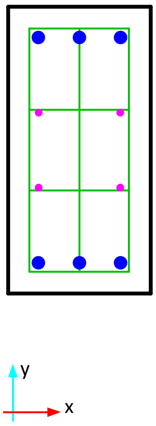
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 286.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5378 Ref. CSA Eq. 11.11
  and ex = -0.0001708 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 483kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.8 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2045kN (Compression)
Factored shear, Vf = 11.4kN, Factored moment, Mf = 20.9kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2044.99kN (Compression)
Factored moment about x, Mfx = 20.88kNm
Factored moment about y, Mfy = -40.59kNm

Moment capacity about x, Mrx = 114.43kNm
Moment capacity about y, Mry = -222.45kNm
Demand / Capacity, D/C = **0.18 OK**

Detailed Design of Column C25 at L07 - 1496



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L07 - 1496
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 234.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4924 Ref. CSA Eq. 11.11
  and ex = -0.0001251 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 284.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.12 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 519.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1824.4kN (Compression)
Factored shear, Vf = -20.9kN, Factored moment, Mf = -39.4kN

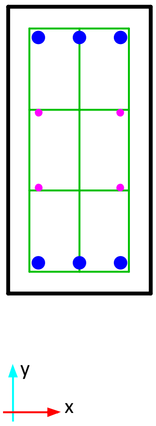
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 276kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5186 Ref. CSA Eq. 11.11
  and ex = -0.0001525 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 480.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.93 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1824.4kN (Compression)
Factored shear, Vf = 9.9kN, Factored moment, Mf = 18.5kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 1805.99kN (Compression)
Factored moment about x, Mfx = -15.5kNm
Factored moment about y, Mfy = 39.01kNm

Moment capacity about x, Mrx = -90.64kNm
Moment capacity about y, Mry = 228.13kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C25 at L08 - 1381



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L08 - 1381
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 227.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4767 Ref. CSA Eq. 11.11
  and ex = -0.0001073 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 282.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.25 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 510.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1609.6kN (Compression)
Factored shear, Vf = -20.5kN, Factored moment, Mf = -38.1kN

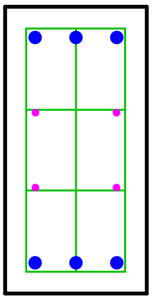
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 266.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5015 Ref. CSA Eq. 11.11
  and ex = -0.0001349 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 477.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.06 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 744.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1609.6kN (Compression)
Factored shear, Vf = 8.1kN, Factored moment, Mf = 15.7kN

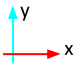
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1609.6kN (Compression)
Factored moment about x, Mfx = 15.68kNm
Factored moment about y, Mfy = -38.11kNm

Moment capacity about x, Mrx = 92.1kNm
Moment capacity about y, Mry = -223.84kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C25 at L09 - 1266





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L09 - 1266
Governing Load Combo:
  UW02 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 214.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4501 Ref. CSA Eq. 11.11
  and ex = -7.42E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 280.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.48 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 494.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1063.3kN (Compression)
Factored shear, Vf = -14.1kN, Factored moment, Mf = -21kN

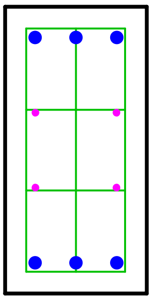
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 242.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4557 Ref. CSA Eq. 11.11
  and ex = -8.15E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 470.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 713kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1063.3kN (Compression)
Factored shear, Vf = -16.3kN, Factored moment, Mf = -25.9kN

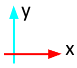
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1400.96kN (Compression)
Factored moment about x, Mfx = 13kNm
Factored moment about y, Mfy = -36.77kNm

Moment capacity about x, Mrx = 78.03kNm
Moment capacity about y, Mry = -220.72kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C25 at L10 - 1151





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L10 - 1151
Governing Load Combo:
  UW02 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 210.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4413 Ref. CSA Eq. 11.11
  and ex = -6.24E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 279.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.56 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 489.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 935.2kN (Compression)
Factored shear, Vf = -14.1kN, Factored moment, Mf = -21.6kN

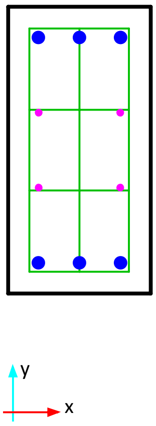
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 238.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4474 Ref. CSA Eq. 11.11
  and ex = -7.07E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.51 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 707.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 935.2kN (Compression)
Factored shear, Vf = -15.4kN, Factored moment, Mf = -25kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 1180.62kN (Compression)
Factored moment about x, Mfx = -6.58kNm
Factored moment about y, Mfy = 35.93kNm

Moment capacity about x, Mrx = -39.99kNm
Moment capacity about y, Mry = 218.38kNm
Demand / Capacity, D/C = **0.16 OK**

Detailed Design of Column C25 at L11 - 1036



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L11 - 1036
Governing Load Combo:
  UW02 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 206.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4326 Ref. CSA Eq. 11.11
  and ex = -5.02E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 484.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 804.6kN (Compression)
Factored shear, Vf = -14.3kN, Factored moment, Mf = -22.4kN

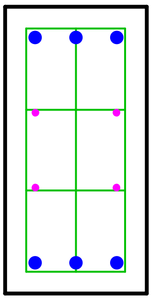
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 233.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4394 Ref. CSA Eq. 11.11
  and ex = -5.97E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 467.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.58 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 701.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 804.6kN (Compression)
Factored shear, Vf = -14.5kN, Factored moment, Mf = -23.8kN

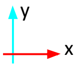
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 985.41kN (Compression)
Factored moment about x, Mfx = -3.55kNm
Factored moment about y, Mfy = 35.18kNm

Moment capacity about x, Mrx = -21.44kNm
Moment capacity about y, Mry = 212.51kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C25 at L12 - 921





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L12 - 921
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 205.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4306 Ref. CSA Eq. 11.11
  and ex = -4.74E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 483.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 872.2kN (Compression)
Factored shear, Vf = -19kN, Factored moment, Mf = -32.1kN

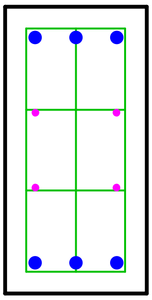
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 238.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4488 Ref. CSA Eq. 11.11
  and ex = -7.25E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.49 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 708.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 872.2kN (Compression)
Factored shear, Vf = -6.3kN, Factored moment, Mf = -9.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

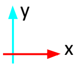
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 851.51kN (Compression)
Factored moment about x, Mfx = 10.75kNm
Factored moment about y, Mfy = 32.48kNm

Moment capacity about x, Mrx = 61.68kNm
Moment capacity about y, Mry = 186.37kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C25 at L13 - 806



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at L13 - 806
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 200kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4196 Ref. CSA Eq. 11.11
  and ex = -3.12E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 276.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 476.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 686.3kN (Compression)
Factored shear, Vf = -18.8kN, Factored moment, Mf = -31.9kN

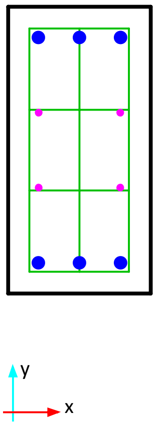
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 232.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4361 Ref. CSA Eq. 11.11
  and ex = -5.53E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 466.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 699kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 686.3kN (Compression)
Factored shear, Vf = -7.1kN, Factored moment, Mf = -11.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 686.28kN (Compression)
Factored moment about x, Mfx = -11.07kNm
Factored moment about y, Mfy = -31.87kNm

Moment capacity about x, Mrx = -62.45kNm
Moment capacity about y, Mry = -179.78kNm
Demand / Capacity, D/C = **0.18 OK**

Detailed Design of Column C25 at L14 - 691



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C25 at L14 - 691
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 194.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4085 Ref. CSA Eq. 11.11
and ex = -1.38E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 470kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 476.7kN (Compression)
Factored shear, Vf = -18.3kN, Factored moment, Mf = -30.6kN

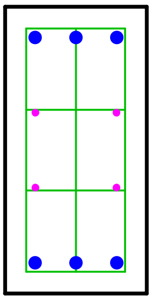
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 225.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4233 Ref. CSA Eq. 11.11
and ex = -3.67E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 464.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.74 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 689.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 476.7kN (Compression)
Factored shear, Vf = -7.4kN, Factored moment, Mf = -11.2kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 483.17kN (Compression)
Factored moment about x, Mfx = 15.43kNm
Factored moment about y, Mfy = 32.4kNm

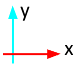
Moment capacity about x, Mrx = 80.4kNm
Moment capacity about y, Mry = 168.82kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C25 at L15 - 576



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C25 at L15 - 576
Governing Load Combo:
UW04 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm



SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 191.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4012 Ref. CSA Eq. 11.11
and ex = -2E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 274.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.99 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 465.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 266.3kN (Compression)
Factored shear, Vf = -13.7kN, Factored moment, Mf = -23.3kN

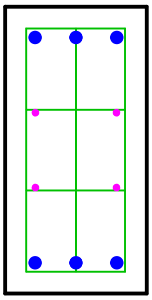
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 217.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4089 Ref. CSA Eq. 11.11
and ex = -1.44E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 461.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 679kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 266.3kN (Compression)
Factored shear, Vf = -11.1kN, Factored moment, Mf = -19.4kN

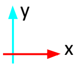
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 324.19kN (Compression)
Factored moment about x, Mfx = -10.75kNm
Factored moment about y, Mfy = -28.66kNm

Moment capacity about x, Mrx = -57.29kNm
Moment capacity about y, Mry = -152.74kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C25 at RF - 461





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C25 at RF - 461
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 149.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3139 Ref. CSA Eq. 11.11
  and ex = 0.0001827 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 260.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.28 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 410kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 119.4kN (Compression)
Factored shear, Vf = -20.8kN, Factored moment, Mf = 38.4kN

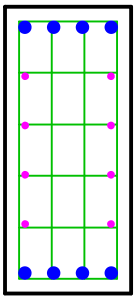
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 201.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3779 Ref. CSA Eq. 11.11
  and ex = 3.9E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 454.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.27 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 655.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 119.4kN (Compression)
Factored shear, Vf = -17.2kN, Factored moment, Mf = 34.8kN

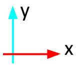
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 126.06kN (Compression)
Factored moment about x, Mfx = 38.52kNm
Factored moment about y, Mfy = 39.84kNm

Moment capacity about x, Mrx = 126.49kNm
Moment capacity about y, Mry = 130.82kNm
Demand / Capacity, D/C = **0.3 OK**

Detailed Design of Column C29 at L01 - 2089





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L01 - 2089
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 948.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9476 Ref. CSA Eq. 11.11
  and ex = -0.0003852 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 646kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9138.4kN (Compression)
Factored shear, Vf = -41kN, Factored moment, Mf = -95.9kN

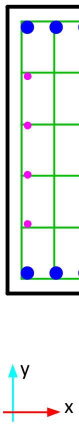
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1086.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9819 Ref. CSA Eq. 11.11
  and ex = -0.0003951 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1074.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.23 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9138.4kN (Compression)
Factored shear, Vf = 52.7kN, Factored moment, Mf = 148.8kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 9559.51kN (Compression)
Factored moment about x, Mfx = 153.13kNm
Factored moment about y, Mfy = -91.35kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.1 Pf>Pmax Not OK**

Detailed Design of Column C29 at L02 - 2091



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L02 - 2091
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 912.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9115 Ref. CSA Eq. 11.11
  and ex = -0.0003741 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 643.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8439.3kN (Compression)
Factored shear, Vf = -19.7kN, Factored moment, Mf = -33.4kN

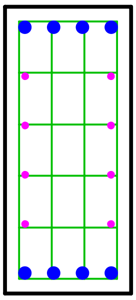
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1026.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9277 Ref. CSA Eq. 11.11
  and ex = -0.0003792 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1069.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.35 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8439.3kN (Compression)
Factored shear, Vf = 18.2kN, Factored moment, Mf = 42.3kN

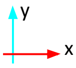
Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 8888.35kN (Compression)
Factored moment about x, Mfx = 41.02kNm
Factored moment about y, Mfy = -32.96kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.02 Pf>Pmax Not OK**

Detailed Design of Column C29 at L03 - 2121





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C29 at L03 - 2121
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 716.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7153 Ref. CSA Eq. 11.11
and ex = -0.0002939 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 628.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.94 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1344.4kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6874.1kN (Compression)
Factored shear, Vf = -22.9kN, Factored moment, Mf = -61kN

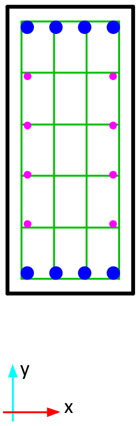
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 819.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7403 Ref. CSA Eq. 11.11
and ex = -0.0003064 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1045.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.85 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6874.1kN (Compression)
Factored shear, Vf = 19.2kN, Factored moment, Mf = 51.3kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 6874.07kN (Compression)
Factored moment about x, Mfx = 51.34kNm
Factored moment about y, Mfy = -61.03kNm

Moment capacity about x, Mrx = 393.1kNm
Moment capacity about y, Mry = -467.29kNm
Demand / Capacity, D/C = **0.13 OK**

Detailed Design of Column C29 at L04 - 2119



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C29 at L04 - 2119
Governing Load Combo:
U01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 762.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7616 Ref. CSA Eq. 11.11
and ex = -0.0003165 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 632.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1395kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7213kN (Compression)
Factored shear, Vf = -22kN, Factored moment, Mf = -37.6kN

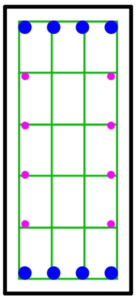
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 856kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7735 Ref. CSA Eq. 11.11
and ex = -0.0003219 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1050.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.75 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7213kN (Compression)
Factored shear, Vf = 21.8kN, Factored moment, Mf = 49.7kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

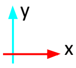
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 6337.48kN (Compression)
Factored moment about x, Mfx = 61.65kNm
Factored moment about y, Mfy = -57.31kNm

Moment capacity about x, Mrx = 507.31kNm
Moment capacity about y, Mry = -471.6kNm
Demand / Capacity, D/C = **0.12 OK**

Detailed Design of Column C29 at L05 - 2117



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C29 at L05 - 2117
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)



Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 630.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6298 Ref. CSA Eq. 11.11
and ex = -0.0002433 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 618.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1249.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5801.8kN (Compression)
Factored shear, Vf = -29.8kN, Factored moment, Mf = -64.1kN

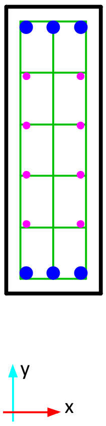
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 717.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6486 Ref. CSA Eq. 11.11
and ex = -0.0002556 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1030kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.21 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5801.8kN (Compression)
Factored shear, Vf = 27.8kN, Factored moment, Mf = 59.9kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 5801.83kN (Compression)
Factored moment about x, Mfx = 59.85kNm
Factored moment about y, Mfy = -64.14kNm

Moment capacity about x, Mrx = 473.1kNm
Moment capacity about y, Mry = -507.01kNm
Demand / Capacity, D/C = **0.13 OK**

Detailed Design of Column C29 at L06 - 2115



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L06 - 2115
Governing Load Combo:
  UW01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 507kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7093 Ref. CSA Eq. 11.11
  and ex = -0.0002907 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 448.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.97 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 955.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5266.1kN (Compression)
Factored shear, Vf = -19.6kN, Factored moment, Mf = -44.7kN

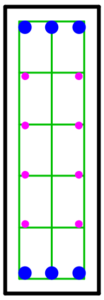
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 613.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.739 Ref. CSA Eq. 11.11
  and ex = -0.0003058 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 784.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.86 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5266.1kN (Compression)
Factored shear, Vf = 27.3kN, Factored moment, Mf = 55.6kN

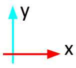
Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm   **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2   **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2   **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 6275.8kN (Compression)
Factored moment about x, Mfx = -42.95kNm
Factored moment about y, Mfy = 39.05kNm

Moment capacity about x, Mrx = -213.73kNm
Moment capacity about y, Mry = 194.32kNm
Demand / Capacity, D/C =   **0.2 OK**

Detailed Design of Column C29 at L07 - 2113





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L07 - 2113
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 457.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.64 Ref. CSA Eq. 11.11
  and ex = -0.00025 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 442.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.25 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 900.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4744.3kN (Compression)
Factored shear, Vf = -26.5kN, Factored moment, Mf = -59.6kN

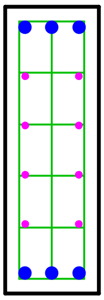
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 562.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6778 Ref. CSA Eq. 11.11
  and ex = -0.0002733 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 776.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4744.3kN (Compression)
Factored shear, Vf = 29.7kN, Factored moment, Mf = 60.4kN

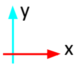
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 4744.33kN (Compression)
Factored moment about x, Mfx = 60.41kNm
Factored moment about y, Mfy = -59.6kNm

Moment capacity about x, Mrx = 280.51kNm
Moment capacity about y, Mry = -276.74kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C29 at L08 - 2111





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L08 - 2111
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 425.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5951 Ref. CSA Eq. 11.11
  and ex = -0.0002186 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 438.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.47 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 864kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4226.8kN (Compression)
Factored shear, Vf = -28.9kN, Factored moment, Mf = -59.4kN

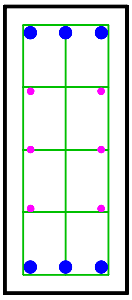
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 519.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6258 Ref. CSA Eq. 11.11
  and ex = -0.0002405 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 769kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.32 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4226.8kN (Compression)
Factored shear, Vf = 36.6kN, Factored moment, Mf = 64.5kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

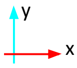
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 4199.21kN (Compression)
Factored moment about x, Mfx = -70.19kNm
Factored moment about y, Mfy = 63.04kNm

Moment capacity about x, Mrx = -322.03kNm
Moment capacity about y, Mry = 289.22kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C29 at L09 - 2109



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L09 - 2109
Governing Load Combo:
  U02 (Shear)
  UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 408.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7344 Ref. CSA Eq. 11.11
  and ex = -0.0003035 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 375kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.88 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 783.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4433.7kN (Compression)
Factored shear, Vf = -26.1kN, Factored moment, Mf = -42.9kN

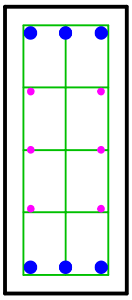
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 487kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7712 Ref. CSA Eq. 11.11
  and ex = -0.0003209 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 599.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.75 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4433.7kN (Compression)
Factored shear, Vf = 27.9kN, Factored moment, Mf = 47.4kN

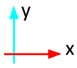
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 3690.07kN (Compression)
Factored moment about x, Mfx = -58.15kNm
Factored moment about y, Mfy = 57.97kNm

Moment capacity about x, Mrx = -220.44kNm
Moment capacity about y, Mry = 219.75kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C29 at L10 - 2107





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
- Confinement Type: Tied
- Axial compression: varies
- Steel: 0.85
- Concrete: 0.65

Column: C29 at L10 - 2107
Governing Load Combo:
- UW01 (Shear)
- UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
- 5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
- 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)

Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 316.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5688 Ref. CSA Eq. 11.11
  and ex = -0.0001978 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 363.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.62 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 679.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3207.5kN (Compression)
Factored shear, Vf = -30kN, Factored moment, Mf = -59.5kN

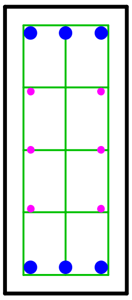
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 378.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5993 Ref. CSA Eq. 11.11
  and ex = -0.0002217 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 581.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.45 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3207.5kN (Compression)
Factored shear, Vf = 35.2kN, Factored moment, Mf = 65.1kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 3186.11kN (Compression)
Factored moment about x, Mfx = -62.49kNm
Factored moment about y, Mfy = 60.14kNm

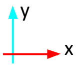
Moment capacity about x, Mrx = -239.03kNm
Moment capacity about y, Mry = 230.04kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C29 at L11 - 2105



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
- Confinement Type: Tied
- Axial compression: varies
- Steel: 0.85
- Concrete: 0.65

Column: C29 at L11 - 2105
Governing Load Combo:
- UW01 (Shear)
- UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
- 5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
- 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)

Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 291.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5248 Ref. CSA Eq. 11.11
  and ex = -0.0001586 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 359kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.89 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 650.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2708.5kN (Compression)
Factored shear, Vf = -32.6kN, Factored moment, Mf = -60.7kN

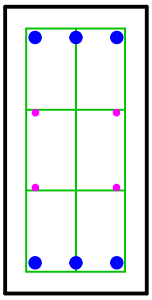
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 347.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5509 Ref. CSA Eq. 11.11
  and ex = -0.0001826 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 575.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.72 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2708.5kN (Compression)
Factored shear, Vf = 39.5kN, Factored moment, Mf = 66.5kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

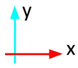
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 2687.03kN (Compression)
Factored moment about x, Mfx = -74.45kNm
Factored moment about y, Mfy = 64.38kNm

Moment capacity about x, Mrx = -267.84kNm
Moment capacity about y, Mry = 231.62kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C29 at L12 - 2103



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L12 - 2103
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 243.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.511 Ref. CSA Eq. 11.11
  and ex = -0.0001448 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 286.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.99 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 529.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2212.4kN (Compression)
Factored shear, Vf = -30.3kN, Factored moment, Mf = -55.2kN

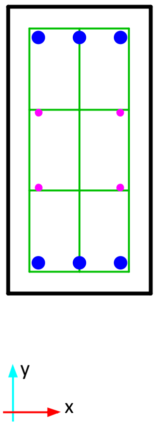
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 285.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5358 Ref. CSA Eq. 11.11
  and ex = -0.0001689 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 482.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.82 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2212.4kN (Compression)
Factored shear, Vf = 33.4kN, Factored moment, Mf = 55.8kN

Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm   **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2   **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2   **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 2194.02kN (Compression)
Factored moment about x, Mfx = -63.22kNm
Factored moment about y, Mfy = 58.68kNm

Moment capacity about x, Mrx = -180.6kNm
Moment capacity about y, Mry = 167.63kNm
Demand / Capacity, D/C = **0.35 OK**

Detailed Design of Column C29 at L13 - 2101



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L13 - 2101
Governing Load Combo:
  U02 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 238.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4999 Ref. CSA Eq. 11.11
  and ex = -0.0001332 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 285.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.07 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 523.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2054.6kN (Compression)
Factored shear, Vf = -30.8kN, Factored moment, Mf = -52.2kN

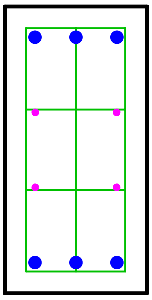
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 274.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.516 Ref. CSA Eq. 11.11
  and ex = -0.0001499 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 480kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.95 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2054.6kN (Compression)
Factored shear, Vf = 38.1kN, Factored moment, Mf = 67.5kN

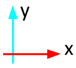
Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1723.89kN (Compression)
Factored moment about x, Mfx = 66.96kNm
Factored moment about y, Mfy = -59.37kNm

