* 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. : 100.00kN·m
     3. : 300kN·m
     4. : 100.00kN
     5. : 200kN
     6. : 10.000kN
     7. : 20.00kN
  2. Factors
     1. : 1.000
     2. : 1.000
     3. : 1.000
  3. Rebar
     1. Main Bar
        + Layer-1 : 8-3-#18 (62.23mm, 20,645mm²)
        + Layer-2 : -
        + Layer-3 : -
        + Layer-4 : -
        + 20,645mm²
     2. Hoop Bar
        + End : #3@150
        + Middle : #3@300
     3. Tie Bar
        + Apply Tie Bar to Shear Check : Yes
        + Tie Bar :
  4. Option
     1. Special provisions for seismic design is applied.
     2. Frame Type : Special Moment Frame
  5. 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
  6. Check Magnified Moment
     1. Calculate modulus of elasticity
     2. Calculate moment magnification factor (Direction X)
        + 5.208333e+9mm⁴
        + 550,164,132mm⁴
        + 6.700871e+13
        + 53,988kN
        + 1.002
     3. Calculate moment magnification factor (Direction Y)
        + 5.208333e+9mm⁴
        + 550,164,132mm⁴
        + 6.700871e+13
        + 53,988kN
        + 1.002
  7. Check Minimum Moment
     1. Calculate minimum eccentricity
        + 30.00mm
        + 30.00mm
     2. Calculate minimum moment
        + 3.000kN·m
        + 3.000kN·m
  8. Check Design Moment
     1. Calculate design moment
        + 100kN·m
        + 301kN·m
        + 317kN·m
  9. Check Design Parameter
     1. Calculate rebar ratio
        + 250,000mm² 20,645mm²
        + 0.0100 0.0600
        + 0.0826
     2. Calculate eccentricity
        + 3,007mm
        + 1,002mm
        + 3,170mm
        + Rotation angle of neutral axis = 68.21°
     3. Calculate concentric axial load capacity
        + 14,588kN
        + 11,671kN
        + -9,910kN
  10. Check Moment Capacity ( Balanced axis )
      1. Calculate capacity of compression stress block
         + 0.850
         + 341mm 290mm
         + 106,287mm²
         + 136mm 39.18mm
         + 2,168kN
         + 84.95kN·m
         + 295kN·m
      2. Calculate capacity of rebar

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **i** | **(mm)** |  | **(MPa)** | **(mm²)** | **(kN)** | **(mm)** | **(kN)** | **(mm)** | **(kN)** |
| 1 | 569 | -0.002000 | -400 | 2,581 | -1,032 | -188 | 194 | -188 | 194 |
| 2 | 499 | -0.001388 | -278 | 2,581 | -716 | 0.000 | 0.000 | -188 | 134 |
| 3 | 430 | -0.000775 | -155 | 2,581 | -400 | 188 | -75.11 | -188 | 75.11 |
| 4 | 255 | 0.000757 | 151 | 2,581 | 391 | 188 | 73.37 | 0.000 | 0.000 |
| 5 | 80.88 | 0.002289 | 400 | 2,581 | 1,032 | 188 | 194 | 188 | 194 |
| 6 | 151 | 0.001677 | 335 | 2,581 | 865 | 0.000 | 0.000 | 188 | 162 |
| 7 | 220 | 0.001064 | 213 | 2,581 | 549 | -188 | -103 | 188 | 103 |
| 8 | 395 | -0.000468 | -93.57 | 2,581 | -241 | -188 | 45.34 | 0.000 | 0.000 |

* + - * 448kN
      * 328kN·m
      * 863kN·m
    1. Calculate nominal capacity for neutral axis
       - 2,616kN
       - 413kN·m
       - 1,158kN·m
       - 1,229kN·m
  1. Check Moment Capacity ( Neutral axis )
     1. Calculate capacity of compression stress block
        + 0.850
        + 283mm 240mm
        + 79,509mm²
        + 160mm 52.37mm
        + 1,622kN
        + 84.95kN·m
        + 260kN·m
     2. Calculate capacity of rebar

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **i** | **(mm)** |  | **(MPa)** | **(mm²)** | **(kN)** | **(mm)** | **(kN)** | **(mm)** | **(kN)** |
| 1 | 569 | -0.003034 | -400 | 2,581 | -1,032 | -188 | 194 | -188 | 194 |
| 2 | 499 | -0.002295 | -400 | 2,581 | -1,032 | 0.000 | 0.000 | -188 | 194 |
| 3 | 430 | -0.001556 | -311 | 2,581 | -803 | 188 | -151 | -188 | 151 |
| 4 | 255 | 0.000293 | 58.65 | 2,581 | 151 | 188 | 28.42 | 0.000 | 0.000 |
| 5 | 80.88 | 0.002142 | 400 | 2,581 | 1,032 | 188 | 194 | 188 | 194 |
| 6 | 151 | 0.001403 | 281 | 2,581 | 724 | 0.000 | 0.000 | 188 | 136 |
| 7 | 220 | 0.000664 | 133 | 2,581 | 343 | -188 | -64.34 | 188 | 64.34 |
| 8 | 395 | -0.001185 | -237 | 2,581 | -612 | -188 | 115 | 0.000 | 0.000 |

* + - * -1,229kN
      * 316kN·m
      * 933kN·m
    1. Calculate nominal capacity for neutral axis
       - 393kN
       - 401kN·m
       - 1,192kN·m
       - 1,258kN·m
    2. Calculate strength reduction factor
       - 0.0024 0.0050
       - 0.003484
       - ø = 0.774
    3. Calculate axial load and moment capacities
       - 290kN
       - 295kN·m
       - 878kN·m
       - 926kN·m



* 1. Calculate Shear Force by Special Provisions for Seismic Design (Direction Y).
     1. Calculate bending strength for design shear force.
        + 1,590kN·m
        + 1,590kN·m
        + 1,590kN·m
        + 1,590kN·m
     2. Calculate design shear force by special provision for seismic design
        + 944kN
        + 944kN
        + 944kN
  2. Calculate Shear Force by Special Provisions for Seismic Design (Direction X).
     1. Calculate bending strength for design shear force.
        + 1,652kN·m
        + 1,652kN·m
        + 1,652kN·m
        + 1,652kN·m
     2. Calculate design shear force by special provision for seismic design
        + 909kN
        + 909kN
        + 909kN
  3. Check Shear Capacity
     1. Calculate maximum space
        + ø = 0.750
     2. Calculate shear strength (Direction X)

s = 0.00100mm <

* + - * 137kN
      * 186kN
      * 324kN

2.808 → N.G

* + 1. Calculate shear strength (Direction Y)

s = 0.00100mm <

* + - * 138kN
      * 186kN
      * 324kN

2.915 → N.G

* 1. Check Dimension by Special Provision for Seismic Design
     1. Calculate section dimension limit
     2. Calculate section dimension ratio
  2. Check Rebar Limit by Special Provision for Seismic Design
     1. Calculate amount of transverse rebar (Direction X)
     2. Calculate amount of transverse rebar (Direction Y)