

Detailed Joint Calculations

Units: N&mm

Regulation: ASCE 41-17

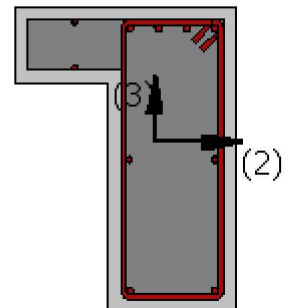
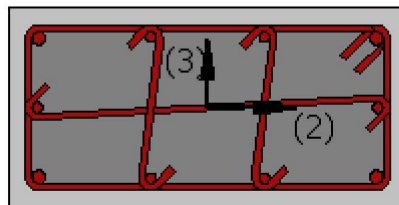
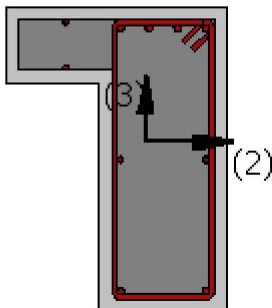
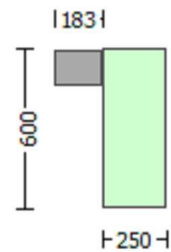
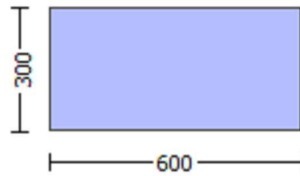
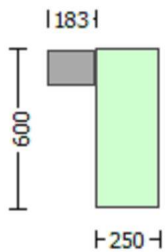
Calculation No. 1

Col. C2 - Beam B2 - Beam B1, Floor : 1

Limit State: Operational Level (data interpolation between analysis steps 3 and 4)

Analysis: Uniform +X

Check: Shear Force



Demanded Shear Force: $V_{jhd} = \text{Max}(V_{jhd1}, V_{jhd2}) = 444520.976$, where V_{jhd1}, V_{jhd2} are calculated for beam 1 and beam 2, respectively, using TBDY, (7.11) and ACI 318-14, 18.8.2.1.

Beam 1:

$V_{jhd1} = 444520.976$

with

$V_{kol} = \text{Min}(V_{kol, \text{above_joint}}, V_{kol, \text{below_joint}}) = 17293.144$

$As1 = 615.7522$

$As2 = 307.8761$

Existing Material: $f_y d = f_{s_Lower_bound} = 400.00$

Beam 2:

$V_{jhd2} = 444520.976$

with

$V_{kol} = \text{Min}(V_{kol,above_joint}, V_{kol,below_joint}) = 17293.144$

$A_{s1} = 615.7522$

$A_{s2} = 307.8761$

Existing Material: $f_y d = f_{s_Lower_bound} = 400.00$

knowledge factor, $= 1.00$

$V_n = \text{Min}(V_{n1}, V_{n2}) = 871966.828$, where

provided Shear Forces are calculated for beam 1 and beam 2, respectively

Beam 1:

Existing Joint: From table 7-7, ASCE 41-17: Final value $V_{n1,R} = *V_{n1} = 883704.216$

$V_{n1} = 883704.216$ from (10.4) ASCE 41-17

with

$f_c = \text{Min}(f_{c_beam}, f_{c_Column}) = 16.00$

Existing Material: $f_{c_column} = f_{c_lower_bound_column} = 16.00$

Existing Material: $f_{c_beam} = f_{c_lower_bound_beam} = 16.00$

$A_j = 133027.115$

$h_c = 600.00$

$b_j = 221.7119$

column width = 300.00

beam width plus joint depth = 850.00

Min perpendicular distance of beam axis to column sides = 110.8559

= 20.00, from table 10-12, ASCE 41-17)

column hoops spacing = 100.00

Beam 2:

Existing Joint: From table 7-7, ASCE 41-17: Final value $V_{n1,R} = *V_{n1} = 871966.828$