Moment capacity about x, Mrx = 194.01kNm
Moment capacity about y, Mry = -172.02kNm
Demand / Capacity, D/C = **0.35 OK**

Detailed Design of Column C29 at L14 - 2099





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L14 - 2099
Governing Load Combo:
  U02 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 217kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4554 Ref. CSA Eq. 11.11
  and ex = -8.11E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 280.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 497.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1478.3kN (Compression)
Factored shear, Vf = -31.9kN, Factored moment, Mf = -53.5kN

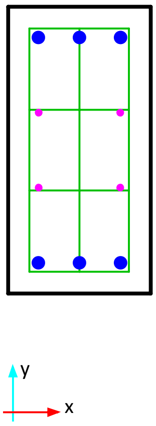
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 249.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4687 Ref. CSA Eq. 11.11
  and ex = -9.78E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 472.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.32 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 722.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1478.3kN (Compression)
Factored shear, Vf = 41.6kN, Factored moment, Mf = 69.3kN

Vfx/Vrx + Vfy/Vry = **0.12 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 1220.94kN (Compression)
Factored moment about x, Mfx = -73.22kNm
Factored moment about y, Mfy = 61.84kNm

Moment capacity about x, Mrx = -198.74kNm
Moment capacity about y, Mry = 167.85kNm
Demand / Capacity, D/C = **0.37 OK**

Detailed Design of Column C29 at L15 - 2097



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C29 at L15 - 2097
Governing Load Combo:
  UW03 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 197.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4149 Ref. CSA Eq. 11.11
  and ex = -2.39E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 276.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.83 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 473.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 761.4kN (Compression)
Factored shear, Vf = -27.8kN, Factored moment, Mf = -47kN

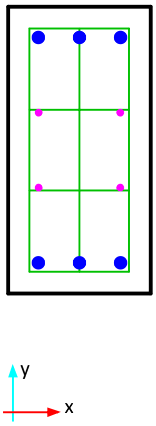
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 224kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4209 Ref. CSA Eq. 11.11
  and ex = -3.31E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 463.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.77 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 687.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 761.4kN (Compression)
Factored shear, Vf = 39kN, Factored moment, Mf = 74.5kN

Vfx/Vrx + Vfy/Vry = **0.12 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 756.11kN (Compression)
Factored moment about x, Mfx = 59.84kNm
Factored moment about y, Mfy = -56.44kNm

Moment capacity about x, Mrx = 159.27kNm
Moment capacity about y, Mry = -150.22kNm
Demand / Capacity, D/C = **0.38 OK**

Detailed Design of Column C29 at RF - 2095



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C29 at RF - 2095
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 133.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.28 Ref. CSA Eq. 11.11
and ex = 0.0002857 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 253kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 31 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 386.4kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 257.6kN (Compression)
Factored shear, Vf = -37.1kN, Factored moment, Mf = 66.7kN

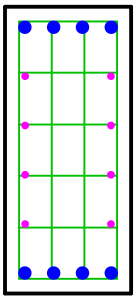
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 134.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.2522 Ref. CSA Eq. 11.11
and ex = 0.0003908 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 411.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 31.74 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 546kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 257.6kN (Compression)
Factored shear, Vf = 76.8kN, Factored moment, Mf = -168.4kN

Vfx/Vrx + Vfy/Vry = **0.24 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 257.6kN (Compression)
Factored moment about x, Mfx = -168.42kNm
Factored moment about y, Mfy = 66.72kNm

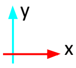
Moment capacity about x, Mrx = -252.35kNm
Moment capacity about y, Mry = 99.97kNm
Demand / Capacity, D/C = **0.67 OK**

Detailed Design of Column C31 at L01 - 210



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C31 at L01 - 210
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm



SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 2001.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 1.9996 Ref. CSA Eq. 11.11
and ex = -0.0005333 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 676.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 25.27 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 12344.2kN (Compression)
Factored shear, Vf = -45.3kN, Factored moment, Mf = -89.9kN

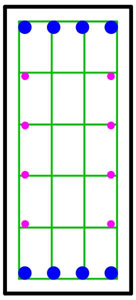
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 2862.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 2.5868 Ref. CSA Eq. 11.11
and ex = -0.0005636 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1132.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 25.05 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 12344.2kN (Compression)
Factored shear, Vf = -8.5kN, Factored moment, Mf = 2.3kN

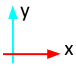
Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 12777.35kN (Compression)
Factored moment about x, Mfx = 1.3kNm
Factored moment about y, Mfy = -84.97kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.47 Pf>Pmax Not OK**

Detailed Design of Column C31 at L02 - 31





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C31 at L02 - 31
Governing Load Combo:
U02 (Shear)
U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1700.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 1.6991 Ref. CSA Eq. 11.11
and ex = -0.0005097 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 671.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 25.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 11722.8kN (Compression)
Factored shear, Vf = -39.3kN, Factored moment, Mf = -75.7kN

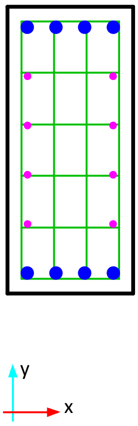
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 2211.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 1.9985 Ref. CSA Eq. 11.11
and ex = -0.0005332 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1122kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 25.27 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 11722.8kN (Compression)
Factored shear, Vf = -15.8kN, Factored moment, Mf = -12.6kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 11722.8kN (Compression)
Factored moment about x, Mfx = -12.62kNm
Factored moment about y, Mfy = -75.74kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.34 Pf>Pmax Not OK**

Detailed Design of Column C31 at L03 - 1962



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L03 - 1962
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1021.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0203 Ref. CSA Eq. 11.11
  and ex = -0.0004053 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 650kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.16 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9206.9kN (Compression)
Factored shear, Vf = -26.9kN, Factored moment, Mf = -44.2kN

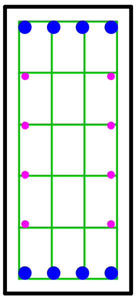
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1153.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0419 Ref. CSA Eq. 11.11
  and ex = -0.0004107 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1079.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.12 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9206.9kN (Compression)
Factored shear, Vf = -20.6kN, Factored moment, Mf = -70.1kN

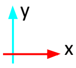
Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 10912.69kN (Compression)
Factored moment about x, Mfx = -16.21kNm
Factored moment about y, Mfy = -47.94kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.25 Pf>Pmax Not OK**

Detailed Design of Column C31 at L04 - 1847





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L04 - 1847
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 909.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9084 Ref. CSA Eq. 11.11
  and ex = -0.0003731 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 643.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.39 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8516kN (Compression)
Factored shear, Vf = -26.8kN, Factored moment, Mf = -46.2kN

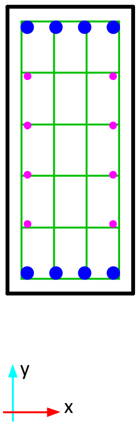
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1028.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9293 Ref. CSA Eq. 11.11
  and ex = -0.0003797 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1069.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8516kN (Compression)
Factored shear, Vf = -20.7kN, Factored moment, Mf = -65.3kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 10096.92kN (Compression)
Factored moment about x, Mfx = -14.48kNm
Factored moment about y, Mfy = -51.01kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.16 Pf>Pmax Not OK**

Detailed Design of Column C31 at L05 - 1732



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L05 - 1732
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1022kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.021 Ref. CSA Eq. 11.11
  and ex = -0.0004055 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 650.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.16 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9276.8kN (Compression)
Factored shear, Vf = -32.8kN, Factored moment, Mf = -52.4kN

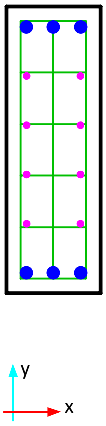
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1201.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0858 Ref. CSA Eq. 11.11
  and ex = -0.0004211 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1083.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.05 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9276.8kN (Compression)
Factored shear, Vf = -15.5kN, Factored moment, Mf = -15.1kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 9276.8kN (Compression)
Factored moment about x, Mfx = -15.06kNm
Factored moment about y, Mfy = -52.4kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.06 Pf>Pmax Not OK**

Detailed Design of Column C31 at L06 - 1617



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L06 - 1617
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 741.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0378 Ref. CSA Eq. 11.11
  and ex = -0.0004097 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 464.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.13 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7124.9kN (Compression)
Factored shear, Vf = -20.8kN, Factored moment, Mf = -32.4kN

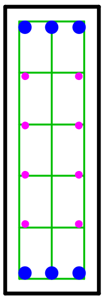
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 893.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0766 Ref. CSA Eq. 11.11
  and ex = -0.000419 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 812kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.07 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7124.9kN (Compression)
Factored shear, Vf = -22.1kN, Factored moment, Mf = -54.1kN

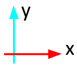
Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 8452.47kN (Compression)
Factored moment about x, Mfx = -14.16kNm
Factored moment about y, Mfy = -34.96kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.27 Pf>Pmax Not OK**

Detailed Design of Column C31 at L07 - 1502





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L07 - 1502
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 626.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8767 Ref. CSA Eq. 11.11
  and ex = -0.0003625 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 458.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.46 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6439.6kN (Compression)
Factored shear, Vf = -24.4kN, Factored moment, Mf = -42kN

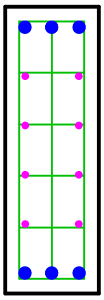
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 763.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9199 Ref. CSA Eq. 11.11
  and ex = -0.0003768 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 801.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6439.6kN (Compression)
Factored shear, Vf = -24.6kN, Factored moment, Mf = -57.2kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

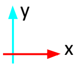
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7641kN (Compression)
Factored moment about x, Mfx = -19.29kNm
Factored moment about y, Mfy = -44.98kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.15 Pf>Pmax Not OK**

Detailed Design of Column C31 at L08 - 1387



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L08 - 1387
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 553kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7737 Ref. CSA Eq. 11.11
  and ex = -0.000322 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 452.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.75 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1005.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5757.3kN (Compression)
Factored shear, Vf = -24.7kN, Factored moment, Mf = -40.7kN

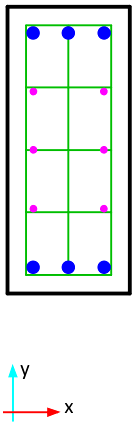
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 666.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8031 Ref. CSA Eq. 11.11
  and ex = -0.0003346 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 791.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.66 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5757.3kN (Compression)
Factored shear, Vf = -30.5kN, Factored moment, Mf = -58.8kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6832.56kN (Compression)
Factored moment about x, Mfx = -22.02kNm
Factored moment about y, Mfy = -43.34kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.03 Pf>Pmax Not OK**

Detailed Design of Column C31 at L09 - 1272



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
 Confinement Type: Tied
 Axial compression: varies
 Steel: 0.85
 Concrete: 0.65
Column: C31 at L09 - 1272
Governing Load Combo:
 UW01 (Shear)
 U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
 5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 471.3kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.8477 Ref. CSA Eq. 11.11
 and ex = -0.0003521 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 380.5kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 26.54 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5144.8kN (Compression)
Factored shear, Vf = -23.2kN, Factored moment, Mf = -51.5kN

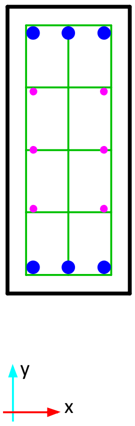
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 603.1kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.955 Ref. CSA Eq. 11.11
 and ex = -0.0003874 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 611.8kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 26.29 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5144.8kN (Compression)
Factored shear, Vf = -11.3kN, Factored moment, Mf = -10.5kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6025.77kN (Compression)
Factored moment about x, Mfx = -18.63kNm
Factored moment about y, Mfy = -38.23kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.13 Pf>Pmax Not OK**

Detailed Design of Column C31 at L10 - 1157



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C31 at L10 - 1157
Governing Load Combo:
UW04 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 409.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7373 Ref. CSA Eq. 11.11
and ex = -0.000305 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 375.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 785kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4405kN (Compression)
Factored shear, Vf = -22.6kN, Factored moment, Mf = -38.5kN

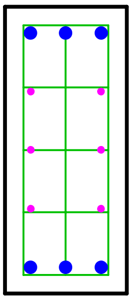
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 479.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7596 Ref. CSA Eq. 11.11
and ex = -0.0003156 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 598.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.79 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4405kN (Compression)
Factored shear, Vf = -29.6kN, Factored moment, Mf = -58.2kN

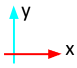
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5229.18kN (Compression)
Factored moment about x, Mfx = -27.28kNm
Factored moment about y, Mfy = -40.66kNm

Moment capacity about x, Mrx = -96.5kNm
Moment capacity about y, Mry = -143.83kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C31 at L11 - 1042





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L11 - 1042
Governing Load Combo:
  UW04 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 359.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6462 Ref. CSA Eq. 11.11
  and ex = -0.000254 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 369.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.22 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 728.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3737.3kN (Compression)
Factored shear, Vf = -23.1kN, Factored moment, Mf = -38.6kN

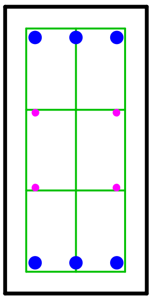
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 418.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.662 Ref. CSA Eq. 11.11
  and ex = -0.0002639 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 589.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.15 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3737.3kN (Compression)
Factored shear, Vf = -33.7kN, Factored moment, Mf = -59.1kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

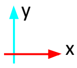
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 3770.2kN (Compression)
Factored moment about x, Mfx = 19.78kNm
Factored moment about y, Mfy = 55.75kNm

Moment capacity about x, Mrx = 83.37kNm
Moment capacity about y, Mry = 234.98kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C31 at L12 - 927



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L12 - 927
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 295.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6204 Ref. CSA Eq. 11.11
  and ex = -0.0002368 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 294kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 589.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3053.7kN (Compression)
Factored shear, Vf = -20.7kN, Factored moment, Mf = 35.5kN

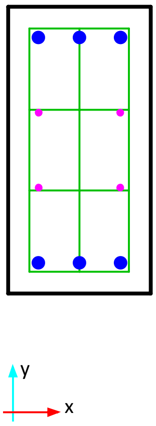
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 335.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6299 Ref. CSA Eq. 11.11
  and ex = -0.0002433 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 493.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3053.7kN (Compression)
Factored shear, Vf = -28.4kN, Factored moment, Mf = 57.8kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 3626.59kN (Compression)
Factored moment about x, Mfx = 29.68kNm
Factored moment about y, Mfy = 37.18kNm

Moment capacity about x, Mrx = 96.59kNm
Moment capacity about y, Mry = 121kNm
Demand / Capacity, D/C = **0.31 OK**

Detailed Design of Column C31 at L13 - 812



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at L13 - 812
Governing Load Combo:
  UW04 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 260.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5474 Ref. CSA Eq. 11.11
  and ex = -0.0001795 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 289kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.74 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 549.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2414kN (Compression)
Factored shear, Vf = -21.3kN, Factored moment, Mf = -36.4kN

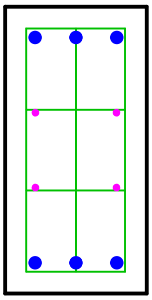
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 294.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5538 Ref. CSA Eq. 11.11
  and ex = -0.0001852 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 485kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.7 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2414kN (Compression)
Factored shear, Vf = -33.4kN, Factored moment, Mf = -60.1kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

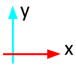
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2451.5kN (Compression)
Factored moment about x, Mfx = -22.22kNm
Factored moment about y, Mfy = -48.42kNm

Moment capacity about x, Mrx = -83.38kNm
Moment capacity about y, Mry = -181.69kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C31 at L14 - 697



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C31 at L14 - 697
Governing Load Combo:
UW04 (Shear)
UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 232.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4888 Ref. CSA Eq. 11.11
and ex = -0.0001211 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 284.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.15 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 517kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1760.2kN (Compression)
Factored shear, Vf = -22.2kN, Factored moment, Mf = -37.1kN

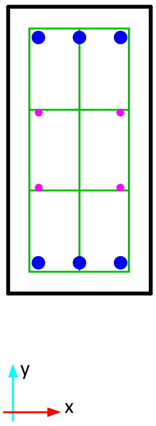
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 263.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4945 Ref. CSA Eq. 11.11
and ex = -0.0001274 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 476.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.11 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 740kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1760.2kN (Compression)
Factored shear, Vf = -34.7kN, Factored moment, Mf = -59.7kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 1770.18kN (Compression)
Factored moment about x, Mfx = 23.21kNm
Factored moment about y, Mfy = 50.68kNm

Moment capacity about x, Mrx = 90.05kNm
Moment capacity about y, Mry = 196.62kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C31 at L15 - 582



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C31 at L15 - 582
Governing Load Combo:
UW04 (Shear)
UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 212.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4454 Ref. CSA Eq. 11.11
and ex = -6.8E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 279.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 492kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1108kN (Compression)
Factored shear, Vf = -17.9kN, Factored moment, Mf = -32.6kN

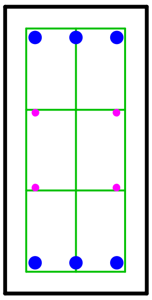
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 238.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4477 Ref. CSA Eq. 11.11
and ex = -7.1E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 707.3kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1108kN (Compression)
Factored shear, Vf = -32.9kN, Factored moment, Mf = -57.3kN

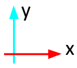
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 1107.98kN (Compression)
Factored moment about x, Mfx = -57.34kNm
Factored moment about y, Mfy = -32.6kNm

Moment capacity about x, Mrx = -234.47kNm
Moment capacity about y, Mry = -133.31kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C31 at RF - 467





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C31 at RF - 467
Governing Load Combo:
  UW04 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 149.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3146 Ref. CSA Eq. 11.11
  and ex = 0.0001811 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 260.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.27 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 410.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 443kN (Compression)
Factored shear, Vf = -34.6kN, Factored moment, Mf = 70.1kN

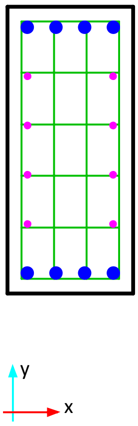
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 213.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4013 Ref. CSA Eq. 11.11
  and ex = -2.1E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 459.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.99 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 673.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 443kN (Compression)
Factored shear, Vf = -42.7kN, Factored moment, Mf = 80.5kN

Vfx/Vrx + Vfy/Vry = **0.15 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 451.93kN (Compression)
Factored moment about x, Mfx = 19.4kNm
Factored moment about y, Mfy = 85.67kNm

Moment capacity about x, Mrx = 36.39kNm
Moment capacity about y, Mry = 160.7kNm
Demand / Capacity, D/C = **0.53 OK**

Detailed Design of Column C33 at L01 - 212



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L01 - 212
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 930.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9295 Ref. CSA Eq. 11.11
  and ex = -0.0003798 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 645kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9495.8kN (Compression)
Factored shear, Vf = -69.9kN, Factored moment, Mf = -159.3kN

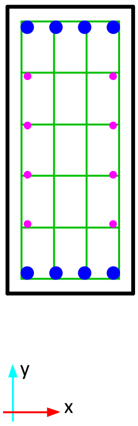
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1264.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1424 Ref. CSA Eq. 11.11
  and ex = -0.0004332 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1087.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.97 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9495.8kN (Compression)
Factored shear, Vf = 4.9kN, Factored moment, Mf = 5.4kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 9995.23kN (Compression)
Factored moment about x, Mfx = 5.66kNm
Factored moment about y, Mfy = -152.15kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.15 Pf>Pmax Not OK**

Detailed Design of Column C33 at L02 - 33



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L02 - 33
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 896.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8956 Ref. CSA Eq. 11.11
  and ex = -0.0003689 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 642.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.42 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8626.1kN (Compression)
Factored shear, Vf = -35.2kN, Factored moment, Mf = -74.2kN

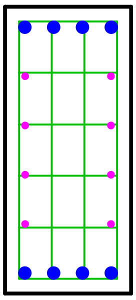
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1084kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9794 Ref. CSA Eq. 11.11
  and ex = -0.0003944 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1074.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.24 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8626.1kN (Compression)
Factored shear, Vf = -1.7kN, Factored moment, Mf = -0.1kN

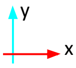
Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 9118.69kN (Compression)
Factored moment about x, Mfx = -0.83kNm
Factored moment about y, Mfy = -64.37kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.05 Pf>Pmax Not OK**

Detailed Design of Column C33 at L03 - 1964





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L03 - 1964
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 850.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8494 Ref. CSA Eq. 11.11
  and ex = -0.0003527 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 639.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.53 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8023.9kN (Compression)
Factored shear, Vf = -22.6kN, Factored moment, Mf = -40.4kN

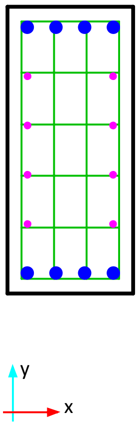
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 978.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8844 Ref. CSA Eq. 11.11
  and ex = -0.0003651 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1064.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.44 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 8023.9kN (Compression)
Factored shear, Vf = -5.9kN, Factored moment, Mf = -11.1kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 8439.77kN (Compression)
Factored moment about x, Mfx = 12.44kNm
Factored moment about y, Mfy = 40.39kNm

Moment capacity about x, Mrx = 108.9kNm
Moment capacity about y, Mry = 353.58kNm
Demand / Capacity, D/C = **0.11 OK**

Detailed Design of Column C33 at L04 - 1849



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C33 at L04 - 1849
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 774.8kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.774 Ref. CSA Eq. 11.11
and ex = -0.0003222 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 633.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.74 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1408.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7421.4kN (Compression)
Factored shear, Vf = -25.2kN, Factored moment, Mf = -49.6kN

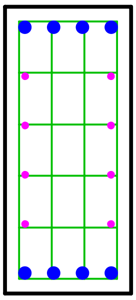
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 899.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8124 Ref. CSA Eq. 11.11
and ex = -0.0003384 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1056.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7421.4kN (Compression)
Factored shear, Vf = -3.7kN, Factored moment, Mf = -5.7kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

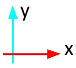
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7843.28kN (Compression)
Factored moment about x, Mfx = -8.48kNm
Factored moment about y, Mfy = -46.41kNm

Moment capacity about x, Mrx = -76.69kNm
Moment capacity about y, Mry = -419.72kNm
Demand / Capacity, D/C = **0.11 OK**

Detailed Design of Column C33 at L05 - 1734



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L05 - 1734
Governing Load Combo:
  UW01 (Shear)
  UW03 (PMM)



Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 672kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6713 Ref. CSA Eq. 11.11
  and ex = -0.0002694 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 623.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.11 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1295.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6207.8kN (Compression)
Factored shear, Vf = -23.4kN, Factored moment, Mf = -41kN

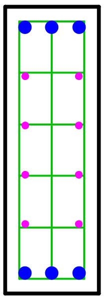
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 755.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6822 Ref. CSA Eq. 11.11
  and ex = -0.0002758 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1036.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.07 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6207.8kN (Compression)
Factored shear, Vf = -16.8kN, Factored moment, Mf = -54.5kN

