* MEMBER NAME : W01
  1. General Information
     1. Design Code : ACI318M-11
     2. Unit System : N, mm
  2. Material
     1. : 24.00MPa
     2. : 400MPa
     3. : 400MPa
  3. Section
     1. Thickness : 300mm
     2. Length : 3.000m
     3. Cover : 50.00mm
     4. Height(X) : 3.500m
     5. Height(Y) : 3.500m
     6. : 1.000
     7. : 1.000
     8. Frame Type : Braced Frame



* 1. Force
     1. Axial & Moment
        + : 10,000kN
        + : 500kN·m
        + : 100.00kN·m
     2. Shear
        + : 10,000kN
        + : 500kN·m
        + : 62.00kN
     3. Force for Boundary Element Length
        + : -1,000kN
  2. Factors
     1. : 0.850
     2. : 0.850
     3. : 0.750
  3. Rebar
     1. Vertical Bar : #3@450
     2. Horizontal Bar : #10@250
     3. Boundary Element Bar : #10@100
  4. Seismic Design Parameters
     1. Special provisions for seismic design is applied.
     2. Structural Wall Type : Special Structural Wall
  5. Check Slenderness Ratio
     1. Calculate radii of gyration
        + 900mm
        + 90.00mm
     2. Calculate slenderness ratio
        + 0.625
        + 0.625
        + 3.889 < 26.50 → Not Slender
        + 38.89 > 26.50 → Slender
  6. Check Magnified Moment
     1. Calculate modulus of elasticity
     2. Calculate moment magnification factor (Direction X)
        + 1.000
     3. Calculate moment magnification factor (Direction Y)
        + 6.750000e+9mm⁴
        + 4,510,259mm⁴
        + 1.827776e+13
        + 14,726kN
        + 8.988
  7. Check Minimum Moment
     1. Calculate minimum eccentricity
     2. Calculate minimum moment
        + 1,050kN·m
        + 240kN·m
  8. Check Design Moment
     1. Calculate design moment
        + 500kN·m
        + 2,157kN·m
        + 2,214kN·m
  9. Check Design Parameter
     1. Calculate rebar ratio
        + 900,000mm² 1,135mm²
        + 0.00126
     2. Calculate concentric axial load capacity
        + 18,791kN
        + 15,033kN
        + -454kN
  10. Check Balanced Moment Capacity of Direction X
      1. Calculate capacity of compression stress block
         + 0.850
         + 1,748mm 1,486mm
         + 9,092kN
         + 6,884kN·m
      2. Calculate capacity of rebar

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **i** | **TYPE** | **(mm)** |  | **(MPa)** | **(mm²)** | **(kN)** |
| 1 | Ver. | 87.02 | -0.002000 | -400 | 142 | -56.77 |
| 2 | Ver. | 537 | -0.001228 | -246 | 142 | -34.85 |
| 3 | Ver. | 987 | -0.000455 | -91.04 | 142 | -12.92 |
| 4 | Ver. | 1,437 | 0.000317 | 63.44 | 142 | 9.005 |
| 5 | Ver. | 2,913 | 0.002851 | 400 | 142 | 56.77 |
| 6 | Ver. | 2,463 | 0.002078 | 400 | 142 | 56.77 |
| 7 | Ver. | 2,013 | 0.001306 | 261 | 142 | 37.07 |
| 8 | Ver. | 1,563 | 0.000533 | 107 | 142 | 15.14 |

* + - * 70.22kN
      * 275kN·m
    1. Calculate nominal capacity for balanced axis
       - 9,162kN
       - 7,159kN·m
  1. Check Moment Capacity about Neutral Axis of Direction X
     1. Calculate strength reduction factor
        + 0.0020 0.0050
        + -0.000000
        + ø = 0.650
     2. Calculate capacity of concrete stress block
        + c = 3,424mm
        + 2,910mm
        + 17,811kN
        + 799kN·m
     3. Calculate capacity of rebar
        + 338kN
        + 105kN·m
        + 18,148kN
        + 905kN·m
        + 15,033kN
     4. Calculate axial load and moment capacities
        + 9,771kN
        + 588kN·m

1.023 > 1.000 → N.G

0.850 < 1.000 → O.K



* 1. Check Balanced Moment Capacity of Direction Y
     1. Calculate capacity of compression stress block
        + 0.850
        + 128mm 109mm
        + 6,648kN
        + 636kN·m
     2. Calculate capacity of rebar

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **i** | **TYPE** | **(mm)** |  | **(MPa)** | **(mm²)** | **(kN)** |
| 1 | Ver. | 87.02 | -0.002000 | -400 | 568 | -227 |
| 2 | Ver. | 213 | 0.000957 | 191 | 568 | 109 |

* + - * -118kN
      * 21.15kN·m
    1. Calculate nominal capacity for balanced axis
       - 6,529kN
       - 657kN·m
  1. Check Moment Capacity about Neutral Axis of Direction Y
     1. Calculate strength reduction factor
        + 0.0020 0.0050
        + 0.022585
        + ø = 0.900
     2. Calculate capacity of concrete stress block
        + c = 24.97mm
        + 21.23mm
        + 1,299kN
        + 181kN·m
     3. Calculate capacity of rebar
        + -454kN
        + 0.000kN·m
        + 845kN
        + 181kN·m
     4. Calculate axial load and moment capacities
        + 760kN
        + 163kN·m

13.15 > 1.000 → N.G

13.24 > 1.000 → N.G



* 1. Check Shear Capacity
     1. Calculate maximum shear strength
        + 0.750
        + 2,400mm
        + 2,928kN
        + 2,196kN

→ O.K

* + 1. Calculate maximum shear strength for special RC wall
       - 8,615kN
       - 6,462kN

→ O.K

* + 1. Calculate shear strength by concrete
       - 2,952kN
       - 1,069kN
       - 1,069kN
    2. Calculate ratio
       - 802kN
       - 1,394kN
       - 2,196kN

0.0282 → O.K

* 1. Check Rebar
     1. Calculate rebar ratio
        + 0.00150 0.00126
        + 0.00250 0.02185

→ N.G

→ O.K

* + 1. Calculate rebar spacing
       - 310mm 450mm
       - 450mm 250mm

→ N.G

→ O.K

* 1. Check Boundary Element
     1. Calculate horizontal rebar length
        + c = 0.000mm
     2. Calculate maximum spacing of horizontal rebar

→ N.G

* + 1. Calculate horizontal rebar in x-direction
    2. Calculate horizontal rebar in y-direction