* MEMBER NAME : C01
  1. General Information
     1. Design Code : ACI318M-14
     2. Unit System : N, mm
  2. Material
     1. : 24.00MPa
     2. : 400MPa
     3. : 400MPa
  3. Section
     1. Section Size : 500 x 500mm
     2. : 3.500m
     3. : 3.500m
     4. : 1.000
     5. : 1.000
     6. Splicing Limit : 50%
     7. Frame Type : Braced Frame



* 1. Forces
     1. : 100.00kN
     2. : 130kN·m
     3. : 135kN·m
     4. : 100.00kN
     5. : 90.00kN
     6. : 0.000kN
     7. : 0.000kN
  2. Factors
     1. : 1.000
     2. : 1.000
     3. : 1.000
  3. Rebar
     1. Main Bar
        + Layer-1 : 10-2-#8 (62.23mm, 5,097mm²)
        + Layer-2 : -
        + Layer-3 : -
        + Layer-4 : -
        + 5,097mm²
     2. Hoop Bar
        + End : #3@150
        + Middle : #3@300
     3. Tie Bar
        + Apply Tie Bar to Shear Check : Yes
        + Tie Bar :
  4. Check Slenderness Ratio
     1. Calculate radii of gyration
        + 150mm
        + 150mm
     2. Calculate slenderness ratio
        + 1.000
        + 1.000
        + 23.33 > 22.00 → Slender
        + 23.33 > 22.00 → Slender
  5. Check Magnified Moment
     1. Calculate modulus of elasticity
     2. Calculate moment magnification factor (Direction X)
        + 5.208333e+9mm⁴
        + 179,903,845mm⁴
        + 2.998268e+13
        + 24,157kN
        + 1.006
     3. Calculate moment magnification factor (Direction Y)
        + 5.208333e+9mm⁴
        + 90,054,081mm⁴
        + 2.099770e+13
        + 16,917kN
        + 1.008
  6. Check Minimum Moment
     1. Calculate minimum eccentricity
        + 30.00mm
        + 30.00mm
     2. Calculate minimum moment
        + 3.000kN·m
        + 3.000kN·m
  7. Check Design Moment
     1. Calculate design moment
        + 131kN·m
        + 136kN·m
        + 189kN·m
  8. Check Design Parameter
     1. Calculate rebar ratio
        + 250,000mm² 5,097mm²
        + 0.0100 0.0800
        + 0.0204
     2. Calculate eccentricity
        + 1,361mm
        + 1,307mm
        + 1,887mm
        + Rotation angle of neutral axis = 57.11°
     3. Calculate concentric axial load capacity
        + 7,035kN
        + 5,628kN
        + -2,039kN
  9. Check Moment Capacity ( Balanced axis )
     1. Calculate capacity of compression stress block
        + 0.850
        + 363mm 309mm
        + 102,987mm²
        + 126mm 65.40mm
        + 2,101kN
        + 137kN·m
        + 264kN·m
     2. Calculate capacity of rebar

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **i** | **(mm)** |  | **(MPa)** | **(mm²)** | **(kN)** | **(mm)** | **(kN)** | **(mm)** | **(kN)** |
| 1 | 605 | -0.002000 | -400 | 510 | -204 | -188 | 38.28 | -188 | 38.28 |
| 2 | 401 | -0.000316 | -63.12 | 510 | -32.17 | 188 | -6.041 | -188 | 6.041 |
| 3 | 323 | 0.000336 | 67.12 | 510 | 34.21 | 188 | 6.424 | -93.89 | -3.212 |
| 4 | 244 | 0.000987 | 197 | 510 | 101 | 188 | 18.89 | 0.000 | 0.000 |
| 5 | 165 | 0.001638 | 328 | 510 | 167 | 188 | 31.35 | 93.89 | 15.68 |
| 6 | 86.05 | 0.002289 | 400 | 510 | 204 | 188 | 38.28 | 188 | 38.28 |
| 7 | 290 | 0.000605 | 121 | 510 | 61.66 | -188 | -11.58 | 188 | 11.58 |
| 8 | 369 | -0.000046 | -9.273 | 510 | -4.726 | -188 | 0.887 | 93.89 | -0.444 |
| 9 | 448 | -0.000698 | -140 | 510 | -71.11 | -188 | 13.35 | 0.000 | 0.000 |
| 10 | 526 | -0.001349 | -270 | 510 | -137 | -188 | 25.82 | -93.89 | 12.91 |

* + - * 118kN
      * 156kN·m
      * 119kN·m
    1. Calculate nominal capacity for neutral axis
       - 2,219kN
       - 293kN·m
       - 384kN·m
       - 483kN·m
  1. Check Moment Capacity ( Neutral axis )
     1. Calculate capacity of compression stress block
        + 0.850
        + 248mm 211mm
        + 48,816mm²
        + 166mm 120mm
        + 996kN
        + 120kN·m
        + 166kN·m
     2. Calculate capacity of rebar

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **i** | **(mm)** |  | **(MPa)** | **(mm²)** | **(kN)** | **(mm)** | **(kN)** | **(mm)** | **(kN)** |
| 1 | 605 | -0.004316 | -400 | 510 | -204 | -188 | 38.28 | -188 | 38.28 |
| 2 | 401 | -0.001851 | -370 | 510 | -189 | 188 | -35.43 | -188 | 35.43 |
| 3 | 323 | -0.000898 | -180 | 510 | -91.58 | 188 | -17.20 | -93.89 | 8.598 |
| 4 | 244 | 0.000054 | 10.88 | 510 | 5.546 | 188 | 1.041 | 0.000 | 0.000 |
| 5 | 165 | 0.001007 | 201 | 510 | 103 | 188 | 19.28 | 93.89 | 9.639 |
| 6 | 86.05 | 0.001960 | 392 | 510 | 200 | 188 | 37.52 | 188 | 37.52 |
| 7 | 290 | -0.000504 | -101 | 510 | -51.42 | -188 | 9.656 | 188 | -9.656 |
| 8 | 369 | -0.001457 | -291 | 510 | -149 | -188 | 27.89 | 93.89 | -13.95 |
| 9 | 448 | -0.002410 | -400 | 510 | -204 | -188 | 38.28 | 0.000 | 0.000 |
| 10 | 526 | -0.003363 | -400 | 510 | -204 | -188 | 38.28 | -93.89 | 19.14 |

* + - * -784kN
      * 158kN·m
      * 125kN·m
    1. Calculate nominal capacity for neutral axis
       - 212kN
       - 278kN·m
       - 291kN·m
       - 402kN·m
    2. Calculate strength reduction factor
       - 0.0020 0.0050
       - 0.004316
       - ø = 0.843
    3. Calculate axial load and moment capacities
       - 179kN
       - 234kN·m
       - 245kN·m
       - 339kN·m



* 1. Check Shear Capacity
     1. Calculate maximum space
        + ø = 0.750
        + 406mm
     2. Calculate shear strength (Direction X)

s = 150mm <

* + - * 137kN
      * 124kN
      * 261kN

0.383 → O.K

* + 1. Calculate shear strength (Direction Y)

s = 150mm <

* + - * 137kN
      * 186kN
      * 323kN

0.279 → O.K