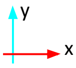
Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 6249.54kN (Compression)
Factored moment about x, Mfx = 11.74kNm
Factored moment about y, Mfy = 60.13kNm

Moment capacity about x, Mrx = 104.53kNm
Moment capacity about y, Mry = 535.39kNm
Demand / Capacity, D/C = **0.11 OK**

Detailed Design of Column C33 at L06 - 1619





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C33 at L06 - 1619
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 606.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8479 Ref. CSA Eq. 11.11
and ex = -0.0003522 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 456.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.53 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6215.1kN (Compression)
Factored shear, Vf = -21kN, Factored moment, Mf = -37kN

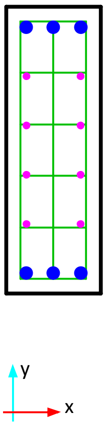
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 757.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.9121 Ref. CSA Eq. 11.11
and ex = -0.0003743 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 800.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6215.1kN (Compression)
Factored shear, Vf = -2.9kN, Factored moment, Mf = -4.5kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 6535.31kN (Compression)
Factored moment about x, Mfx = 8.49kNm
Factored moment about y, Mfy = 39.51kNm

Moment capacity about x, Mrx = 40.66kNm
Moment capacity about y, Mry = 189.2kNm
Demand / Capacity, D/C = **0.21 OK**

Detailed Design of Column C33 at L07 - 1504



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L07 - 1504
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 534kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7471 Ref. CSA Eq. 11.11
  and ex = -0.0003097 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 450.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.83 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 984.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5623.3kN (Compression)
Factored shear, Vf = -25.1kN, Factored moment, Mf = -48.1kN

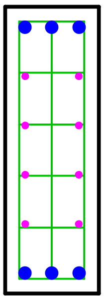
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 675.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8134 Ref. CSA Eq. 11.11
  and ex = -0.0003388 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 792.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5623.3kN (Compression)
Factored shear, Vf = -2.2kN, Factored moment, Mf = -3.4kN

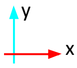
Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5940.36kN (Compression)
Factored moment about x, Mfx = -6.2kNm
Factored moment about y, Mfy = -45.07kNm

Moment capacity about x, Mrx = -32.58kNm
Moment capacity about y, Mry = -236.85kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C33 at L08 - 1389





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L08 - 1389
Governing Load Combo:
  U01 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 486.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6805 Ref. CSA Eq. 11.11
  and ex = -0.0002748 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 446.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.08 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 932.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5032.5kN (Compression)
Factored shear, Vf = -25.6kN, Factored moment, Mf = -46.6kN

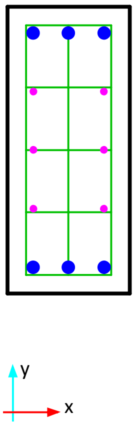
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 609.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7343 Ref. CSA Eq. 11.11
  and ex = -0.0003035 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 783.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.88 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5032.5kN (Compression)
Factored shear, Vf = -1.4kN, Factored moment, Mf = -1.8kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 4612.49kN (Compression)
Factored moment about x, Mfx = 8.48kNm
Factored moment about y, Mfy = 52.92kNm

Moment capacity about x, Mrx = 49.01kNm
Moment capacity about y, Mry = 305.84kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C33 at L09 - 1274



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L09 - 1274
Governing Load Combo:
  U01 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 410.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7383 Ref. CSA Eq. 11.11
  and ex = -0.0003055 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 375.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.86 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 785.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4443.1kN (Compression)
Factored shear, Vf = -22.8kN, Factored moment, Mf = -41.9kN

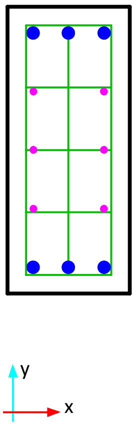
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 513kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8123 Ref. CSA Eq. 11.11
  and ex = -0.0003384 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 602.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4443.1kN (Compression)
Factored shear, Vf = -0.2kN, Factored moment, Mf = -0.3kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 4096.19kN (Compression)
Factored moment about x, Mfx = -4.16kNm
Factored moment about y, Mfy = -46.68kNm

Moment capacity about x, Mrx = -20.29kNm
Moment capacity about y, Mry = -227.71kNm
Demand / Capacity, D/C = **0.21 OK**

Detailed Design of Column C33 at L10 - 1159



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L10 - 1159
Governing Load Combo:
  UW01 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 348.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6263 Ref. CSA Eq. 11.11
  and ex = -0.0002409 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 368kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.31 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 716.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3510kN (Compression)
Factored shear, Vf = -17.8kN, Factored moment, Mf = -33.7kN

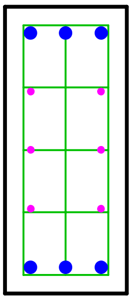
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 411.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6522 Ref. CSA Eq. 11.11
  and ex = -0.0002578 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 588.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.2 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3510kN (Compression)
Factored shear, Vf = -13.1kN, Factored moment, Mf = -28.7kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

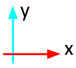
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 3560.41kN (Compression)
Factored moment about x, Mfx = -3.76kNm
Factored moment about y, Mfy = -49.51kNm

Moment capacity about x, Mrx = -19.03kNm
Moment capacity about y, Mry = -250.52kNm
Demand / Capacity, D/C = **0.2 OK**

Detailed Design of Column C33 at L11 - 1044



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C33 at L11 - 1044
Governing Load Combo:
UW01 (Shear)
UW03 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 318.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5727 Ref. CSA Eq. 11.11
and ex = -0.000201 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 363.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.59 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 682kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2982.7kN (Compression)
Factored shear, Vf = -18.3kN, Factored moment, Mf = -33.2kN

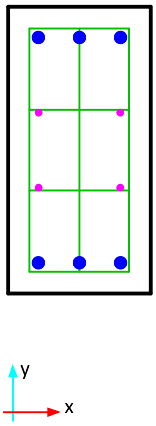
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 375.8kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5951 Ref. CSA Eq. 11.11
and ex = -0.0002185 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 581.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.47 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2982.7kN (Compression)
Factored shear, Vf = -13.2kN, Factored moment, Mf = -25.1kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 3004.7kN (Compression)
Factored moment about x, Mfx = 2.47kNm
Factored moment about y, Mfy = 50.64kNm

Moment capacity about x, Mrx = 13.09kNm
Moment capacity about y, Mry = 268.38kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C33 at L12 - 929



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L12 - 929
Governing Load Combo:
  U01 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 273.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5742 Ref. CSA Eq. 11.11
  and ex = -0.0002022 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 291kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.58 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 564.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2705.2kN (Compression)
Factored shear, Vf = -22.2kN, Factored moment, Mf = -39.9kN

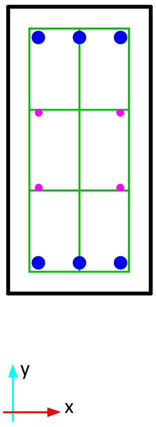
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 330.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6206 Ref. CSA Eq. 11.11
  and ex = -0.000237 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 492.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2705.2kN (Compression)
Factored shear, Vf = 2.3kN, Factored moment, Mf = 3.7kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 2475kN (Compression)
Factored moment about x, Mfx = 0.65kNm
Factored moment about y, Mfy = 45.48kNm

Moment capacity about x, Mrx = 2.76kNm
Moment capacity about y, Mry = 192.82kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C33 at L13 - 814



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C33 at L13 - 814
Governing Load Combo:
U01 (Shear)
UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 246kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5163 Ref. CSA Eq. 11.11
and ex = -0.0001502 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 286.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.95 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 532.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2132.8kN (Compression)
Factored shear, Vf = -22.9kN, Factored moment, Mf = -41.6kN

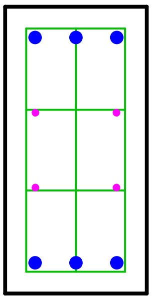
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 295kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5543 Ref. CSA Eq. 11.11
and ex = -0.0001855 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 485.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.7 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2132.8kN (Compression)
Factored shear, Vf = 3.4kN, Factored moment, Mf = 5.7kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

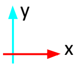
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 1965.68kN (Compression)
Factored moment about x, Mfx = 0.45kNm
Factored moment about y, Mfy = -45.89kNm

Moment capacity about x, Mrx = 2.05kNm
Moment capacity about y, Mry = -209.35kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C33 at L14 - 699



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at L14 - 699
Governing Load Combo:
  U01 (Shear)
  UW03 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 224.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4702 Ref. CSA Eq. 11.11
  and ex = -9.95E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 282.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 506.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1562kN (Compression)
Factored shear, Vf = -24.1kN, Factored moment, Mf = -41.7kN

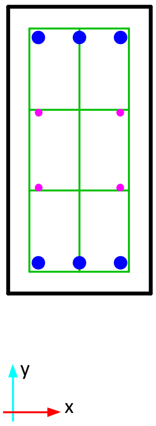
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 266.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5011 Ref. CSA Eq. 11.11
  and ex = -0.0001345 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 477.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.06 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 744.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1562kN (Compression)
Factored shear, Vf = 4.3kN, Factored moment, Mf = 7kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 1421.13kN (Compression)
Factored moment about x, Mfx = -2.32kNm
Factored moment about y, Mfy = 47.83kNm

Moment capacity about x, Mrx = -10.34kNm
Moment capacity about y, Mry = 213.24kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C33 at L15 - 584



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C33 at L15 - 584
Governing Load Combo:
U01 (Shear)
UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 207.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4356 Ref. CSA Eq. 11.11
and ex = -5.45E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.62 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 486.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 992.2kN (Compression)
Factored shear, Vf = -19.2kN, Factored moment, Mf = -36.3kN

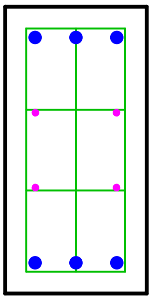
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 243.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4582 Ref. CSA Eq. 11.11
and ex = -8.46E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 470.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.41 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 714.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 992.2kN (Compression)
Factored shear, Vf = 3.3kN, Factored moment, Mf = 6.4kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

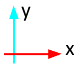
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 914.34kN (Compression)
Factored moment about x, Mfx = 1.15kNm
Factored moment about y, Mfy = -39.82kNm

Moment capacity about x, Mrx = 5.27kNm
Moment capacity about y, Mry = -182.34kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C33 at RF - 469



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C33 at RF - 469
Governing Load Combo:
  UW03 (Shear)
  UW03 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 122.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.257 Ref. CSA Eq. 11.11
  and ex = 0.000371 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 247.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 31.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 369.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 371.5kN (Compression)
Factored shear, Vf = -43.6kN, Factored moment, Mf = 91.6kN

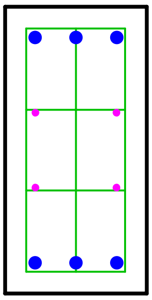
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 221.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4159 Ref. CSA Eq. 11.11
  and ex = -2.55E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 462.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.82 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 684.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 371.5kN (Compression)
Factored shear, Vf = 6.9kN, Factored moment, Mf = -16.7kN

Vfx/Vrx + Vfy/Vry = **0.13 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

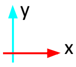
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 371.46kN (Compression)
Factored moment about x, Mfx = -16.73kNm
Factored moment about y, Mfy = 91.59kNm

Moment capacity about x, Mrx = -28.91kNm
Moment capacity about y, Mry = 158.27kNm
Demand / Capacity, D/C = **0.58 OK**

Detailed Design of Column C35 at L01 - 231



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C35 at L01 - 231
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 165.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3479 Ref. CSA Eq. 11.11
  and ex = 9.98E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 266.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.7 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 432.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 70.7kN (Compression)
Factored shear, Vf = 9.8kN, Factored moment, Mf = 21.9kN

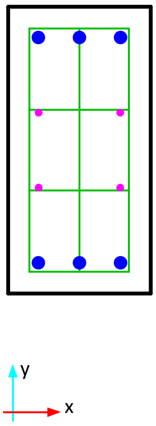
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 177.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3342 Ref. CSA Eq. 11.11
  and ex = 0.0001314 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 442.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.92 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 620.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 70.7kN (Compression)
Factored shear, Vf = -27kN, Factored moment, Mf = -52.2kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 56.38kN (Compression)
Factored moment about x, Mfx = -2.64kNm
Factored moment about y, Mfy = 38.88kNm

Moment capacity about x, Mrx = -10.19kNm
Moment capacity about y, Mry = 150.12kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C38 at L01 - 234



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C38 at L01 - 234
Governing Load Combo:
  UW01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 137.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2884 Ref. CSA Eq. 11.11
  and ex = 0.0002579 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 255kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.81 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 392.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 181.2kN (Compression)
Factored shear, Vf = -23.2kN, Factored moment, Mf = 56.9kN

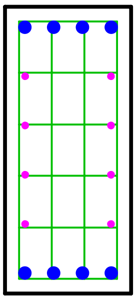
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 209.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3934 Ref. CSA Eq. 11.11
  and ex = 1.11E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 458kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.08 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 667.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 181.2kN (Compression)
Factored shear, Vf = 18kN, Factored moment, Mf = -39.1kN

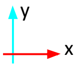
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 188.8kN (Compression)
Factored moment about x, Mfx = 4.83kNm
Factored moment about y, Mfy = 68.17kNm

Moment capacity about x, Mrx = 11.46kNm
Moment capacity about y, Mry = 161.74kNm
Demand / Capacity, D/C = **0.42 OK**

Detailed Design of Column C4 at L01 - 183





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L01 - 183
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 2022.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 2.0203 Ref. CSA Eq. 11.11
  and ex = -0.0005347 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 676.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.26 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 12340.7kN (Compression)
Factored shear, Vf = 43.8kN, Factored moment, Mf = 85.3kN

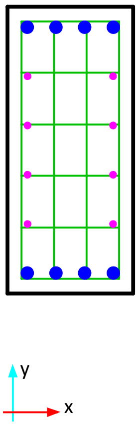
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 2844.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 2.5703 Ref. CSA Eq. 11.11
  and ex = -0.0005629 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1132.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.06 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 12340.7kN (Compression)
Factored shear, Vf = -12.4kN, Factored moment, Mf = -3.5kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 12773.68kN (Compression)
Factored moment about x, Mfx = -4.86kNm
Factored moment about y, Mfy = 79.75kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.47 Pf>Pmax Not OK**

Detailed Design of Column C4 at L02 - 4



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L02 - 4
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1136.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.135 Ref. CSA Eq. 11.11
  and ex = -0.0004317 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 655.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.98 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9909.3kN (Compression)
Factored shear, Vf = 31.9kN, Factored moment, Mf = 61.6kN

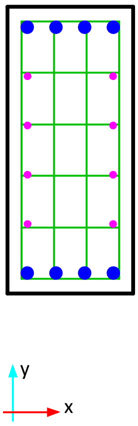
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1320.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1931 Ref. CSA Eq. 11.11
  and ex = -0.0004432 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1090.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9909.3kN (Compression)
Factored shear, Vf = -19.8kN, Factored moment, Mf = -68.2kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 11734.98kN (Compression)
Factored moment about x, Mfx = -9.82kNm
Factored moment about y, Mfy = 72.58kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.35 Pf>Pmax Not OK**

Detailed Design of Column C4 at L03 - 1935



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L03 - 1935
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1351kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.3496 Ref. CSA Eq. 11.11
  and ex = -0.0004691 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 663kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.72 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 10517kN (Compression)
Factored shear, Vf = 21.2kN, Factored moment, Mf = 33.2kN

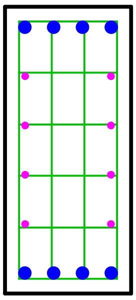
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1562.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.4119 Ref. CSA Eq. 11.11
  and ex = -0.0004778 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1102.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.66 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 10517kN (Compression)
Factored shear, Vf = -16.9kN, Factored moment, Mf = -14.1kN

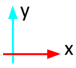
Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 10924.7kN (Compression)
Factored moment about x, Mfx = -15.03kNm
Factored moment about y, Mfy = 39.81kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.25 Pf>Pmax Not OK**

Detailed Design of Column C4 at L04 - 1820





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L04 - 1820
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 1133kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1318 Ref. CSA Eq. 11.11
  and ex = -0.0004311 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 655.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.98 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9731.7kN (Compression)
Factored shear, Vf = 22.7kN, Factored moment, Mf = 39.7kN

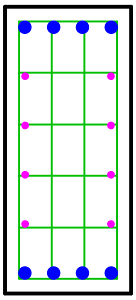
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 1315.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.1887 Ref. CSA Eq. 11.11
  and ex = -0.0004423 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1090.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 25.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 9731.7kN (Compression)
Factored shear, Vf = -15.4kN, Factored moment, Mf = -11.5kN

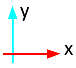
Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 10108.04kN (Compression)
Factored moment about x, Mfx = -12.69kNm
Factored moment about y, Mfy = 45kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.16 Pf>Pmax Not OK**

Detailed Design of Column C4 at L05 - 1705





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L05 - 1705
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 400mm
Depth, D = 900mm
ETABS assignment: C400x900C5060
End Bars: 8 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 66mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.56%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  4 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 824.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8233 Ref. CSA Eq. 11.11
  and ex = -0.0003428 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 637.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1415.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7835.5kN (Compression)
Factored shear, Vf = 27kN, Factored moment, Mf = 43.5kN

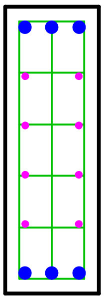
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 929.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8401 Ref. CSA Eq. 11.11
  and ex = -0.0003492 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 1059.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.56 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1565.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7835.5kN (Compression)
Factored shear, Vf = -23.1kN, Factored moment, Mf = -58kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 400mm2 **OK**

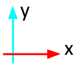
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 9287.03kN (Compression)
Factored moment about x, Mfx = -13.36kNm
Factored moment about y, Mfy = 45.93kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.07 Pf>Pmax Not OK**

Detailed Design of Column C4 at L06 - 1590



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L06 - 1590
Governing Load Combo:
  UW04 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 749.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0486 Ref. CSA Eq. 11.11
  and ex = -0.0004124 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 465.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.11 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7137.6kN (Compression)
Factored shear, Vf = 18.5kN, Factored moment, Mf = 29.5kN

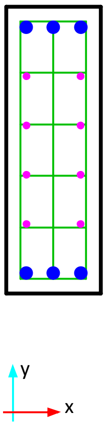
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 899.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0834 Ref. CSA Eq. 11.11
  and ex = -0.0004205 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 812.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.06 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7137.6kN (Compression)
Factored shear, Vf = -21.4kN, Factored moment, Mf = -49.7kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 8461.82kN (Compression)
Factored moment about x, Mfx = -12.6kNm
Factored moment about y, Mfy = 31.04kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.27 Pf>Pmax Not OK**

Detailed Design of Column C4 at L07 - 1475



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C4 at L07 - 1475
Governing Load Combo:
U02 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 829.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 1.1601 Ref. CSA Eq. 11.11
and ex = -0.0004368 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 468.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 25.94 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7649.5kN (Compression)
Factored shear, Vf = 23.1kN, Factored moment, Mf = 40.1kN

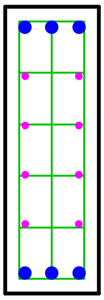
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 1056.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 1.2731 Ref. CSA Eq. 11.11
and ex = -0.0004572 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 821.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 25.8 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7649.5kN (Compression)
Factored shear, Vf = -16.1kN, Factored moment, Mf = -17.9kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

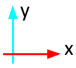
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7649.52kN (Compression)
Factored moment about x, Mfx = -17.86kNm
Factored moment about y, Mfy = 40.1kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.15 Pf>Pmax Not OK**

Detailed Design of Column C4 at L08 - 1360



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C4 at L08 - 1360
Governing Load Combo:
UW04 (Shear)
U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 557.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7804 Ref. CSA Eq. 11.11
and ex = -0.000325 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 452.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.73 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5768kN (Compression)
Factored shear, Vf = 22kN, Factored moment, Mf = 37.1kN

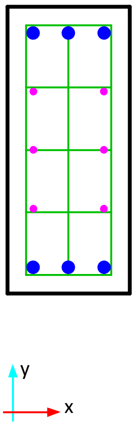
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 669.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8066 Ref. CSA Eq. 11.11
and ex = -0.0003361 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 791.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5768kN (Compression)
Factored shear, Vf = -29.2kN, Factored moment, Mf = -54.8kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6840.22kN (Compression)
Factored moment about x, Mfx = -20.39kNm
Factored moment about y, Mfy = 38.7kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.03 Pf>Pmax Not OK**

Detailed Design of Column C4 at L09 - 1245



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
 Confinement Type: Tied
 Axial compression: varies
 Steel: 0.85
 Concrete: 0.65
Column: C4 at L09 - 1245
Governing Load Combo:
 UW04 (Shear)
 U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
 5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 485.4kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.8731 Ref. CSA Eq. 11.11
 and ex = -0.0003612 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 381.6kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 26.47 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5086.3kN (Compression)
Factored shear, Vf = 19.5kN, Factored moment, Mf = 33kN

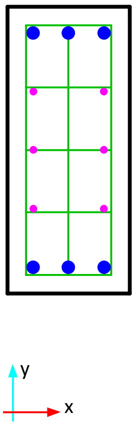
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 572.9kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.9072 Ref. CSA Eq. 11.11
 and ex = -0.0003727 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 609kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 26.39 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5086.3kN (Compression)
Factored shear, Vf = -23kN, Factored moment, Mf = -42.3kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6032.59kN (Compression)
Factored moment about x, Mfx = -17.44kNm
Factored moment about y, Mfy = 34.39kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.13 Pf>Pmax Not OK**

Detailed Design of Column C4 at L10 - 1130



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C4 at L10 - 1130
Governing Load Combo:
UW04 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 413.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.744 Ref. CSA Eq. 11.11
and ex = -0.0003082 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 375.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.84 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4413.6kN (Compression)
Factored shear, Vf = 20.3kN, Factored moment, Mf = 35.3kN

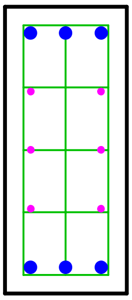
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 482kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7633 Ref. CSA Eq. 11.11
and ex = -0.0003173 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 598.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4413.6kN (Compression)
Factored shear, Vf = -28.4kN, Factored moment, Mf = -54.9kN

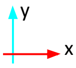
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5235.18kN (Compression)
Factored moment about x, Mfx = -26.06kNm
Factored moment about y, Mfy = 36.71kNm

Moment capacity about x, Mrx = -101.37kNm
Moment capacity about y, Mry = 142.8kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C4 at L11 - 1015





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
 Confinement Type: Tied
 Axial compression: varies
 Steel: 0.85
 Concrete: 0.65
Column: C4 at L11 - 1015
Governing Load Combo:
 UW04 (Shear)
 UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
 5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 362.1kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.6513 Ref. CSA Eq. 11.11
 and ex = -0.0002572 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 369.8kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 27.2 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 731.8kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3744.8kN (Compression)
Factored shear, Vf = 20.9kN, Factored moment, Mf = 35.3kN

