# Detailed Member Calculations

**Units: N&mm**

**Regulation: ASCE 41-17**

## Calculation No. 1

wall W1, Floor 1

Limit State: Operational Level (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Shear capacity VRd

Edge: Start

Local Axis: (2)



Start Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)
Section Type: rcrws

Constant Properties
------------------------------------------------------------
Knowledge Factor,  = 1.00
Member Shear Force is generally considered as Force-Controlled Action according to Table C7-1, ASCE 41-17.
Lower-bound strengths are used for Force-Controlled Actions according to 7.5.1.3, ASCE 41-17
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444

Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min =lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
EDGE -A-
Bending Moment, Ma = -3.8068487E-012
Shear Force, Va = -2.0402016E-014
EDGE -B-
Bending Moment, Mb = -6.0084169E-011
Shear Force, Vb = 2.0402016E-014
BOTH EDGES
Axial Force, F = -33005.924
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
    -Compression: Asl,com = 2830.575
        -Middle: Asl,mid = 1608.495
Mean Diameter of Tension Reinforcement, DbL,ten = 16.46154
------------------------------------------------------------
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New component: From table 7-7, ASCE 41_17: Final Shear Capacity VR = 1.0*Vn = 1.0254E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vn < 0.83*fc'^0.5*h*d  = 1.0254E+006
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 816601.185
  Mu/Vu-lw/2 = 61.59179 > 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.8068487E-012
    Vu = 2.0402016E-014
    Nu = 33005.924
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00

Av = 157079.633
s = 150.00
fy = 500.00
Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
2(1-s/d) = 0.50
Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
d = 200.00
Av = 157079.633
s = 150.00
fy = 500.00
Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
2(1-s/d) = 0.50
Vs3 = 0.00 is calculated for web, with:
d = 200.00
Av = 0.00
s = 200.00
fy = 500.00
Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
2(1-s/d) = 0.00
Vf ((11-3)-(11.4), ACI 440) = 109599.773
f = 0.95, for fully-wrapped sections
wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1:  1 = b1 + 90° = 90.00
Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 208.00
ffe ((11-5), ACI 440) = 259.312
Ef = 64828.00
fe = 0.004, from (11.6a), ACI 440
with  fu = 0.01
From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
bw = 3000.00
---------------------------------------------------------------
End Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)

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## Calculation No. 2

wall W1, Floor 1

Limit State: Operational Level (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Chord rotation capacity ( u)

Edge: Start

Local Axis: (2)

Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 3
(Bending local axis: 2)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------------
Knowledge Factor,    = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-----------------------------------------------------------------

Stepwise Properties
-----------------------------------------------------------------
At local axis: 3
EDGE -A-
Shear Force, Va = 1.0097420E-028
EDGE -B-
Shear Force, Vb = -1.0097420E-028

BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
  -Tension: Aslt = 0.00
  -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
  -Tension: Asl,ten = 2865.133
  -Compression: Asl,com = 2865.133
   -Middle: Asl,mid = 0.00
   (According to 10.7.2.3 Asl,mid is setted equal to zero)
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Calculation of Shear Capacity ratio , Ve/Vr  =  1.02813
Member Controlled by Shear (Ve/Vr > 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln =  2.5600E+006
with
Mpr1 =  Max(Mu1+ , Mu1-) = 3.8401E+009
 Mu1+ = 3.3585E+009, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
 Mu1- = 3.8401E+009, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 =  Max(Mu2+ , Mu2-) = 3.8401E+009
 Mu2+ = 3.3585E+009, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
 Mu2- = 3.8401E+009, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination


----------------------------------------------------------------------------
Calculation of Mu1+
----------------------------------------------------------------------------


----------------------------------------------------------------------------
Calculation of ultimate curvature   φu according to 4.1, Biskinis/Fardis 2013:
 φu = 2.0296703E-006
Mu = 3.3585E+009
----------------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
  N = 27588.841
 fc = 25.00
 εco (5A.5, TBDY) = 0.002
 Final value of  εcu:  εcu* = shear_factor * Max( εcu, εcc) = 0.0035
  The Shear_factor is considered equal to 1 (pure moment strength)
  From (5.4b), TBDY: εcu = 0.0035
   ωwe ((5.4c), TBDY) = αse* ρsh,min*fywe/fce+Min( ωfx, ωfy) = 0.00
  where  ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
  --------------------------------------------------------------------
   ωfx = 0.00
   αf = 0.00
    b = 250.00
    h = 3000.00
   From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
    bw = 250.00
   effective stress from (A.35), ff,e = 757.2164
  --------------------------------------------------------------------
   ωfy = 0.00
   αf = 0.00
    b = 3000.00
    h = 250.00
   From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
    bw = 3000.00
   effective stress from (A.35), ff,e = 954.4864

```
        ------------------------------------------------------------------
        R = 40.00
        Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
        fu,f = 1055.00
        Ef = 64828.00
         u,f = 0.015
        ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
            ase1 = 0.00
               sh_1 = 150.00
               bo_1 = 190.00
               ho_1 = 540.00
                bi2_1 = 655400.00
            ase2 = 0.00
               sh_2 = 150.00
                bo_2 = 190.00
                ho_2 = 540.00
                 bi2_2 = 655400.00
            ase3 = 0 (grid does not provide confinement)
            psh,min = Min(psh,x , psh,y) = 0.00069813
      Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
   earthquake detailing (90° closed stirrups)
        ------------------------------------------------------------------
        psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
            ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
               h1 = 600.00
               As1 = Astir1*ns1 = 157.0796
                  No stirups, ns1 = 2.00
            ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
               h2 = 600.00
               As2 = Astir2*ns2 = 157.0796
                  No stirups, ns2 = 2.00
            ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
               h3 = 1800.00
               As3 = Astir3*ns3 = 0.00
                  No stirups, ns3 = 2.00
        ------------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
            ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
               h1 = 250.00
               As1 = Astir1*ns1 = 157.0796
                  No stirups, ns1 = 2.00
            ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
               h2 = 250.00
               As2 = Astir2*ns2 = 157.0796
                  No stirups, ns2 = 2.00
            ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
               h3 = 250.00
               As3 = Astir3*ns3 = 157.0796
                  No stirups, ns3 = 0.00
        ------------------------------------------------------------------
            Asec = 750000.00
            s_1 = 150.00
            s_2 = 150.00
            s_3 = 200.00
         fywe = 625.00
         fce  = 25.00
      From ((5.A5), TBDY), TBDY:  cc = 0.00202463
          c  = confinement factor = 1.00246
     y1 = 0.00140044
    sh1 = 0.0044814
   ft1 = 420.1317
   fy1 = 350.1097
   su1 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/ld = 0.30
```

su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
   y2 = 0.00140044
   sh2 = 0.0044814
  ft2 = 420.1317
  fy2 = 350.1097
   su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
   yv = 0.00140044
   shv = 0.0044814
  ftv = 420.1317
  fyv = 350.1097
   suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fsv = fs = 350.1097
     with Esv = Es = 200000.00
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
   2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
 u =   su (4.1) = 2.0296703E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
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-----------------------------------------------------------------------
-----------------------------------------------------------------------
Calculation of Mu1-
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-----------------------------------------------------------------------
Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
  φu = 2.0532423E-006
Mu = 3.8401E+009
-----------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  ν = 0.0014928
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY: εcu = 0.0035
       ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(αfx, αfy) = 0.00
     where αf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ------------------------------------------------------------------
       αfx = 0.00
        αf = 0.00
          b = 250.00
          h = 3000.00
        From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
          bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ------------------------------------------------------------------
       αfy = 0.00
        αf = 0.00
          b = 3000.00
          h = 250.00
        From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
          bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ------------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        εu,f = 0.015
       αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
         αse1 = 0.00
           sh_1 = 150.00
           bo_1 = 190.00
           ho_1 = 540.00
            Σbi2_1 = 655400.00
         αse2 = 0.00
           sh_2 = 150.00
           bo_2 = 190.00
           ho_2 = 540.00
            Σbi2_2 = 655400.00
       αse3 = 0 (grid does not provide confinement)
       ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
     Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
       ------------------------------------------------------------------
       ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
         ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
           h1 = 600.00
           As1 = Astir1*ns1 = 157.0796
              No stirups, ns1 = 2.00
         ρs2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776

```
                h2 = 600.00
                As2 = Astir2*ns2 = 157.0796
                    No stirups, ns2 = 2.00
              ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                h3 = 1800.00
                As3 = Astir3*ns3 = 0.00
                    No stirups, ns3 = 2.00
        -----------------------------------------------------------------
           psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
              ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                  h1 = 250.00
                  As1 = Astir1*ns1 = 157.0796
                      No stirups, ns1 = 2.00
              ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                  h2 = 250.00
                  As2 = Astir2*ns2 = 157.0796
                      No stirups, ns2 = 2.00
              ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                  h3 = 250.00
                  As3 = Astir3*ns3 = 157.0796
                      No stirups, ns3 = 0.00
        -----------------------------------------------------------------
              Asec = 750000.00
               s_1 = 150.00
               s_2 = 150.00
               s_3 = 200.00
           fywe = 625.00
            fce  = 25.00
        From ((5.A5), TBDY), TBDY:  cc = 0.00202463
              c  = confinement factor = 1.00246
     y1 = 0.00140044
     sh1 = 0.0044814
    ft1 = 420.1317
    fy1 = 350.1097
     su1 = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/ld = 0.30
         su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu1_nominal = 0.08,
        For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
        characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
         with fs1 = fs = 350.1097
         with Es1 = Es = 200000.00
     y2 = 0.00140044
     sh2 = 0.0044814
    ft2 = 420.1317
    fy2 = 350.1097
     su2 = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/lb,min = 0.30
         su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu2_nominal = 0.08,
        For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
        characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
         with fs2 = fs = 350.1097
         with Es2 = Es = 200000.00
     yv = 0.00140044
     shv = 0.0044814
    ftv = 420.1317
    fyv = 350.1097
     suv = 0.00512
```

using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and   yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
 2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
 v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
 2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
 v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
 u =   su (4.1) = 2.0532423E-006
--------------------------------------------------------------

Calculation of ratio lb/ld
--------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
Calculation of Mu2+
------------------------------------------------------------------------

------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
 u = 2.0296703E-006
Mu = 3.3585E+009
------------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
   N = 27588.841
 fc = 25.00
  co (5A.5, TBDY) = 0.002
 Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY:  cu = 0.0035
    we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min( fx,   fy) = 0.00
   where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
   ------------------------------------------------------------------
    fx = 0.00
     af = 0.00
       b = 250.00
       h = 3000.00

From EC8 A4.4.3(6), $pf = 2tf/bw = 0.008128$
 $bw = 250.00$
effective stress from (A.35), $ff,e = 757.2164$

----------------------------------------------------------------

 $fy = 0.00$
 $af = 0.00$
  $b = 3000.00$
  $h = 250.00$
 From EC8 A4.4.3(6), $pf = 2tf/bw = 0.00067733$
  $bw = 3000.00$
 effective stress from (A.35), $ff,e = 954.4864$

----------------------------------------------------------------

 $R = 40.00$
 Effective FRP thickness, $tf = NL*t*Cos(b1) = 1.016$
 $fu,f = 1055.00$
 $Ef = 64828.00$
 $u,f = 0.015$
 ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
  ase1 = 0.00
   sh_1 = 150.00
   bo_1 = 190.00
   ho_1 = 540.00
   bi2_1 = 655400.00
  ase2 = 0.00
   sh_2 = 150.00
   bo_2 = 190.00
   ho_2 = 540.00
   bi2_2 = 655400.00
  ase3 = 0 (grid does not provide confinement)
 psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

----------------------------------------------------------------

 psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
  ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
   h1 = 600.00
   As1 = Astir1*ns1 = 157.0796
    No stirups, ns1 = 2.00
  ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
   h2 = 600.00
   As2 = Astir2*ns2 = 157.0796
    No stirups, ns2 = 2.00
  ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
   h3 = 1800.00
   As3 = Astir3*ns3 = 0.00
    No stirups, ns3 = 2.00

----------------------------------------------------------------

 psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
  ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
   h1 = 250.00
   As1 = Astir1*ns1 = 157.0796
    No stirups, ns1 = 2.00
  ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
   h2 = 250.00
   As2 = Astir2*ns2 = 157.0796
    No stirups, ns2 = 2.00
  ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
   h3 = 250.00
   As3 = Astir3*ns3 = 157.0796
    No stirups, ns3 = 0.00

----------------------------------------------------------------

  Asec = 750000.00
  s_1 = 150.00
  s_2 = 150.00
  s_3 = 200.00
 fywe = 625.00
 fce = 25.00

From ((5.A5), TBDY), TBDY:  cc = 0.00202463
    c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu1_nominal = 0.08,
  For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
  characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
b = 190.00
d = 2927.00
d' = 13.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
    c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->

v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
 u =  su (4.1) = 2.0296703E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------------
-------------------------------------------------------------------
-------------------------------------------------------------------
Calculation of Mu2-
-------------------------------------------------------------------

-------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
 u = 2.0532423E-006
Mu = 3.8401E+009
-------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
   N = 27588.841
 fc = 25.00
  co (5A.5, TBDY) = 0.002
 Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ------------------------------------------------------------------
      fx = 0.00
       af = 0.00
         b = 250.00
         h = 3000.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
         bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    ------------------------------------------------------------------
      fy = 0.00
       af = 0.00
         b = 3000.00
         h = 250.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
         bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    ------------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
        ase1 = 0.00
           sh_1 = 150.00
           bo_1 = 190.00
           ho_1 = 540.00
            bi2_1 = 655400.00
        ase2 = 0.00
          sh_2 = 150.00
           bo_2 = 190.00
           ho_2 = 540.00
            bi2_2 = 655400.00

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ase3 = 0 (grid does not provide confinement)
      psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
      ----------------------------------------------------------------
      psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
        ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
          h1 = 600.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
          h2 = 600.00
          As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
          h3 = 1800.00
          As3 = Astir3*ns3 = 0.00
            No stirups, ns3 = 2.00
      ----------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
          h1 = 250.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
          h2 = 250.00
          As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
          h3 = 250.00
          As3 = Astir3*ns3 = 157.0796
            No stirups, ns3 = 0.00
      ----------------------------------------------------------------
      Asec = 750000.00
      s_1 = 150.00
      s_2 = 150.00
      s_3 = 200.00
    fywe = 625.00
    fce  = 25.00
  From ((5.A5), TBDY), TBDY:  cc = 0.00202463
      c = confinement factor = 1.00246
 y1 = 0.00140044
 sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
 su1 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu1_nominal = 0.08,
   For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
   characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
 y2 = 0.00140044
 sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032

From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs2 = fs = 350.1097
with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fsv = fs = 350.1097
with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
b = 190.00
d = 2927.00
d' = 13.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
u = su (4.1) = 2.0532423E-006
-------------------------------------------------------------

Calculation of ratio lb/ld
-------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
----------------------------------------------------------------
----------------------------------------------------------------
----------------------------------------------------------------
----------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 2.4900E+006
-------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
-------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-------------------------------------------------------------
From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
Mu/Vu-lw/2 = 0.00 <= 0
= 1 (normal-weight concrete)
fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
h = 250.00
d = 2400.00

lw = 3000.00
Mu = 1.1486927E-009
Vu = 1.0097420E-028
Nu = 27588.841
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
  d = 480.00
  Av = 157079.633
  s = 150.00
  fy = 500.00
Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
  d = 480.00
  Av = 157079.633
  s = 150.00
  fy = 500.00
Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs3 = 565486.678 is calculated for web, with:
  d = 1440.00
  Av = 157079.633
  s = 200.00
  fy = 500.00
Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
  f = 0.95, for fully-wrapped sections
wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
  Ef = 64828.00
  fe = 0.004, from (11.6a), ACI 440
   with fu = 0.01
From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
  bw = 250.00
--------------------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
----------------------------------------------------------------
From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
Mu/Vu-lw/2 = 0.00 <= 0
  = 1 (normal-weight concrete)
  fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
  h = 250.00
  d = 2400.00
  lw = 3000.00
  Mu = 1.1486927E-009
  Vu = 1.0097420E-028
  Nu = 27588.841
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
  d = 480.00
  Av = 157079.633
  s = 150.00
  fy = 500.00
Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
  d = 480.00
  Av = 157079.633

s = 150.00
     fy = 500.00
   Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
     d = 1440.00
     Av = 157079.633
     s = 200.00
     fy = 500.00
   Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
   Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
     f = 0.95, for fully-wrapped sections
   wf/sf = 1 (FRP strips adjacent to one another).
   In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
   where  is the angle of the crack direction (see KANEPE).
   This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
   as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
   orientation 1:  1 = b1 + 90° = 90.00
   Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
   total thickness per orientation, tf1 = NL*t/NoDir = 1.016
   dfv = d (figure 11.2, ACI 440) = 2957.00
   ffe ((11-5), ACI 440) = 259.312
      Ef = 64828.00
       fe = 0.004, from (11.6a), ACI 440
         with  fu = 0.01
   From (11-11), ACI 440: Vs + Vf < = 1.9929E+006
      bw = 250.00
-----------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 3


-----------------------------------------------------------


Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 2
(Bending local axis: 3)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------
Knowledge Factor,  = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon

Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
At local axis: 2
EDGE -A-
Shear Force, Va = 1.7354940E-029
EDGE -B-
Shear Force, Vb = -1.7354940E-029
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
       -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
       -Tension: Asl,ten = 2830.575
    -Compression: Asl,com = 2830.575
         -Middle: Asl,mid = 0.00
         (According to 10.7.2.3 Asl,mid is setted equal to zero)
--------------------------------------------------------------
------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 0.15621236
Member Controlled by Flexure (Ve/Vr < 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 160017.271
with
Mpr1 = Max(Mu1+ , Mu1-) = 2.4003E+008
  Mu1+ = 2.0658E+008, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
  Mu1- = 2.4003E+008, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 2.4003E+008
  Mu2+ = 2.0658E+008, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
  Mu2- = 2.4003E+008, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination


--------------------------------------------------------------------------
Calculation of Mu1+
--------------------------------------------------------------------------