$V_{n1} = 871966.828$ from (10.4) ASCE 41-17

with

$f_c = \text{Min}(f_{c_beam}, f_{c_Column}) = 16.00$

Existing Material: $f_{c_column} = f_{c_lower_bound_column} = 16.00$

Existing Material: $f_{c_beam} = f_{c_lower_bound_beam} = 16.00$

$A_j = 131260.244$

$h_c = 600.00$

$b_j = 218.7671$

column width = 300.00

beam width plus joint depth = 850.00

Min perpendicular distance of beam axis to column sides = 109.3835

= 20.00, from table 10-12, ASCE 41-17)

column hoops spacing = 100.00

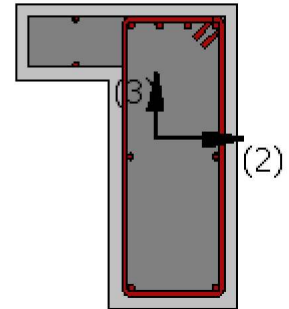
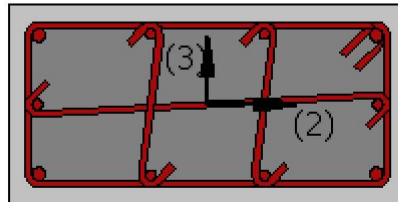
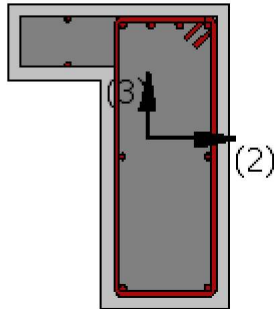
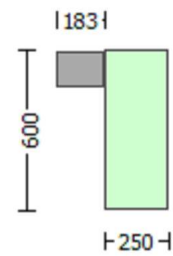
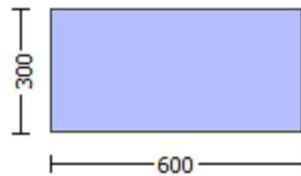
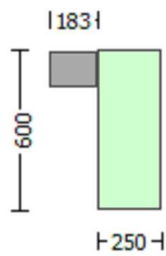
Calculation No. 2

Col. C2 - Beam B2 - Beam B1, Floor : 1

Limit State: Immediate Occupancy (data interpolation between analysis steps 4 and 5)

Analysis: Uniform +X

Check: Shear Force



Demanded Shear Force: $V_{jhd} = \text{Max}(V_{jhd1}, V_{jhd2}) = 441431.793$, where V_{jhd1}, V_{jhd2} are calculated for beam 1 and beam 2, respectively, using TBDY, (7.11) and ACI 318-14, 18.8.2.1.

Beam 1:

$V_{jhd1} = 441431.793$

with

$V_{kol} = \text{Min}(V_{kol, \text{above_joint}}, V_{kol, \text{below_joint}}) = 20382.327$

$As1 = 615.7522$

$As2 = 307.8761$

Existing Material: $f_{yd} = f_{s_Lower_bound} = 400.00$

Beam 2:

$V_{jhd2} = 441431.793$

with

$V_{kol} = \text{Min}(V_{kol, \text{above_joint}}, V_{kol, \text{below_joint}}) = 20382.327$

$As1 = 615.7522$

$As2 = 307.8761$

Existing Material: $f_{yd} = f_{s_Lower_bound} = 400.00$

knowledge factor, $= 1.00$

$V_n = \text{Min}(V_{n1}, V_{n2}) = 871966.828$, where

provided Shear Forces are calculated for beam 1 and beam 2, respectively

Beam 1:

Existing Joint: From table 7-7, ASCE 41-17: Final value $V_{n1,R} = *V_{n1} = 883704.216$

$V_{n1} = 883704.216$ from (10.4) ASCE 41-17

with

$f_c = \text{Min}(f_{c_beam}, f_{c_Column}) = 16.00$

Existing Material: $f_{c_column} = f_{c_lower_bound_column} = 16.00$

Existing Material: $f_{c_beam} = f_{c_lower_bound_beam} = 16.00$

$A_j = 133027.115$

$h_c = 600.00$

$b_j = 221.7119$

column width = 300.00

beam width plus joint depth = 850.00

Min perpendicular distance of beam axis to column sides = 110.8559

= 20.00, from table 10-12, ASCE 41-17)

column hoops spacing = 100.00

Beam 2:

Existing Joint: From table 7-7, ASCE 41-17: Final value $V_{n1,R} = *V_{n1} = 871966.828$

$V_{n1} = 871966.828$ from (10.4) ASCE 41-17

with

$f_c = \text{Min}(f_{c_beam}, f_{c_Column}) = 16.00$

Existing Material: $f_{c_column} = f_{c_lower_bound_column} = 16.00$

Existing Material: $f_{c_beam} = f_{c_lower_bound_beam} = 16.00$

$A_j = = 131260.244$

$h_c = 600.00$

$b_j = 218.7671$

column width = 300.00

beam width plus joint depth = 850.00

Min perpendicular distance of beam axis to column sides = 109.3835

= 20.00, from table 10-12, ASCE 41-17)

column hoops spacing = 100.00