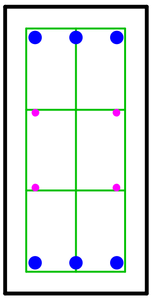
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 419.8kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.6648 Ref. CSA Eq. 11.11
 and ex = -0.0002655 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 589.5kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 27.14 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3744.8kN (Compression)
Factored shear, Vf = -32.3kN, Factored moment, Mf = -55.8kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

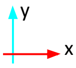
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 3774.08kN (Compression)
Factored moment about x, Mfx = 22.38kNm
Factored moment about y, Mfy = -51.5kNm

Moment capacity about x, Mrx = 101.15kNm
Moment capacity about y, Mry = -232.76kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C4 at L12 - 900



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L12 - 900
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 299.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6286 Ref. CSA Eq. 11.11
  and ex = -0.0002425 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 294.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 594.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3078.4kN (Compression)
Factored shear, Vf = 18.7kN, Factored moment, Mf = 31.7kN

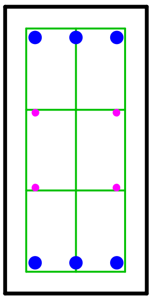
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 340.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6397 Ref. CSA Eq. 11.11
  and ex = -0.0002498 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 494.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.25 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3078.4kN (Compression)
Factored shear, Vf = -27.2kN, Factored moment, Mf = -46.7kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

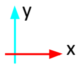
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 3103.28kN (Compression)
Factored moment about x, Mfx = 20.02kNm
Factored moment about y, Mfy = -45.62kNm

Moment capacity about x, Mrx = 68.94kNm
Moment capacity about y, Mry = -157.08kNm
Demand / Capacity, D/C = **0.29 OK**

Detailed Design of Column C4 at L13 - 785



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L13 - 785
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 262.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5499 Ref. CSA Eq. 11.11
  and ex = -0.0001817 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 289.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.73 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 551.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2400.7kN (Compression)
Factored shear, Vf = 19.3kN, Factored moment, Mf = -32.7kN

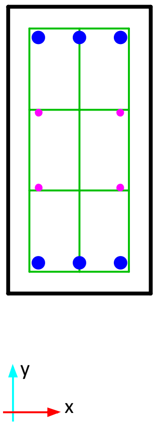
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 294.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5536 Ref. CSA Eq. 11.11
  and ex = -0.000185 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 485kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.71 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2400.7kN (Compression)
Factored shear, Vf = -31.9kN, Factored moment, Mf = 58.1kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 2454.24kN (Compression)
Factored moment about x, Mfx = -23.59kNm
Factored moment about y, Mfy = 45.07kNm

Moment capacity about x, Mrx = -94.21kNm
Moment capacity about y, Mry = 180kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C4 at L14 - 670



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L14 - 670
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 234.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4917 Ref. CSA Eq. 11.11
  and ex = -0.0001243 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 284.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.13 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 518.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1764.1kN (Compression)
Factored shear, Vf = 20.3kN, Factored moment, Mf = 34kN

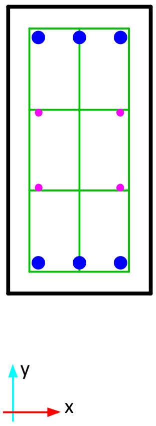
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 264kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4961 Ref. CSA Eq. 11.11
  and ex = -0.0001291 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 477.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.1 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 741.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1764.1kN (Compression)
Factored shear, Vf = -33.1kN, Factored moment, Mf = -56.7kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 1772.36kN (Compression)
Factored moment about x, Mfx = 24.84kNm
Factored moment about y, Mfy = -47.41kNm

Moment capacity about x, Mrx = 101.76kNm
Moment capacity about y, Mry = -194.21kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C4 at L15 - 555



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C4 at L15 - 555
Governing Load Combo:
  UW04 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 213.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4475 Ref. CSA Eq. 11.11
  and ex = -7.08E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 279.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 493.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1110.7kN (Compression)
Factored shear, Vf = 16.2kN, Factored moment, Mf = 29.8kN

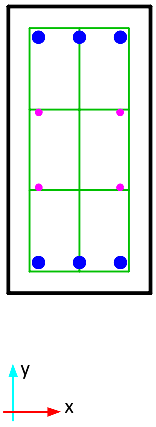
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 238.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4488 Ref. CSA Eq. 11.11
  and ex = -7.25E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.49 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 708.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1110.7kN (Compression)
Factored shear, Vf = -31.4kN, Factored moment, Mf = -54.5kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 1128.55kN (Compression)
Factored moment about x, Mfx = -24.49kNm
Factored moment about y, Mfy = 39.11kNm

Moment capacity about x, Mrx = -106.04kNm
Moment capacity about y, Mry = 169.35kNm
Demand / Capacity, D/C = **0.23 OK**

Detailed Design of Column C4 at RF - 440



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C4 at RF - 440
Governing Load Combo:
UW04 (Shear)
UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 155.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.3254 Ref. CSA Eq. 11.11
and ex = 0.0001527 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 262.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 30.07 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 417.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 444.5kN (Compression)
Factored shear, Vf = 32.3kN, Factored moment, Mf = -66.1kN

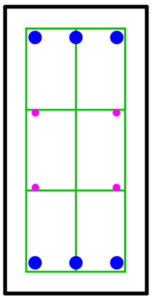
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 214.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4029 Ref. CSA Eq. 11.11
and ex = -4.8E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 460.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.97 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 674.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 444.5kN (Compression)
Factored shear, Vf = -40.1kN, Factored moment, Mf = 74.9kN

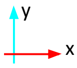
Vfx/Vrx + Vfy/Vry = **0.14 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 453.03kN (Compression)
Factored moment about x, Mfx = 20.94kNm
Factored moment about y, Mfy = -81.77kNm

Moment capacity about x, Mrx = 41.02kNm
Moment capacity about y, Mry = -160.19kNm
Demand / Capacity, D/C = **0.51 OK**

Detailed Design of Column C41 at L01 - 235





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C41 at L01 - 235
Governing Load Combo:
  UW01 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 137.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2883 Ref. CSA Eq. 11.11
  and ex = 0.0002584 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 254.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.81 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 392.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 187.5kN (Compression)
Factored shear, Vf = -23.5kN, Factored moment, Mf = 57.6kN

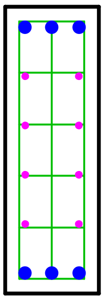
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 208.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3922 Ref. CSA Eq. 11.11
  and ex = 1.32E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 457.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 666.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 187.5kN (Compression)
Factored shear, Vf = 18.4kN, Factored moment, Mf = -41.2kN

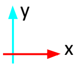
Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 195.38kN (Compression)
Factored moment about x, Mfx = 1.77kNm
Factored moment about y, Mfy = 70.04kNm

Moment capacity about x, Mrx = 4.12kNm
Moment capacity about y, Mry = 163.13kNm
Demand / Capacity, D/C = **0.43 OK**

Detailed Design of Column C52 at L01 - 214





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L01 - 214
Governing Load Combo:
  UW02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 531.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7438 Ref. CSA Eq. 11.11
  and ex = -0.0003081 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 450.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.84 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 982.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6246.8kN (Compression)
Factored shear, Vf = 52.1kN, Factored moment, Mf = 112.4kN

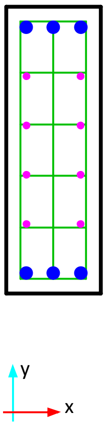
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 715kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8614 Ref. CSA Eq. 11.11
  and ex = -0.0003571 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 796.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6246.8kN (Compression)
Factored shear, Vf = 24.9kN, Factored moment, Mf = 107.1kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7718.88kN (Compression)
Factored moment about x, Mfx = 25.25kNm
Factored moment about y, Mfy = 137.24kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.16 Pf>Pmax Not OK**

Detailed Design of Column C52 at L02 - 35



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C52 at L02 - 35
Governing Load Combo:
    UW02 (Shear)
    U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
    6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 528.5kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.7394 Ref. CSA Eq. 11.11
    and ex = -0.000306 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 450.3kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 26.86 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 978.8kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5643kN (Compression)
Factored shear, Vf = 31.3kN, Factored moment, Mf = 55.5kN

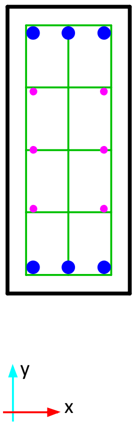
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 647.2kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.7797 Ref. CSA Eq. 11.11
    and ex = -0.0003247 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 788.8kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 26.73 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5643kN (Compression)
Factored shear, Vf = 28.9kN, Factored moment, Mf = 79kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm   **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2   **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2   **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6958.98kN (Compression)
Factored moment about x, Mfx = 17.65kNm
Factored moment about y, Mfy = 68.46kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C =   **>1.05 Pf>Pmax Not OK**

Detailed Design of Column C52 at L03 - 1966



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L03 - 1966
Governing Load Combo:
  UW02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 499.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8984 Ref. CSA Eq. 11.11
  and ex = -0.0003698 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 382.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.41 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5198.2kN (Compression)
Factored shear, Vf = 21.3kN, Factored moment, Mf = 32.5kN

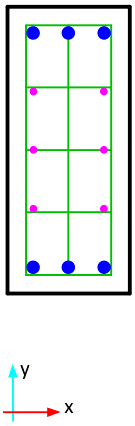
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 576.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9132 Ref. CSA Eq. 11.11
  and ex = -0.0003747 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 609.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5198.2kN (Compression)
Factored shear, Vf = 26.8kN, Factored moment, Mf = 64.9kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6404.69kN (Compression)
Factored moment about x, Mfx = 20.44kNm
Factored moment about y, Mfy = 36.42kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.2 Pf>Pmax Not OK**

Detailed Design of Column C52 at L04 - 1851



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L04 - 1851
Governing Load Combo:
  UW02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 445kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8004 Ref. CSA Eq. 11.11
  and ex = -0.0003335 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 378.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4775.4kN (Compression)
Factored shear, Vf = 23.4kN, Factored moment, Mf = 37.9kN

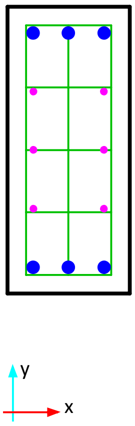
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 513.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8129 Ref. CSA Eq. 11.11
  and ex = -0.0003386 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 602.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4775.4kN (Compression)
Factored shear, Vf = 33.5kN, Factored moment, Mf = 75.5kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5874.37kN (Compression)
Factored moment about x, Mfx = 31kNm
Factored moment about y, Mfy = 43.22kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.1 Pf>Pmax Not OK**

Detailed Design of Column C52 at L05 - 1736



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L05 - 1736
Governing Load Combo:
  UW02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 408.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7351 Ref. CSA Eq. 11.11
  and ex = -0.0003039 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 375kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 783.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4365.9kN (Compression)
Factored shear, Vf = 22.5kN, Factored moment, Mf = 35.8kN

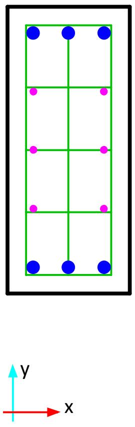
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 466.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7389 Ref. CSA Eq. 11.11
  and ex = -0.0003058 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 596.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.86 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4365.9kN (Compression)
Factored shear, Vf = 37.4kN, Factored moment, Mf = 79.4kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5359.57kN (Compression)
Factored moment about x, Mfx = 34.44kNm
Factored moment about y, Mfy = 40.31kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.01 Pf>Pmax Not OK**

Detailed Design of Column C52 at L06 - 1621



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C52 at L06 - 1621
Governing Load Combo:
UW02 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 376.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6775 Ref. CSA Eq. 11.11
and ex = -0.0002731 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 371.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 748.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3946.5kN (Compression)
Factored shear, Vf = 22.3kN, Factored moment, Mf = -34.3kN

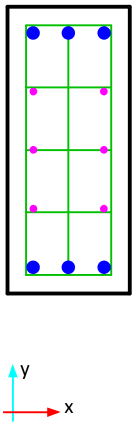
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 429.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6802 Ref. CSA Eq. 11.11
and ex = -0.0002746 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 591.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.08 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3946.5kN (Compression)
Factored shear, Vf = 41.5kN, Factored moment, Mf = -74kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4858.46kN (Compression)
Factored moment about x, Mfx = 38.94kNm
Factored moment about y, Mfy = 39.72kNm

Moment capacity about x, Mrx = 163.28kNm
Moment capacity about y, Mry = 166.55kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C52 at L07 - 1506



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L07 - 1506
Governing Load Combo:
  UW02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 350.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6306 Ref. CSA Eq. 11.11
  and ex = -0.0002438 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 368.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.29 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 718.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3555.7kN (Compression)
Factored shear, Vf = 22.1kN, Factored moment, Mf = -33.6kN

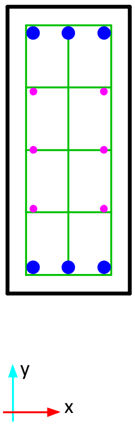
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 398.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6305 Ref. CSA Eq. 11.11
  and ex = -0.0002438 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 585.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.29 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3555.7kN (Compression)
Factored shear, Vf = 43.4kN, Factored moment, Mf = -77.1kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 3481.94kN (Compression)
Factored moment about x, Mfx = 41.15kNm
Factored moment about y, Mfy = 50.16kNm

Moment capacity about x, Mrx = 190.17kNm
Moment capacity about y, Mry = 231.81kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C52 at L08 - 1391



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L08 - 1391
Governing Load Combo:
  UW02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 328.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5904 Ref. CSA Eq. 11.11
  and ex = -0.000215 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 365.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 693.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3192.5kN (Compression)
Factored shear, Vf = 22.4kN, Factored moment, Mf = 35.2kN

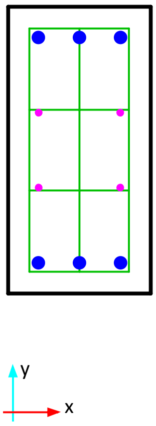
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 370.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.586 Ref. CSA Eq. 11.11
  and ex = -0.0002116 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 580kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3192.5kN (Compression)
Factored shear, Vf = 50.4kN, Factored moment, Mf = 89.9kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 3098.12kN (Compression)
Factored moment about x, Mfx = 45.66kNm
Factored moment about y, Mfy = 50.45kNm

Moment capacity about x, Mrx = 215.1kNm
Moment capacity about y, Mry = 237.67kNm
Demand / Capacity, D/C = **0.21 OK**

Detailed Design of Column C52 at L09 - 1276



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L09 - 1276
Governing Load Combo:
  UW02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 283.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5946 Ref. CSA Eq. 11.11
  and ex = -0.0002182 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 292.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.47 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 575.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2813.7kN (Compression)
Factored shear, Vf = 20.6kN, Factored moment, Mf = 32.4kN

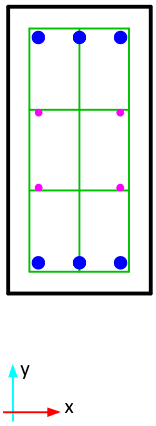
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 312.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5878 Ref. CSA Eq. 11.11
  and ex = -0.000213 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 489.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.51 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2813.7kN (Compression)
Factored shear, Vf = 43.1kN, Factored moment, Mf = 75.7kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 2720.91kN (Compression)
Factored moment about x, Mfx = 39.96kNm
Factored moment about y, Mfy = 46.25kNm

Moment capacity about x, Mrx = 172.35kNm
Moment capacity about y, Mry = 199.47kNm
Demand / Capacity, D/C = **0.23 OK**

Detailed Design of Column C52 at L10 - 1161



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L10 - 1161
Governing Load Combo:
  UW02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 263.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5529 Ref. CSA Eq. 11.11
  and ex = -0.0001843 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 289.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.71 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 552.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2442.7kN (Compression)
Factored shear, Vf = 21kN, Factored moment, Mf = 33.7kN

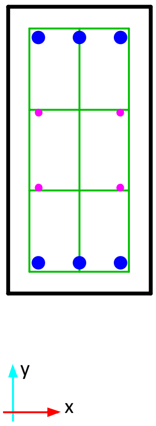
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 288.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5414 Ref. CSA Eq. 11.11
  and ex = -0.0001742 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 483.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2442.7kN (Compression)
Factored shear, Vf = 49.4kN, Factored moment, Mf = 89.4kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 2352.9kN (Compression)
Factored moment about x, Mfx = 49.05kNm
Factored moment about y, Mfy = 47.73kNm

Moment capacity about x, Mrx = 203.13kNm
Moment capacity about y, Mry = 197.66kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C52 at L11 - 1046



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C52 at L11 - 1046
Governing Load Combo:
UW02 (Shear)
UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 247kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5182 Ref. CSA Eq. 11.11
and ex = -0.0001521 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 286.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.94 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 533.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2075.5kN (Compression)
Factored shear, Vf = 20.9kN, Factored moment, Mf = 33.5kN

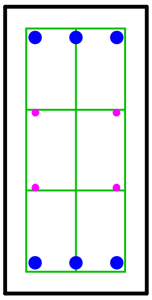
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 270.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5085 Ref. CSA Eq. 11.11
and ex = -0.0001422 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 478.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 749.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2075.5kN (Compression)
Factored shear, Vf = 50.1kN, Factored moment, Mf = 87.7kN

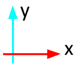
Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 2075.51kN (Compression)
Factored moment about x, Mfx = 87.72kNm
Factored moment about y, Mfy = 33.51kNm

Moment capacity about x, Mrx = 370.29kNm
Moment capacity about y, Mry = 141.45kNm
Demand / Capacity, D/C = **0.24 OK**

Detailed Design of Column C52 at L12 - 931





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L12 - 931
Governing Load Combo:
  UW02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 232.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4885 Ref. CSA Eq. 11.11
  and ex = -0.0001208 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 284.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.15 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 516.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1710.8kN (Compression)
Factored shear, Vf = 20.2kN, Factored moment, Mf = 32.6kN

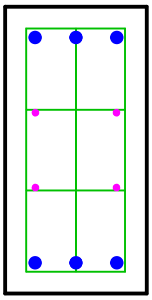
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 255.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4795 Ref. CSA Eq. 11.11
  and ex = -0.0001106 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 474.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.23 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 729.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1710.8kN (Compression)
Factored shear, Vf = 49.9kN, Factored moment, Mf = 86.4kN

Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

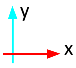
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 1631.56kN (Compression)
Factored moment about x, Mfx = 50.52kNm
Factored moment about y, Mfy = 45.19kNm

Moment capacity about x, Mrx = 193.61kNm
Moment capacity about y, Mry = 173.18kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C52 at L13 - 816



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L13 - 816
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 219.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4611 Ref. CSA Eq. 11.11
  and ex = -8.83E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 501.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1347.6kN (Compression)
Factored shear, Vf = 20.2kN, Factored moment, Mf = 33.1kN

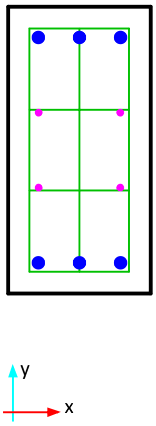
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 241kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4528 Ref. CSA Eq. 11.11
  and ex = -7.78E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.46 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 710.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1347.6kN (Compression)
Factored shear, Vf = 51.1kN, Factored moment, Mf = 87.9kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 1347.6kN (Compression)
Factored moment about x, Mfx = 87.95kNm
Factored moment about y, Mfy = 33.1kNm

Moment capacity about x, Mrx = 328.6kNm
Moment capacity about y, Mry = 123.67kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C52 at L14 - 701



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
- Confinement Type: Tied
- Axial compression: varies
- Steel: 0.85
- Concrete: 0.65

Column: C52 at L14 - 701
Governing Load Combo:
- UW02 (Shear)
- UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
- 4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
- 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)

Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 208.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4366 Ref. CSA Eq. 11.11
  and ex = -5.59E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 486.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 985.1kN (Compression)
Factored shear, Vf = 20.5kN, Factored moment, Mf = 33.5kN

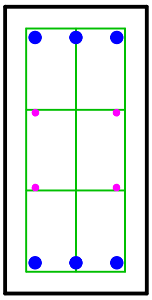
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 228.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4297 Ref. CSA Eq. 11.11
  and ex = -4.61E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 465.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.68 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 694.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 985.1kN (Compression)
Factored shear, Vf = 50.9kN, Factored moment, Mf = 87kN

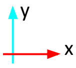
Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 920.97kN (Compression)
Factored moment about x, Mfx = 53.52kNm
Factored moment about y, Mfy = 45.24kNm

Moment capacity about x, Mrx = 192.47kNm
Moment capacity about y, Mry = 162.69kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C52 at L15 - 586





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at L15 - 586
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 198.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4164 Ref. CSA Eq. 11.11
  and ex = -2.62E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 276.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.82 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 474.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 622.3kN (Compression)
Factored shear, Vf = 18.5kN, Factored moment, Mf = 31.1kN

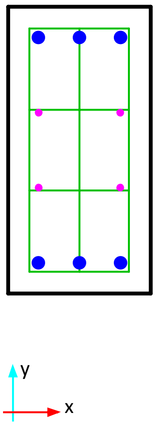
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 217.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4079 Ref. CSA Eq. 11.11
  and ex = -1.3E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 461.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.91 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 678.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 622.3kN (Compression)
Factored shear, Vf = 55.2kN, Factored moment, Mf = 88kN

Vfx/Vrx + Vfy/Vry = **0.12 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 604.53kN (Compression)
Factored moment about x, Mfx = -96.59kNm
Factored moment about y, Mfy = -28.74kNm

Moment capacity about x, Mrx = -312.34kNm
Moment capacity about y, Mry = -92.94kNm
Demand / Capacity, D/C = **0.31 OK**

Detailed Design of Column C52 at RF - 471



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C52 at RF - 471
Governing Load Combo:
  U02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 174.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3671 Ref. CSA Eq. 11.11
  and ex = 5.98E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 269.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.42 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 444.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 321.2kN (Compression)
Factored shear, Vf = 25kN, Factored moment, Mf = 39.1kN

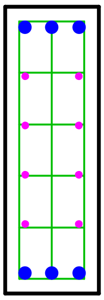
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 215.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4042 Ref. CSA Eq. 11.11
  and ex = -6.9E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 460.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.95 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 675.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 321.2kN (Compression)
Factored shear, Vf = 20kN, Factored moment, Mf = 49.1kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

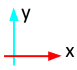
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 212.75kN (Compression)
Factored moment about x, Mfx = 43.88kNm
Factored moment about y, Mfy = 45.3kNm

Moment capacity about x, Mrx = 131.44kNm
Moment capacity about y, Mry = 135.7kNm
Demand / Capacity, D/C = **0.33 OK**

Detailed Design of Column C56 at L01 - 217



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C56 at L01 - 217
Governing Load Combo:
    UW01 (Shear)
    U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
    6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 645.1kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.9024 Ref. CSA Eq. 11.11
    and ex = -0.0003712 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 459.3kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 26.4 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6552.1kN (Compression)
Factored shear, Vf = -21.4kN, Factored moment, Mf = -39.3kN