--------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0306889E-005
Mu = 2.0658E+008
--------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
     N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu = 0.0035

we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
where  f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
------------------------------------------------------------------
  fx = 0.00
   af = 0.00
      b = 250.00
      h = 3000.00
   From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
      bw = 250.00
   effective stress from (A.35), ff,e = 757.2164
------------------------------------------------------------------
  fy = 0.00
   af = 0.00
      b = 3000.00
      h = 250.00
   From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
      bw = 3000.00
   effective stress from (A.35), ff,e = 954.4864
------------------------------------------------------------------
  R = 40.00
  Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
  fu,f = 1055.00
  Ef = 64828.00
   u,f = 0.015
  ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
     ase1 = 0.00
        sh_1 = 150.00
        bo_1 = 190.00
        ho_1 = 540.00
         bi2_1 = 655400.00
     ase2 = 0.00
        sh_2 = 150.00
        bo_2 = 190.00
        ho_2 = 540.00
         bi2_2 = 655400.00
     ase3 = O (grid does not provide confinement)
     psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
------------------------------------------------------------------
     psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
        ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
           h1 = 600.00
           As1 = Astir1*ns1 = 157.0796
              No stirups, ns1 = 2.00
        ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
           h2 = 600.00
           As2 = Astir2*ns2 = 157.0796
              No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
           h3 = 1800.00
           As3 = Astir3*ns3 = 0.00
              No stirups, ns3 = 2.00
------------------------------------------------------------------
     psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
           h1 = 250.00
           As1 = Astir1*ns1 = 157.0796
              No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
           h2 = 250.00
           As2 = Astir2*ns2 = 157.0796
              No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
           h3 = 250.00
           As3 = Astir3*ns3 = 157.0796
              No stirups, ns3 = 0.00

```
            ----------------------------------------------------------------------
            Asec = 750000.00
             s_1 = 150.00
             s_2 = 150.00
             s_3 = 200.00
          fywe = 625.00
           fce  = 25.00
       From ((5.A5), TBDY):  cc = 0.00202463
           c  = confinement factor = 1.00246
    y1 = 0.00140044
   sh1 = 0.0044814
  ft1 = 420.1317
  fy1 = 350.1097
   su1 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/ld = 0.30
       su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esu1_nominal = 0.08,
      For calculation of esu1_nominal and   y1, sh1,ft1,fy1, it is considered
      characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^ 2/3), from 10.3.5, ASCE 41-17.
       with fs1 = fs = 350.1097
       with Es1 = Es = 200000.00
    y2 = 0.00140044
   sh2 = 0.0044814
  ft2 = 420.1317
  fy2 = 350.1097
   su2 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/lb,min = 0.30
       su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esu2_nominal = 0.08,
      For calculation of esu2_nominal and   y2, sh2,ft2,fy2, it is considered
      characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^ 2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
    yv = 0.00140044
   shv = 0.0044814
  ftv = 420.1317
  fyv = 350.1097
   suv = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/ld = 0.30
       suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esuv_nominal = 0.08,
      considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
      For calculation of esuv_nominal and   yv, shv,ftv,fyv, it is considered
      characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^ 2/3), from 10.3.5, ASCE 41-17.
       with fsv = fs = 350.1097
       with Esv = Es = 200000.00
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
     2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
     v = Asl,mid/(b*d)*(fsv/fc) = 0.00
 and confined core properties:
   b = 2940.00
   d = 178.00
   d' = 12.00
   fcc (5A.2, TBDY) = 25.06158
    cc (5A.5, TBDY) = 0.00202463
```

c = confinement factor = 1.00246
$\omega_1$ = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
$\omega_2$ = Asl,com/(b*d)*(fs2/fc) = 0.07574806
$\omega_v$ = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
$\omega_v$ < $\omega_{s,y2}$ - LHS eq.(4.5) is satisfied
--->
$\xi_{su}$ (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
$\varphi_u$ = $\varphi_{su}$ (4.1) = 3.0306889E-005
----------------------------------------------------------------

Calculation of ratio lb/ld
----------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
-----------------------------------------------------------------------------------
Calculation of Mu1-
-----------------------------------------------------------------------------------

-----------------------------------------------------------------------------------
Calculation of ultimate curvature $\varphi_u$ according to 4.1, Biskinis/Fardis 2013:
$\varphi_u$ = 3.0889637E-005
Mu = 2.4003E+008
-----------------------------------------------------------------------------------
with full section properties:
b = 3000.00
d = 208.00
d' = 42.00
$\nu$ = 0.00176852
N = 27588.841
fc = 25.00
$\varepsilon_{co}$ (5A.5, TBDY) = 0.002
Final value of $\varepsilon_{cu}$: $\varepsilon_{cu}*$ = shear_factor * Max( $\varepsilon_{cu}$, $\varepsilon_{cc}$) = 0.0035
The Shear_factor is considered equal to 1 (pure moment strength)
From (5.4b), TBDY: $\varepsilon_{cu}$ = 0.0035
$\omega_{we}$ ((5.4c), TBDY) = $\alpha_{se}*\rho_{sh,min}*fywe/fce+Min(\omega_{fx}, \omega_{fy})$ = 0.00
where $\omega_f$ = $\alpha_f*\rho_f*ffe/fce$ is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
------------------------------------------------------------------
$\omega_{fx}$ = 0.00
$\alpha_f$ = 0.00
b = 250.00
h = 3000.00
From EC8 A.4.4.3(6), $\rho_f$ = 2tf/bw = 0.008128
bw = 250.00
effective stress from (A.35), ff,e = 757.2164
------------------------------------------------------------------
$\omega_{fy}$ = 0.00
$\alpha_f$ = 0.00
b = 3000.00
h = 250.00
From EC8 A.4.4.3(6), $\rho_f$ = 2tf/bw = 0.00067733
bw = 3000.00
effective stress from (A.35), ff,e = 954.4864
------------------------------------------------------------------
R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
$\varepsilon_{u,f}$ = 0.015
$\alpha_{se}$ ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
ase1 = 0.00
sh_1 = 150.00
bo_1 = 190.00

```
                    ho_1 = 540.00
                       bi2_1 = 655400.00
                 ase2 = 0.00
                    sh_2 = 150.00
                       bo_2 = 190.00
                       ho_2 = 540.00
                          bi2_2 = 655400.00
                 ase3 = 0 (grid does not provide confinement)
                 psh,min = Min(psh,x , psh,y) = 0.00069813
         Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
    earthquake detailing (90° closed stirrups)
            --------------------------------------------------------------
            psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
               ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                   h1 = 600.00
                   As1 = Astir1*ns1 = 157.0796
                      No stirups, ns1 = 2.00
               ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
                   h2 = 600.00
                   As2 = Astir2*ns2 = 157.0796
                      No stirups, ns2 = 2.00
               ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                   h3 = 1800.00
                   As3 = Astir3*ns3 = 0.00
                      No stirups, ns3 = 2.00
            --------------------------------------------------------------
            psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
               ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                   h1 = 250.00
                   As1 = Astir1*ns1 = 157.0796
                      No stirups, ns1 = 2.00
               ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                   h2 = 250.00
                   As2 = Astir2*ns2 = 157.0796
                      No stirups, ns2 = 2.00
               ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                   h3 = 250.00
                   As3 = Astir3*ns3 = 157.0796
                      No stirups, ns3 = 0.00
            --------------------------------------------------------------
            Asec = 750000.00
            s_1 = 150.00
            s_2 = 150.00
            s_3 = 200.00
          fywe = 625.00
          fce  = 25.00
       From ((5.A5), TBDY), TBDY:  cc = 0.00202463
            c  = confinement factor = 1.00246
      y1 = 0.00140044
     sh1 = 0.0044814
    ft1 = 420.1317
   fy1 = 350.1097
    su1 = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/ld = 0.30
        su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esu1_nominal = 0.08,
       For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
       characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fs1 = fs = 350.1097
        with Es1 = Es = 200000.00
      y2 = 0.00140044
     sh2 = 0.0044814
    ft2 = 420.1317
```

fy2 = 350.1097
  su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and   y2,  sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1,  sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^ 2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and   yv,  shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1,  sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^ 2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
  2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
  v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
  2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
  v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =   su (4.1) = 3.0889637E-005
----------------------------------------------------------------

Calculation of ratio lb/ld
----------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------------------
------------------------------------------------------------------------------
------------------------------------------------------------------------------
Calculation of Mu2+
------------------------------------------------------------------------------

------------------------------------------------------------------------------
Calculation of ultimate curvature    u according to 4.1, Biskinis/Fardis 2013:
 u = 3.0306889E-005
Mu = 2.0658E+008
------------------------------------------------------------------------------

with full section properties:

b = 3000.00
d = 208.00
d' = 42.00
v = 0.00176852
    N = 27588.841
fc = 25.00
  $\epsilon$co (5A.5, TBDY) = 0.002
Final value of $\epsilon$cu:  $\epsilon$cu* = shear_factor * Max($\epsilon$cu, $\epsilon$cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  $\epsilon$cu = 0.0035
      $\omega$we ((5.4c), TBDY) = $\alpha$se*$\rho$sh,min*fywe/fce+Min($\omega$fx, $\omega$fy) = 0.00
    where  $\omega$f = $\alpha$f*$\rho$f*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -------------------------------------------------------------------

      $\omega$fx = 0.00
       $\alpha$f = 0.00
          b = 250.00
          h = 3000.00
       From EC8 A.4.4.3(6), $\rho$f = 2tf/bw = 0.008128
          bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    -------------------------------------------------------------------

      $\omega$fy = 0.00
       $\alpha$f = 0.00
          b = 3000.00
          h = 250.00
       From EC8 A.4.4.3(6), $\rho$f = 2tf/bw = 0.00067733
          bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    -------------------------------------------------------------------

      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       $\epsilon$u,f = 0.015
      $\alpha$se ((5.4d), TBDY) = ($\alpha$se1*Acol1+$\alpha$se2*Acol2+$\alpha$se3*Aweb)/Asec = 0.00
         $\alpha$se1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
            ho_1 = 540.00
             $\Sigma$bi2_1 = 655400.00
         $\alpha$se2 = 0.00
            sh_2 = 150.00
            bo_2 = 190.00
            ho_2 = 540.00
             $\Sigma$bi2_2 = 655400.00
         $\alpha$se3 = 0 (grid does not provide confinement)
      $\rho$sh,min = Min($\rho$sh,x , $\rho$sh,y) = 0.00069813
    Expression ((5.4d), TBDY) for $\rho$sh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
    -------------------------------------------------------------------

         $\rho$sh,x = $\rho$s1,x+$\rho$s2,x+$\rho$s3,x = 0.00356047
            $\rho$s1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
               h1 = 600.00
               As1 = Astir1*ns1 = 157.0796
                  No stirups, ns1 = 2.00
            $\rho$s2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
               h2 = 600.00
               As2 = Astir2*ns2 = 157.0796
                  No stirups, ns2 = 2.00
            $\rho$s3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
               h3 = 1800.00
               As3 = Astir3*ns3 = 0.00
                  No stirups, ns3 = 2.00
    -------------------------------------------------------------------

         $\rho$sh,y = $\rho$s1,y+$\rho$s2,y+$\rho$s3,y = 0.00069813
            $\rho$s1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907

```
              h1 = 250.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
              h2 = 250.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
      ------------------------------------------------------------------
           Asec = 750000.00
            s_1 = 150.00
            s_2 = 150.00
            s_3 = 200.00
         fywe = 625.00
         fce  = 25.00
      From ((5.A5), TBDY), TBDY:  cc = 0.00202463
           c  = confinement factor = 1.00246
  y1 = 0.00140044
 sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
 su1 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu1_nominal = 0.08,
   For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
   characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
  y2 = 0.00140044
 sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
  yv = 0.00140044
 shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
 suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
```

```
      with fsv = fs =  350.1097
      with Esv = Es =  200000.00
    1 = Asl,ten/(b*d)*(fs1/fc) =  0.0635264
    2 = Asl,com/(b*d)*(fs2/fc) =  0.0635264
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
   b =  2940.00
   d =  178.00
   d' =  12.00
   fcc (5A.2, TBDY) =  25.06158
     cc (5A.5, TBDY) =  0.00202463
        c  = confinement factor =  1.00246
     1 = Asl,ten/(b*d)*(fs1/fc) =  0.07574806
     2 = Asl,com/(b*d)*(fs2/fc) =  0.07574806
     v = Asl,mid/(b*d)*(fsv/fc) =  0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) =  0.18779572
Mu = MRc (4.14) =  2.0658E+008
  u =    su (4.1) =  3.0306889E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld =  0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Mu2-
--------------------------------------------------------------------

--------------------------------------------------------------------
Calculation of ultimate curvature    u according to 4.1, Biskinis/Fardis 2013:
   u =  3.0889637E-005
Mu =  2.4003E+008
--------------------------------------------------------------------
with full section properties:
   b =  3000.00
   d =  208.00
   d' =  42.00
   v =  0.00176852
      N =  27588.841
   fc =  25.00
    co (5A.5, TBDY) =  0.002
   Final value of   cu:  cu* = shear_factor * Max( cu,  cc) =  0.0035
      The Shear_factor is considered equal to 1 (pure moment strength)
      From (5.4b), TBDY:  cu =  0.0035
        we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx,   fy) =  0.00
      where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
      -----------------------------------------------------------------
        fx =  0.00
         af =  0.00
            b =  250.00
            h =  3000.00
        From EC8 A.4.4.3(6), pf =  2tf/bw =  0.008128
            bw =  250.00
        effective stress from (A.35), ff,e =  757.2164
      -----------------------------------------------------------------
        fy =  0.00
         af =  0.00
            b =  3000.00
            h =  250.00
        From EC8 A.4.4.3(6), pf =  2tf/bw =  0.00067733
            bw =  3000.00
```

effective stress from (A.35), ff,e = 954.4864

-------------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
 u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
   ase1 = 0.00
      sh_1 = 150.00
      bo_1 = 190.00
      ho_1 = 540.00
       bi2_1 = 655400.00
   ase2 = 0.00
      sh_2 = 150.00
      bo_2 = 190.00
      ho_2 = 540.00
       bi2_2 = 655400.00
   ase3 = 0 (grid does not provide confinement)
   psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)

-------------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
   ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
      h1 = 600.00
      As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
   ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
      h2 = 600.00
      As2 = Astir2*ns2 = 157.0796
        No stirups, ns2 = 2.00
   ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
      h3 = 1800.00
      As3 = Astir3*ns3 = 0.00
        No stirups, ns3 = 2.00

-------------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
   ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
      h1 = 250.00
      As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
   ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
      h2 = 250.00
      As2 = Astir2*ns2 = 157.0796
        No stirups, ns2 = 2.00
   ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
      h3 = 250.00
      As3 = Astir3*ns3 = 157.0796
        No stirups, ns3 = 0.00

-------------------------------------------------------------------

   Asec = 750000.00
   s_1 = 150.00
   s_2 = 150.00
   s_3 = 200.00
 fywe = 625.00
 fce = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
   c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00

lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and   y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs1 = fs = 350.1097
  with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and   y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
 suv = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and   yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
b = 2940.00
d = 178.00
d' = 12.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
  c  = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
u =    su (4.1) = 3.0889637E-005
-----------------------------------------------------------
Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30

```
----------------------------------------------------------------
----------------------------------------------------------------
----------------------------------------------------------------
----------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 1.0244E+006
----------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
----------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:  1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 208.00
  ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
      with  fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
----------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
```

---------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: $V_c$ = 815517.768
  $M_u/V_u-l_w/2$ = 0.00 <= 0
      = 1 (normal-weight concrete)
    $f_c'$ = 25.00, but $f_c^{0.5}$ <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    $l_w$ = 250.00
    $M_u$ = 3.7289358E-011
    $V_u$ = 1.7354940E-029
    $N_u$ = 27588.841
  From (11.5.4.8), ACI 318-14: $V_s$ = $V_{s1}$ + $V_{s2}$ + $V_{s3}$ = 104719.755
  $V_{s1}$ = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    $A_v$ = 157079.633
    s = 150.00
    $f_y$ = 500.00
  $V_{s1}$ has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  $V_{s2}$ = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    $A_v$ = 157079.633
    s = 150.00
    $f_y$ = 500.00
  $V_{s2}$ has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  $V_{s3}$ = 0.00 is calculated for web, with:
    d = 200.00
    $A_v$ = 0.00
    s = 200.00
    $f_y$ = 500.00
  $V_{s3}$ has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
  $V_f$ ((11-3)-(11.4), ACI 440) = 109599.773
     f = 0.95, for fully-wrapped sections
  $w_f/s_f$ = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function $V_f(, )$, is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  = 45° and  = -45° to take into consideration the cyclic seismic loading.
  orientation 1:   1 = b1 + 90° = 90.00
  $V_f$ = Min(|$V_f$(45, 1)|,|$V_f$(-45,a1)|), with:
  total thickness per orientation, $t_{f1}$ = NL*t/NoDir = 1.016
  $d_{fv}$ = d (figure 11.2, ACI 440) = 208.00
  $f_{fe}$ ((11-5), ACI 440) = 259.312
     $E_f$ = 64828.00
     fe = 0.004, from (11.6a), ACI 440
      with  fu = 0.01
  From (11-11), ACI 440: $V_s$ + $V_f$ <= 1.9929E+006
    $b_w$ = 3000.00
---------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 2


---------------------------------------------------------------


Start Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)
Section Type: rcrws

Constant Properties
---------------------------------------------------------------
Knowledge Factor,   = 1.00
According to 10.7.2.3, ASCE 41-17, shear walls with
transverse reinforcement percentage,   n < 0.0015

are considered Force-Controlled and lower-bound strengths are used according to 7.5.1.3, ASCE 41-17
  n = 0.00069813
--------------------------------------------------------------------------------
with   n = ps1 + ps2 + ps3, being the shear reinf. ratio in a plane perpedicular to the shear axis 3
 (pseudo-col.1 ps1 = As1*b1/s1 = (As1*h1/s1) / Ac = 0.00034907
         h1 = 250.00
         s1 = 150.00
         total area of hoops perpedicular to shear axis, As1 = 157.0796
 (pseudo-col.2 ps2 = As2*b2/s2 = (As2*h2/s2) / Ac = 0.00034907
         h2 = 250.00
         s2 = 150.00
         total area of hoops perpedicular to shear axis, As2 = 157.0796
 (grid      ps3 = As3*b3/s3 = (As3*h3/s3) / Ac = 0.00
         h3 = 250.00
         s3 = 200.00
         total area of hoops perpedicular to shear axis, As3 = 0.00
  total section area, Ac = 750000.00
--------------------------------------------------------------------------------
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
----------------------------------------------------------------

Stepwise Properties
----------------------------------------------------------------
Axial Force, F = -33005.924
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
      -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2865.133
       -Compression: Asl,com = 2865.133
          -Middle: Asl,mid = 1539.38
Mean Diameter of Tension Reinforcement, DbL = 17.33333
----------------------------------------------------------------
----------------------------------------------------------------


Considering wall controlled by Shear (shear control ratio > 1),
interstorey drift provided values are calculated
New component: From table 7-7, ASCE 41_17: Final chord rotation Capacity   u,R = 1.0*  u = 0.004
from table 10-20:  u = 0.004

with:
 - Condition i (shear wall and wall segments)
 - (As-As')*fy+P)/(tw*lw*fc') = -0.19209689
   As = 0.00
   As' = 7269.645
   fy = 500.00
   P = 33005.924
   tw = 250.00
   lw = 3000.00
   fc = 25.00

------------------------------------------------------------
End Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
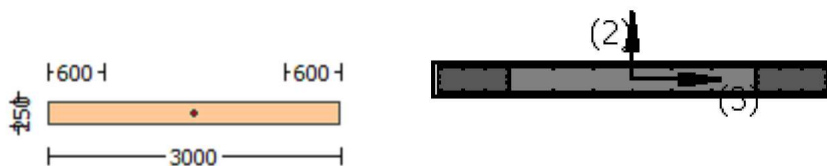At local axis: 2
Integration Section: (a)

------------------------------------------------------------

# Calculation No. 3

wall W1, Floor 1

Limit State: Operational Level (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Shear capacity VRd

Edge: Start

Local Axis: (3)



Start Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (a)
Section Type: rcrws

Constant Properties
------------------------------------------------------------
Knowledge Factor,   = 1.00
Member Shear Force is generally considered as Force-Controlled Action according to Table C7-1, ASCE 41-17.