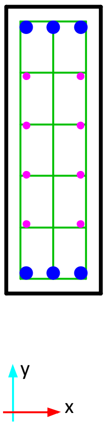
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 771.4kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.9294 Ref. CSA Eq. 11.11
    and ex = -0.0003797 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 802.2kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 26.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 6552.1kN (Compression)
Factored shear, Vf = -14.3kN, Factored moment, Mf = -88.9kN

Vfx/Vrx + Vfy/Vry = **0.03 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7547.92kN (Compression)
Factored moment about x, Mfx = -2.05kNm
Factored moment about y, Mfy = -46.78kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.14 Pf>Pmax Not OK**

Detailed Design of Column C56 at L02 - 38



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L02 - 38
Governing Load Combo:
  UW02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 517kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7233 Ref. CSA Eq. 11.11
  and ex = -0.000298 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 449.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.91 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 966.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5525.4kN (Compression)
Factored shear, Vf = -29.6kN, Factored moment, Mf = -57.5kN

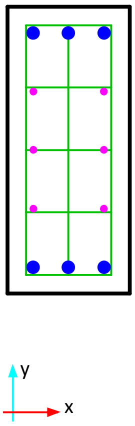
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 625.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7531 Ref. CSA Eq. 11.11
  and ex = -0.0003126 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 785.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.81 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5525.4kN (Compression)
Factored shear, Vf = 35.4kN, Factored moment, Mf = 105kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6869.96kN (Compression)
Factored moment about x, Mfx = 32.09kNm
Factored moment about y, Mfy = -70.54kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.03 Pf>Pmax Not OK**

Detailed Design of Column C56 at L03 - 1969



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L03 - 1969
Governing Load Combo:
  UW02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 488.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8793 Ref. CSA Eq. 11.11
  and ex = -0.0003634 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 381.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.46 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5104.5kN (Compression)
Factored shear, Vf = -18.7kN, Factored moment, Mf = -32.1kN

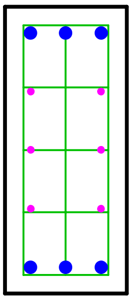
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 569.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9015 Ref. CSA Eq. 11.11
  and ex = -0.0003709 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 608.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.4 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5104.5kN (Compression)
Factored shear, Vf = 21.2kN, Factored moment, Mf = 55.5kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

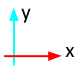
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 6343.01kN (Compression)
Factored moment about x, Mfx = 11.61kNm
Factored moment about y, Mfy = -37.34kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.19 Pf>Pmax Not OK**

Detailed Design of Column C56 at L04 - 1854



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L04 - 1854
Governing Load Combo:
  UW02 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 436.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7844 Ref. CSA Eq. 11.11
  and ex = -0.0003267 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 377.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.71 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4701.9kN (Compression)
Factored shear, Vf = -21.9kN, Factored moment, Mf = -39.9kN

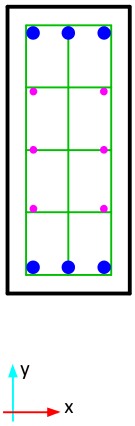
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 508.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8055 Ref. CSA Eq. 11.11
  and ex = -0.0003356 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 602.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4701.9kN (Compression)
Factored shear, Vf = 29kN, Factored moment, Mf = 68.3kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5834.8kN (Compression)
Factored moment about x, Mfx = 24.66kNm
Factored moment about y, Mfy = -47.22kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.09 Pf>Pmax Not OK**

Detailed Design of Column C56 at L05 - 1739



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C56 at L05 - 1739
Governing Load Combo:
UW02 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 401.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7218 Ref. CSA Eq. 11.11
and ex = -0.0002972 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 374.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.92 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 775.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4308.6kN (Compression)
Factored shear, Vf = -21.8kN, Factored moment, Mf = -39.3kN

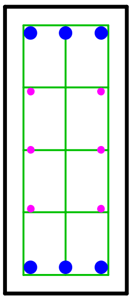
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 464.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.7349 Ref. CSA Eq. 11.11
and ex = -0.0003038 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 596.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4308.6kN (Compression)
Factored shear, Vf = 33.3kN, Factored moment, Mf = 72.7kN

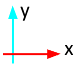
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5336.91kN (Compression)
Factored moment about x, Mfx = 29.47kNm
Factored moment about y, Mfy = -46.47kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1 Pf>Pmax Not OK**

Detailed Design of Column C56 at L06 - 1624





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L06 - 1624
Governing Load Combo:
  UW02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 370.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6669 Ref. CSA Eq. 11.11
  and ex = -0.0002668 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 370.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.13 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 741.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3923.4kN (Compression)
Factored shear, Vf = -22.5kN, Factored moment, Mf = -40.6kN

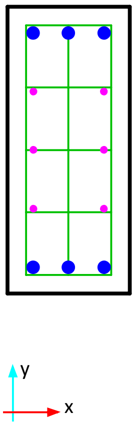
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 427.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6764 Ref. CSA Eq. 11.11
  and ex = -0.0002724 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 590.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3923.4kN (Compression)
Factored shear, Vf = 37.9kN, Factored moment, Mf = 77.7kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4848.93kN (Compression)
Factored moment about x, Mfx = 35.36kNm
Factored moment about y, Mfy = -48.05kNm

Moment capacity about x, Mrx = 125.91kNm
Moment capacity about y, Mry = -171.1kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C56 at L07 - 1509



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L07 - 1509
Governing Load Combo:
  UW02 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 345.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6221 Ref. CSA Eq. 11.11
  and ex = -0.000238 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 367.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.33 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 713.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3524.3kN (Compression)
Factored shear, Vf = -22.7kN, Factored moment, Mf = 38.3kN

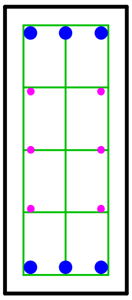
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 397.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6295 Ref. CSA Eq. 11.11
  and ex = -0.0002431 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 585.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3524.3kN (Compression)
Factored shear, Vf = 40.2kN, Factored moment, Mf = -72.5kN

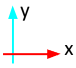
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 3514.38kN (Compression)
Factored moment about x, Mfx = 35.73kNm
Factored moment about y, Mfy = -60.06kNm

Moment capacity about x, Mrx = 140.99kNm
Moment capacity about y, Mry = -236.99kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C56 at L08 - 1394





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L08 - 1394
Governing Load Combo:
  UW02 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 323.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5813 Ref. CSA Eq. 11.11
  and ex = -0.0002079 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 364.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.54 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 687.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3172.4kN (Compression)
Factored shear, Vf = -24kN, Factored moment, Mf = -42.7kN

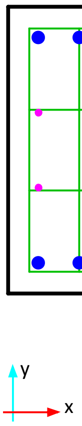
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 370.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5863 Ref. CSA Eq. 11.11
  and ex = -0.0002118 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 580.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3172.4kN (Compression)
Factored shear, Vf = 47.4kN, Factored moment, Mf = 85.1kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 3136.23kN (Compression)
Factored moment about x, Mfx = 41.23kNm
Factored moment about y, Mfy = -62.03kNm

Moment capacity about x, Mrx = 162.32kNm
Moment capacity about y, Mry = -244.21kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C56 at L09 - 1279



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
 Confinement Type: Tied
 Axial compression: varies
 Steel: 0.85
 Concrete: 0.65
Column: C56 at L09 - 1279
Governing Load Combo:
 UW02 (Shear)
 UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
 4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 278.7kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.5849 Ref. CSA Eq. 11.11
 and ex = -0.0002108 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 291.7kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 27.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 570.5kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2804kN (Compression)
Factored shear, Vf = -22.6kN, Factored moment, Mf = -40kN

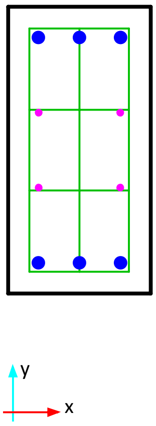
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 313.4kN Ref. CSA Eq. 11.6
 Where phiC = 0.65, lambda = 1, beta = 0.5888 Ref. CSA Eq. 11.11
 and ex = -0.0002138 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 489.2kN Ref. CSA Eq. 11.7
 Where phiS = 0.85, theta = 27.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
 Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2804kN (Compression)
Factored shear, Vf = 40.9kN, Factored moment, Mf = 72.4kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 2763.72kN (Compression)
Factored moment about x, Mfx = 37.17kNm
Factored moment about y, Mfy = -57.93kNm

Moment capacity about x, Mrx = 133.46kNm
Moment capacity about y, Mry = -208kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C56 at L10 - 1164



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L10 - 1164
Governing Load Combo:
  UW02 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 259.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5442 Ref. CSA Eq. 11.11
  and ex = -0.0001767 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 288.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.76 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 548.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2443kN (Compression)
Factored shear, Vf = -23.7kN, Factored moment, Mf = -42.5kN

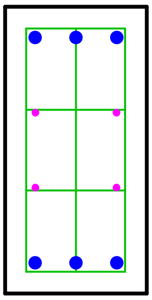
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 289.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5432 Ref. CSA Eq. 11.11
  and ex = -0.0001757 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 483.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.77 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2443kN (Compression)
Factored shear, Vf = 47.4kN, Factored moment, Mf = 86.1kN

Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

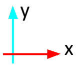
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 2399.72kN (Compression)
Factored moment about x, Mfx = 46.62kNm
Factored moment about y, Mfy = -60.92kNm

Moment capacity about x, Mrx = 159.85kNm
Moment capacity about y, Mry = -208.89kNm
Demand / Capacity, D/C = **0.29 OK**

Detailed Design of Column C56 at L11 - 1049



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L11 - 1049
Governing Load Combo:
  UW02 (Shear)
  UW03 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 243.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5109 Ref. CSA Eq. 11.11
  and ex = -0.0001447 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 286.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.99 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 529.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2085.5kN (Compression)
Factored shear, Vf = -24.3kN, Factored moment, Mf = -42.9kN

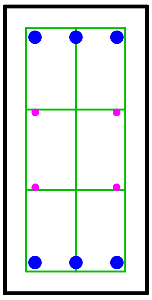
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 271.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5106 Ref. CSA Eq. 11.11
  and ex = -0.0001444 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 479.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.99 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 751kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2085.5kN (Compression)
Factored shear, Vf = 48.4kN, Factored moment, Mf = 84.9kN

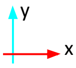
Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 2040.81kN (Compression)
Factored moment about x, Mfx = 48.3kNm
Factored moment about y, Mfy = -61.03kNm

Moment capacity about x, Mrx = 167kNm
Moment capacity about y, Mry = -211.02kNm
Demand / Capacity, D/C = **0.29 OK**

Detailed Design of Column C56 at L12 - 934





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L12 - 934
Governing Load Combo:
  UW02 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 229.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4824 Ref. CSA Eq. 11.11
  and ex = -0.0001139 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 283.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.2 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 513.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1730.6kN (Compression)
Factored shear, Vf = -24.1kN, Factored moment, Mf = -42.3kN

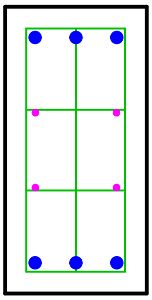
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 256.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.482 Ref. CSA Eq. 11.11
  and ex = -0.0001134 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 474.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.21 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 731.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1730.6kN (Compression)
Factored shear, Vf = 48.5kN, Factored moment, Mf = 84kN

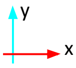
Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 1685.97kN (Compression)
Factored moment about x, Mfx = 49.7kNm
Factored moment about y, Mfy = -59.47kNm

Moment capacity about x, Mrx = 153.73kNm
Moment capacity about y, Mry = -183.95kNm
Demand / Capacity, D/C = **0.32 OK**

Detailed Design of Column C56 at L13 - 819





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L13 - 819
Governing Load Combo:
  UW02 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 217.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.456 Ref. CSA Eq. 11.11
  and ex = -8.19E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 280.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 498.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1378.2kN (Compression)
Factored shear, Vf = -24.6kN, Factored moment, Mf = -43.3kN

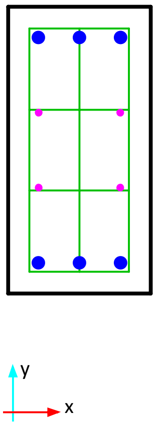
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 242.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4557 Ref. CSA Eq. 11.11
  and ex = -8.15E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 470.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 713kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1378.2kN (Compression)
Factored shear, Vf = 49.8kN, Factored moment, Mf = 85.8kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 1334.77kN (Compression)
Factored moment about x, Mfx = 52.58kNm
Factored moment about y, Mfy = -60.28kNm

Moment capacity about x, Mrx = 158.69kNm
Moment capacity about y, Mry = -181.93kNm
Demand / Capacity, D/C = **0.33 OK**

Detailed Design of Column C56 at L14 - 704



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L14 - 704
Governing Load Combo:
  UW02 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 206.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4326 Ref. CSA Eq. 11.11
  and ex = -5.03E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 484.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1027.3kN (Compression)
Factored shear, Vf = -25.4kN, Factored moment, Mf = -43.9kN

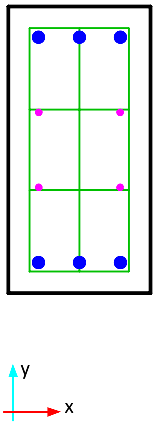
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 230.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.433 Ref. CSA Eq. 11.11
  and ex = -5.07E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 466.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.64 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 696.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1027.3kN (Compression)
Factored shear, Vf = 49.8kN, Factored moment, Mf = 85.1kN

Vfx/Vrx + Vfy/Vry = **0.12 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 986.43kN (Compression)
Factored moment about x, Mfx = 53.75kNm
Factored moment about y, Mfy = -60.49kNm

Moment capacity about x, Mrx = 156.23kNm
Moment capacity about y, Mry = -175.82kNm
Demand / Capacity, D/C = **0.34 OK**

Detailed Design of Column C56 at L15 - 589



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at L15 - 589
Governing Load Combo:
  UW02 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 196.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4132 Ref. CSA Eq. 11.11
  and ex = -2.12E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.85 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 472.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 677.5kN (Compression)
Factored shear, Vf = -24.4kN, Factored moment, Mf = -41.9kN

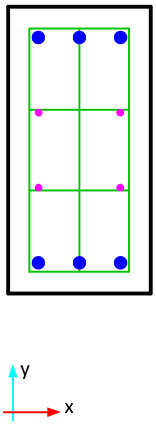
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 219.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4117 Ref. CSA Eq. 11.11
  and ex = -1.9E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 462kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 681.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 677.5kN (Compression)
Factored shear, Vf = 53.5kN, Factored moment, Mf = 85.7kN

Vfx/Vrx + Vfy/Vry = **0.13 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 640.35kN (Compression)
Factored moment about x, Mfx = 55.18kNm
Factored moment about y, Mfy = -57.69kNm

Moment capacity about x, Mrx = 144.63kNm
Moment capacity about y, Mry = -151.21kNm
Demand / Capacity, D/C = **0.38 OK**

Detailed Design of Column C56 at RF - 474



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C56 at RF - 474
Governing Load Combo:
  UW03 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 146.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3068 Ref. CSA Eq. 11.11
  and ex = 0.0002026 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 258.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.42 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 405.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 295kN (Compression)
Factored shear, Vf = -33.4kN, Factored moment, Mf = -57.9kN

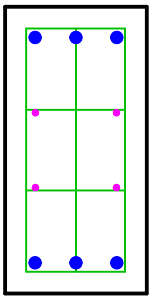
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 214.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4035 Ref. CSA Eq. 11.11
  and ex = -5.8E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 460.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.96 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 675kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 295kN (Compression)
Factored shear, Vf = 19.6kN, Factored moment, Mf = 45.9kN

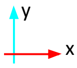
Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 295.02kN (Compression)
Factored moment about x, Mfx = 45.92kNm
Factored moment about y, Mfy = -57.91kNm

Moment capacity about x, Mrx = 114.34kNm
Moment capacity about y, Mry = -144.19kNm
Demand / Capacity, D/C = **0.4 OK**

Detailed Design of Column C59 at L01 - 238





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C59 at L01 - 238
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 135.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2835 Ref. CSA Eq. 11.11
  and ex = 0.000274 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 253.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.92 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 388.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 172.6kN (Compression)
Factored shear, Vf = -36.2kN, Factored moment, Mf = 55.8kN

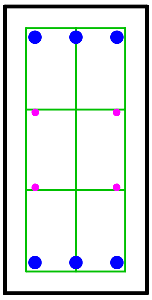
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 186.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3508 Ref. CSA Eq. 11.11
  and ex = 9.36E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 447.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.66 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 634kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 172.6kN (Compression)
Factored shear, Vf = -36.8kN, Factored moment, Mf = 58.2kN

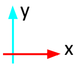
Vfx/Vrx + Vfy/Vry = **0.14 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 16
Factored axial force, Pf = 190.02kN (Compression)
Factored moment about x, Mfx = -60.39kNm
Factored moment about y, Mfy = -60.92kNm

Moment capacity about x, Mrx = -145.75kNm
Moment capacity about y, Mry = -147.03kNm
Demand / Capacity, D/C = **0.41 OK**

Detailed Design of Column C61 at L01 - 240





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C61 at L01 - 240
Governing Load Combo:
  UW02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 156.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3294 Ref. CSA Eq. 11.11
  and ex = 0.000143 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 263.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 420.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 207.8kN (Compression)
Factored shear, Vf = -26kN, Factored moment, Mf = -40.3kN

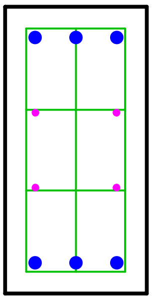
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 209.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.393 Ref. CSA Eq. 11.11
  and ex = 1.19E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 457.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.08 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 667kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 207.8kN (Compression)
Factored shear, Vf = -23.2kN, Factored moment, Mf = -43.3kN

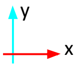
Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 194.72kN (Compression)
Factored moment about x, Mfx = 1.68kNm
Factored moment about y, Mfy = 72.89kNm

Moment capacity about x, Mrx = 3.76kNm
Moment capacity about y, Mry = 163.11kNm
Demand / Capacity, D/C = **0.45 OK**

Detailed Design of Column C63 at L01 - 242





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C63 at L01 - 242
Governing Load Combo:
  UW02 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 134.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2826 Ref. CSA Eq. 11.11
  and ex = 0.0002771 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 253.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.94 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 388.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 201.5kN (Compression)
Factored shear, Vf = -26.6kN, Factored moment, Mf = 61.5kN

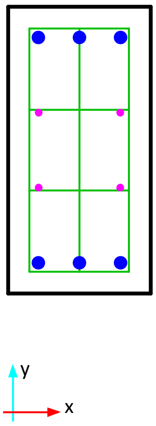
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 186.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.351 Ref. CSA Eq. 11.11
  and ex = 9.3E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 447.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 634.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 201.5kN (Compression)
Factored shear, Vf = -31.5kN, Factored moment, Mf = 67.5kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 210.61kN (Compression)
Factored moment about x, Mfx = 19.26kNm
Factored moment about y, Mfy = 72.72kNm

Moment capacity about x, Mrx = 42.43kNm
Moment capacity about y, Mry = 160.19kNm
Demand / Capacity, D/C = **0.45 OK**

Detailed Design of Column C66 at L01 - 245



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C66 at L01 - 245
Governing Load Combo:
  UW04 (Shear)
  UW04 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 154.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3239 Ref. CSA Eq. 11.11
  and ex = 0.0001565 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 262.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.1 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 416.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 180.7kN (Compression)
Factored shear, Vf = -21.8kN, Factored moment, Mf = -40.5kN

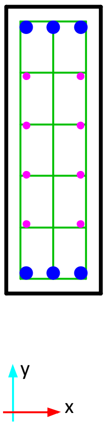
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 159.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.299 Ref. CSA Eq. 11.11
  and ex = 0.0002251 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 431.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.58 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 590.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 180.7kN (Compression)
Factored shear, Vf = -49.6kN, Factored moment, Mf = -102.2kN

Vfx/Vrx + Vfy/Vry = **0.13 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 18
Factored axial force, Pf = 159.65kN (Compression)
Factored moment about x, Mfx = 91.29kNm
Factored moment about y, Mfy = 44.48kNm

Moment capacity about x, Mrx = 243.8kNm
Moment capacity about y, Mry = 118.79kNm
Demand / Capacity, D/C = **0.37 OK**

Detailed Design of Column C7 at L01 - 487



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C7 at L01 - 487
Governing Load Combo:
  UW01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 393.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.55 Ref. CSA Eq. 11.11
  and ex = -0.0001818 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 433.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.73 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 827kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3879.4kN (Compression)
Factored shear, Vf = 42.3kN, Factored moment, Mf = 84.7kN

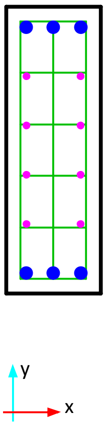
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 473.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5709 Ref. CSA Eq. 11.11
  and ex = -0.0001996 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 759.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3879.4kN (Compression)
Factored shear, Vf = -54.7kN, Factored moment, Mf = -175.2kN

Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5738.62kN (Compression)
Factored moment about x, Mfx = -97.68kNm
Factored moment about y, Mfy = 99.14kNm

Moment capacity about x, Mrx = -227.93kNm
Moment capacity about y, Mry = 231.33kNm
Demand / Capacity, D/C = **0.43 OK**

Detailed Design of Column C7 at L02 - 558



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C7 at L02 - 558
Governing Load Combo:
UW01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 384.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5379 Ref. CSA Eq. 11.11
and ex = -0.0001709 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 432.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.8 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 816.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3485.2kN (Compression)
Factored shear, Vf = 35.4kN, Factored moment, Mf = 63.2kN

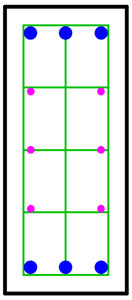
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 459.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5538 Ref. CSA Eq. 11.11
and ex = -0.0001852 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 756.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.7 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3485.2kN (Compression)
Factored shear, Vf = -54.7kN, Factored moment, Mf = -116.6kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

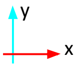
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5159.62kN (Compression)
Factored moment about x, Mfx = -55.18kNm
Factored moment about y, Mfy = 72.03kNm

Moment capacity about x, Mrx = -204.12kNm
Moment capacity about y, Mry = 266.46kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C7 at L03 - 713



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C7 at L03 - 713
Governing Load Combo:
UW01 (Shear)
U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 328.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5908 Ref. CSA Eq. 11.11
and ex = -0.0002153 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 365.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.49 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 693.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3205.4kN (Compression)
Factored shear, Vf = 23.7kN, Factored moment, Mf = 35.8kN

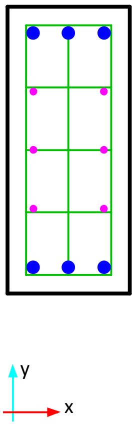
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 370.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5861 Ref. CSA Eq. 11.11
and ex = -0.0002117 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 580.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3205.4kN (Compression)
Factored shear, Vf = -48.3kN, Factored moment, Mf = -94.4kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 4702.72kN (Compression)
Factored moment about x, Mfx = 58.32kNm
Factored moment about y, Mfy = -40.79kNm