Lower-bound strengths are used for Force-Controlled Actions according to 7.5.1.3, ASCE 41-17
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min =lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-------------------------------------------------------------

Stepwise Properties
-------------------------------------------------------------
EDGE -A-
Bending Moment, Ma = 9.7363E+007
Shear Force, Va = -32914.791
EDGE -B-
Bending Moment, Mb = 1.4016E+006
Shear Force, Vb = 32914.791
BOTH EDGES
Axial Force, F = -33005.924
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2865.133
      -Compression: Asl,com = 2865.133
         -Middle: Asl,mid = 1539.38
Mean Diameter of Tension Reinforcement, DbL,ten = 17.33333
-------------------------------------------------------------
-------------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final Shear Capacity VR = 1.0*Vn = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vn < 0.83*fc'^0.5*h*d = 2.4900E+006
-------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 778130.169
  Mu/Vu-lw/2 = 1458.046 > 0
      = 1 (normal-weight concrete)
     fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
     h = 250.00
     d = 2400.00
     lw = 3000.00
     Mu = 9.7363E+007

Vu = 32914.791
Nu = 33005.924
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
  d = 480.00
  Av = 157079.633
  s = 150.00
  fy = 500.00
Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
  d = 480.00
  Av = 157079.633
  s = 150.00
  fy = 500.00
Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs3 = 565486.678 is calculated for web, with:
  d = 1440.00
  Av = 157079.633
  s = 200.00
  fy = 500.00
Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
  $\psi_f$ = 0.95, for fully-wrapped sections
wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
  Ef = 64828.00
  $\epsilon_{fe}$ = 0.004, from (11.6a), ACI 440
   with $\epsilon_{fu}$ = 0.01
From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
  bw = 250.00
---------------------------------------------------------------
End Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (a)

---------------------------------------------------------------

## Calculation No. 4

wall W1, Floor 1

Limit State: Operational Level (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Chord rotation capacity ( u)

Edge: Start

Local Axis: (3)

Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 3
(Bending local axis: 2)
Section Type: rcrws

Constant Properties
----------------------------------------------------------------
Knowledge Factor,    = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
###########################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
###########################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
----------------------------------------------------------------

Stepwise Properties
----------------------------------------------------------------
At local axis: 3
EDGE -A-
Shear Force, Va = 1.0097420E-028
EDGE -B-
Shear Force, Vb = -1.0097420E-028

BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
    -Tension: Aslt = 0.00
  -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
    -Tension: Asl,ten = 2865.133
  -Compression: Asl,com = 2865.133
    -Middle: Asl,mid = 0.00
    (According to 10.7.2.3 Asl,mid is setted equal to zero)
------------------------------------------------------------
------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 1.02813
Member Controlled by Shear (Ve/Vr > 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 2.5600E+006
with
Mpr1 = Max(Mu1+ , Mu1-) = 3.8401E+009
  Mu1+ = 3.3585E+009, is the ultimate moment strength at the edge 1 of the member in the actual moment direction which is defined for the static loading combination
  Mu1- = 3.8401E+009, is the ultimate moment strength at the edge 1 of the member in the opposite moment direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 3.8401E+009
  Mu2+ = 3.3585E+009, is the ultimate moment strength at the edge 2 of the member in the actual moment direction which is defined for the the static loading combination
  Mu2- = 3.8401E+009, is the ultimate moment strength at the edge 2 of the member in the opposite moment direction which is defined for the the static loading combination

-----------------------------------------------------------------------------
Calculation of Mu1+
-----------------------------------------------------------------------------

-----------------------------------------------------------------------------
Calculation of ultimate curvature   φu according to 4.1, Biskinis/Fardis 2013:
  φu = 2.0296703E-006
Mu = 3.3585E+009
-----------------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  ν = 0.0014928
   N = 27588.841
  fc = 25.00
  εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: εcu = 0.0035
      ωwe ((5.4c), TBDY) = αse* ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
    where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
      -----------------------------------------------------------------
      ωfx = 0.00
       αf = 0.00
        b = 250.00
        h = 3000.00
      From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
        bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
      -----------------------------------------------------------------
      ωfy = 0.00
       αf = 0.00
        b = 3000.00
        h = 250.00
      From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
        bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864

```
    ------------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
        ase1 = 0.00
          sh_1 = 150.00
          bo_1 = 190.00
          ho_1 = 540.00
           bi2_1 = 655400.00
        ase2 = 0.00
          sh_2 = 150.00
          bo_2 = 190.00
          ho_2 = 540.00
           bi2_2 = 655400.00
        ase3 = 0 (grid does not provide confinement)
        psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
      ------------------------------------------------------------------
      psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
        ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
          h1 = 600.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
          h2 = 600.00
          As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
          h3 = 1800.00
          As3 = Astir3*ns3 = 0.00
            No stirups, ns3 = 2.00
      ------------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
          h1 = 250.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
          h2 = 250.00
          As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
          h3 = 250.00
          As3 = Astir3*ns3 = 157.0796
            No stirups, ns3 = 0.00
      ------------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
      fce  = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c  = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
```

su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs1 = fs = 350.1097
with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/lb,min = 0.30
su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs2 = fs = 350.1097
with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fsv = fs = 350.1097
with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
b = 190.00
d = 2927.00
d' = 13.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
u = su (4.1) = 2.0296703E-006
-------------------------------------------------------------

Calculation of ratio lb/ld
-------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------------------------

---------------------------------------------------------------
---------------------------------------------------------------
Calculation of Mu1-
---------------------------------------------------------------

---------------------------------------------------------------
Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
φu = 2.0532423E-006
Mu = 3.8401E+009
---------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  ν = 0.0014928
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY: εcu = 0.0035
       ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(αfx, αfy) = 0.00
     where αf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------------
       αfx = 0.00
        αf = 0.00
          b = 250.00
          h = 3000.00
        From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
          bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ----------------------------------------------------------------
       αfy = 0.00
        αf = 0.00
          b = 3000.00
          h = 250.00
        From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
          bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        εu,f = 0.015
       αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
          αse1 = 0.00
             sh_1 = 150.00
             bo_1 = 190.00
             ho_1 = 540.00
              Σbi2_1 = 655400.00
          αse2 = 0.00
             sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
              Σbi2_2 = 655400.00
       αse3 = 0 (grid does not provide confinement)
       ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
     Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
        ----------------------------------------------------------------
          ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
             ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                h1 = 600.00
                As1 = Astir1*ns1 = 157.0796
                   No stirups, ns1 = 2.00
             ρs2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776

```
                h2 = 600.00
                As2 = Astir2*ns2 = 157.0796
                    No stirups, ns2 = 2.00
              ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                h3 = 1800.00
                As3 = Astir3*ns3 = 0.00
                    No stirups, ns3 = 2.00
      -------------------------------------------------------------------
          psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
              ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                  h1 = 250.00
                  As1 = Astir1*ns1 = 157.0796
                      No stirups, ns1 = 2.00
              ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                  h2 = 250.00
                  As2 = Astir2*ns2 = 157.0796
                      No stirups, ns2 = 2.00
              ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                  h3 = 250.00
                  As3 = Astir3*ns3 = 157.0796
                      No stirups, ns3 = 0.00
      -------------------------------------------------------------------
          Asec = 750000.00
          s_1 = 150.00
          s_2 = 150.00
          s_3 = 200.00
        fywe = 625.00
        fce  = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c  = confinement factor = 1.00246
   y1 = 0.00140044
   sh1 = 0.0044814
  ft1 = 420.1317
  fy1 = 350.1097
   su1 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
      su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu1_nominal = 0.08,
     For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
     characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs1 = fs = 350.1097
       with Es1 = Es = 200000.00
   y2 = 0.00140044
   sh2 = 0.0044814
  ft2 = 420.1317
  fy2 = 350.1097
   su2 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/lb,min = 0.30
      su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu2_nominal = 0.08,
     For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
     characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
   yv = 0.00140044
   shv = 0.0044814
  ftv = 420.1317
  fyv = 350.1097
   suv = 0.00512
```

using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
   v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
 u =    su (4.1) = 2.0532423E-006
---------------------------------------------------------------

Calculation of ratio lb/ld
---------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------------------
-------------------------------------------------------------------------
-------------------------------------------------------------------------
Calculation of Mu2+
-------------------------------------------------------------------------

-------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
 u = 2.0296703E-006
Mu = 3.3585E+009
-------------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
   N = 27588.841
 fc = 25.00
  co (5A.5, TBDY) = 0.002
 Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY:  cu = 0.0035
    we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx,  fy) = 0.00
   where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
   --------------------------------------------------------------
    fx = 0.00
     af = 0.00
       b = 250.00
       h = 3000.00

From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
    bw = 250.00
  effective stress from (A.35), ff,e = 757.2164
------------------------------------------------------------------
  fy = 0.00
  af = 0.00
    b = 3000.00
    h = 250.00
  From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
    bw = 3000.00
  effective stress from (A.35), ff,e = 954.4864
------------------------------------------------------------------
  R = 40.00
  Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
  fu,f = 1055.00
  Ef = 64828.00
   u,f = 0.015
  ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
    ase1 = 0.00
        sh_1 = 150.00
        bo_1 = 190.00
        ho_1 = 540.00
         bi2_1 = 655400.00
    ase2 = 0.00
      sh_2 = 150.00
        bo_2 = 190.00
        ho_2 = 540.00
         bi2_2 = 655400.00
    ase3 = 0 (grid does not provide confinement)
    psh,min = Min(psh,x , psh,y) = 0.00069813
   Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
------------------------------------------------------------------
    psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
      ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
        h1 = 600.00
        As1 = Astir1*ns1 = 157.0796
          No stirups, ns1 = 2.00
      ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
        h2 = 600.00
        As2 = Astir2*ns2 = 157.0796
          No stirups, ns2 = 2.00
      ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
        h3 = 1800.00
        As3 = Astir3*ns3 = 0.00
          No stirups, ns3 = 2.00
------------------------------------------------------------------
    psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
      ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
        h1 = 250.00
        As1 = Astir1*ns1 = 157.0796
          No stirups, ns1 = 2.00
      ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
        h2 = 250.00
        As2 = Astir2*ns2 = 157.0796
          No stirups, ns2 = 2.00
      ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
        h3 = 250.00
        As3 = Astir3*ns3 = 157.0796
          No stirups, ns3 = 0.00
------------------------------------------------------------------
    Asec = 750000.00
    s_1 = 150.00
    s_2 = 150.00
    s_3 = 200.00
  fywe = 625.00
  fce  = 25.00

From ((5.A5), TBDY), TBDY:  cc = 0.00202463
    c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu1_nominal = 0.08,
  For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
  characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs1 = fs = 350.1097
  with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
b = 190.00
d = 2927.00
d' = 13.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
    c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->

v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
  u =   su (4.1) = 2.0296703E-006
--------------------------------------------------------------

Calculation of ratio lb/ld
--------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
Calculation of Mu2-
------------------------------------------------------------------------

------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0532423E-006
Mu = 3.8401E+009
------------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      fx = 0.00
       af = 0.00
         b = 250.00
         h = 3000.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
         bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      fy = 0.00
       af = 0.00
         b = 3000.00
         h = 250.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
         bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    ----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
        ase1 = 0.00
           sh_1 = 150.00
           bo_1 = 190.00
           ho_1 = 540.00
            bi2_1 = 655400.00
        ase2 = 0.00
          sh_2 = 150.00
            bo_2 = 190.00
            ho_2 = 540.00
             bi2_2 = 655400.00

ase3 = 0 (grid does not provide confinement)
        psh,min = Min(psh,x , psh,y) = 0.00069813
     Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
     ------------------------------------------------------------------
        psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
           ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
              h1 = 600.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
              h2 = 600.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
              h3 = 1800.00
              As3 = Astir3*ns3 = 0.00
                 No stirups, ns3 = 2.00
     ------------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
           ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
              h1 = 250.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
              h2 = 250.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
     ------------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
      fce  = 25.00
   From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032

From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
  2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
  v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
     c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
   v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
  u =  su (4.1) = 2.0532423E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 2.4900E+006
------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00

lw = 3000.00
Mu = 1.1486927E-009
Vu = 1.0097420E-028
Nu = 27588.841
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
   d = 480.00
   Av = 157079.633
   s = 150.00
   fy = 500.00
 Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
   d = 480.00
   Av = 157079.633
   s = 150.00
   fy = 500.00
 Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs3 = 565486.678 is calculated for web, with:
   d = 1440.00
   Av = 157079.633
   s = 200.00
   fy = 500.00
 Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
 Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
  f = 0.95, for fully-wrapped sections
 wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
  Ef = 64828.00
   fe = 0.004, from (11.6a), ACI 440
    with fu = 0.01
 From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
  bw = 250.00
--------------------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
-------------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-------------------------------------------------------------------
 From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
 Mu/Vu-lw/2 = 0.00 <= 0
   = 1 (normal-weight concrete)
  fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
  h = 250.00
  d = 2400.00
  lw = 3000.00
  Mu = 1.1486927E-009
  Vu = 1.0097420E-028
  Nu = 27588.841
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
   d = 480.00
   Av = 157079.633
   s = 150.00
   fy = 500.00
 Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
   d = 480.00
   Av = 157079.633

```
        s = 150.00
        fy = 500.00
    Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
   Vs3 = 565486.678 is calculated for web, with:
        d = 1440.00
        Av = 157079.633
        s = 200.00
        fy = 500.00
    Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
    Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
        f = 0.95, for fully-wrapped sections
     wf/sf = 1 (FRP strips adjacent to one another).
    In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
    where   is the angle of the crack direction (see KANEPE).
    This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
    as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
    orientation 1:   1 = b1 + 90° = 90.00
    Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
    total thickness per orientation, tf1 = NL*t/NoDir = 1.016
    dfv = d (figure 11.2, ACI 440) = 2957.00
    ffe ((11-5), ACI 440) = 259.312
        Ef = 64828.00
         fe = 0.004, from (11.6a), ACI 440
           with  fu = 0.01
     From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
        bw = 250.00
-----------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 3


-----------------------------------------------------------


Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 2
(Bending local axis: 3)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------
Knowledge Factor,   = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
```

Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
At local axis: 2
EDGE -A-
Shear Force, Va = 1.7354940E-029
EDGE -B-
Shear Force, Vb = -1.7354940E-029
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
      -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
      -Tension: Asl,ten = 2830.575
    -Compression: Asl,com = 2830.575
       -Middle: Asl,mid = 0.00
       (According to 10.7.2.3 Asl,mid is setted equal to zero)
------------------------------------------------------------
------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 0.15621236
Member Controlled by Flexure (Ve/Vr < 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 160017.271
with
Mpr1 = Max(Mu1+ , Mu1-) = 2.4003E+008
  Mu1+ = 2.0658E+008, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
  Mu1- = 2.4003E+008, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 2.4003E+008
  Mu2+ = 2.0658E+008, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
  Mu2- = 2.4003E+008, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination


----------------------------------------------------------------------------
Calculation of Mu1+
----------------------------------------------------------------------------

----------------------------------------------------------------------------
Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
  φu = 3.0306889E-005
Mu = 2.0658E+008
----------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  ν = 0.00176852
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: εcu = 0.0035

we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
where f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
-----------------------------------------------------------------
fx = 0.00
af = 0.00
b = 250.00
h = 3000.00
From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
bw = 250.00
effective stress from (A.35), ff,e = 757.2164
-----------------------------------------------------------------
fy = 0.00
af = 0.00
b = 3000.00
h = 250.00
From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
bw = 3000.00
effective stress from (A.35), ff,e = 954.4864
-----------------------------------------------------------------
R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
ase1 = 0.00
sh_1 = 150.00
bo_1 = 190.00
ho_1 = 540.00
bi2_1 = 655400.00
ase2 = 0.00
sh_2 = 150.00
bo_2 = 190.00
ho_2 = 540.00
bi2_2 = 655400.00
ase3 = 0 (grid does not provide confinement)
psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
-----------------------------------------------------------------
psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
h1 = 600.00
As1 = Astir1*ns1 = 157.0796
No stirups, ns1 = 2.00
ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
h2 = 600.00
As2 = Astir2*ns2 = 157.0796
No stirups, ns2 = 2.00
ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
h3 = 1800.00
As3 = Astir3*ns3 = 0.00
No stirups, ns3 = 2.00
-----------------------------------------------------------------
psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
h1 = 250.00
As1 = Astir1*ns1 = 157.0796
No stirups, ns1 = 2.00
ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
h2 = 250.00
As2 = Astir2*ns2 = 157.0796
No stirups, ns2 = 2.00
ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
h3 = 250.00
As3 = Astir3*ns3 = 157.0796
No stirups, ns3 = 0.00

```
------------------------------------------------------------------------
          Asec = 750000.00
           s_1 = 150.00
           s_2 = 150.00
           s_3 = 200.00
          fywe = 625.00
           fce  = 25.00
     From ((5.A5), TBDY), TBDY:  cc = 0.00202463
          c  = confinement factor = 1.00246
   y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs1 = fs = 350.1097
      with Es1 = Es = 200000.00
   y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs2 = fs = 350.1097
      with Es2 = Es = 200000.00
   yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fsv = fs = 350.1097
      with Esv = Es = 200000.00
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
    2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
 and confined core properties:
   b = 2940.00
   d = 178.00
   d' = 12.00
   fcc (5A.2, TBDY) = 25.06158
    cc (5A.5, TBDY) = 0.00202463
```

c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
 u =   su (4.1) = 3.0306889E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
---------------------------------------------------------------------------
---------------------------------------------------------------------------
---------------------------------------------------------------------------
Calculation of Mu1-
---------------------------------------------------------------------------

---------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0889637E-005
Mu = 2.4003E+008
---------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu = 0.0035
       we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
     where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     -------------------------------------------------------------
       fx = 0.00
        af = 0.00
           b = 250.00
           h = 3000.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
           bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     -------------------------------------------------------------
       fy = 0.00
        af = 0.00
           b = 3000.00
           h = 250.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
           bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     -------------------------------------------------------------
        R = 40.00
        Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
        fu,f = 1055.00
        Ef = 64828.00
         u,f = 0.015
        ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
           ase1 = 0.00
              sh_1 = 150.00
              bo_1 = 190.00

```
                    ho_1 = 540.00
                       bi2_1 = 655400.00
                ase2 = 0.00
                   sh_2 = 150.00
                       bo_2 = 190.00
                       ho_2 = 540.00
                        bi2_2 = 655400.00
                ase3 = 0 (grid does not provide confinement)
                psh,min = Min(psh,x , psh,y) = 0.00069813
```
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
```
        ------------------------------------------------------------------
          psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
              ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                  h1 = 600.00
                  As1 = Astir1*ns1 = 157.0796
                      No stirups, ns1 = 2.00
              ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
                  h2 = 600.00
                  As2 = Astir2*ns2 = 157.0796
                      No stirups, ns2 = 2.00
              ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                  h3 = 1800.00
                  As3 = Astir3*ns3 = 0.00
                      No stirups, ns3 = 2.00
        ------------------------------------------------------------------
          psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
              ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                  h1 = 250.00
                  As1 = Astir1*ns1 = 157.0796
                      No stirups, ns1 = 2.00
              ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                  h2 = 250.00
                  As2 = Astir2*ns2 = 157.0796
                      No stirups, ns2 = 2.00
              ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                  h3 = 250.00
                  As3 = Astir3*ns3 = 157.0796
                      No stirups, ns3 = 0.00
        ------------------------------------------------------------------
          Asec = 750000.00
          s_1 = 150.00
          s_2 = 150.00
          s_3 = 200.00
        fywe = 625.00
        fce  = 25.00
      From ((5.A5), TBDY), TBDY:  cc = 0.00202463
          c  = confinement factor = 1.00246
    y1 = 0.00140044
   sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
```
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs1 = fs = 350.1097
with Es1 = Es = 200000.00
```
    y2 = 0.00140044
   sh2 = 0.0044814
 ft2 = 420.1317
```

fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
      su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and   y2,  sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs2 = fs = 350.1097
      with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
      suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and   yv,  shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fsv = fs = 350.1097
      with Esv = Es = 200000.00
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
   2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
   v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
  u =   su (4.1) = 3.0889637E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------------
--------------------------------------------------------------------------
--------------------------------------------------------------------------
Calculation of Mu2+
--------------------------------------------------------------------------

--------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0306889E-005
Mu = 2.0658E+008
--------------------------------------------------------------------------

with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   $\epsilon$co (5A.5, TBDY) = 0.002
  Final value of $\epsilon$cu: $\epsilon$cu* = shear_factor * Max($\epsilon$cu, $\epsilon$cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: $\epsilon$cu = 0.0035
      $\omega$we ((5.4c), TBDY) = $\alpha$se*$\rho$sh,min*fywe/fce+Min($\omega$fx, $\omega$fy) = 0.00
    where $\omega$f = $\alpha$f*$\rho$f*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ------------------------------------------------------------------
      $\omega$fx = 0.00
       $\alpha$f = 0.00
         b = 250.00
         h = 3000.00
       From EC8 A.4.4.3(6), $\rho$f = 2tf/bw = 0.008128
         bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    ------------------------------------------------------------------
      $\omega$fy = 0.00
       $\alpha$f = 0.00
         b = 3000.00
         h = 250.00
       From EC8 A.4.4.3(6), $\rho$f = 2tf/bw = 0.00067733
         bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    ------------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       $\epsilon$u,f = 0.015
      $\alpha$se ((5.4d), TBDY) = ($\alpha$se1*Acol1+$\alpha$se2*Acol2+$\alpha$se3*Aweb)/Asec = 0.00
        $\alpha$se1 = 0.00
          sh_1 = 150.00
          bo_1 = 190.00
          ho_1 = 540.00
           $\Sigma$bi2_1 = 655400.00
        $\alpha$se2 = 0.00
          sh_2 = 150.00
          bo_2 = 190.00
          ho_2 = 540.00
           $\Sigma$bi2_2 = 655400.00
      $\alpha$se3 = 0 (grid does not provide confinement)
      $\rho$sh,min = Min($\rho$sh,x , $\rho$sh,y) = 0.00069813
    Expression ((5.4d), TBDY) for $\rho$sh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
    ------------------------------------------------------------------
      $\rho$sh,x = $\rho$s1,x+$\rho$s2,x+$\rho$s3,x = 0.00356047
        $\rho$s1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
          h1 = 600.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        $\rho$s2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
          h2 = 600.00
          As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        $\rho$s3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
          h3 = 1800.00
          As3 = Astir3*ns3 = 0.00
            No stirups, ns3 = 2.00
    ------------------------------------------------------------------
      $\rho$sh,y = $\rho$s1,y+$\rho$s2,y+$\rho$s3,y = 0.00069813
        $\rho$s1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907

```
              h1 = 250.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
          ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
              h2 = 250.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
          ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
      ------------------------------------------------------------------
          Asec = 750000.00
          s_1 = 150.00
          s_2 = 150.00
          s_3 = 200.00
         fywe = 625.00
         fce  = 25.00
      From ((5.A5), TBDY), TBDY:  cc = 0.00202463
          c  = confinement factor = 1.00246
   y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
   y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
   yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
```

```
        with fsv = fs =  350.1097
        with Esv = Es =  200000.00
    1 = Asl,ten/(b*d)*(fs1/fc) =  0.0635264
    2 = Asl,com/(b*d)*(fs2/fc) =  0.0635264
    v = Asl,mid/(b*d)*(fsv/fc) =  0.00
and confined core properties:
   b =  2940.00
   d =  178.00
   d' =  12.00
  fcc (5A.2, TBDY) =  25.06158
    cc (5A.5, TBDY) =  0.00202463
      c  = confinement factor =  1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) =  0.07574806
    2 = Asl,com/(b*d)*(fs2/fc) =  0.07574806
    v = Asl,mid/(b*d)*(fsv/fc) =  0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
  su (4.9) =  0.18779572
Mu = MRc (4.14) =  2.0658E+008
   u =    su (4.1) =  3.0306889E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld =  0.30
---------------------------------------------------------------------------
---------------------------------------------------------------------------
---------------------------------------------------------------------------
Calculation of Mu2-
---------------------------------------------------------------------------

---------------------------------------------------------------------------
Calculation of ultimate curvature    u according to 4.1, Biskinis/Fardis 2013:
   u =  3.0889637E-005
Mu =  2.4003E+008
---------------------------------------------------------------------------
with full section properties:
   b =  3000.00
   d =  208.00
   d' =  42.00
   v =  0.00176852
     N =  27588.841
  fc =  25.00
   co (5A.5, TBDY) =  0.002
  Final value of   cu:  cu* = shear_factor * Max( cu, cc) =  0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu =  0.0035
       we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) =  0.00
     where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------------
       fx =  0.00
        af =  0.00
          b =  250.00
          h =  3000.00
        From EC8 A.4.4.3(6), pf = 2tf/bw =  0.008128
          bw =  250.00
        effective stress from (A.35), ff,e =  757.2164

     ----------------------------------------------------------------
       fy =  0.00
        af =  0.00
          b =  3000.00
          h =  250.00
        From EC8 A.4.4.3(6), pf = 2tf/bw =  0.00067733
          bw =  3000.00
```

effective stress from (A.35), ff,e = 954.4864

---------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
   ase1 = 0.00
     sh_1 = 150.00
     bo_1 = 190.00
     ho_1 = 540.00
      bi2_1 = 655400.00
  ase2 = 0.00
    sh_2 = 150.00
     bo_2 = 190.00
     ho_2 = 540.00
      bi2_2 = 655400.00
  ase3 = 0 (grid does not provide confinement)
psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

---------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
  ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
    h1 = 600.00
    As1 = Astir1*ns1 = 157.0796
     No stirups, ns1 = 2.00
  ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
    h2 = 600.00
    As2 = Astir2*ns2 = 157.0796
     No stirups, ns2 = 2.00
  ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
    h3 = 1800.00
    As3 = Astir3*ns3 = 0.00
     No stirups, ns3 = 2.00

---------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
  ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
    h1 = 250.00
    As1 = Astir1*ns1 = 157.0796
     No stirups, ns1 = 2.00
  ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
    h2 = 250.00
    As2 = Astir2*ns2 = 157.0796
     No stirups, ns2 = 2.00
  ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
    h3 = 250.00
    As3 = Astir3*ns3 = 157.0796
     No stirups, ns3 = 0.00

---------------------------------------------------------------

Asec = 750000.00
s_1 = 150.00
s_2 = 150.00
s_3 = 200.00
fywe = 625.00
fce = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
  c  = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00

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lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
 with fs1 = fs = 350.1097
 with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
 using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
 and also multiplied by the shear_factor according to 15.7.1.4, with
 Shear_factor = 1.00
 lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
 From table 5A.1, TBDY: esu2_nominal = 0.08,
 For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
 characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
 with fs2 = fs = 350.1097
 with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
 suv = 0.00512
 using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
 and also multiplied by the shear_factor according to 15.7.1.4, with
 Shear_factor = 1.00
 lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
 From table 5A.1, TBDY: esuv_nominal = 0.08,
 considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
 For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
 characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
 with fsv = fs = 350.1097
 with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
b = 2940.00
d = 178.00
d' = 12.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
 c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
u =  su (4.1) = 3.0889637E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30

```
-----------------------------------------------------------------
-----------------------------------------------------------------
-----------------------------------------------------------------
-----------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 1.0244E+006
-----------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
-----------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-------------------------------------------------------
   From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
   Mu/Vu-lw/2 = 0.00 <= 0
       = 1 (normal-weight concrete)
     fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
     h = 3000.00
     d = 200.00
     lw = 250.00
     Mu = 3.7289358E-011
     Vu = 1.7354940E-029
     Nu = 27588.841
   From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
   Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
   Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.50
   Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
   Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.50
   Vs3 = 0.00 is calculated for web, with:
     d = 200.00
     Av = 0.00
     s = 200.00
     fy = 500.00
   Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.00
   Vf ((11-3)-(11.4), ACI 440) = 109599.773
      f = 0.95, for fully-wrapped sections
    wf/sf = 1 (FRP strips adjacent to one another).
   In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
   where    is the angle of the crack direction (see KANEPE).
   This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
   as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
   orientation 1:   1 = b1 + 90° = 90.00
   Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
   total thickness per orientation, tf1 = NL*t/NoDir = 1.016
   dfv = d (figure 11.2, ACI 440) = 208.00
   ffe ((11-5), ACI 440) = 259.312
      Ef = 64828.00
       fe = 0.004, from (11.6a), ACI 440
        with  fu = 0.01
    From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
      bw = 3000.00
-----------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
-----------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
```

--------------------------------------------------------------
　From Table (11.5.4.6(d-e)), ACI 318-14: $V_c$ = 815517.768
　Mu/Vu-lw/2 = 0.00 <= 0
　　　= 1 (normal-weight concrete)
　　fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
　　h = 3000.00
　　d = 200.00
　　lw = 250.00
　　Mu = 3.7289358E-011
　　Vu = 1.7354940E-029
　　Nu = 27588.841
　From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
　Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
　　d = 200.00
　　Av = 157079.633
　　s = 150.00
　　fy = 500.00
　Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
　2(1-s/d) = 0.50
　Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
　　d = 200.00
　　Av = 157079.633
　　s = 150.00
　　fy = 500.00
　Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
　2(1-s/d) = 0.50
　Vs3 = 0.00 is calculated for web, with:
　　d = 200.00
　　Av = 0.00
　　s = 200.00
　　fy = 500.00
　Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
　2(1-s/d) = 0.00
　Vf ((11-3)-(11.4), ACI 440) = 109599.773
　　f = 0.95, for fully-wrapped sections
　wf/sf = 1 (FRP strips adjacent to one another).
　In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
　where   is the angle of the crack direction (see KANEPE).
　This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
　as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
　orientation 1:   1 = b1 + 90° = 90.00
　Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
　total thickness per orientation, tf1 = NL*t/NoDir = 1.016
　dfv = d (figure 11.2, ACI 440) = 208.00
　ffe ((11-5), ACI 440) = 259.312
　　Ef = 64828.00
　　 fe = 0.004, from (11.6a), ACI 440
　　　with  fu = 0.01
　From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
　　bw = 3000.00
--------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 2


--------------------------------------------------------------


Start Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (a)
Section Type: rcrws

Constant Properties
--------------------------------------------------------------
Knowledge Factor,  = 1.00
According to 10.7.2.3, ASCE 41-17, shear walls with
transverse reinforcement percentage,  n < 0.0015

are considered Force-Controlled and lower-bound strengths are used according to 7.5.1.3, ASCE 41-17
  n = 0.00069813
--------------------------------------------------------------------------------
with   n = ps1 + ps2 + ps3, being the shear reinf. ratio in a plane perpedicular to the shear axis 2
 (pseudo-col.1 ps1 = As1*b1/s1 = (As1*h1/s1) / Ac = 0.00034907
         h1 = 250.00
         s1 = 150.00
         total area of hoops perpedicular to shear axis, As1 = 157.0796
 (pseudo-col.2 ps2 = As2*b2/s2 = (As2*h2/s2) / Ac = 0.00034907
         h2 = 250.00
         s2 = 150.00
         total area of hoops perpedicular to shear axis, As2 = 157.0796
 (grid       ps3 = As3*b3/s3 = (As3*h3/s3) / Ac = 0.00
         h3 = 250.00
         s3 = 200.00
         total area of hoops perpedicular to shear axis, As3 = 0.00
  total section area, Ac = 750000.00
--------------------------------------------------------------------------------
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
--------------------------------------------------------------

Stepwise Properties
--------------------------------------------------------------
Bending Moment, M = -3.8068487E-012
Shear Force, V2 = -2.0402016E-014
Shear Force, V3 = -32914.791
Axial Force, F = -33005.924
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
     -Compression: Asl,com = 2830.575
         -Middle: Asl,mid = 1608.495
Mean Diameter of Tension Reinforcement, DbL = 16.46154
--------------------------------------------------------------
--------------------------------------------------------------

New component: From table 7-7, ASCE 41_17: Final chord rotation Capacity   u,R = 1.0*  u = 0.00318826

εu = εy + εp = 0.00318826

---------------------------------------------------------
- Calculation of θy -
---------------------------------------------------------
θy = (My*lp)/(EI)Eff = 0.00118826 ((10-5), ASCE 41-17))
  My = 1.8276E+008
  (EI)Eff = 0.35*Ec*I (table 10-5)
   Ec*I = 1.0547E+014
  lp = 0.5*d = 0.5*(0.8*h) = 240.00
---------------------------------------------------------
---------------------------------------------------------

Calculation of Yielding Moment My
---------------------------------------------------------
Calculation of εy and My according to Annex 7   -
---------------------------------------------------------
  εy = Min(εy_ten, εy_com)
  εy_ten = 8.9802449E-006
  with ((10.1), ASCE 41-17) fy = Min(fy, 1.25*fy*(lb/ld)^2/3) = 280.0878
     d = 208.00
      y = 0.25025656
     A = 0.01183892
     B = 0.00719009
      with pt = 0.00453618
          pc = 0.00453618
          pv = 0.00257772
          N = 33005.924
          b = 3000.00
          " = 0.20192308
  εy_comp = 3.2313175E-005
  with fc* (12.3, (ACI 440)) = 25.002
     fc = 25.00
     fl = 0.17503396
     b = 3000.00
     h = 250.00
     Ag = 750000.00
     From (12.9), ACI 440: ka = 0.0036426
        ρg = pt + pc + pv = 0.01165007
        rc = 40.00
        Ae/Ac = 0.52453487
        Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      effective strain from (12.5) and (12.12), efe = 0.004
       εfu = 0.01
     Ef = 64828.00
     Ec = 26999.444
      y = 0.24799872
     A = 0.01149141
     B = 0.00700125
      with Es = 200000.00
---------------------------------------------------------
---------------------------------------------------------

Calculation of ratio lb/ld
---------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30

---------------------------------------------------------
- Calculation of θp -
---------------------------------------------------------
Considering wall controlled by flexure (shear control ratio <= 1),
from table 10-19: θp = 0.002
with:
- Condition i (shear wall and wall segments)
- (As-As')*fy+P)/(tw*lw*fc') = -0.19209689
   As = 0.00
   As' = 7269.645

```
    fy = 500.00
    P = 33005.924
    tw = 3000.00
    lw = 250.00
    fc = 25.00
 - V/(tw*lw*fc^0.5) = 6.5518667E-020, NOTE: units in lb & in
 - Confined Boundary: No
   Boundary hoops spacing exceed 8db (s1 > 8*db or s2 > 8*db )
   Boundary Trans. Reinf. does not exceed 50% of ACI 318 provision (Vw1 + Vw2 > 0.50*(V-Vc-Vw3)
   With
   Boundary Element 1:
    Vw1 = 104719.755
    s1 = 150.00
   Boundary Element 2:
    Vw2 = 104719.755
    s2 = 150.00
   Grid Shear Force, Vw3 = 0.00
   Concrete Shear Force, Vc = 816601.185
(The variables above have already been given in Shear control ratio calculation)
   Mean diameter of all bars, db = 17.33333
   Design Shear Force, V = 2.0402016E-014
```

---------------------------------------------------------------

End Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (a)

---------------------------------------------------------------
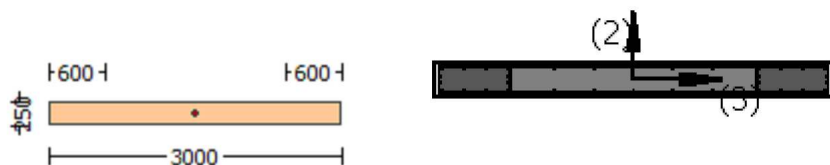
---

## Calculation No. 5

wall W1, Floor 1

Limit State: Operational Level (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Shear capacity VRd

Edge: End

Local Axis: (2)

Start Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (d)
Section Type: rcrws

Constant Properties
------------------------------------------------------------
Knowledge Factor,    = 1.00
Member Shear Force is generally considered as Force-Controlled Action according to Table C7-1, ASCE 41-17.
Lower-bound strengths are used for Force-Controlled Actions according to 7.5.1.3, ASCE 41-17
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min =lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
EDGE -A-
Bending Moment, Ma = -3.8068487E-012
Shear Force, Va = -2.0402016E-014
EDGE -B-
Bending Moment, Mb = -6.0084169E-011
Shear Force, Vb = 2.0402016E-014
BOTH EDGES
Axial Force, F = -33005.924
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
     -Compression: Asl,com = 2830.575
         -Middle: Asl,mid = 1608.495
Mean Diameter of Tension Reinforcement, DbL,ten = 16.46154
------------------------------------------------------------
------------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final Shear Capacity VR = 1.0*Vn = 385903.344
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vn < 0.83*fc'^0.5*h*d  = 385903.344
------------------------------------------------------------

NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-----------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 177063.805
  Mu/Vu-lw/2 = 2820.011 > 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 6.0084169E-011
    Vu = 2.0402016E-014
    Nu = 33005.924
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
  2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
  2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
  2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
  where is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
  orientation 1: 1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 208.00
  ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
    fe = 0.004, from (11.6a), ACI 440
      with fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
-----------------------------------------------------------------
End Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (d)

-----------------------------------------------------------------

# Calculation No. 6

wall W1, Floor 1

Limit State: Operational Level (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Chord rotation capacity ( u)

Edge: End

Local Axis: (2)



Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 3
(Bending local axis: 2)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------------
Knowledge Factor,   = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30

FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
At local axis: 3
EDGE -A-
Shear Force, Va = 1.0097420E-028
EDGE -B-
Shear Force, Vb = -1.0097420E-028
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
    -Tension: Aslt = 0.00
   -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
    -Tension: Asl,ten = 2865.133
   -Compression: Asl,com = 2865.133
     -Middle: Asl,mid = 0.00
     (According to 10.7.2.3 Asl,mid is setted equal to zero)
------------------------------------------------------------
------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 1.02813
Member Controlled by Shear (Ve/Vr > 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 2.5600E+006
with
Mpr1 = Max(Mu1+ , Mu1-) = 3.8401E+009
   Mu1+ = 3.3585E+009, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
   Mu1- = 3.8401E+009, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 3.8401E+009
   Mu2+ = 3.3585E+009, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
   Mu2- = 3.8401E+009, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination


--------------------------------------------------------------------------
Calculation of Mu1+
--------------------------------------------------------------------------


--------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
   u = 2.0296703E-006
Mu = 3.3585E+009
--------------------------------------------------------------------------
with full section properties:
   b = 250.00
   d = 2957.00
   d' = 43.00
   v = 0.0014928
      N = 27588.841
   fc = 25.00
    co (5A.5, TBDY) = 0.002
   Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035

The Shear_factor is considered equal to 1 (pure moment strength)
From (5.4b), TBDY: εcu = 0.0035
ωwe ((5.4c), TBDY) = ρse*ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)

----------------------------------------------------------------

ωfx = 0.00
αf = 0.00
b = 250.00
h = 3000.00
From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
bw = 250.00
effective stress from (A.35), ff,e = 757.2164

----------------------------------------------------------------

ωfy = 0.00
αf = 0.00
b = 3000.00
h = 250.00
From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
bw = 3000.00
effective stress from (A.35), ff,e = 954.4864

----------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
εu,f = 0.015
ρse ((5.4d), TBDY) = (ρse1*Acol1+ρse2*Acol2+ρse3*Aweb)/Asec = 0.00
ρse1 = 0.00
sh_1 = 150.00
bo_1 = 190.00
ho_1 = 540.00
∑bi2_1 = 655400.00
ρse2 = 0.00
sh_2 = 150.00
bo_2 = 190.00
ho_2 = 540.00
∑bi2_2 = 655400.00
ρse3 = 0 (grid does not provide confinement)
ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

----------------------------------------------------------------

ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
h1 = 600.00
As1 = Astir1*ns1 = 157.0796
No stirups, ns1 = 2.00
ρs2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
h2 = 600.00
As2 = Astir2*ns2 = 157.0796
No stirups, ns2 = 2.00
ρs3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
h3 = 1800.00
As3 = Astir3*ns3 = 0.00
No stirups, ns3 = 2.00