Moment capacity about x, Mrx = 233.25kNm
Moment capacity about y, Mry = -163.14kNm
Demand / Capacity, D/C = **0.25 OK**

Detailed Design of Column C7 at L04 - 712



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C7 at L04 - 712
Governing Load Combo:
UW01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 311.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5599 Ref. CSA Eq. 11.11
and ex = -0.0001904 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 362.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 673.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2956.6kN (Compression)
Factored shear, Vf = 26.9kN, Factored moment, Mf = 43.6kN

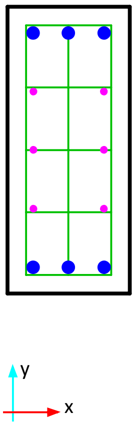
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 349.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.553 Ref. CSA Eq. 11.11
and ex = -0.0001844 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 575.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.71 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2956.6kN (Compression)
Factored shear, Vf = -61kN, Factored moment, Mf = -118.4kN

Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4319.84kN (Compression)
Factored moment about x, Mfx = -72.91kNm
Factored moment about y, Mfy = 45.57kNm

Moment capacity about x, Mrx = -280.29kNm
Moment capacity about y, Mry = 175.19kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C7 at L05 - 711



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C7 at L05 - 711
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 300.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5409 Ref. CSA Eq. 11.11
and ex = -0.0001737 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 360.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 661.4kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2726.4kN (Compression)
Factored shear, Vf = 26.6kN, Factored moment, Mf = 42.5kN

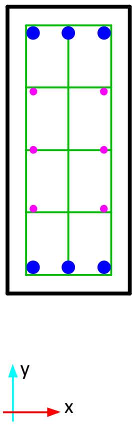
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 335.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5316 Ref. CSA Eq. 11.11
and ex = -0.000165 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 572.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.84 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2726.4kN (Compression)
Factored shear, Vf = -65.6kN, Factored moment, Mf = -122.9kN

Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2726.45kN (Compression)
Factored moment about x, Mfx = -122.89kNm
Factored moment about y, Mfy = 42.53kNm

Moment capacity about x, Mrx = -480.97kNm
Moment capacity about y, Mry = 166.45kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C7 at L06 - 710



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C7 at L06 - 710
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 290.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5228 Ref. CSA Eq. 11.11
and ex = -0.0001566 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 358.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 649.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2508.2kN (Compression)
Factored shear, Vf = 26.9kN, Factored moment, Mf = 43.1kN

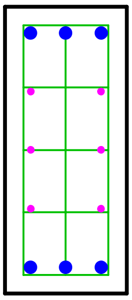
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 323.3kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.512 Ref. CSA Eq. 11.11
and ex = -0.0001458 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 568.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.98 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 892.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2508.2kN (Compression)
Factored shear, Vf = -71kN, Factored moment, Mf = -129.5kN

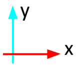
Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2508.18kN (Compression)
Factored moment about x, Mfx = -129.47kNm
Factored moment about y, Mfy = 43.13kNm

Moment capacity about x, Mrx = -493.26kNm
Moment capacity about y, Mry = 164.32kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C7 at L07 - 683





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C7 at L07 - 683
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 281.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5064 Ref. CSA Eq. 11.11
  and ex = -0.0001401 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 357.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.02 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 638.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2295.7kN (Compression)
Factored shear, Vf = 26.9kN, Factored moment, Mf = 43.5kN

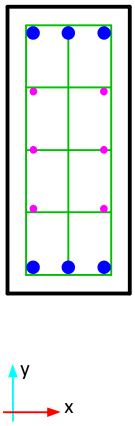
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 313kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4957 Ref. CSA Eq. 11.11
  and ex = -0.0001287 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 566kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.1 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 879kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2295.7kN (Compression)
Factored shear, Vf = -72.9kN, Factored moment, Mf = -131.9kN

Vfx/Vrx + Vfy/Vry = **0.12 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 2295.71kN (Compression)
Factored moment about x, Mfx = -131.93kNm
Factored moment about y, Mfy = 43.51kNm

Moment capacity about x, Mrx = -498.05kNm
Moment capacity about y, Mry = 164.25kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C7 at L08 - 673



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C7 at L08 - 673
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 272.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4909 Ref. CSA Eq. 11.11
  and ex = -0.0001234 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 355.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.14 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 628.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2085.9kN (Compression)
Factored shear, Vf = 27.7kN, Factored moment, Mf = 44.3kN

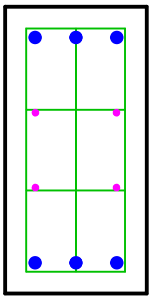
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 302.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4784 Ref. CSA Eq. 11.11
  and ex = -0.0001092 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 562.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.24 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 864.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2085.9kN (Compression)
Factored shear, Vf = -82.7kN, Factored moment, Mf = -139.3kN

Vfx/Vrx + Vfy/Vry = **0.13 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

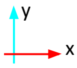
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 2065.06kN (Compression)
Factored moment about x, Mfx = 145.43kNm
Factored moment about y, Mfy = -43.43kNm

Moment capacity about x, Mrx = 517.86kNm
Moment capacity about y, Mry = -154.65kNm
Demand / Capacity, D/C = **0.28 OK**

Detailed Design of Column C7 at L09 - 646



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C7 at L09 - 646
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 235.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4944 Ref. CSA Eq. 11.11
  and ex = -0.0001273 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 284.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.11 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 520.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1874.1kN (Compression)
Factored shear, Vf = 25.6kN, Factored moment, Mf = 41.1kN

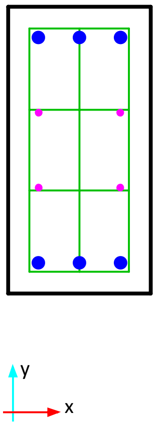
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 255.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4793 Ref. CSA Eq. 11.11
  and ex = -0.0001103 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 474.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.23 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 729.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1874.1kN (Compression)
Factored shear, Vf = -70.1kN, Factored moment, Mf = -116.8kN

Vfx/Vrx + Vfy/Vry = **0.13 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 1856.29kN (Compression)
Factored moment about x, Mfx = 124.82kNm
Factored moment about y, Mfy = -40.24kNm

Moment capacity about x, Mrx = 401.35kNm
Moment capacity about y, Mry = -129.39kNm
Demand / Capacity, D/C = **0.31 OK**

Detailed Design of Column C7 at L10 - 644



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C7 at L10 - 644
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 227kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4765 Ref. CSA Eq. 11.11
and ex = -0.000107 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 282.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.25 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 510kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1663.8kN (Compression)
Factored shear, Vf = 26.3kN, Factored moment, Mf = 43.1kN

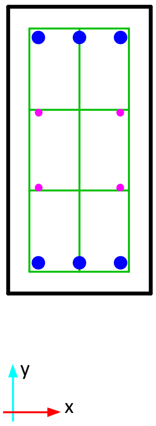
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 242.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4564 Ref. CSA Eq. 11.11
and ex = -8.24E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 470.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.42 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 713.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1663.8kN (Compression)
Factored shear, Vf = -79kN, Factored moment, Mf = -137.9kN

Vfx/Vrx + Vfy/Vry = **0.15 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1663.8kN (Compression)
Factored moment about x, Mfx = -137.91kNm
Factored moment about y, Mfy = 43.13kNm

Moment capacity about x, Mrx = -402.59kNm
Moment capacity about y, Mry = 125.91kNm
Demand / Capacity, D/C = **0.34 OK**

Detailed Design of Column C7 at L11 - 602



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C7 at L11 - 602
Governing Load Combo:
    UW01 (Shear)
    UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
    4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 219.7kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.461 Ref. CSA Eq. 11.11
    and ex = -8.82E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281.4kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 28.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 501kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1452.2kN (Compression)
Factored shear, Vf = 26.4kN, Factored moment, Mf = 43.2kN

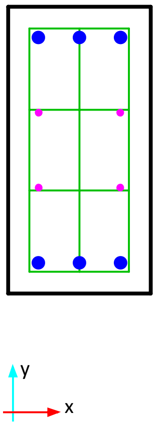
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 235.7kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.4429 Ref. CSA Eq. 11.11
    and ex = -6.46E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 468.1kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 28.55 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 703.9kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1452.2kN (Compression)
Factored shear, Vf = -79.5kN, Factored moment, Mf = -135.4kN

Vfx/Vrx + Vfy/Vry = **0.15 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1452.17kN (Compression)
Factored moment about x, Mfx = -135.37kNm
Factored moment about y, Mfy = 43.19kNm

Moment capacity about x, Mrx = -394.37kNm
Moment capacity about y, Mry = 125.82kNm
Demand / Capacity, D/C = **0.34 OK**

Detailed Design of Column C7 at L12 - 601



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C7 at L12 - 601
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 213.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4471 Ref. CSA Eq. 11.11
  and ex = -7.02E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 279.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.51 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 493kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1237.1kN (Compression)
Factored shear, Vf = 25.7kN, Factored moment, Mf = 42.1kN

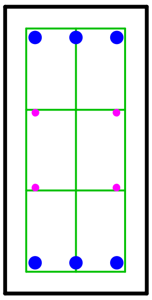
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 228.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4301 Ref. CSA Eq. 11.11
  and ex = -4.66E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 465.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 694.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1237.1kN (Compression)
Factored shear, Vf = -78.5kN, Factored moment, Mf = -133.2kN

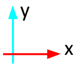
Vfx/Vrx + Vfy/Vry = **0.16 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1237.15kN (Compression)
Factored moment about x, Mfx = -133.22kNm
Factored moment about y, Mfy = 42.09kNm

Moment capacity about x, Mrx = -354.19kNm
Moment capacity about y, Mry = 111.9kNm
Demand / Capacity, D/C = **0.38 OK**

Detailed Design of Column C7 at L13 - 598





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C7 at L13 - 598
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 206.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4326 Ref. CSA Eq. 11.11
  and ex = -5.03E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 484.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1018.8kN (Compression)
Factored shear, Vf = 25.8kN, Factored moment, Mf = 42.9kN

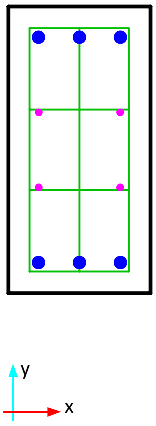
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 221.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4164 Ref. CSA Eq. 11.11
  and ex = -2.62E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 462.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.82 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 684.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1018.8kN (Compression)
Factored shear, Vf = -79.7kN, Factored moment, Mf = -135.7kN

Vfx/Vrx + Vfy/Vry = **0.16 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1018.82kN (Compression)
Factored moment about x, Mfx = -135.66kNm
Factored moment about y, Mfy = 42.89kNm

Moment capacity about x, Mrx = -348.89kNm
Moment capacity about y, Mry = 110.3kNm
Demand / Capacity, D/C = **0.39 OK**

Detailed Design of Column C7 at L14 - 597



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C7 at L14 - 597
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 199.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.419 Ref. CSA Eq. 11.11
  and ex = -3.03E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 276.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.79 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 476.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 797.4kN (Compression)
Factored shear, Vf = 26.2kN, Factored moment, Mf = 43.4kN

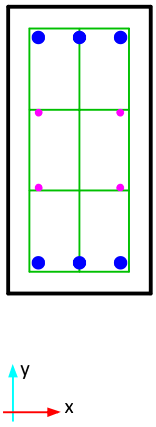
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 215.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4041 Ref. CSA Eq. 11.11
  and ex = -6.7E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 460.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.95 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 675.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 797.4kN (Compression)
Factored shear, Vf = -80.1kN, Factored moment, Mf = -135.3kN

Vfx/Vrx + Vfy/Vry = **0.17 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 797.42kN (Compression)
Factored moment about x, Mfx = -135.25kNm
Factored moment about y, Mfy = 43.35kNm

Moment capacity about x, Mrx = -337kNm
Moment capacity about y, Mry = 108.02kNm
Demand / Capacity, D/C = **0.4 OK**

Detailed Design of Column C7 at L15 - 596



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C7 at L15 - 596
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 194.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.408 Ref. CSA Eq. 11.11
and ex = -1.3E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.3kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.91 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 469.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 572.9kN (Compression)
Factored shear, Vf = 24.2kN, Factored moment, Mf = 40.7kN

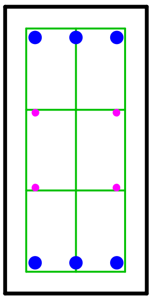
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 187kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.3514 Ref. CSA Eq. 11.11
and ex = 9.22E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 447.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 29.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 634.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 572.9kN (Compression)
Factored shear, Vf = -81.1kN, Factored moment, Mf = -132.9kN

Vfx/Vrx + Vfy/Vry = **0.18 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

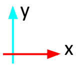
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 555.1kN (Compression)
Factored moment about x, Mfx = 136.98kNm
Factored moment about y, Mfy = -38.07kNm

Moment capacity about x, Mrx = 317.03kNm
Moment capacity about y, Mry = -88.11kNm
Demand / Capacity, D/C = **0.43 OK**

Detailed Design of Column C7 at RF - 595



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C7 at RF - 595
Governing Load Combo:
  U01 (Shear)
  UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 179kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3756 Ref. CSA Eq. 11.11
  and ex = 4.32E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 270.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 449.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 404.5kN (Compression)
Factored shear, Vf = 27.7kN, Factored moment, Mf = 44.8kN

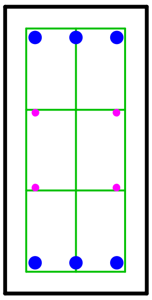
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 179.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3367 Ref. CSA Eq. 11.11
  and ex = 0.0001254 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 443.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.88 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 622.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 404.5kN (Compression)
Factored shear, Vf = -59.6kN, Factored moment, Mf = -114.8kN

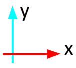
Vfx/Vrx + Vfy/Vry = **0.16 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 346.75kN (Compression)
Factored moment about x, Mfx = -120.77kNm
Factored moment about y, Mfy = 44.38kNm

Moment capacity about x, Mrx = -268.36kNm
Moment capacity about y, Mry = 98.62kNm
Demand / Capacity, D/C = **0.45 OK**

Detailed Design of Column C71 at L01 - 250





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C71 at L01 - 250
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 98.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2068 Ref. CSA Eq. 11.11
  and ex = 0.000623 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 230.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 33.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 329.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 366.3kN (Compression)
Factored shear, Vf = -60.3kN, Factored moment, Mf = 128.8kN

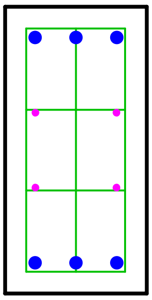
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 222.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.418 Ref. CSA Eq. 11.11
  and ex = -2.86E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 463.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.8 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 685.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 366.3kN (Compression)
Factored shear, Vf = -4.5kN, Factored moment, Mf = 7.9kN

Vfx/Vrx + Vfy/Vry = **0.18 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

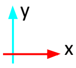
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 367.16kN (Compression)
Factored moment about x, Mfx = 8.14kNm
Factored moment about y, Mfy = 130.59kNm

Moment capacity about x, Mrx = 11.03kNm
Moment capacity about y, Mry = 176.97kNm
Demand / Capacity, D/C = **0.74 OK**

Detailed Design of Column C73 at L01 - 252



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C73 at L01 - 252
Governing Load Combo:
  UW01 (Shear)
  UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 130.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2747 Ref. CSA Eq. 11.11
  and ex = 0.000304 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 251.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 31.13 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 382.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 125.3kN (Compression)
Factored shear, Vf = -33.5kN, Factored moment, Mf = -56.2kN

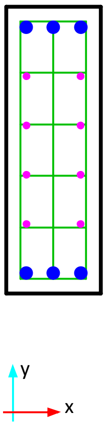
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 207.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3906 Ref. CSA Eq. 11.11
  and ex = 1.61E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 457.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.11 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 665.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 125.3kN (Compression)
Factored shear, Vf = 16kN, Factored moment, Mf = 28.4kN

Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 125.29kN (Compression)
Factored moment about x, Mfx = 28.45kNm
Factored moment about y, Mfy = -56.24kNm

Moment capacity about x, Mrx = 75.52kNm
Moment capacity about y, Mry = -149.28kNm
Demand / Capacity, D/C = **0.38 OK**

Detailed Design of Column C77 at L01 - 200



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L01 - 200
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 739.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.035 Ref. CSA Eq. 11.11
  and ex = -0.000409 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 464.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.14 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1010.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7139kN (Compression)
Factored shear, Vf = -16kN, Factored moment, Mf = -36.2kN

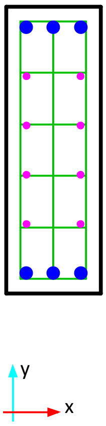
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 905.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 1.0903 Ref. CSA Eq. 11.11
  and ex = -0.0004221 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 812.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.05 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 7139kN (Compression)
Factored shear, Vf = -18.9kN, Factored moment, Mf = -42.4kN

Vfx/Vrx + Vfy/Vry = **0.02 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 7540.92kN (Compression)
Factored moment about x, Mfx = -44.48kNm
Factored moment about y, Mfy = -34.74kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.14 Pf>Pmax Not OK**

Detailed Design of Column C77 at L02 - 21



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L02 - 21
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 900mm
ETABS assignment: C300x900C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 8 Nos. of #15 (Dia.: 16mm, Clear spacing: 138mm)
Reinforcement content: 1.7%
Shear reinforcement:
  6 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 900mm Ref. CSA 11.2.10
Rebar area for shear, Av = 600mm2
Concrete shear capacity, Vc = 525.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.735 Ref. CSA Eq. 11.11
  and ex = -0.0003038 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 450kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 975.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5824.7kN (Compression)
Factored shear, Vf = 33.1kN, Factored moment, Mf = -78.6kN

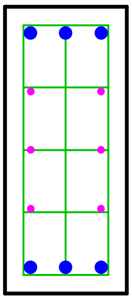
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 752mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 701.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8451 Ref. CSA Eq. 11.11
  and ex = -0.0003511 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 795.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.54 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 1173.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5824.7kN (Compression)
Factored shear, Vf = 5kN, Factored moment, Mf = -0.6kN

Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 148mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 600mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 6244.43kN (Compression)
Factored moment about x, Mfx = -0.76kNm
Factored moment about y, Mfy = -83.91kNm

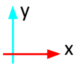
Moment capacity about x, Mrx = -1.97kNm
Moment capacity about y, Mry = -217.13kNm
Demand / Capacity, D/C = **0.39 OK**

Detailed Design of Column C77 at L03 - 1952



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
- Confinement Type: Tied
- Axial compression: varies
- Steel: 0.85
- Concrete: 0.65

Column: C77 at L03 - 1952
Governing Load Combo:
- U01 (Shear)
- U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
- 5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
- 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)

Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 454.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.8176 Ref. CSA Eq. 11.11
and ex = -0.0003405 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 379.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.62 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5440kN (Compression)
Factored shear, Vf = 53.7kN, Factored moment, Mf = 93.2kN

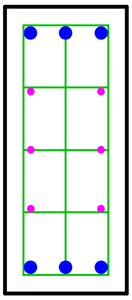
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 664kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 1.0514 Ref. CSA Eq. 11.11
and ex = -0.000413 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 616.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 26.11 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5440kN (Compression)
Factored shear, Vf = 0.3kN, Factored moment, Mf = 5.1kN

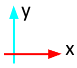
Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5832.08kN (Compression)
Factored moment about x, Mfx = 4.72kNm
Factored moment about y, Mfy = 97.56kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.09 Pf>Pmax Not OK**

Detailed Design of Column C77 at L04 - 1837





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
    Confinement Type: Tied
    Axial compression: varies
    Steel: 0.85
    Concrete: 0.65
Column: C77 at L04 - 1837
Governing Load Combo:
    U01 (Shear)
    U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
    5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
    3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 422.3kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.7596 Ref. CSA Eq. 11.11
    and ex = -0.0003156 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 376.3kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 26.79 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 786.2kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5034.2kN (Compression)
Factored shear, Vf = 50.5kN, Factored moment, Mf = 85.4kN

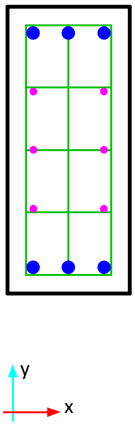
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 589.3kN Ref. CSA Eq. 11.6
    Where phiC = 0.65, lambda = 1, beta = 0.9332 Ref. CSA Eq. 11.11
    and ex = -0.0003809 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 610.5kN Ref. CSA Eq. 11.7
    Where phiS = 0.85, theta = 26.33 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
    Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 5034.2kN (Compression)
Factored shear, Vf = 2kN, Factored moment, Mf = 8.7kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 5396.38kN (Compression)
Factored moment about x, Mfx = 8.73kNm
Factored moment about y, Mfy = 90.05kNm

Moment capacity about x, Mrx = Redesign!
Moment capacity about y, Mry = Redesign!
Demand / Capacity, D/C = **>1.01 Pf>Pmax Not OK**

Detailed Design of Column C77 at L05 - 1722



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L05 - 1722
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 409.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.7361 Ref. CSA Eq. 11.11
  and ex = -0.0003044 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 375.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.87 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 784.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4939.3kN (Compression)
Factored shear, Vf = 53.4kN, Factored moment, Mf = -90.4kN

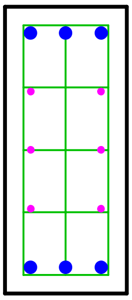
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 576.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.9129 Ref. CSA Eq. 11.11
  and ex = -0.0003746 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 609.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.38 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4939.3kN (Compression)
Factored shear, Vf = 2.8kN, Factored moment, Mf = -4.9kN

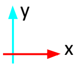
Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4963.36kN (Compression)
Factored moment about x, Mfx = 9.65kNm
Factored moment about y, Mfy = 90.89kNm

Moment capacity about x, Mrx = 18.43kNm
Moment capacity about y, Mry = 173.61kNm
Demand / Capacity, D/C = **0.52 OK**

Detailed Design of Column C77 at L06 - 1607





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L06 - 1607
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 375.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.675 Ref. CSA Eq. 11.11
  and ex = -0.0002716 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 371.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.1 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 746.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4508.3kN (Compression)
Factored shear, Vf = 53.2kN, Factored moment, Mf = -90.4kN

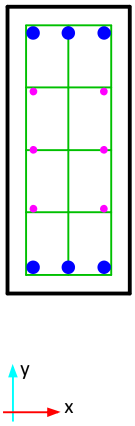
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 517.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.8191 Ref. CSA Eq. 11.11
  and ex = -0.0003411 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 603.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 26.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 4508.3kN (Compression)
Factored shear, Vf = 3.7kN, Factored moment, Mf = -6.7kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 4508.26kN (Compression)
Factored moment about x, Mfx = -6.75kNm
Factored moment about y, Mfy = -90.44kNm

Moment capacity about x, Mrx = -15.33kNm
Moment capacity about y, Mry = -205.41kNm
Demand / Capacity, D/C = **0.44 OK**