----------------------------------------------------------------

ρsh,y = ρs1,y+ρs2,y+ρs3,y = 0.00069813
ρs1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
h1 = 250.00
As1 = Astir1*ns1 = 157.0796
No stirups, ns1 = 2.00
ρs2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
h2 = 250.00
As2 = Astir2*ns2 = 157.0796
No stirups, ns2 = 2.00
ρs3,y (web) = (As3*h3/s_3)/Ac = 0.00
h3 = 250.00

```
            As3 = Astir3*ns3 = 157.0796
                No stirups, ns3 = 0.00
    ------------------------------------------------------------------
            Asec = 750000.00
            s_1 = 150.00
            s_2 = 150.00
            s_3 = 200.00
          fywe = 625.00
           fce = 25.00
      From ((5.A5), TBDY):  cc = 0.00202463
          c = confinement factor = 1.00246
     y1 = 0.00140044
    sh1 = 0.0044814
  ft1 = 420.1317
  fy1 = 350.1097
   su1 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
       su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu1_nominal = 0.08,
     For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
     characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs1 = fs = 350.1097
       with Es1 = Es = 200000.00
    y2 = 0.00140044
   sh2 = 0.0044814
  ft2 = 420.1317
  fy2 = 350.1097
   su2 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/lb,min = 0.30
       su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu2_nominal = 0.08,
     For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
     characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
    yv = 0.00140044
   shv = 0.0044814
  ftv = 420.1317
  fyv = 350.1097
   suv = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
       suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esuv_nominal = 0.08,
     considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
     For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
     characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fsv = fs = 350.1097
       with Esv = Es = 200000.00
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
     2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
     v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
```

fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c = confinement factor = 1.00246
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
  2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
  v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
  u =   su (4.1) = 2.0296703E-006
----------------------------------------------------------

Calculation of ratio lb/ld
----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------
-------------------------------------------------------------
-------------------------------------------------------------
Calculation of Mu1-
-------------------------------------------------------------

-------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0532423E-006
Mu = 3.8401E+009
-------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu,  cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      fx = 0.00
       af = 0.00
          b = 250.00
          h = 3000.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
          bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      fy = 0.00
       af = 0.00
          b = 3000.00
          h = 250.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
          bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
    ----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
         ase1 = 0.00

```
                    sh_1 = 150.00
                    bo_1 = 190.00
                    ho_1 = 540.00
                      bi2_1 = 655400.00
              ase2 = 0.00
                  sh_2 = 150.00
                    bo_2 = 190.00
                    ho_2 = 540.00
                      bi2_2 = 655400.00
              ase3 = 0 (grid does not provide confinement)
              psh,min = Min(psh,x , psh,y) = 0.00069813
         Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
     earthquake detailing (90° closed stirrups)
         -------------------------------------------------------------------
         psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
            ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                h1 = 600.00
                As1 = Astir1*ns1 = 157.0796
                  No stirups, ns1 = 2.00
            ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
                h2 = 600.00
                As2 = Astir2*ns2 = 157.0796
                  No stirups, ns2 = 2.00
            ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                h3 = 1800.00
                As3 = Astir3*ns3 = 0.00
                  No stirups, ns3 = 2.00
         -------------------------------------------------------------------
         psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
            ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                h1 = 250.00
                As1 = Astir1*ns1 = 157.0796
                  No stirups, ns1 = 2.00
            ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                h2 = 250.00
                As2 = Astir2*ns2 = 157.0796
                  No stirups, ns2 = 2.00
            ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                h3 = 250.00
                As3 = Astir3*ns3 = 157.0796
                  No stirups, ns3 = 0.00
         -------------------------------------------------------------------
            Asec = 750000.00
            s_1 = 150.00
            s_2 = 150.00
            s_3 = 200.00
         fywe = 625.00
         fce  = 25.00
       From ((5.A5), TBDY), TBDY:  cc = 0.00202463
            c = confinement factor = 1.00246
     y1 = 0.00140044
     sh1 = 0.0044814
    ft1 = 420.1317
   fy1 = 350.1097
    su1 = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/ld = 0.30
        su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esu1_nominal = 0.08,
       For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
       characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fs1 = fs = 350.1097
        with Es1 = Es = 200000.00
     y2 = 0.00140044
```

sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
b = 190.00
d = 2927.00
d' = 13.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
  c  = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
u =   su (4.1) = 2.0532423E-006
---------------------------------------------------------------

Calculation of ratio lb/ld
---------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
Calculation of Mu2+
-----------------------------------------------------------------------------

-----------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
u = 2.0296703E-006

Mu = 3.3585E+009
---------------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of cu: cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: cu = 0.0035
     we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
    where f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -------------------------------------------------------------
     fx = 0.00
     af = 0.00
      b = 250.00
      h = 3000.00
     From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
      bw = 250.00
     effective stress from (A.35), ff,e = 757.2164
    -------------------------------------------------------------
     fy = 0.00
     af = 0.00
      b = 3000.00
      h = 250.00
     From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
      bw = 3000.00
     effective stress from (A.35), ff,e = 954.4864
    -------------------------------------------------------------
     R = 40.00
     Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
     fu,f = 1055.00
     Ef = 64828.00
     u,f = 0.015
     ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
      ase1 = 0.00
       sh_1 = 150.00
       bo_1 = 190.00
       ho_1 = 540.00
        bi2_1 = 655400.00
      ase2 = 0.00
       sh_2 = 150.00
       bo_2 = 190.00
       ho_2 = 540.00
        bi2_2 = 655400.00
      ase3 = 0 (grid does not provide confinement)
     psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
    -------------------------------------------------------------
     psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
      ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
       h1 = 600.00
       As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
      ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
       h2 = 600.00
       As2 = Astir2*ns2 = 157.0796
        No stirups, ns2 = 2.00
      ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
       h3 = 1800.00
       As3 = Astir3*ns3 = 0.00
        No stirups, ns3 = 2.00
    -------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
    ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
      h1 = 250.00
      As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
    ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
      h2 = 250.00
      As2 = Astir2*ns2 = 157.0796
        No stirups, ns2 = 2.00
    ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
      h3 = 250.00
      As3 = Astir3*ns3 = 157.0796
        No stirups, ns3 = 0.00
------------------------------------------------------------------
    Asec = 750000.00
    s_1 = 150.00
    s_2 = 150.00
    s_3 = 200.00
  fywe = 625.00
  fce = 25.00
From ((5.A5), TBDY): cc = 0.00202463
    c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu1_nominal = 0.08,
  For calculation of esu1_nominal and y1, sh1,ft1,fy1, it is considered
  characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs1 = fs = 350.1097
  with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered

characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
 with fsv = fs = 350.1097
 with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c = confinement factor = 1.00246
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
 2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
 v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
  u =  su (4.1) = 2.0296703E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------
------------------------------------------------------------------
------------------------------------------------------------------
Calculation of Mu2-
------------------------------------------------------------------

------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0532423E-006
Mu = 3.8401E+009
------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
   N = 27588.841
 fc = 25.00
  co (5A.5, TBDY) = 0.002
 Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY:  cu = 0.0035
    we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx,  fy) = 0.00
   where  f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ------------------------------------------------------------
     fx = 0.00
      af = 0.00
        b = 250.00
        h = 3000.00
      From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
        bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
    ------------------------------------------------------------
     fy = 0.00
      af = 0.00
        b = 3000.00
        h = 250.00

From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
   bw = 3000.00
effective stress from (A.35), ff,e = 954.4864
------------------------------------------------------------------
R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
   ase1 = 0.00
      sh_1 = 150.00
      bo_1 = 190.00
      ho_1 = 540.00
       bi2_1 = 655400.00
  ase2 = 0.00
     sh_2 = 150.00
       bo_2 = 190.00
       ho_2 = 540.00
        bi2_2 = 655400.00
  ase3 = 0 (grid does not provide confinement)
psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
------------------------------------------------------------------
psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
  ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
    h1 = 600.00
    As1 = Astir1*ns1 = 157.0796
      No stirups, ns1 = 2.00
  ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
    h2 = 600.00
    As2 = Astir2*ns2 = 157.0796
      No stirups, ns2 = 2.00
  ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
    h3 = 1800.00
    As3 = Astir3*ns3 = 0.00
      No stirups, ns3 = 2.00
------------------------------------------------------------------
psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
  ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
    h1 = 250.00
    As1 = Astir1*ns1 = 157.0796
      No stirups, ns1 = 2.00
  ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
    h2 = 250.00
    As2 = Astir2*ns2 = 157.0796
      No stirups, ns2 = 2.00
  ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
    h3 = 250.00
    As3 = Astir3*ns3 = 157.0796
      No stirups, ns3 = 0.00
------------------------------------------------------------------
  Asec = 750000.00
  s_1 = 150.00
  s_2 = 150.00
  s_3 = 200.00
fywe = 625.00
fce = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
  c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor

and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu1_nominal = 0.08,
   For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
   characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
  2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
  v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
   v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
  u =   su (4.1) = 2.0532423E-006
----------------------------------------------------------

Calculation of ratio lb/ld

```
----------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 2.4900E+006
--------------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
----------------------------------------------------------------
   From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
   Mu/Vu-lw/2 = 0.00 <= 0
        = 1 (normal-weight concrete)
     fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
     h = 250.00
     d = 2400.00
     lw = 3000.00
     Mu = 1.1486927E-009
     Vu = 1.0097420E-028
     Nu = 27588.841
   From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
   Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
     d = 480.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
   Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
   Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
     d = 480.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
   Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
   Vs3 = 565486.678 is calculated for web, with:
     d = 1440.00
     Av = 157079.633
     s = 200.00
     fy = 500.00
   Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
   Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
     f = 0.95, for fully-wrapped sections
   wf/sf = 1 (FRP strips adjacent to one another).
   In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
   where   is the angle of the crack direction (see KANEPE).
   This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
   as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
   orientation 1:   1 = b1 + 90° = 90.00
   Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
   total thickness per orientation, tf1 = NL*t/NoDir = 1.016
   dfv = d (figure 11.2, ACI 440) = 2957.00
   ffe ((11-5), ACI 440) = 259.312
       Ef = 64828.00
       fe = 0.004, from (11.6a), ACI 440
         with  fu = 0.01
   From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
     bw = 250.00
--------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
----------------------------------------------------------------
```

From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
Mu/Vu-lw/2 = 0.00 <= 0
       = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00
    lw = 3000.00
    Mu = 1.1486927E-009
    Vu = 1.0097420E-028
    Nu = 27588.841
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
 Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
 Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs3 = 565486.678 is calculated for web, with:
    d = 1440.00
    Av = 157079.633
    s = 200.00
    fy = 500.00
 Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
 Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
    f = 0.95, for fully-wrapped sections
 wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
where   is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( ,  ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
orientation 1:  1 = b1 + 90° = 90.00
Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
      with  fu = 0.01
 From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 250.00
-------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 3


-------------------------------------------------------------


Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 2
(Bending local axis: 3)
Section Type: rcrws

Constant Properties
-------------------------------------------------------------
Knowledge Factor,   = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00

###########################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
###########################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-------------------------------------------------------------

Stepwise Properties
-------------------------------------------------------------
At local axis: 2
EDGE -A-
Shear Force, Va = 1.7354940E-029
EDGE -B-
Shear Force, Vb = -1.7354940E-029
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
      -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
      -Compression: Asl,com = 2830.575
        -Middle: Asl,mid = 0.00
        (According to 10.7.2.3 Asl,mid is setted equal to zero)
-------------------------------------------------------------
-------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr  =  0.15621236
Member Controlled by Flexure (Ve/Vr < 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 160017.271
with
Mpr1 =  Max(Mu1+ , Mu1-) = 2.4003E+008
   Mu1+ = 2.0658E+008, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
   Mu1- = 2.4003E+008, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 =  Max(Mu2+ , Mu2-) = 2.4003E+008
   Mu2+ = 2.0658E+008, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
   Mu2- = 2.4003E+008, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination

--------------------------------------------------------------------------------
Calculation of Mu1+
--------------------------------------------------------------------------------


--------------------------------------------------------------------------------
Calculation of ultimate curvature  φu according to 4.1, Biskinis/Fardis 2013:
  φu = 3.0306889E-005
Mu = 2.0658E+008
--------------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  ν = 0.00176852
    N = 27588.841
  fc = 25.00
  εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY: εcu = 0.0035
       ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
     where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------------
       ωfx = 0.00
        αf = 0.00
           b = 250.00
           h = 3000.00
        From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
           bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ----------------------------------------------------------------
       ωfy = 0.00
        αf = 0.00
           b = 3000.00
           h = 250.00
        From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
           bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        εu,f = 0.015
       αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
          αse1 = 0.00
             sh_1 = 150.00
             bo_1 = 190.00
             ho_1 = 540.00
              Σbi2_1 = 655400.00
          αse2 = 0.00
             sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
              Σbi2_2 = 655400.00
       αse3 = 0 (grid does not provide confinement)
       ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
     Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
     ----------------------------------------------------------------
       ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
          ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
             h1 = 600.00
             As1 = Astir1*ns1 = 157.0796
                No stirups, ns1 = 2.00
          ρs2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
             h2 = 600.00

```
            As2 = Astir2*ns2 = 157.0796
                No stirups, ns2 = 2.00
           ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                h3 = 1800.00
                As3 = Astir3*ns3 = 0.00
                   No stirups, ns3 = 2.00
       --------------------------------------------------------------------
         psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
            ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                h1 = 250.00
                As1 = Astir1*ns1 = 157.0796
                   No stirups, ns1 = 2.00
            ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                h2 = 250.00
                As2 = Astir2*ns2 = 157.0796
                   No stirups, ns2 = 2.00
            ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                h3 = 250.00
                As3 = Astir3*ns3 = 157.0796
                   No stirups, ns3 = 0.00
       --------------------------------------------------------------------
         Asec = 750000.00
          s_1 = 150.00
          s_2 = 150.00
          s_3 = 200.00
        fywe = 625.00
         fce = 25.00
      From ((5.A5), TBDY), TBDY:  cc = 0.00202463
         c = confinement factor = 1.00246
   y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
      su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu1_nominal = 0.08,
     For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
     characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs1 = fs = 350.1097
       with Es1 = Es = 200000.00
   y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/lb,min = 0.30
      su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu2_nominal = 0.08,
     For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
     characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
   yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
```

and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
      suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fsv = fs = 350.1097
      with Esv = Es = 200000.00
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
    2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
    cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
  u =   su (4.1) = 3.0306889E-005
---------------------------------------------------------------

Calculation of ratio lb/ld
---------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
Calculation of Mu1-
------------------------------------------------------------------------

------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0889637E-005
Mu = 2.4003E+008
------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
    co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      fx = 0.00
       af = 0.00
         b = 250.00
         h = 3000.00
      From EC8 A 4.4.3(6), pf = 2tf/bw = 0.008128

```
        bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
  --------------------------------------------------------------------
      fy = 0.00
      af = 0.00
         b = 3000.00
         h = 250.00
      From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
         bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864
  --------------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
         ase1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
            ho_1 = 540.00
             bi2_1 = 655400.00
         ase2 = 0.00
            sh_2 = 150.00
            bo_2 = 190.00
            ho_2 = 540.00
             bi2_2 = 655400.00
         ase3 = 0 (grid does not provide confinement)
         psh,min = Min(psh,x , psh,y) = 0.00069813
      Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
   earthquake detailing (90° closed stirrups)
  --------------------------------------------------------------------
      psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
         ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
            h1 = 600.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
            h2 = 600.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
            h3 = 1800.00
            As3 = Astir3*ns3 = 0.00
               No stirups, ns3 = 2.00
  --------------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
         ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
            h1 = 250.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
            h2 = 250.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
            h3 = 250.00
            As3 = Astir3*ns3 = 157.0796
               No stirups, ns3 = 0.00
  --------------------------------------------------------------------
         Asec = 750000.00
         s_1 = 150.00
         s_2 = 150.00
         s_3 = 200.00
      fywe = 625.00
      fce = 25.00
   From ((5.A5), TBDY), TBDY:  cc = 0.00202463
```

c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs1 = fs = 350.1097
with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/lb,min = 0.30
su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs2 = fs = 350.1097
with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fsv = fs = 350.1097
with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
b = 2940.00
d = 178.00
d' = 12.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied

```
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
  u =   su (4.1) = 3.0889637E-005
--------------------------------------------------------------

Calculation of ratio lb/ld
--------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
----------------------------------------------------------------------
----------------------------------------------------------------------
----------------------------------------------------------------------
Calculation of Mu2+
----------------------------------------------------------------------


----------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0306889E-005
Mu = 2.0658E+008
----------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu = 0.0035
       we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
     where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------------
       fx = 0.00
        af = 0.00
          b = 250.00
          h = 3000.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
          bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ----------------------------------------------------------------
       fy = 0.00
        af = 0.00
          b = 3000.00
          h = 250.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
          bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ----------------------------------------------------------------
        R = 40.00
        Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
        fu,f = 1055.00
        Ef = 64828.00
         u,f = 0.015
        ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
          ase1 = 0.00
             sh_1 = 150.00
             bo_1 = 190.00
             ho_1 = 540.00
               bi2_1 = 655400.00
          ase2 = 0.00
             sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
               bi2_2 = 655400.00
          ase3 = 0 (grid does not provide confinement)
```

psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
--------------------------------------------------------------------
psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
    ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
        h1 = 600.00
        As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
    ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
        h2 = 600.00
        As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
    ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
        h3 = 1800.00
        As3 = Astir3*ns3 = 0.00
            No stirups, ns3 = 2.00
--------------------------------------------------------------------
psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
    ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
        h1 = 250.00
        As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
    ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
        h2 = 250.00
        As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
    ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
        h3 = 250.00
        As3 = Astir3*ns3 = 157.0796
            No stirups, ns3 = 0.00
--------------------------------------------------------------------
Asec = 750000.00
s_1 = 150.00
s_2 = 150.00
s_3 = 200.00
fywe = 625.00
fce = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
    c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
    su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,

For calculation of esu2_nominal and $\gamma2$, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
$\gamma1$, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs2 = fs = 350.1097
with Es2 = Es = 200000.00
$\gamma v$ = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and $\gamma v$, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
$\gamma1$, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fsv = fs = 350.1097
with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
b = 2940.00
d = 178.00
d' = 12.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
u = su (4.1) = 3.0306889E-005
----------------------------------------------------------

Calculation of ratio lb/ld
----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
Calculation of Mu2-
------------------------------------------------------------------------

------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
u = 3.0889637E-005
Mu = 2.4003E+008
------------------------------------------------------------------------
with full section properties:
b = 3000.00
d = 208.00
d' = 42.00
v = 0.00176852
N = 27588.841
fc = 25.00
co (5A.5, TBDY) = 0.002

Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY:  cu = 0.0035
     we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
   where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
   ------------------------------------------------------------------
   fx = 0.00
    af = 0.00
       b = 250.00
       h = 3000.00
    From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
       bw = 250.00
    effective stress from (A.35), ff,e = 757.2164
   ------------------------------------------------------------------
   fy = 0.00
    af = 0.00
       b = 3000.00
       h = 250.00
    From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
       bw = 3000.00
    effective stress from (A.35), ff,e = 954.4864
   ------------------------------------------------------------------
   R = 40.00
   Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
   fu,f = 1055.00
   Ef = 64828.00
    u,f = 0.015
   ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
      ase1 = 0.00
         sh_1 = 150.00
         bo_1 = 190.00
         ho_1 = 540.00
          bi2_1 = 655400.00
      ase2 = 0.00
         sh_2 = 150.00
         bo_2 = 190.00
         ho_2 = 540.00
          bi2_2 = 655400.00
      ase3 = 0 (grid does not provide confinement)
      psh,min = Min(psh,x , psh,y) = 0.00069813
   Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
   ------------------------------------------------------------------
      psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
         ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
            h1 = 600.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
            h2 = 600.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
            h3 = 1800.00
            As3 = Astir3*ns3 = 0.00
               No stirups, ns3 = 2.00
   ------------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
         ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
            h1 = 250.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
            h2 = 250.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,y (web) = (As3*h3/s_3)/Ac = 0.00

```
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                  No stirups, ns3 = 0.00
      ----------------------------------------------------------------
          Asec = 750000.00
           s_1 = 150.00
           s_2 = 150.00
           s_3 = 200.00
         fywe = 625.00
          fce  = 25.00
       From ((5.A5), TBDY),  TBDY:  cc = 0.00202463
            c  = confinement factor = 1.00246
    y1 = 0.00140044
   sh1 = 0.0044814
  ft1 = 420.1317
  fy1 = 350.1097
   su1 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
       su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu1_nominal = 0.08,
     For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
     characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs1 = fs = 350.1097
       with Es1 = Es = 200000.00
    y2 = 0.00140044
   sh2 = 0.0044814
  ft2 = 420.1317
  fy2 = 350.1097
   su2 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/lb,min = 0.30
       su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu2_nominal = 0.08,
     For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
     characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
    yv = 0.00140044
   shv = 0.0044814
  ftv = 420.1317
  fyv = 350.1097
   suv = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
       suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esuv_nominal = 0.08,
     considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
     For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
     characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fsv = fs = 350.1097
       with Esv = Es = 200000.00
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
     2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
     v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
```

```
   d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =    su (4.1) = 3.0889637E-005
----------------------------------------------------------

Calculation of ratio lb/ld
----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------
-----------------------------------------------------------------
-----------------------------------------------------------------
-----------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 1.0244E+006
-----------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
-----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+   f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-----------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
```

In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 208.00
ffe ((11-5), ACI 440) = 259.312
   Ef = 64828.00
    fe = 0.004, from (11.6a), ACI 440
      with fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
--------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
--------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
--------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
   wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
  where is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
  orientation 1: 1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 208.00
  ffe ((11-5), ACI 440) = 259.312
     Ef = 64828.00
      fe = 0.004, from (11.6a), ACI 440

```
        with  fu = 0.01
   From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
      bw = 3000.00
-----------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 2


-----------------------------------------------------------------



Start Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------------
Knowledge Factor,   = 1.00
According to 10.7.2.3, ASCE 41-17, shear walls with
transverse reinforcement percentage,  n < 0.0015
are considered Force-Controlled and lower-bound strengths are used according to 7.5.1.3, ASCE 41-17
  n = 0.00069813
--------------------------------------------------------------------------------
with  n = ps1 + ps2 + ps3, being the shear reinf. ratio in a plane perpedicular to the shear axis 3
 (pseudo-col.1 ps1 = As1*b1/s1 = (As1*h1/s1) / Ac = 0.00034907
          h1 = 250.00
          s1 = 150.00
          total area of hoops perpedicular to shear axis, As1 = 157.0796
 (pseudo-col.2 ps2 = As2*b2/s2 = (As2*h2/s2) / Ac = 0.00034907
          h2 = 250.00
          s2 = 150.00
          total area of hoops perpedicular to shear axis, As2 = 157.0796
 (grid      ps3 = As3*b3/s3 = (As3*h3/s3) / Ac = 0.00
          h3 = 250.00
          s3 = 200.00
          total area of hoops perpedicular to shear axis, As3 = 0.00
  total section area, Ac = 750000.00
--------------------------------------------------------------------------------
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-----------------------------------------------------------------
```

Stepwise Properties
----------------------------------------------------------------
Axial Force, F = -33005.924
Longitudinal Reinforcement Area Distribution (in 2 divisions)
    -Tension: Aslt = 0.00
  -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
    -Tension: Asl,ten = 2865.133
  -Compression: Asl,com = 2865.133
    -Middle: Asl,mid = 1539.38
Mean Diameter of Tension Reinforcement, DbL = 17.33333
----------------------------------------------------------------
----------------------------------------------------------------


Considering wall controlled by Shear (shear control ratio > 1),
interstorey drift provided values are calculated
New component: From table 7-7, ASCE 41_17: Final chord rotation Capacity   $\theta_{u,R}$ = 1.0* $\theta_u$ = 0.004
from table 10-20:   $\theta_u$ = 0.004
with:
 - Condition i (shear wall and wall segments)
 - $(As-As')*fy+P)/(tw*lw*fc')$ = -0.19209689
   As = 0.00
   As' = 7269.645
   fy = 500.00
   P = 33005.924
   tw = 250.00
   lw = 3000.00
   fc = 25.00


----------------------------------------------------------------
End Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)

----------------------------------------------------------------

## Calculation No. 7

wall W1, Floor 1

Limit State: Operational Level (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Shear capacity VRd

Edge: End

Local Axis: (3)

Start Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (d)
Section Type: rcrws

Constant Properties
------------------------------------------------------------
Knowledge Factor, = 1.00
Member Shear Force is generally considered as Force-Controlled Action according to Table C7-1, ASCE 41-17.
Lower-bound strengths are used for Force-Controlled Actions according to 7.5.1.3, ASCE 41-17
Consequently:
New material of Secondary Member: Concrete Strength, $fc = fc\_lower\_bound = 25.00$
New material of Secondary Member: Steel Strength, $fs = fs\_lower\_bound = 500.00$
Concrete Elasticity, $Ec = 26999.444$
Steel Elasticity, $Es = 200000.00$
Total Height, $Htot = 3000.00$
Edges Width, $Wedg = 250.00$
Edges Height, $Hedg = 600.00$
Web Width, $Wweb = 250.00$
Cover Thickness, $c = 25.00$
Element Length, $L = 3000.00$
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with $lo/lou,min = lb/ld = 0.30$
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, $t = 1.016$
Tensile Strength, $ffu = 1055.00$
Tensile Modulus, $Ef = 64828.00$
Elongation, $efu = 0.01$
Number of directions, $NoDir = 1$
Fiber orientations, $bi: 0.00°$
Number of layers, $NL = 1$
Radius of rounding corners, $R = 40.00$
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
EDGE -A-
Bending Moment, $Ma = 9.7363E+007$
Shear Force, $Va = -32914.791$
EDGE -B-
Bending Moment, $Mb = 1.4016E+006$
Shear Force, $Vb = 32914.791$
BOTH EDGES
Axial Force, $F = -33005.924$
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: $Aslt = 0.00$

-Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
       -Tension: Asl,ten = 2865.133
     -Compression: Asl,com = 2865.133
         -Middle: Asl,mid = 1539.38
Mean Diameter of Tension Reinforcement, DbL,ten = 17.33333
----------------------------------------------------------
----------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final Shear Capacity $V_R = 1.0*V_n = 2.4900E+006$
From (22.5.1.1) and 11.5.4.3, ACI 318-14: $V_n < 0.83*fc'^0.5*h*d = 2.4900E+006$
----------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
----------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: $V_c = 816601.185$
  $M_u/V_u-l_w/2 = -1457.417 <= 0$
      = 1 (normal-weight concrete)
    $fc' = 25.00$, but $fc^0.5 <= 8.3 MPa$ (22.5.3.1, ACI 318-14)
    $h = 250.00$
    $d = 2400.00$
    $l_w = 3000.00$
    $M_u = 1.4016E+006$
    $V_u = 32914.791$
    $N_u = 33005.924$
  From (11.5.4.8), ACI 318-14: $V_s = V_{s1} + V_{s2} + V_{s3} = 1.0681E+006$
  $V_{s1} = 251327.412$ is calculated for pseudo-Column 1, with:
    $d = 480.00$
    $A_v = 157079.633$
    $s = 150.00$
    $f_y = 500.00$
  Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  $V_{s2} = 251327.412$ is calculated for pseudo-Column 2, with:
    $d = 480.00$
    $A_v = 157079.633$
    $s = 150.00$
    $f_y = 500.00$
  Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  $V_{s3} = 565486.678$ is calculated for web, with:
    $d = 1440.00$
    $A_v = 157079.633$
    $s = 200.00$
    $f_y = 500.00$
  Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  $V_f ((11-3)-(11.4), ACI 440) = 1.5581E+006$
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
  where    is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:  1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 2957.00
  ffe ((11-5), ACI 440) = 259.312
    $E_f = 64828.00$
     fe = 0.004, from (11.6a), ACI 440
       with  fu = 0.01
  From (11-11), ACI 440: $V_s + V_f <= 1.9929E+006$
    $b_w = 250.00$
----------------------------------------------------------
End Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (d)

---------------------------------------------------------------

# Calculation No. 8

wall W1, Floor 1

Limit State: Operational Level (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Chord rotation capacity ( u)

Edge: End

Local Axis: (3)



Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 3
(Bending local axis: 2)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------
Knowledge Factor, = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel

Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-------------------------------------------------------------

Stepwise Properties
-------------------------------------------------------------
At local axis: 3
EDGE -A-
Shear Force, Va = 1.0097420E-028
EDGE -B-
Shear Force, Vb = -1.0097420E-028
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2865.133
     -Compression: Asl,com = 2865.133
       -Middle: Asl,mid = 0.00
       (According to 10.7.2.3 Asl,mid is setted equal to zero)
-------------------------------------------------------------
-------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 1.02813
Member Controlled by Shear (Ve/Vr > 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 2.5600E+006
with
Mpr1 = Max(Mu1+ , Mu1-) = 3.8401E+009
  Mu1+ = 3.3585E+009, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
  Mu1- = 3.8401E+009, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 3.8401E+009
  Mu2+ = 3.3585E+009, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
  Mu2- = 3.8401E+009, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination


-----------------------------------------------------------------------
Calculation of Mu1+
-----------------------------------------------------------------------


-----------------------------------------------------------------------
Calculation of ultimate curvature u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0296703E-006
Mu = 3.3585E+009
-----------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841

fc = 25.00
  co (5A.5, TBDY) = 0.002
Final value of cu: cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY: cu = 0.0035
    we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
  where f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
------------------------------------------------------------------
  fx = 0.00
   af = 0.00
     b = 250.00
     h = 3000.00
   From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
     bw = 250.00
  effective stress from (A.35), ff,e = 757.2164
------------------------------------------------------------------
  fy = 0.00
   af = 0.00
     b = 3000.00
     h = 250.00
   From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
     bw = 3000.00
  effective stress from (A.35), ff,e = 954.4864
------------------------------------------------------------------
  R = 40.00
  Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
  fu,f = 1055.00
  Ef = 64828.00
  u,f = 0.015
  ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
    ase1 = 0.00
      sh_1 = 150.00
      bo_1 = 190.00
      ho_1 = 540.00
       bi2_1 = 655400.00
    ase2 = 0.00
     sh_2 = 150.00
      bo_2 = 190.00
      ho_2 = 540.00
       bi2_2 = 655400.00
    ase3 = 0 (grid does not provide confinement)
    psh,min = Min(psh,x , psh,y) = 0.00069813
  Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
------------------------------------------------------------------
    psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
     ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
       h1 = 600.00
       As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
     ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
       h2 = 600.00
       As2 = Astir2*ns2 = 157.0796
        No stirups, ns2 = 2.00
     ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
       h3 = 1800.00
       As3 = Astir3*ns3 = 0.00
        No stirups, ns3 = 2.00
------------------------------------------------------------------
    psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
     ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
       h1 = 250.00
       As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
     ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
       h2 = 250.00
       As2 = Astir2*ns2 = 157.0796

```
             No stirups, ns2 = 2.00
          ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                  No stirups, ns3 = 0.00

      ------------------------------------------------------------------
          Asec = 750000.00
          s_1 = 150.00
          s_2 = 150.00
          s_3 = 200.00
        fywe = 625.00
         fce = 25.00
      From ((5.A5), TBDY), TBDY:  cc = 0.00202463
          c = confinement factor = 1.00246
   y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
      su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu1_nominal = 0.08,
     For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
     characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs1 = fs = 350.1097
      with Es1 = Es = 200000.00
   y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/lb,min = 0.30
      su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu2_nominal = 0.08,
     For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
     characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs2 = fs = 350.1097
      with Es2 = Es = 200000.00
   yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
      suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esuv_nominal = 0.08,
     considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
     For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
     characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fsv = fs = 350.1097
      with Esv = Es = 200000.00
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
   2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
 and confined core properties:
```

```
    b = 190.00
    d = 2927.00
    d' = 13.00
    fcc (5A.2, TBDY) = 25.06158
      cc (5A.5, TBDY) = 0.00202463
         c = confinement factor = 1.00246
      1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
      2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
      v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
  su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
  u =   su (4.1) = 2.0296703E-006
-------------------------------------------------------------

Calculation of ratio lb/ld
-------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Mu1-
--------------------------------------------------------------------

--------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0532423E-006
Mu = 3.8401E+009
--------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu = 0.0035
       we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
     where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------------
       fx = 0.00
        af = 0.00
          b = 250.00
          h = 3000.00
        From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
          bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ----------------------------------------------------------------
       fy = 0.00
        af = 0.00
          b = 3000.00
          h = 250.00
        From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
          bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
```

```
     u,f = 0.015
     ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
       ase1 = 0.00
          sh_1 = 150.00
          bo_1 = 190.00
          ho_1 = 540.00
           bi2_1 = 655400.00
       ase2 = 0.00
          sh_2 = 150.00
          bo_2 = 190.00
          ho_2 = 540.00
           bi2_2 = 655400.00
       ase3 = 0 (grid does not provide confinement)
       psh,min = Min(psh,x , psh,y) = 0.00069813
   Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
     ------------------------------------------------------------------
       psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
          ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
             h1 = 600.00
             As1 = Astir1*ns1 = 157.0796
                No stirups, ns1 = 2.00
          ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
             h2 = 600.00
             As2 = Astir2*ns2 = 157.0796
                No stirups, ns2 = 2.00
          ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
             h3 = 1800.00
             As3 = Astir3*ns3 = 0.00
                No stirups, ns3 = 2.00
     ------------------------------------------------------------------
       psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
          ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
             h1 = 250.00
             As1 = Astir1*ns1 = 157.0796
                No stirups, ns1 = 2.00
          ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
             h2 = 250.00
             As2 = Astir2*ns2 = 157.0796
                No stirups, ns2 = 2.00
          ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
             h3 = 250.00
             As3 = Astir3*ns3 = 157.0796
                No stirups, ns3 = 0.00
     ------------------------------------------------------------------
       Asec = 750000.00
       s_1 = 150.00
       s_2 = 150.00
       s_3 = 200.00
     fywe = 625.00
     fce  = 25.00
   From ((5.A5), TBDY), TBDY:  cc = 0.00202463
       c  = confinement factor = 1.00246
 y1 = 0.00140044
 sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
 su1 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu1_nominal = 0.08,
   For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
   characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
```

with fs1 = fs = 350.1097
with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/lb,min = 0.30
su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs2 = fs = 350.1097
with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fsv = fs = 350.1097
with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
b = 190.00
d = 2927.00
d' = 13.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
u = su (4.1) = 2.0532423E-006
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
Calculation of Mu2+
---------------------------------------------------------------------

---------------------------------------------------------------------------------
Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
  φu = 2.0296703E-006
Mu = 3.3585E+009
---------------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  ν = 0.0014928
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: εcu = 0.0035
      ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
    where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -------------------------------------------------------------------
      ωfx = 0.00
       αf = 0.00
          b = 250.00
          h = 3000.00
       From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
          bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    -------------------------------------------------------------------
      ωfy = 0.00
       αf = 0.00
          b = 3000.00
          h = 250.00
       From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
          bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    -------------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       εu,f = 0.015
      αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
         αse1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
            ho_1 = 540.00
             Σbi2_1 = 655400.00
         αse2 = 0.00
            sh_2 = 150.00
            bo_2 = 190.00
            ho_2 = 540.00
             Σbi2_2 = 655400.00
      αse3 = 0 (grid does not provide confinement)
      ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
    Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
    -------------------------------------------------------------------
      ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
         ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
            h1 = 600.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ρs2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
            h2 = 600.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ρs3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
            h3 = 1800.00

```
              As3 = Astir3*ns3 = 0.00
                  No stirups, ns3 = 2.00
      --------------------------------------------------------------------
           psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
               ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                   h1 = 250.00
                   As1 = Astir1*ns1 = 157.0796
                       No stirups, ns1 = 2.00
               ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                   h2 = 250.00
                   As2 = Astir2*ns2 = 157.0796
                       No stirups, ns2 = 2.00
               ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                   h3 = 250.00
                   As3 = Astir3*ns3 = 157.0796
                       No stirups, ns3 = 0.00

      --------------------------------------------------------------------
            Asec =  750000.00
            s_1 =  150.00
            s_2 =  150.00
            s_3 =  200.00
          fywe =  625.00
           fce  =  25.00
        From ((5.A5), TBDY), TBDY:  cc = 0.00202463
            c  = confinement factor = 1.00246
   y1 = 0.00140044
   sh1 = 0.0044814
  ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
      su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu1_nominal = 0.08,
     For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
     characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs1 = fs = 350.1097
       with Es1 = Es = 200000.00
   y2 = 0.00140044
   sh2 = 0.0044814
  ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/lb,min = 0.30
      su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
     From table 5A.1, TBDY: esu2_nominal = 0.08,
     For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
     characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
   yv = 0.00140044
   shv = 0.0044814
  ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
      suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
```

From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
 with fsv = fs = 350.1097
 with Esv = Es = 200000.00
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
 2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
 v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c = confinement factor = 1.00246
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
 2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
 v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
 u =   su (4.1) = 2.0296703E-006
-----------------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
---------------------------------------------------------------------------
---------------------------------------------------------------------------
---------------------------------------------------------------------------
Calculation of Mu2-
---------------------------------------------------------------------------

---------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
 u = 2.0532423E-006
Mu = 3.8401E+009
---------------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
   N = 27588.841
 fc = 25.00
  co (5A.5, TBDY) = 0.002
 Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY:  cu = 0.0035
    we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
   where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
   ------------------------------------------------------------------
     fx = 0.00
     af = 0.00
       b = 250.00
       h = 3000.00
     From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
       bw = 250.00
     effective stress from (A.35), ff,e = 757.2164
   ------------------------------------------------------------------
     fy = 0.00

af = 0.00
  b = 3000.00
  h = 250.00
From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
  bw = 3000.00
effective stress from (A.35), ff,e = 954.4864

---------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
 u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
  ase1 = 0.00
    sh_1 = 150.00
    bo_1 = 190.00
    ho_1 = 540.00
     bi2_1 = 655400.00
  ase2 = 0.00
    sh_2 = 150.00
    bo_2 = 190.00
    ho_2 = 540.00
     bi2_2 = 655400.00
  ase3 = 0 (grid does not provide confinement)
psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

---------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
  ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
    h1 = 600.00
    As1 = Astir1*ns1 = 157.0796
     No stirups, ns1 = 2.00
  ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
    h2 = 600.00
    As2 = Astir2*ns2 = 157.0796
     No stirups, ns2 = 2.00
  ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
    h3 = 1800.00
    As3 = Astir3*ns3 = 0.00
     No stirups, ns3 = 2.00

---------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
  ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
    h1 = 250.00
    As1 = Astir1*ns1 = 157.0796
     No stirups, ns1 = 2.00
  ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
    h2 = 250.00
    As2 = Astir2*ns2 = 157.0796
     No stirups, ns2 = 2.00
  ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
    h3 = 250.00
    As3 = Astir3*ns3 = 157.0796
     No stirups, ns3 = 0.00

---------------------------------------------------------------

  Asec = 750000.00
  s_1 = 150.00
  s_2 = 150.00
  s_3 = 200.00
fywe = 625.00
fce = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
  c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317

fy1 = 350.1097
  su1 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu1_nominal = 0.08,
   For calculation of esu1_nominal and y1, sh1,ft1,fy1, it is considered
   characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
  su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
  suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
  2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
  v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
    c = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
   v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
 u =  su (4.1) = 2.0532423E-006

------------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 2.4900E+006
--------------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
--------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
--------------------------------------------------------------
   From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
   Mu/Vu-lw/2 = 0.00 <= 0
       = 1 (normal-weight concrete)
     fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
     h = 250.00
     d = 2400.00
     lw = 3000.00
     Mu = 1.1486927E-009
     Vu = 1.0097420E-028
     Nu = 27588.841
   From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
   Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
     d = 480.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
    Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
   Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
     d = 480.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
    Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
   Vs3 = 565486.678 is calculated for web, with:
     d = 1440.00
     Av = 157079.633
     s = 200.00
     fy = 500.00
    Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
    Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
      f = 0.95, for fully-wrapped sections
    wf/sf = 1 (FRP strips adjacent to one another).
   In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
   where   is the angle of the crack direction (see KANEPE).
   This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
   as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
   orientation 1:   1 = b1 + 90° = 90.00
   Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
   total thickness per orientation, tf1 = NL*t/NoDir = 1.016
   dfv = d (figure 11.2, ACI 440) = 2957.00
   ffe ((11-5), ACI 440) = 259.312
      Ef = 64828.00
       fe = 0.004, from (11.6a), ACI 440
         with  fu = 0.01
    From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
      bw = 250.00
--------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
--------------------------------------------------------------

NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+ φf*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
       λ = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00
    lw = 3000.00
    Mu = 1.1486927E-009
    Vu = 1.0097420E-028
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
  Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
    d = 1440.00
    Av = 157079.633
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
    φf = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sinβ + cosβ is replaced with (cotθ+cota)sina which is more a generalised expression,
  where θ is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf(θ, α), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions, θ=45° and θ=-45° to take into consideration the cyclic seismic loading.
  orientation 1:  α1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45, α1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 2957.00
  ffe ((11-5), ACI 440) = 259.312
     Ef = 64828.00
     εfe = 0.004, from (11.6a), ACI 440
       with εfu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
     bw = 250.00
-------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 3


-------------------------------------------------------------


Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 2
(Bending local axis: 3)
Section Type: rcrws

Constant Properties
-------------------------------------------------------------
Knowledge Factor, γ = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00

New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
################################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
################################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-------------------------------------------------------------

Stepwise Properties
-------------------------------------------------------------
At local axis: 2
EDGE -A-
Shear Force, Va = 1.7354940E-029
EDGE -B-
Shear Force, Vb = -1.7354940E-029
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
    -Compression: Asl,com = 2830.575
        -Middle: Asl,mid = 0.00
        (According to 10.7.2.3 Asl,mid is setted equal to zero)
-------------------------------------------------------------
-------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 0.15621236
Member Controlled by Flexure (Ve/Vr < 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 160017.271
with
Mpr1 = Max(Mu1+ , Mu1-) = 2.4003E+008
  Mu1+ = 2.0658E+008, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
  Mu1- = 2.4003E+008, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 2.4003E+008
  Mu2+ = 2.0658E+008, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination

Mu2- = 2.4003E+008, is the ultimate moment strength at the edge 2 of the member in the opposite moment direction which is defined for the the static loading combination

----------------------------------------------------------------------------
Calculation of Mu1+
----------------------------------------------------------------------------


----------------------------------------------------------------------------
Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
  φu = 3.0306889E-005
Mu = 2.0658E+008
----------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: εcu = 0.0035
      ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(αfx, αfy) = 0.00
    where αf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
      ----------------------------------------------------------------
      αfx = 0.00
       αf = 0.00
          b = 250.00
          h = 3000.00
       From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
          bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
      ----------------------------------------------------------------
      αfy = 0.00
       αf = 0.00
          b = 3000.00
          h = 250.00
       From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
          bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
      ----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        εu,f = 0.015
       αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
          αse1 = 0.00
             sh_1 = 150.00
             bo_1 = 190.00
             ho_1 = 540.00
              bi2_1 = 655400.00
          αse2 = 0.00
             sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
              bi2_2 = 655400.00
          αse3 = 0 (grid does not provide confinement)
       ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
    Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
      ----------------------------------------------------------------
       ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
          ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
             h1 = 600.00
             As1 = Astir1*ns1 = 157.0796

No stirups, ns1 = 2.00
ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
h2 = 600.00
As2 = Astir2*ns2 = 157.0796
No stirups, ns2 = 2.00
ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
h3 = 1800.00
As3 = Astir3*ns3 = 0.00
No stirups, ns3 = 2.00

---------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
h1 = 250.00
As1 = Astir1*ns1 = 157.0796
No stirups, ns1 = 2.00
ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
h2 = 250.00
As2 = Astir2*ns2 = 157.0796
No stirups, ns2 = 2.00
ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
h3 = 250.00
As3 = Astir3*ns3 = 157.0796
No stirups, ns3 = 0.00

---------------------------------------------------------------

Asec = 750000.00
s_1 = 150.00
s_2 = 150.00
s_3 = 200.00
fywe = 625.00
fce = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs1 = fs = 350.1097
with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/lb,min = 0.30
su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs2 = fs = 350.1097
with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317

fyv = 350.1097
     suv = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/ld = 0.30
        suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esuv_nominal = 0.08,
       considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
       For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
       characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fsv = fs = 350.1097
        with Esv = Es = 200000.00
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
     2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
     v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
     2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
     v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
  u =   su (4.1) = 3.0306889E-005
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Mu1-
--------------------------------------------------------------------

--------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0889637E-005
Mu = 2.4003E+008
--------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx,  fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------
      fx = 0.00
       af = 0.00

```
        b = 250.00
        h = 3000.00
     From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
        bw = 250.00
     effective stress from (A.35), ff,e = 757.2164
  ---------------------------------------------------------------
     fy = 0.00
     af = 0.00
        b = 3000.00
        h = 250.00
     From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
        bw = 3000.00
     effective stress from (A.35), ff,e = 954.4864
  ---------------------------------------------------------------
     R = 40.00
     Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
     fu,f = 1055.00
     Ef = 64828.00
      u,f = 0.015
     ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
        ase1 = 0.00
           sh_1 = 150.00
           bo_1 = 190.00
           ho_1 = 540.00
            bi2_1 = 655400.00
        ase2 = 0.00
           sh_2 = 150.00
           bo_2 = 190.00
           ho_2 = 540.00
            bi2_2 = 655400.00
        ase3 = 0 (grid does not provide confinement)
        psh,min = Min(psh,x , psh,y) = 0.00069813
     Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
  earthquake detailing (90° closed stirrups)
  ---------------------------------------------------------------
     psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
        ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
           h1 = 600.00
           As1 = Astir1*ns1 = 157.0796
              No stirups, ns1 = 2.00
        ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
           h2 = 600.00
           As2 = Astir2*ns2 = 157.0796
              No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
           h3 = 1800.00
           As3 = Astir3*ns3 = 0.00
              No stirups, ns3 = 2.00
  ---------------------------------------------------------------
     psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
           h1 = 250.00
           As1 = Astir1*ns1 = 157.0796
              No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
           h2 = 250.00
           As2 = Astir2*ns2 = 157.0796
              No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
           h3 = 250.00
           As3 = Astir3*ns3 = 157.0796
              No stirups, ns3 = 0.00
  ---------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
```

```
        fywe = 625.00
         fce  = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c  = confinement factor = 1.00246
   y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
   y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
   yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fsv = fs = 350.1097
     with Esv = Es = 200000.00
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
   2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
   v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
```

' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =   su (4.1) = 3.0889637E-005
--------------------------------------------------------------

Calculation of ratio lb/ld
--------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
Calculation of Mu2+
------------------------------------------------------------------------

------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
 u = 3.0306889E-005
Mu = 2.0658E+008
------------------------------------------------------------------------
with full section properties:
 b = 3000.00
 d = 208.00
 d' = 42.00
 v = 0.00176852
   N = 27588.841
 fc = 25.00
  co (5A.5, TBDY) = 0.002
 Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY:  cu = 0.0035
    we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
   where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
   ------------------------------------------------------------------
     fx = 0.00
      af = 0.00
        b = 250.00
        h = 3000.00
      From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
        bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
   ------------------------------------------------------------------
     fy = 0.00
      af = 0.00
        b = 3000.00
        h = 250.00
      From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
        bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864
   ------------------------------------------------------------------
     R = 40.00
     Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
     fu,f = 1055.00
     Ef = 64828.00
      u,f = 0.015
     ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
       ase1 = 0.00
          sh_1 = 150.00
          bo_1 = 190.00
          ho_1 = 540.00
           bi2_1 = 655400.00
       ase2 = 0.00
          sh_2 = 150.00
            bo_2 = 190.00

```
        ho_2 = 540.00
          bi2_2 = 655400.00
      ase3 = 0 (grid does not provide confinement)
      psh,min = Min(psh,x , psh,y) = 0.00069813
   Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
   ------------------------------------------------------------------
      psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
         ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
            h1 = 600.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
            h2 = 600.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
            h3 = 1800.00
            As3 = Astir3*ns3 = 0.00
               No stirups, ns3 = 2.00
   ------------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
         ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
            h1 = 250.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
            h2 = 250.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
            h3 = 250.00
            As3 = Astir3*ns3 = 157.0796
               No stirups, ns3 = 0.00
   ------------------------------------------------------------------
      Asec = 750000.00
      s_1 = 150.00
      s_2 = 150.00
      s_3 = 200.00
    fywe = 625.00
    fce  = 25.00
  From ((5.A5), TBDY), TBDY:  cc = 0.00202463
      c  = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs1 = fs = 350.1097
      with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
```

```
        lo/lou,min = lb/lb,min = 0.30
          su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu2_nominal = 0.08,
        For calculation of esu2_nominal and   y2, sh2,ft2,fy2, it is considered
        characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
         with fs2 = fs = 350.1097
         with Es2 = Es = 200000.00
     yv = 0.00140044
     shv = 0.0044814
   ftv = 420.1317
   fyv = 350.1097
     suv = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/ld = 0.30
         suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esuv_nominal = 0.08,
       considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
       For calculation of esuv_nominal and   yv, shv,ftv,fyv, it is considered
       characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
         with fsv = fs = 350.1097
         with Esv = Es = 200000.00
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
     2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
     v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
   b = 2940.00
   d = 178.00
   d' = 12.00
   fcc (5A.2, TBDY) = 25.06158
     cc (5A.5, TBDY) = 0.00202463
       c  = confinement factor = 1.00246
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
     2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
     v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
   u =    su (4.1) = 3.0306889E-005
-------------------------------------------------------------

Calculation of ratio lb/ld
-------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------------
--------------------------------------------------------------------------
--------------------------------------------------------------------------
Calculation of Mu2-
--------------------------------------------------------------------------

--------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
   u = 3.0889637E-005
Mu = 2.4003E+008
--------------------------------------------------------------------------
with full section properties:
   b = 3000.00
   d = 208.00
   d' = 42.00
   v = 0.00176852
```

N = 27588.841
fc = 25.00
  co (5A.5, TBDY) = 0.002
  Final value of cu: cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: cu = 0.0035
      we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
    where f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -----------------------------------------------------------------
      fx = 0.00
      af = 0.00
        b = 250.00
        h = 3000.00
      From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
        bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
    -----------------------------------------------------------------
      fy = 0.00
      af = 0.00
        b = 3000.00
        h = 250.00
      From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
        bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864
    -----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
        ase1 = 0.00
          sh_1 = 150.00
          bo_1 = 190.00
          ho_1 = 540.00
           bi2_1 = 655400.00
        ase2 = 0.00
          sh_2 = 150.00
          bo_2 = 190.00
          ho_2 = 540.00
           bi2_2 = 655400.00
      ase3 = 0 (grid does not provide confinement)
      psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
    -----------------------------------------------------------------
      psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
        ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
          h1 = 600.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
          h2 = 600.00
          As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
          h3 = 1800.00
          As3 = Astir3*ns3 = 0.00
            No stirups, ns3 = 2.00
    -----------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
          h1 = 250.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
          h2 = 250.00

```
        As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
            h3 = 250.00
            As3 = Astir3*ns3 = 157.0796
                No stirups, ns3 = 0.00
    -------------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
       fce = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fsv = fs = 350.1097
     with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
  2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
  v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
```

and confined core properties:
   b = 2940.00
   d = 178.00
   d' = 12.00
   fcc (5A.2, TBDY) = 25.06158
    cc (5A.5, TBDY) = 0.00202463
       c = confinement factor = 1.00246
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
     2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
     v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
  su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
  u =   su (4.1) = 3.0889637E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 1.0244E+006
--------------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
   From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
   Mu/Vu-lw/2 = 0.00 <= 0
       = 1 (normal-weight concrete)
     fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
     h = 3000.00
     d = 200.00
     lw = 250.00
     Mu = 3.7289358E-011
     Vu = 1.7354940E-029
     Nu = 27588.841
   From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
   Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
   Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.50
   Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
   Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.50
   Vs3 = 0.00 is calculated for web, with:
      d = 200.00
      Av = 0.00
      s = 200.00
      fy = 500.00
   Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.00

Vf ((11-3)-(11.4), ACI 440) = 109599.773
   f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
 In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
 where   is the angle of the crack direction (see KANEPE).
 This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
 as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
 orientation 1:   1 = b1 + 90° = 90.00
 Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
 total thickness per orientation, tf1 = NL*t/NoDir = 1.016
 dfv = d (figure 11.2, ACI 440) = 208.00
 ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
      with   fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
--------------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
   f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
 In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
 where   is the angle of the crack direction (see KANEPE).
 This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
 as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
 orientation 1:   1 = b1 + 90° = 90.00
 Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
 total thickness per orientation, tf1 = NL*t/NoDir = 1.016
 dfv = d (figure 11.2, ACI 440) = 208.00

ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
       with  fu = 0.01
   From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
--------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 2


--------------------------------------------------------------


Start Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (d)
Section Type: rcrws

Constant Properties
--------------------------------------------------------------
Knowledge Factor,   = 1.00
According to 10.7.2.3, ASCE 41-17, shear walls with
transverse reinforcement percentage,   n < 0.0015
are considered Force-Controlled and lower-bound strengths are used according to 7.5.1.3, ASCE 41-17
  n = 0.00069813
------------------------------------------------------------------------------------
with   n = ps1 + ps2 + ps3, being the shear reinf. ratio in a plane perpedicular to the shear axis 2
 (pseudo-col.1 ps1 = As1*b1/s1 = (As1*h1/s1) / Ac = 0.00034907
         h1 = 250.00
         s1 = 150.00
         total area of hoops perpedicular to shear axis, As1 = 157.0796
 (pseudo-col.2 ps2 = As2*b2/s2 = (As2*h2/s2) / Ac = 0.00034907
         h2 = 250.00
         s2 = 150.00
         total area of hoops perpedicular to shear axis, As2 = 157.0796
 (grid      ps3 = As3*b3/s3 = (As3*h3/s3) / Ac = 0.00
         h3 = 250.00
         s3 = 200.00
         total area of hoops perpedicular to shear axis, As3 = 0.00
  total section area, Ac = 750000.00
------------------------------------------------------------------------------------
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°

Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-----------------------------------------------------------

Stepwise Properties
-----------------------------------------------------------
Bending Moment, M = -6.0084169E-011
Shear Force, V2 = 2.0402016E-014
Shear Force, V3 = 32914.791
Axial Force, F = -33005.924
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
      -Compression: Asl,com = 2830.575
         -Middle: Asl,mid = 1608.495
Mean Diameter of Tension Reinforcement, DbL = 16.46154
-----------------------------------------------------------
-----------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final chord rotation Capacity   u,R = 1.0*  u = 0.00318826
   u =    y +    p = 0.00318826


-----------------------------------------------------------
  - Calculation of   y -
-----------------------------------------------------------
  y = (My*lp)/(EI)Eff = 0.00118826 ((10-5), ASCE 41-17))
   My = 1.8276E+008
   (EI)Eff = 0.35*Ec*I (table 10-5)
    Ec*I = 1.0547E+014
   lp = 0.5*d = 0.5*(0.8*h) = 240.00
-----------------------------------------------------------
-----------------------------------------------------------

Calculation of Yielding Moment My
-----------------------------------------------------------
Calculation of   y and My according to Annex 7   -
-----------------------------------------------------------
  y = Min(  y_ten,  y_com)
  y_ten = 8.9802449E-006
  with ((10.1), ASCE 41-17) fy = Min(fy, 1.25*fy*(lb/ld)^2/3) = 280.0878
     d = 208.00
      y = 0.25025656
     A = 0.01183892
     B = 0.00719009
      with pt = 0.00453618
         pc = 0.00453618
         pv = 0.00257772
         N = 33005.924
         b = 3000.00
          " = 0.20192308
  y_comp = 3.2313175E-005
  with fc* (12.3, (ACI 440)) = 25.002
     fc = 25.00
     fl = 0.17503396
     b = 3000.00
     h = 250.00
     Ag = 750000.00
     From (12.9), ACI 440: ka = 0.0036426
         g = pt + pc + pv = 0.01165007
       rc = 40.00
       Ae/Ac = 0.52453487
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
     effective strain from (12.5) and (12.12), efe = 0.004
      fu = 0.01

```
    Ef = 64828.00
    Ec = 26999.444
     y = 0.24799872
    A = 0.01149141
    B = 0.00700125
     with Es = 200000.00
```

-----------------------------------------------------------
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30


-----------------------------------------------------------
 - Calculation of   p -
-----------------------------------------------------------
Considering wall controlled by flexure (shear control ratio <= 1),
from table 10-19:   p = 0.002
with:
 - Condition i (shear wall and wall segments)
 - (As-As')*fy+P)/(tw*lw*fc') = -0.19209689
     As = 0.00
     As' = 7269.645
     fy = 500.00
     P = 33005.924
     tw = 3000.00
     lw = 250.00
     fc = 25.00
 - V/(tw*lw*fc^0.5) = 6.5518667E-020, NOTE: units in lb & in
 - Confined Boundary: No
   Boundary hoops spacing exceed 8db (s1 > 8*db or s2 > 8*db )
   Boundary Trans. Reinf. does not exceed 50% of ACI 318 provision (Vw1 + Vw2 > 0.50*(V-Vc-Vw3)
   With
   Boundary Element 1:
    Vw1 = 104719.755
    s1 = 150.00
   Boundary Element 2:
    Vw2 = 104719.755
    s2 = 150.00
   Grid Shear Force, Vw3 = 0.00
   Concrete Shear Force, Vc = 177063.805
(The variables above have already been given in Shear control ratio calculation)
    Mean diameter of all bars, db = 17.33333
    Design Shear Force, V = 2.0402016E-014


-----------------------------------------------------------
End Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (d)


-----------------------------------------------------------

## Calculation No. 9
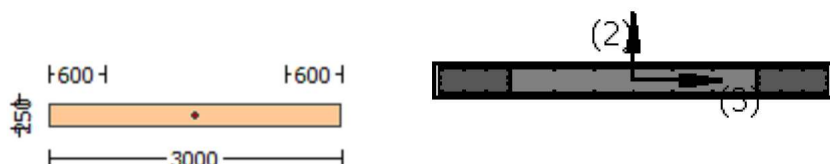
wall W1, Floor 1

Limit State: Life Safety (data interpolation between analysis steps 1 and 2)

Analysis: Uniform + X

Check: Shear capacity VRd

Edge: Start

Local Axis: (2)



Start Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------------
Knowledge Factor,    = 1.00
Member Shear Force is generally considered as Force-Controlled Action according to Table C7-1, ASCE 41-17.
Lower-bound strengths are used for Force-Controlled Actions according to 7.5.1.3, ASCE 41-17
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min =lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-----------------------------------------------------------------

Stepwise Properties
-------------------------------------------------------------
EDGE -A-
Bending Moment, Ma = -1.6039204E-011
Shear Force, Va = -1.2948432E-014
EDGE -B-
Bending Moment, Mb = -2.4510145E-011
Shear Force, Vb = 1.2948432E-014
BOTH EDGES
Axial Force, F = -31026.87
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
      -Compression: Asl,com = 2830.575
         -Middle: Asl,mid = 1608.495
Mean Diameter of Tension Reinforcement, DbL,ten = 16.46154
-------------------------------------------------------------
-------------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final Shear Capacity VR = 1.0*Vn = 427297.088
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vn < 0.83*fc'^0.5*h*d = 427297.088
-------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 218457.549
  Mu/Vu-lw/2 = 1113.699 > 0
       = 1 (normal-weight concrete)
     fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
     h = 3000.00
     d = 200.00
     lw = 250.00
     Mu = 1.6039204E-011
     Vu = 1.2948432E-014
     Nu = 31026.87
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
   Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
   Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
     d = 200.00
     Av = 0.00
     s = 200.00
     fy = 500.00
   Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
   Vf ((11-3)-(11.4), ACI 440) = 109599.773
     f = 0.95, for fully-wrapped sections
   wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
   where is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,

as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 208.00
ffe ((11-5), ACI 440) = 259.312
   Ef = 64828.00
    fe = 0.004, from (11.6a), ACI 440
      with fu = 0.01
 From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
----------------------------------------------------------------
End Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)