Detailed Design of Column C77 at L07 - 1492



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C77 at L07 - 1492
Governing Load Combo:
UW03 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 321.8kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5788 Ref. CSA Eq. 11.11
and ex = -0.000206 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 364.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.56 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 685.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3480.6kN (Compression)
Factored shear, Vf = 44.1kN, Factored moment, Mf = -74.4kN

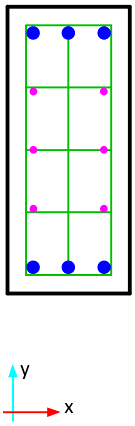
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 413.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6549 Ref. CSA Eq. 11.11
and ex = -0.0002595 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 588.4kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.18 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3480.6kN (Compression)
Factored shear, Vf = 6.7kN, Factored moment, Mf = -17.4kN

Vfx/Vrx + Vfy/Vry = **0.07 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 4102.64kN (Compression)
Factored moment about x, Mfx = 11.98kNm
Factored moment about y, Mfy = 90.26kNm

Moment capacity about x, Mrx = 30.04kNm
Moment capacity about y, Mry = 226.34kNm
Demand / Capacity, D/C = **0.4 OK**

Detailed Design of Column C77 at L08 - 1377



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C77 at L08 - 1377
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 312.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.5616 Ref. CSA Eq. 11.11
and ex = -0.0001918 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 362.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.66 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 674.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3430.2kN (Compression)
Factored shear, Vf = 52.1kN, Factored moment, Mf = 87.3kN

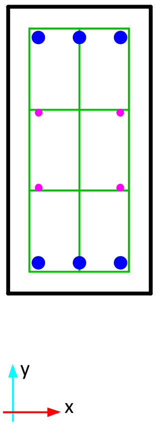
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 411.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.6509 Ref. CSA Eq. 11.11
and ex = -0.000257 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 588kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 27.2 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3430.2kN (Compression)
Factored shear, Vf = 5.7kN, Factored moment, Mf = 13kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 3649.9kN (Compression)
Factored moment about x, Mfx = -11.69kNm
Factored moment about y, Mfy = -94.15kNm

Moment capacity about x, Mrx = -30.52kNm
Moment capacity about y, Mry = -245.83kNm
Demand / Capacity, D/C = **0.38 OK**

Detailed Design of Column C77 at L09 - 1262



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L09 - 1262
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 267.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5621 Ref. CSA Eq. 11.11
  and ex = -0.0001922 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 290.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 558kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3032.2kN (Compression)
Factored shear, Vf = 48.8kN, Factored moment, Mf = 81.7kN

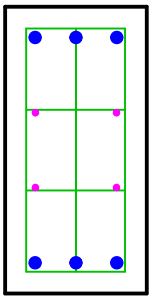
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 351kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6595 Ref. CSA Eq. 11.11
  and ex = -0.0002623 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 496.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.16 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 3032.2kN (Compression)
Factored shear, Vf = 5.5kN, Factored moment, Mf = 11.8kN

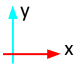
Vfx/Vrx + Vfy/Vry = **0.09 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 3226.1kN (Compression)
Factored moment about x, Mfx = -11.68kNm
Factored moment about y, Mfy = -88.26kNm

Moment capacity about x, Mrx = -27.57kNm
Moment capacity about y, Mry = -208.36kNm
Demand / Capacity, D/C = **0.42 OK**

Detailed Design of Column C77 at L10 - 1147





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L10 - 1147
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 253.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5328 Ref. CSA Eq. 11.11
  and ex = -0.0001662 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 287.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.84 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 541.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2824.3kN (Compression)
Factored shear, Vf = 52.9kN, Factored moment, Mf = 90.2kN

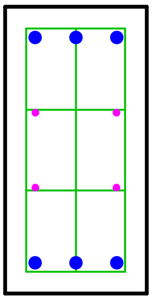
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 334.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6289 Ref. CSA Eq. 11.11
  and ex = -0.0002427 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 493.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.3 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2824.3kN (Compression)
Factored shear, Vf = 7kN, Factored moment, Mf = 14.6kN

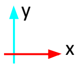
Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 2824.35kN (Compression)
Factored moment about x, Mfx = 14.57kNm
Factored moment about y, Mfy = 90.23kNm

Moment capacity about x, Mrx = 35.64kNm
Moment capacity about y, Mry = 220.74kNm
Demand / Capacity, D/C = **0.41 OK**

Detailed Design of Column C77 at L11 - 1032





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L11 - 1032
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 232.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.487 Ref. CSA Eq. 11.11
  and ex = -0.0001191 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 283.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.17 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 516kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2245.6kN (Compression)
Factored shear, Vf = 50.8kN, Factored moment, Mf = 85.8kN

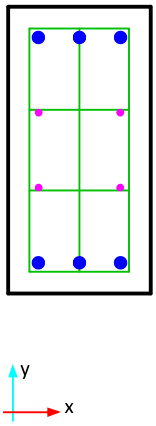
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 298.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5612 Ref. CSA Eq. 11.11
  and ex = -0.0001915 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 485.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.66 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2245.6kN (Compression)
Factored shear, Vf = 7.4kN, Factored moment, Mf = 14.7kN

Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 2382.08kN (Compression)
Factored moment about x, Mfx = -14.48kNm
Factored moment about y, Mfy = -90.93kNm

Moment capacity about x, Mrx = -36.91kNm
Moment capacity about y, Mry = -231.8kNm
Demand / Capacity, D/C = **0.39 OK**

Detailed Design of Column C77 at L12 - 917



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L12 - 917
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 218.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4593 Ref. CSA Eq. 11.11
  and ex = -8.61E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 281.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.4 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 500kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1853.6kN (Compression)
Factored shear, Vf = 49.9kN, Factored moment, Mf = 84.1kN

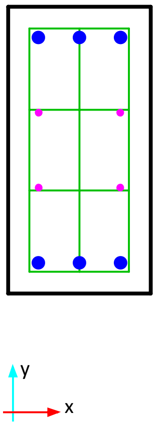
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 278.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5228 Ref. CSA Eq. 11.11
  and ex = -0.0001566 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 480.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1853.6kN (Compression)
Factored shear, Vf = 8.1kN, Factored moment, Mf = 15.3kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 1961.41kN (Compression)
Factored moment about x, Mfx = -15.69kNm
Factored moment about y, Mfy = -89.34kNm

Moment capacity about x, Mrx = -35.68kNm
Moment capacity about y, Mry = -203.19kNm
Demand / Capacity, D/C = **0.44 OK**

Detailed Design of Column C77 at L13 - 802



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C77 at L13 - 802
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 206.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4327 Ref. CSA Eq. 11.11
  and ex = -5.03E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 484.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1462kN (Compression)
Factored shear, Vf = 50kN, Factored moment, Mf = 85.5kN

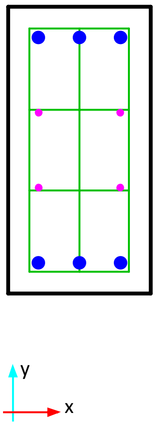
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 260.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4895 Ref. CSA Eq. 11.11
  and ex = -0.0001219 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 476kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.15 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 736.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1462kN (Compression)
Factored shear, Vf = 8.1kN, Factored moment, Mf = 15.7kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 1562kN (Compression)
Factored moment about x, Mfx = 16.23kNm
Factored moment about y, Mfy = 89.52kNm

Moment capacity about x, Mrx = 38.12kNm
Moment capacity about y, Mry = 210.24kNm
Demand / Capacity, D/C = **0.43 OK**

Detailed Design of Column C77 at L14 - 687



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C77 at L14 - 687
Governing Load Combo:
U02 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 195.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.41 Ref. CSA Eq. 11.11
and ex = -1.63E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.89 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 470.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1142.3kN (Compression)
Factored shear, Vf = 55.1kN, Factored moment, Mf = 91.5kN

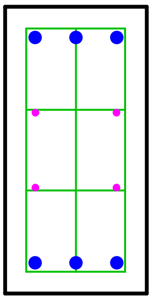
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 246.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.464 Ref. CSA Eq. 11.11
and ex = -9.19E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 471.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.36 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 718.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1142.3kN (Compression)
Factored shear, Vf = 11.8kN, Factored moment, Mf = 18.6kN

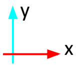
Vfx/Vrx + Vfy/Vry = **0.13 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 1121.67kN (Compression)
Factored moment about x, Mfx = -23.41kNm
Factored moment about y, Mfy = -95.69kNm

Moment capacity about x, Mrx = -48.37kNm
Moment capacity about y, Mry = -197.7kNm
Demand / Capacity, D/C = **0.48 OK**

Detailed Design of Column C77 at L15 - 572





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C77 at L15 - 572
Governing Load Combo:
U01 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 169kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.3546 Ref. CSA Eq. 11.11
and ex = 8.53E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 267.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 29.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 436.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 680.1kN (Compression)
Factored shear, Vf = 43.3kN, Factored moment, Mf = 78.1kN

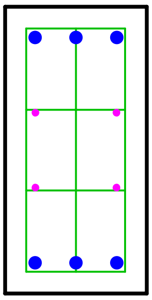
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 232.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4369 Ref. CSA Eq. 11.11
and ex = -5.64E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 467kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 699.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 680.1kN (Compression)
Factored shear, Vf = -0.4kN, Factored moment, Mf = 9.8kN

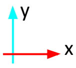
Vfx/Vrx + Vfy/Vry = **0.1 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 723.11kN (Compression)
Factored moment about x, Mfx = 10.01kNm
Factored moment about y, Mfy = 82.03kNm

Moment capacity about x, Mrx = 21.13kNm
Moment capacity about y, Mry = 173.15kNm
Demand / Capacity, D/C = **0.47 OK**

Detailed Design of Column C77 at RF - 457





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C77 at RF - 457
Governing Load Combo:
UW03 (Shear)
U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 91.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.1913 Ref. CSA Eq. 11.11
and ex = 0.000727 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 224.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 34.09 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 315.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 244.9kN (Compression)
Factored shear, Vf = 65.7kN, Factored moment, Mf = -131.6kN

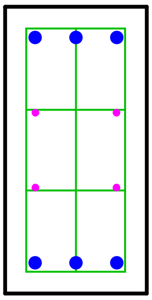
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 116kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.218 Ref. CSA Eq. 11.11
and ex = 0.0005566 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 393.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 32.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 509.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 244.9kN (Compression)
Factored shear, Vf = 86kN, Factored moment, Mf = -221.7kN

Vfx/Vrx + Vfy/Vry = **0.38 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 284.46kN (Compression)
Factored moment about x, Mfx = -147.75kNm
Factored moment about y, Mfy = -159.84kNm

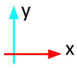
Moment capacity about x, Mrx = -130.39kNm
Moment capacity about y, Mry = -141.06kNm
Demand / Capacity, D/C = **1.13 Not OK**

Detailed Design of Column C80 at L01 - 259



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
- Confinement Type: Tied
- Axial compression: varies
- Steel: 0.85
- Concrete: 0.65

Column: C80 at L01 - 259
Governing Load Combo:
- UW01 (Shear)
- UW01 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
- 4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
- 3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)

Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 157.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.3303 Ref. CSA Eq. 11.11
and ex = 0.0001407 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 263.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 29.98 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 420.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 205.5kN (Compression)
Factored shear, Vf = 21.7kN, Factored moment, Mf = 40.6kN

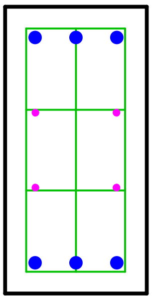
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 117.9kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.2215 Ref. CSA Eq. 11.11
and ex = 0.0005373 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 395.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 32.76 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 513.7kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 205.5kN (Compression)
Factored shear, Vf = 92.4kN, Factored moment, Mf = 202kN

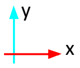
Vfx/Vrx + Vfy/Vry = **0.22 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 205.46kN (Compression)
Factored moment about x, Mfx = 202kNm
Factored moment about y, Mfy = 40.61kNm

Moment capacity about x, Mrx = 341.98kNm
Moment capacity about y, Mry = 68.75kNm
Demand / Capacity, D/C = **0.59 OK**

Detailed Design of Column C81 at L01 - 260





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C81 at L01 - 260
Governing Load Combo:
  UW01 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 150.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3161 Ref. CSA Eq. 11.11
  and ex = 0.000177 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 260.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.24 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 411.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 248.4kN (Compression)
Factored shear, Vf = 26.8kN, Factored moment, Mf = 50.1kN

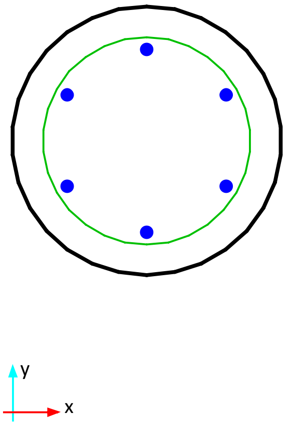
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 199.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3743 Ref. CSA Eq. 11.11
  and ex = 4.58E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 453.5kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.32 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 652.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 248.4kN (Compression)
Factored shear, Vf = 32.2kN, Factored moment, Mf = 61.2kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 228.89kN (Compression)
Factored moment about x, Mfx = -19.34kNm
Factored moment about y, Mfy = -64.75kNm

Moment capacity about x, Mrx = -48.12kNm
Moment capacity about y, Mry = -161.11kNm
Demand / Capacity, D/C = **0.4 OK**

Detailed Design of Column C82 at L01 - 261



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 24MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C82 at L01 - 261
Governing Load Combo:
UW02 (Shear)
U01 (PMM)

Column Properties:
Diameter, d = 400mm
ETABS assignment: C400C5060
Main Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 117mm)
Reinforcement content: 2.38%
Shear reinforcement:
2 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
2 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 191.4kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4301 Ref. CSA Eq. 11.11
and ex = -4.67E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 194.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 386kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 825.2kN (Compression)
Factored shear, Vf = -29.7kN, Factored moment, Mf = -59kN

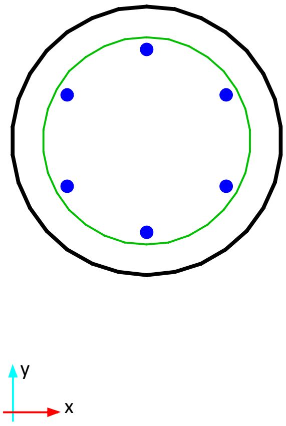
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 203.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4579 Ref. CSA Eq. 11.11
and ex = -8.43E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 196.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.41 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 400.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 825.2kN (Compression)
Factored shear, Vf = -11kN, Factored moment, Mf = -18.8kN

Vfx/Vrx + Vfy/Vry = **0.11 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, Avmin = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprov = 200mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 3
Factored axial force, Pf = 1073.34kN (Compression)
Factored moment about x, Mfx = 6.85kNm
Factored moment about y, Mfy = 66.14kNm

Moment capacity about x, Mrx = 13.59kNm
Moment capacity about y, Mry = 131.25kNm
Demand / Capacity, D/C = **0.5 OK**

Detailed Design of Column C83 at L01 - 262



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 24MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C83 at L01 - 262
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Diameter, d = 400mm
ETABS assignment: C400C5060
Main Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 117mm)
Reinforcement content: 2.38%
Shear reinforcement:
  2 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  2 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 188.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4245 Ref. CSA Eq. 11.11
  and ex = -3.85E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 194.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.73 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 383kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1185.5kN (Compression)
Factored shear, Vf = 54.7kN, Factored moment, Mf = 115.9kN

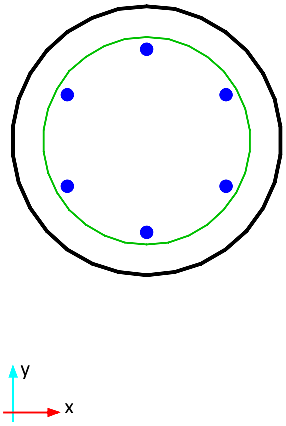
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 215.9kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4854 Ref. CSA Eq. 11.11
  and ex = -0.0001173 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 198.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.18 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 414.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1185.5kN (Compression)
Factored shear, Vf = 13.7kN, Factored moment, Mf = 32.4kN

Vfx/Vrx + Vfy/Vry = **0.19 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, Avmin = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprov = 200mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 1185.52kN (Compression)
Factored moment about x, Mfx = 32.37kNm
Factored moment about y, Mfy = 115.89kNm

Moment capacity about x, Mrx = 33.97kNm
Moment capacity about y, Mry = 121.61kNm
Demand / Capacity, D/C = **0.95 OK**

Detailed Design of Column C84 at L01 - 263



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 24MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C84 at L01 - 263
Governing Load Combo:
  UW01 (Shear)
  U01 (PMM)

Column Properties:
Diameter, d = 400mm
ETABS assignment: C400C5060
Main Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 117mm)
Reinforcement content: 2.38%
Shear reinforcement:
  2 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  2 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 186.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4198 Ref. CSA Eq. 11.11
  and ex = -3.15E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 193.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 380.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 799.9kN (Compression)
Factored shear, Vf = -34.3kN, Factored moment, Mf = -72.3kN

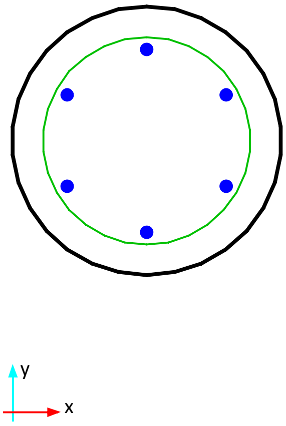
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 194.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4369 Ref. CSA Eq. 11.11
  and ex = -5.63E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 195.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.61 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 389.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 799.9kN (Compression)
Factored shear, Vf = 22.1kN, Factored moment, Mf = 45.8kN

Vfx/Vrx + Vfy/Vry = **0.16 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, Avmin = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprov = 200mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 1
Factored axial force, Pf = 1055.07kN (Compression)
Factored moment about x, Mfx = 32.09kNm
Factored moment about y, Mfy = -82.96kNm

Moment capacity about x, Mrx = 47.35kNm
Moment capacity about y, Mry = -122.4kNm
Demand / Capacity, D/C = **0.68 OK**

Detailed Design of Column C86 at L01 - 265



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 24MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C86 at L01 - 265
Governing Load Combo:
  U02 (Shear)
  U01 (PMM)

Column Properties:
Diameter, d = 400mm
ETABS assignment: C400C5060
Main Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 117mm)
Reinforcement content: 2.38%
Shear reinforcement:
  2 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  2 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 181.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4073 Ref. CSA Eq. 11.11
  and ex = -1.19E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 192.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.92 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 373.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 827.9kN (Compression)
Factored shear, Vf = 47.1kN, Factored moment, Mf = -96.5kN

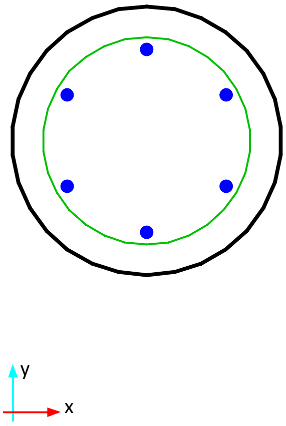
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 209.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4714 Ref. CSA Eq. 11.11
  and ex = -0.000101 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 197.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.29 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 407.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 827.9kN (Compression)
Factored shear, Vf = -1.7kN, Factored moment, Mf = 1.8kN

Vfx/Vrx + Vfy/Vry = **0.14 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, Avmin = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprov = 200mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 3
Factored axial force, Pf = 869.96kN (Compression)
Factored moment about x, Mfx = 2.49kNm
Factored moment about y, Mfy = -100.15kNm

Moment capacity about x, Mrx = 3.5kNm
Moment capacity about y, Mry = -140.77kNm
Demand / Capacity, D/C = **0.71 OK**

Detailed Design of Column C87 at L01 - 266



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 24MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C87 at L01 - 266
Governing Load Combo:
  U01 (Shear)
  U01 (PMM)

Column Properties:
Diameter, d = 400mm
ETABS assignment: C400C5060
Main Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 117mm)
Reinforcement content: 2.38%
Shear reinforcement:
  2 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  2 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 184.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4147 Ref. CSA Eq. 11.11
  and ex = -2.36E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 193.3kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.84 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 377.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 878.2kN (Compression)
Factored shear, Vf = 48.4kN, Factored moment, Mf = 89.5kN

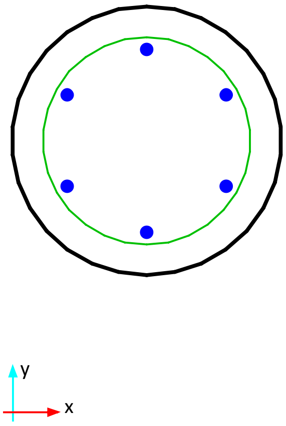
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 207.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4664 Ref. CSA Eq. 11.11
  and ex = -9.49E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 197.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.34 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 404.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 878.2kN (Compression)
Factored shear, Vf = 6.4kN, Factored moment, Mf = 15.3kN

Vfx/Vrx + Vfy/Vry = **0.15 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, Avmin = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprov = 200mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 3
Factored axial force, Pf = 863.53kN (Compression)
Factored moment about x, Mfx = -9.69kNm
Factored moment about y, Mfy = -99.66kNm

Moment capacity about x, Mrx = -13.57kNm
Moment capacity about y, Mry = -139.54kNm
Demand / Capacity, D/C = **0.71 OK**

Detailed Design of Column C88 at L01 - 267



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 24MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C88 at L01 - 267
Governing Load Combo:
  U01 (Shear)
  U01 (PMM)

Column Properties:
Diameter, d = 400mm
ETABS assignment: C400C5060
Main Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 117mm)
Reinforcement content: 2.38%
Shear reinforcement:
  2 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  2 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 400mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 199.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4482 Ref. CSA Eq. 11.11
  and ex = -7.17E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 196.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 395.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1203.5kN (Compression)
Factored shear, Vf = 39.3kN, Factored moment, Mf = -82.9kN

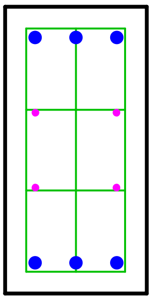
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 302mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 200mm2
Concrete shear capacity, Vc = 226.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5086 Ref. CSA Eq. 11.11
  and ex = -0.0001424 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 200.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 426.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1203.5kN (Compression)
Factored shear, Vf = 4kN, Factored moment, Mf = -7.5kN

Vfx/Vrx + Vfy/Vry = **0.12 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 212mm
Provided spacing, sprov = 200mm **OK**
Minimum shear reinforcement, Avmin = 66mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprov = 200mm2 **OK**

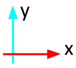
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 3
Factored axial force, Pf = 1203.45kN (Compression)
Factored moment about x, Mfx = -7.52kNm
Factored moment about y, Mfy = -82.86kNm

Moment capacity about x, Mrx = -11.35kNm
Moment capacity about y, Mry = -125.02kNm
Demand / Capacity, D/C = **0.66 OK**

Detailed Design of Column C89 at L01 - 268



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C89 at L01 - 268
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 156.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3277 Ref. CSA Eq. 11.11
  and ex = 0.0001471 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 263kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 30.03 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 419.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 203.3kN (Compression)
Factored shear, Vf = 21.8kN, Factored moment, Mf = 41.4kN

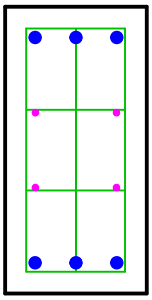
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 116kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.218 Ref. CSA Eq. 11.11
  and ex = 0.0005565 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 393.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 32.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 509.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 203.3kN (Compression)
Factored shear, Vf = -94.5kN, Factored moment, Mf = -207.5kN

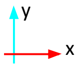
Vfx/Vrx + Vfy/Vry = **0.22 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 203.27kN (Compression)
Factored moment about x, Mfx = -207.5kNm
Factored moment about y, Mfy = 41.37kNm

Moment capacity about x, Mrx = -342.15kNm
Moment capacity about y, Mry = 68.22kNm
Demand / Capacity, D/C = **0.61 OK**

Detailed Design of Column C93 at L01 - 272





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C93 at L01 - 272
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 106.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2235 Ref. CSA Eq. 11.11
  and ex = 0.0005266 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 236.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 32.69 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 343.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 280.6kN (Compression)
Factored shear, Vf = 49.8kN, Factored moment, Mf = -106kN

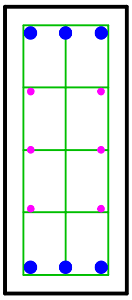
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 215.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4043 Ref. CSA Eq. 11.11
  and ex = -7.2E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 460.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.95 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 675.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 280.6kN (Compression)
Factored shear, Vf = 20.2kN, Factored moment, Mf = -38.4kN

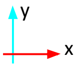
Vfx/Vrx + Vfy/Vry = **0.16 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 280.55kN (Compression)
Factored moment about x, Mfx = -38.42kNm
Factored moment about y, Mfy = -106kNm

Moment capacity about x, Mrx = -59.5kNm
Moment capacity about y, Mry = -164.16kNm
Demand / Capacity, D/C = **0.65 OK**

Detailed Design of Column C99 at L01 - 211





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L01 - 211
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
  5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 280.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5047 Ref. CSA Eq. 11.11
  and ex = -0.0001383 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 356.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.03 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 637.5kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2797.6kN (Compression)
Factored shear, Vf = -45.1kN, Factored moment, Mf = -96.3kN

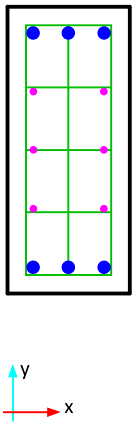
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 342.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5419 Ref. CSA Eq. 11.11
  and ex = -0.0001746 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 573.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.78 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 893.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2797.6kN (Compression)
Factored shear, Vf = -56.5kN, Factored moment, Mf = -112.5kN

Vfx/Vrx + Vfy/Vry = **0.12 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 2948.75kN (Compression)
Factored moment about x, Mfx = -111.65kNm
Factored moment about y, Mfy = -96.16kNm

Moment capacity about x, Mrx = -265.06kNm
Moment capacity about y, Mry = -228.29kNm
Demand / Capacity, D/C = **0.42 OK**

Detailed Design of Column C99 at L02 - 32



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C99 at L02 - 32
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 700mm
ETABS assignment: C300x700C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 6 Nos. of #15 (Dia.: 16mm, Clear spacing: 127mm)
Reinforcement content: 2%
Shear reinforcement:
5 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 700mm Ref. CSA 11.2.10
Rebar area for shear, Av = 500mm2
Concrete shear capacity, Vc = 240.2kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.432 Ref. CSA Eq. 11.11
and ex = -4.94E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 347.7kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.65 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 587.9kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1135.7kN (Compression)
Factored shear, Vf = -22.9kN, Factored moment, Mf = -47.7kN

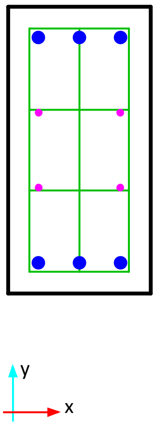
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 572mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 274.1kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.434 Ref. CSA Eq. 11.11
and ex = -5.22E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 553.5kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.63 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 827.5kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1135.7kN (Compression)
Factored shear, Vf = -37.4kN, Factored moment, Mf = -107.4kN

Vfx/Vrx + Vfy/Vry = **0.08 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 115mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 500mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 1135.68kN (Compression)
Factored moment about x, Mfx = -107.45kNm
Factored moment about y, Mfy = -47.7kNm

Moment capacity about x, Mrx = -393.23kNm
Moment capacity about y, Mry = -174.56kNm
Demand / Capacity, D/C = **0.27 OK**

Detailed Design of Column C99 at L03 - 1963



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L03 - 1963
Governing Load Combo:
  UW02 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 280.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.5888 Ref. CSA Eq. 11.11
  and ex = -0.0002138 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 292kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.5 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 572.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2693.2kN (Compression)
Factored shear, Vf = -16.5kN, Factored moment, Mf = -25.7kN

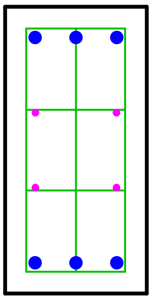
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 320.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.6021 Ref. CSA Eq. 11.11
  and ex = -0.0002238 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 490.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 27.43 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 752.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 2693.2kN (Compression)
Factored shear, Vf = 12.6kN, Factored moment, Mf = 31.9kN

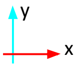
Vfx/Vrx + Vfy/Vry = **0.04 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 12
Factored axial force, Pf = 2674.89kN (Compression)
Factored moment about x, Mfx = -18.06kNm
Factored moment about y, Mfy = 30.13kNm

Moment capacity about x, Mrx = -126.45kNm
Moment capacity about y, Mry = 210.96kNm
Demand / Capacity, D/C = **0.14 OK**

Detailed Design of Column C99 at L04 - 1848





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L04 - 1848
Governing Load Combo:
  UW01 (Shear)
  UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 210kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4407 Ref. CSA Eq. 11.11
  and ex = -6.15E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 279.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.57 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 489.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1014.4kN (Compression)
Factored shear, Vf = -16.5kN, Factored moment, Mf = -30.7kN

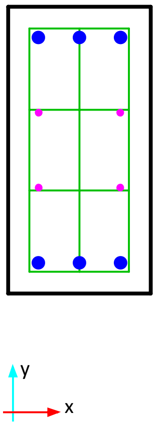
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 240.2kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4513 Ref. CSA Eq. 11.11
  and ex = -7.58E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469.7kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.47 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 709.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1014.4kN (Compression)
Factored shear, Vf = -13.1kN, Factored moment, Mf = -31.3kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 2486.59kN (Compression)
Factored moment about x, Mfx = 30.37kNm
Factored moment about y, Mfy = -33.92kNm

Moment capacity about x, Mrx = 180.75kNm
Moment capacity about y, Mry = -201.87kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C99 at L05 - 1733



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C99 at L05 - 1733
Governing Load Combo:
UW01 (Shear)
UW02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 208.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4376 Ref. CSA Eq. 11.11
and ex = -5.73E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.8kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 487.4kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 960.1kN (Compression)
Factored shear, Vf = -16.5kN, Factored moment, Mf = -30kN

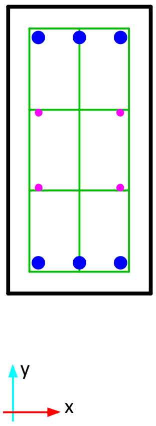
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 239kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.449 Ref. CSA Eq. 11.11
and ex = -7.27E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 469.2kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.49 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 708.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 960.1kN (Compression)
Factored shear, Vf = -12.1kN, Factored moment, Mf = -27kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 10
Factored axial force, Pf = 2273.93kN (Compression)
Factored moment about x, Mfx = 30.07kNm
Factored moment about y, Mfy = -33.03kNm

Moment capacity about x, Mrx = 185.3kNm
Moment capacity about y, Mry = -203.54kNm
Demand / Capacity, D/C = **0.16 OK**

Detailed Design of Column C99 at L06 - 1618



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L06 - 1618
Governing Load Combo:
  UW01 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 206.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4334 Ref. CSA Eq. 11.11
  and ex = -5.14E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.64 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 484.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 904.8kN (Compression)
Factored shear, Vf = -17.2kN, Factored moment, Mf = -31.1kN

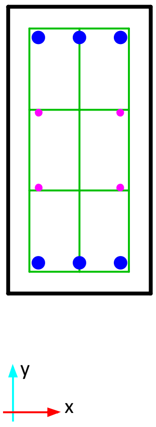
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 237.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4455 Ref. CSA Eq. 11.11
  and ex = -6.81E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 468.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.52 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 705.8kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 904.8kN (Compression)
Factored shear, Vf = -12.2kN, Factored moment, Mf = -26.1kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 1428.79kN (Compression)
Factored moment about x, Mfx = -1.33kNm
Factored moment about y, Mfy = -37.36kNm

Moment capacity about x, Mrx = -8.28kNm
Moment capacity about y, Mry = -232.63kNm
Demand / Capacity, D/C = **0.16 OK**

Detailed Design of Column C99 at L07 - 1503



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C99 at L07 - 1503
Governing Load Combo:
UW01 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 204.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4293 Ref. CSA Eq. 11.11
and ex = -4.54E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 277.9kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.68 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 482.4kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 846.8kN (Compression)
Factored shear, Vf = -17.8kN, Factored moment, Mf = -32kN

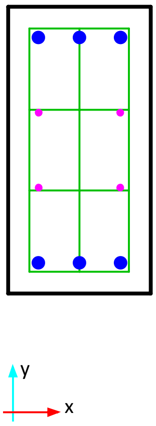
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 235.5kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4425 Ref. CSA Eq. 11.11
and ex = -6.4E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 468.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.55 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 703.6kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 846.8kN (Compression)
Factored shear, Vf = -11.6kN, Factored moment, Mf = -23.7kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 7
Factored axial force, Pf = 846.79kN (Compression)
Factored moment about x, Mfx = -23.74kNm
Factored moment about y, Mfy = -31.96kNm

Moment capacity about x, Mrx = -142.17kNm
Moment capacity about y, Mry = -191.39kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C99 at L08 - 1388



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L08 - 1388
Governing Load Combo:
  UW01 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 202.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.425 Ref. CSA Eq. 11.11
  and ex = -3.92E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 277.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.73 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 479.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 784kN (Compression)
Factored shear, Vf = -18.4kN, Factored moment, Mf = -32.7kN

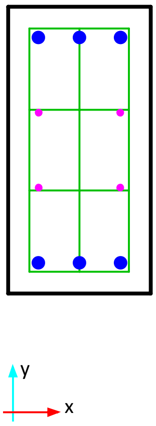
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 233.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4392 Ref. CSA Eq. 11.11
  and ex = -5.94E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 467.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.58 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 701.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 784kN (Compression)
Factored shear, Vf = -10.9kN, Factored moment, Mf = -21.4kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 13
Factored axial force, Pf = 1167.18kN (Compression)
Factored moment about x, Mfx = -0.92kNm
Factored moment about y, Mfy = -38.18kNm

Moment capacity about x, Mrx = -5.36kNm
Moment capacity about y, Mry = -222.6kNm
Demand / Capacity, D/C = **0.17 OK**

Detailed Design of Column C99 at L09 - 1273



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L09 - 1273
Governing Load Combo:
  UW01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 200.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4204 Ref. CSA Eq. 11.11
  and ex = -3.23E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 276.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.77 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 477.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 715.3kN (Compression)
Factored shear, Vf = -19kN, Factored moment, Mf = -33.6kN

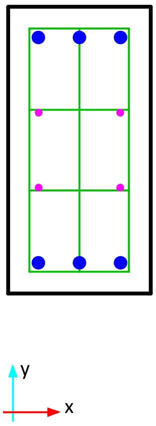
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 231.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4356 Ref. CSA Eq. 11.11
  and ex = -5.45E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 466.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.62 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 698.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 715.3kN (Compression)
Factored shear, Vf = -10kN, Factored moment, Mf = -18.8kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 1221kN (Compression)
Factored moment about x, Mfx = 2.1kNm
Factored moment about y, Mfy = -39.56kNm

Moment capacity about x, Mrx = 11.89kNm
Moment capacity about y, Mry = -223.94kNm
Demand / Capacity, D/C = **0.18 OK**

Detailed Design of Column C99 at L10 - 1158



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L10 - 1158
Governing Load Combo:
  U02 (Shear)
  UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 208.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4375 Ref. CSA Eq. 11.11
  and ex = -5.71E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 278.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.6 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 487.3kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1064.3kN (Compression)
Factored shear, Vf = -23.1kN, Factored moment, Mf = -40.1kN

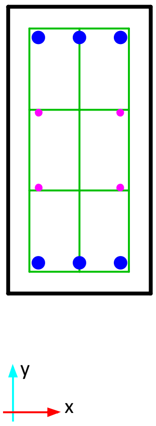
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 247.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4647 Ref. CSA Eq. 11.11
  and ex = -9.29E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 472kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.35 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 719.4kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 1064.3kN (Compression)
Factored shear, Vf = 1.5kN, Factored moment, Mf = 2.2kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 621.56kN (Compression)
Factored moment about x, Mfx = 18.44kNm
Factored moment about y, Mfy = 34.65kNm

Moment capacity about x, Mrx = 98.86kNm
Moment capacity about y, Mry = 185.76kNm
Demand / Capacity, D/C = **0.19 OK**

Detailed Design of Column C99 at L11 - 1043



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 50MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L11 - 1043
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C5060
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 203.6kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4273 Ref. CSA Eq. 11.11
  and ex = -4.25E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 277.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.7 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 481.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 907kN (Compression)
Factored shear, Vf = -23.7kN, Factored moment, Mf = -40.8kN

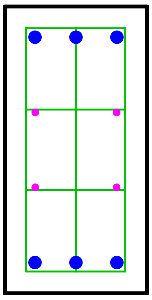
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 241.5kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4537 Ref. CSA Eq. 11.11
  and ex = -7.89E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 470.1kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.45 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 711.6kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 907kN (Compression)
Factored shear, Vf = 1.6kN, Factored moment, Mf = 2.3kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

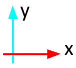
SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 886.38kN (Compression)
Factored moment about x, Mfx = -3.08kNm
Factored moment about y, Mfy = 41.15kNm

Moment capacity about x, Mrx = -15.62kNm
Moment capacity about y, Mry = 208.75kNm
Demand / Capacity, D/C = **0.2 OK**

Detailed Design of Column C99 at L12 - 928



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L12 - 928
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)



Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 198.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4171 Ref. CSA Eq. 11.11
  and ex = -2.74E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 276.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.81 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 475.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 703.1kN (Compression)
Factored shear, Vf = -22kN, Factored moment, Mf = -37.7kN

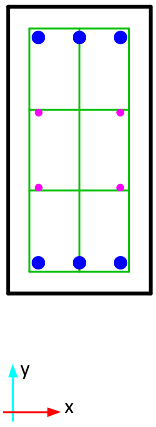
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 234.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4399 Ref. CSA Eq. 11.11
  and ex = -6.05E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 467.6kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.58 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 701.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 703.1kN (Compression)
Factored shear, Vf = 2.2kN, Factored moment, Mf = 3.2kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 6
Factored axial force, Pf = 728.91kN (Compression)
Factored moment about x, Mfx = -3.01kNm
Factored moment about y, Mfy = 40.82kNm

Moment capacity about x, Mrx = -13.83kNm
Moment capacity about y, Mry = 187.6kNm
Demand / Capacity, D/C = **0.22 OK**

Detailed Design of Column C99 at L13 - 813



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L13 - 813
Governing Load Combo:
  U01 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 194.7kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4086 Ref. CSA Eq. 11.11
  and ex = -1.4E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 275.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.9 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 470.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 558kN (Compression)
Factored shear, Vf = -22.1kN, Factored moment, Mf = -38.4kN

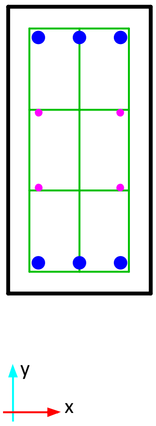
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 229.4kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4309 Ref. CSA Eq. 11.11
  and ex = -4.78E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 465.9kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.67 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 695.2kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 558kN (Compression)
Factored shear, Vf = 1.9kN, Factored moment, Mf = 2.9kN

Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 592.95kN (Compression)
Factored moment about x, Mfx = 1.89kNm
Factored moment about y, Mfy = -41.11kNm

Moment capacity about x, Mrx = 8.38kNm
Moment capacity about y, Mry = -182.31kNm
Demand / Capacity, D/C = **0.23 OK**

Detailed Design of Column C99 at L14 - 698



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 40MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
Confinement Type: Tied
Axial compression: varies
Steel: 0.85
Concrete: 0.65
Column: C99 at L14 - 698
Governing Load Combo:
U02 (Shear)
UW01 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C4050
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 181.6kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.381 Ref. CSA Eq. 11.11
and ex = 3.33E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 271.6kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 29.23 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 453.2kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 416.2kN (Compression)
Factored shear, Vf = -25.5kN, Factored moment, Mf = 44.9kN

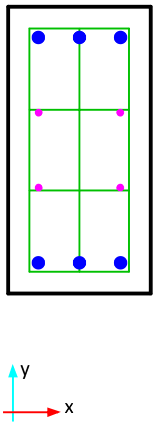
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 224.7kN Ref. CSA Eq. 11.6
Where phiC = 0.65, lambda = 1, beta = 0.4222 Ref. CSA Eq. 11.11
and ex = -3.5E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 464.1kN Ref. CSA Eq. 11.7
Where phiS = 0.85, theta = 28.75 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 688.8kN
Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 416.2kN (Compression)
Factored shear, Vf = 1.7kN, Factored moment, Mf = -3.8kN

Vfx/Vrx + Vfy/Vry = **0.06 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 9
Factored axial force, Pf = 246.98kN (Compression)
Factored moment about x, Mfx = 11.36kNm
Factored moment about y, Mfy = 41kNm

Moment capacity about x, Mrx = 43.42kNm
Moment capacity about y, Mry = 156.72kNm
Demand / Capacity, D/C = **0.26 OK**

Detailed Design of Column C99 at L15 - 583



Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at L15 - 583
Governing Load Combo:
  U02 (Shear)
  U02 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 173.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3648 Ref. CSA Eq. 11.11
  and ex = 6.43E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 269.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.45 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 443.1kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 282.7kN (Compression)
Factored shear, Vf = -19.4kN, Factored moment, Mf = -36.9kN

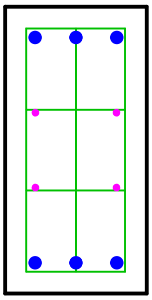
SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 221.1kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.4154 Ref. CSA Eq. 11.11
  and ex = -2.48E-05 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 462.8kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 28.83 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 683.9kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 282.7kN (Compression)
Factored shear, Vf = -0.9kN, Factored moment, Mf = -0.1kN

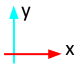
Vfx/Vrx + Vfy/Vry = **0.05 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 4
Factored axial force, Pf = 282.69kN (Compression)
Factored moment about x, Mfx = -0.05kNm
Factored moment about y, Mfy = -36.93kNm

Moment capacity about x, Mrx = -0.21kNm
Moment capacity about y, Mry = -157.61kNm
Demand / Capacity, D/C = **0.23 OK**

Detailed Design of Column C99 at RF - 468





Project: SPB
Design By: EC
Design Code: CSA A23.3-19
Rebar Set: CSA G30.18
Units: Metric
Concrete strength, f'c = 32MPa
Main rebar strength, fy = 414MPa
Shear rebar strength, fys = 414MPa
Material Resistance Factors:
  Confinement Type: Tied
  Axial compression: varies
  Steel: 0.85
  Concrete: 0.65
Column: C99 at RF - 468
Governing Load Combo:
  U02 (Shear)
  UW03 (PMM)

Column Properties:
Width, B = 300mm
Depth, D = 600mm
ETABS assignment: C300x600C3240
End Bars: 6 Nos. of #25 (Dia.: 25.2mm, Clear spacing: 61mm)
Side Bars: 4 Nos. of #15 (Dia.: 16mm, Clear spacing: 141mm)
Reinforcement content: 2.11%
Shear reinforcement:
  4 Legs #10 at 200 mm c/c along x-direction (Dia.: 11.3mm)
  3 Legs #10 at 200 mm c/c along y-direction (Dia.: 11.3mm)
Concrete cover, cc = 40mm

SHEAR CAPACITY - For x direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 600mm Ref. CSA 11.2.10
Rebar area for shear, Av = 400mm2
Concrete shear capacity, Vc = 102.8kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.2158 Ref. CSA Eq. 11.11
  and ex = 0.0005693 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 234.2kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 32.98 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 337kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 105.4kN (Compression)
Factored shear, Vf = -44.6kN, Factored moment, Mf = 95.2kN

SHEAR CAPACITY - For y direction:
Limiting concrete strength, Sqrt(f'c) = Min[Sqrt(f'c), 8.0] = 5.657MPa
Effective shear depth, dv = Max(0.72h, 0.9d) = 482mm
Effective web width, bw = 300mm Ref. CSA 11.2.10
Rebar area for shear, Av = 300mm2
Concrete shear capacity, Vc = 210.3kN Ref. CSA Eq. 11.6
  Where phiC = 0.65, lambda = 1, beta = 0.3952 Ref. CSA Eq. 11.11
  and ex = 8.1E-06 (Eq. 11.13), sze = 300mm (Eq. 11.10)
Rebar shear capacity, Vs = 458.4kN Ref. CSA Eq. 11.7
  Where phiS = 0.85, theta = 29.06 deg. Ref. CSA Eq. 11.12
Total shear capacity, Vr = Min(Vc + Vs, 0.25 phiC f'c bw dv) = 668.7kN
  Ref. CSA Eq. 11.4 & 11.5
Factored axial force, Pf = 105.4kN (Compression)
Factored shear, Vf = 9.3kN, Factored moment, Mf = -23.9kN

Vfx/Vrx + Vfy/Vry = **0.15 OK**
Maximum spacing, smax = Min(0.7dv, 600) = 151mm
Provided spacing, sprov = 200mm **Not OK**
Minimum shear reinforcement, AvminX = 98mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, AvprovX = 400mm2 **OK**
Minimum shear reinforcement, Avminy = 49mm2 Ref. CSA Eq. 11.1
Provided shear reinforcement, Avprovy = 300mm2 **OK**

SPCOLUMN OUTPUT (PMM Strength Check):
spColumn Load Number: 15
Factored axial force, Pf = 84.38kN (Compression)
Factored moment about x, Mfx = -8.29kNm
Factored moment about y, Mfy = 102.86kNm

Moment capacity about x, Mrx = -11.43kNm
Moment capacity about y, Mry = 141.85kNm
Demand / Capacity, D/C = **0.73 OK**