----------------------------------------------------------------

# Calculation No. 10

wall W1, Floor 1

Limit State: Life Safety (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Chord rotation capacity ( u)

Edge: Start

Local Axis: (2)



Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 3
(Bending local axis: 2)
Section Type: rcrws

Constant Properties
----------------------------------------------------------------
Knowledge Factor, = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444

Steel Elasticity, Es = 200000.00
##############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
##############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
---------------------------------------------------------------

Stepwise Properties
---------------------------------------------------------------
At local axis: 3
EDGE -A-
Shear Force, Va = 1.0097420E-028
EDGE -B-
Shear Force, Vb = -1.0097420E-028
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
       -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
       -Tension: Asl,ten = 2865.133
     -Compression: Asl,com = 2865.133
       -Middle: Asl,mid = 0.00
       (According to 10.7.2.3 Asl,mid is setted equal to zero)
---------------------------------------------------------------
---------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 1.02813
Member Controlled by Shear (Ve/Vr > 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 2.5600E+006
with
Mpr1 = Max(Mu1+ , Mu1-) = 3.8401E+009
   Mu1+ = 3.3585E+009, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
   Mu1- = 3.8401E+009, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 3.8401E+009
   Mu2+ = 3.3585E+009, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
   Mu2- = 3.8401E+009, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination

---------------------------------------------------------------------
Calculation of Mu1+
---------------------------------------------------------------------


---------------------------------------------------------------------
Calculation of ultimate curvature $\phi u$ according to 4.1, Biskinis/Fardis 2013:
$\phi u$ = 2.0296703E-006
Mu = 3.3585E+009
---------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  $\nu$ = 0.0014928
    N = 27588.841
  fc = 25.00
   $\varepsilon co$ (5A.5, TBDY) = 0.002
  Final value of $\varepsilon cu$: $\varepsilon cu$* = shear_factor * Max($\varepsilon cu$, $\varepsilon cc$) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: $\varepsilon cu$ = 0.0035
      $\omega we$ ((5.4c), TBDY) = $\alpha se$* $\rho sh,min$*fywe/fce+Min($\omega fx$, $\omega fy$) = 0.00
    where $\omega f$ = $\alpha f$*$\rho f$*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -----------------------------------------------------------------
      $\omega fx$ = 0.00
       $\alpha f$ = 0.00
          b = 250.00
          h = 3000.00
        From EC8 A.4.4.3(6), $\rho f$ = 2tf/bw = 0.008128
          bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
    -----------------------------------------------------------------
      $\omega fy$ = 0.00
       $\alpha f$ = 0.00
          b = 3000.00
          h = 250.00
        From EC8 A.4.4.3(6), $\rho f$ = 2tf/bw = 0.00067733
          bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
    -----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       $\varepsilon u,f$ = 0.015
      $\alpha se$ ((5.4d), TBDY) = ($\alpha se1$*Acol1+$\alpha se2$*Acol2+$\alpha se3$*Aweb)/Asec = 0.00
        $\alpha se1$ = 0.00
           sh_1 = 150.00
           bo_1 = 190.00
           ho_1 = 540.00
            $\Sigma bi2\_1$ = 655400.00
        $\alpha se2$ = 0.00
          sh_2 = 150.00
           bo_2 = 190.00
           ho_2 = 540.00
            $\Sigma bi2\_2$ = 655400.00
      $\alpha se3$ = 0 (grid does not provide confinement)
      $\rho sh,min$ = Min($\rho sh,x$ , $\rho sh,y$) = 0.00069813
    Expression ((5.4d), TBDY) for $\rho sh,min$ has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
    -----------------------------------------------------------------
      $\rho sh,x$ = $\rho s1,x$+$\rho s2,x$+$\rho s3,x$ = 0.00356047
        $\rho s1,x$ (column 1) = (As1*h1/s_1)/Ac = 0.00083776
           h1 = 600.00
           As1 = Astir1*ns1 = 157.0796
             No stirups, ns1 = 2.00
        $\rho s2,x$ (column 2) = (As2*h2/s_2)/Ac = 0.00083776

```
                    h2 = 600.00
                    As2 = Astir2*ns2 = 157.0796
                       No stirups, ns2 = 2.00
                  ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                       h3 = 1800.00
                       As3 = Astir3*ns3 = 0.00
                          No stirups, ns3 = 2.00
          -------------------------------------------------------------------
             psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
                ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                    h1 = 250.00
                    As1 = Astir1*ns1 = 157.0796
                       No stirups, ns1 = 2.00
                  ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                    h2 = 250.00
                    As2 = Astir2*ns2 = 157.0796
                       No stirups, ns2 = 2.00
                  ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                    h3 = 250.00
                    As3 = Astir3*ns3 = 157.0796
                       No stirups, ns3 = 0.00
          -------------------------------------------------------------------
             Asec = 750000.00
             s_1 = 150.00
             s_2 = 150.00
             s_3 = 200.00
          fywe = 625.00
          fce  = 25.00
     From ((5.A5), TBDY), TBDY:  cc = 0.00202463
          c  = confinement factor = 1.00246
    y1 = 0.00140044
    sh1 = 0.0044814
   ft1 = 420.1317
  fy1 = 350.1097
    su1 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/ld = 0.30
       su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esu1_nominal = 0.08,
      For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
      characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs1 = fs = 350.1097
       with Es1 = Es = 200000.00
    y2 = 0.00140044
    sh2 = 0.0044814
   ft2 = 420.1317
  fy2 = 350.1097
    su2 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/lb,min = 0.30
       su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esu2_nominal = 0.08,
      For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
      characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
    yv = 0.00140044
    shv = 0.0044814
   ftv = 420.1317
  fyv = 350.1097
    suv = 0.00512
```

using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
 suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
 with fsv = fs = 350.1097
 with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
 cc (5A.5, TBDY) = 0.00202463
 c = confinement factor = 1.00246
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
 2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
 v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
 u =  su (4.1) = 2.0296703E-006
-------------------------------------------------------------

Calculation of ratio lb/ld
-------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------------
--------------------------------------------------------------------------
--------------------------------------------------------------------------
Calculation of Mu1-
--------------------------------------------------------------------------

--------------------------------------------------------------------------
Calculation of ultimate curvature  u according to 4.1, Biskinis/Fardis 2013:
 u = 2.0532423E-006
Mu = 3.8401E+009
--------------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
 N = 27588.841
 fc = 25.00
 co (5A.5, TBDY) = 0.002
 Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
 The Shear_factor is considered equal to 1 (pure moment strength)
 From (5.4b), TBDY: cu = 0.0035
 we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
where  f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
 -------------------------------------------------------------------
 fx = 0.00
 af = 0.00
 b = 250.00
 h = 3000.00

From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
  bw = 250.00
effective stress from (A.35), ff,e = 757.2164

--------------------------------------------------------------

fy = 0.00
af = 0.00
  b = 3000.00
  h = 250.00
From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
  bw = 3000.00
effective stress from (A.35), ff,e = 954.4864

--------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
 u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
  ase1 = 0.00
    sh_1 = 150.00
    bo_1 = 190.00
    ho_1 = 540.00
     bi2_1 = 655400.00
  ase2 = 0.00
    sh_2 = 150.00
    bo_2 = 190.00
    ho_2 = 540.00
     bi2_2 = 655400.00
  ase3 = 0 (grid does not provide confinement)
  psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

--------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
  ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
    h1 = 600.00
    As1 = Astir1*ns1 = 157.0796
     No stirups, ns1 = 2.00
  ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
    h2 = 600.00
    As2 = Astir2*ns2 = 157.0796
     No stirups, ns2 = 2.00
  ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
    h3 = 1800.00
    As3 = Astir3*ns3 = 0.00
     No stirups, ns3 = 2.00

--------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
  ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
    h1 = 250.00
    As1 = Astir1*ns1 = 157.0796
     No stirups, ns1 = 2.00
  ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
    h2 = 250.00
    As2 = Astir2*ns2 = 157.0796
     No stirups, ns2 = 2.00
  ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
    h3 = 250.00
    As3 = Astir3*ns3 = 157.0796
     No stirups, ns3 = 0.00

--------------------------------------------------------------

  Asec = 750000.00
  s_1 = 150.00
  s_2 = 150.00
  s_3 = 200.00
fywe = 625.00
fce = 25.00

From ((5.A5), TBDY), TBDY:  cc = 0.00202463
      c  = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fsv = fs = 350.1097
     with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
  2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
  v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
  2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
  v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->

v < vs,y2 - LHS eq.(4.5) is satisfied
--->
  su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
  u =   su (4.1) = 2.0532423E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
Calculation of Mu2+
-----------------------------------------------------------------------

-----------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0296703E-006
Mu = 3.3585E+009
-----------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu,  cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -----------------------------------------------------------------
      fx = 0.00
       af = 0.00
         b = 250.00
         h = 3000.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
         bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    -----------------------------------------------------------------
      fy = 0.00
       af = 0.00
         b = 3000.00
         h = 250.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
         bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    -----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        u,f = 0.015
       ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
         ase1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
            ho_1 = 540.00
             bi2_1 = 655400.00
         ase2 = 0.00
           sh_2 = 150.00
            bo_2 = 190.00
            ho_2 = 540.00
             bi2_2 = 655400.00

```
        ase3 = 0 (grid does not provide confinement)
        psh,min = Min(psh,x , psh,y) = 0.00069813
     Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
        ------------------------------------------------------------------
        psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
           ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
              h1 = 600.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
              h2 = 600.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
              h3 = 1800.00
              As3 = Astir3*ns3 = 0.00
                 No stirups, ns3 = 2.00
        ------------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
           ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
              h1 = 250.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
              h2 = 250.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
        ------------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
      fce  = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c = confinement factor = 1.00246
   y1 = 0.00140044
   sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
   y2 = 0.00140044
   sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
```

From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
 yv = 0.00140044
 shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
 suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
   suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
   y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
  2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
  v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
  2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
  v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
 u =   su (4.1) = 2.0296703E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Mu2-
--------------------------------------------------------------------

--------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
 u = 2.0532423E-006
Mu = 3.8401E+009
--------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
   N = 27588.841
 fc = 25.00

co (5A.5, TBDY) = 0.002
Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
   where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
------------------------------------------------------------------
   fx = 0.00
    af = 0.00
       b = 250.00
       h = 3000.00
    From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
       bw = 250.00
    effective stress from (A.35), ff,e = 757.2164
------------------------------------------------------------------
   fy = 0.00
    af = 0.00
       b = 3000.00
       h = 250.00
    From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
       bw = 3000.00
    effective stress from (A.35), ff,e = 954.4864
------------------------------------------------------------------
   R = 40.00
   Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
   fu,f = 1055.00
   Ef = 64828.00
    u,f = 0.015
   ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
      ase1 = 0.00
         sh_1 = 150.00
         bo_1 = 190.00
         ho_1 = 540.00
          bi2_1 = 655400.00
      ase2 = 0.00
         sh_2 = 150.00
         bo_2 = 190.00
         ho_2 = 540.00
          bi2_2 = 655400.00
      ase3 = 0 (grid does not provide confinement)
      psh,min = Min(psh,x , psh,y) = 0.00069813
   Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
------------------------------------------------------------------
   psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
      ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
         h1 = 600.00
         As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
      ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
         h2 = 600.00
         As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
      ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
         h3 = 1800.00
         As3 = Astir3*ns3 = 0.00
            No stirups, ns3 = 2.00
------------------------------------------------------------------
   psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
      ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
         h1 = 250.00
         As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
      ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
         h2 = 250.00
         As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00

```
            ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                h3 = 250.00
                As3 = Astir3*ns3 = 157.0796
                    No stirups, ns3 = 0.00
        ----------------------------------------------------------------
                Asec = 750000.00
                s_1 = 150.00
                s_2 = 150.00
                s_3 = 200.00
            fywe = 625.00
            fce  = 25.00
        From ((5.A5), TBDY), TBDY:  cc = 0.00202463
            c  = confinement factor = 1.00246
    y1 = 0.00140044
    sh1 = 0.0044814
   ft1 = 420.1317
   fy1 = 350.1097
    su1 = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/ld = 0.30
         su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu1_nominal = 0.08,
        For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
        characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
          with fs1 = fs = 350.1097
          with Es1 = Es = 200000.00
    y2 = 0.00140044
    sh2 = 0.0044814
   ft2 = 420.1317
   fy2 = 350.1097
    su2 = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/lb,min = 0.30
         su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu2_nominal = 0.08,
        For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
        characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
          with fs2 = fs = 350.1097
          with Es2 = Es = 200000.00
    yv = 0.00140044
    shv = 0.0044814
   ftv = 420.1317
   fyv = 350.1097
    suv = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/ld = 0.30
         suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esuv_nominal = 0.08,
        considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
        For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
        characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
          with fsv = fs = 350.1097
          with Esv = Es = 200000.00
     1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
     2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
     v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
  b = 190.00
```

d = 2927.00
    d' = 13.00
    fcc (5A.2, TBDY) = 25.06158
     cc (5A.5, TBDY) = 0.00202463
        c = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
    v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
 u =   su (4.1) = 2.0532423E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
---------------------------------------------------------------------------
---------------------------------------------------------------------------
---------------------------------------------------------------------------
---------------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 2.4900E+006
---------------------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
     = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00
    lw = 3000.00
    Mu = 1.1486927E-009
    Vu = 1.0097420E-028
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
  Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
    d = 1440.00
    Av = 157079.633
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).

This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
orientation 1:  1 = b1 + 90° = 90.00
Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
   Ef = 64828.00
    fe = 0.004, from (11.6a), ACI 440
      with  fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 250.00
----------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
----------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00
    lw = 3000.00
    Mu = 1.1486927E-009
    Vu = 1.0097420E-028
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
  Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
   Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
   Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
    d = 1440.00
    Av = 157079.633
    s = 200.00
    fy = 500.00
   Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
   Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
    f = 0.95, for fully-wrapped sections
   wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot  +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:  1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 2957.00
  ffe ((11-5), ACI 440) = 259.312
     Ef = 64828.00
      fe = 0.004, from (11.6a), ACI 440
        with  fu = 0.01
    From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
      bw = 250.00
----------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1

At local axis: 3

------------------------------------------------------------

Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 2
(Bending local axis: 3)
Section Type: rcrws

Constant Properties
------------------------------------------------------------
Knowledge Factor,    = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
At local axis: 2
EDGE -A-
Shear Force, Va = 1.7354940E-029
EDGE -B-
Shear Force, Vb = -1.7354940E-029
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
    -Compression: Asl,com = 2830.575
        -Middle: Asl,mid = 0.00
        (According to 10.7.2.3 Asl,mid is setted equal to zero)

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```
-----------------------------------------------------------------
-----------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr  =  0.15621236
Member Controlled by Flexure (Ve/Vr < 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 160017.271
with
Mpr1 =  Max(Mu1+ , Mu1-) =  2.4003E+008
   Mu1+ = 2.0658E+008, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
   Mu1- = 2.4003E+008, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 =  Max(Mu2+ , Mu2-) = 2.4003E+008
   Mu2+ = 2.0658E+008, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
   Mu2- = 2.4003E+008, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination


----------------------------------------------------------------------------
Calculation of Mu1+
----------------------------------------------------------------------------


----------------------------------------------------------------------------
Calculation of ultimate curvature   φu according to 4.1, Biskinis/Fardis 2013:
  φu = 3.0306889E-005
Mu = 2.0658E+008
----------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of  εcu:  εcu* = shear_factor * Max( εcu, εcc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  εcu = 0.0035
       ωwe ((5.4c), TBDY) = ρse* εsh,min*fywe/fce+Min( εfx,  εfy) = 0.00
     where   εf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------------
        εfx = 0.00
        αf = 0.00
          b = 250.00
          h = 3000.00
        From EC8 A4.4.3(6), ρf = 2tf/bw = 0.008128
          bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ----------------------------------------------------------------
        εfy = 0.00
        αf = 0.00
          b = 3000.00
          h = 250.00
        From EC8 A4.4.3(6), ρf = 2tf/bw = 0.00067733
          bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ----------------------------------------------------------------
        R = 40.00
        Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
        fu,f = 1055.00
        Ef = 64828.00
         εu,f = 0.015
        ρse ((5.4d), TBDY) = (ρse1*Acol1+ρse2*Acol2+ρse3*Aweb)/Asec = 0.00
          ρse1 = 0.00
             sh_1 = 150.00
             bo_1 = 190.00
```

```
                ho_1 = 540.00
                  bi2_1 = 655400.00
            ase2 = 0.00
               sh_2 = 150.00
                  bo_2 = 190.00
                  ho_2 = 540.00
                   bi2_2 = 655400.00
            ase3 = 0 (grid does not provide confinement)
            psh,min = Min(psh,x , psh,y) = 0.00069813
       Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
   earthquake detailing (90° closed stirrups)
        -----------------------------------------------------------------
        psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
           ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
              h1 = 600.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
              h2 = 600.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
              h3 = 1800.00
              As3 = Astir3*ns3 = 0.00
                 No stirups, ns3 = 2.00
        -----------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
           ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
              h1 = 250.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
              h2 = 250.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
        -----------------------------------------------------------------
           Asec = 750000.00
           s_1 = 150.00
           s_2 = 150.00
           s_3 = 200.00
        fywe = 625.00
        fce  = 25.00
      From ((5.A5), TBDY, TBDY:  cc = 0.00202463
           c  = confinement factor = 1.00246
     y1 = 0.00140044
     sh1 = 0.0044814
    ft1 = 420.1317
   fy1 = 350.1097
    su1 = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/ld = 0.30
        su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esu1_nominal = 0.08,
       For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
       characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fs1 = fs = 350.1097
        with Es1 = Es = 200000.00
     y2 = 0.00140044
     sh2 = 0.0044814
    ft2 = 420.1317
```

fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs2 = fs = 350.1097
      with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fsv = fs = 350.1097
      with Esv = Es = 200000.00
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
   2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
  u =   su (4.1) = 3.0306889E-005
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------------
-------------------------------------------------------------------
-------------------------------------------------------------------
Calculation of Mu1-
-------------------------------------------------------------------

-------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0889637E-005
Mu = 2.4003E+008
-------------------------------------------------------------------

with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of cu: $cu^* = shear\_factor * Max(cu, cc) = 0.0035$
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: cu = 0.0035
      we ((5.4c), TBDY) = $ase^* sh,min*fywe/fce + Min(fx, fy) = 0.00$
    where f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      fx = 0.00
       af = 0.00
         b = 250.00
         h = 3000.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
         bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      fy = 0.00
       af = 0.00
         b = 3000.00
         h = 250.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
         bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    ----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        u,f = 0.015
       ase ((5.4d), TBDY) = (ase1*Acol1 + ase2*Acol2 + ase3*Aweb)/Asec = 0.00
         ase1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
            ho_1 = 540.00
             bi2_1 = 655400.00
         ase2 = 0.00
           sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
              bi2_2 = 655400.00
         ase3 = 0 (grid does not provide confinement)
         psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
    ----------------------------------------------------------------
         psh,x = ps1,x + ps2,x + ps3,x = 0.00356047
           ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
              h1 = 600.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
              h2 = 600.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
              h3 = 1800.00
              As3 = Astir3*ns3 = 0.00
                 No stirups, ns3 = 2.00
    ----------------------------------------------------------------
         psh,y = ps1,y + ps2,y + ps3,y = 0.00069813
           ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907

```
                h1 = 250.00
                As1 = Astir1*ns1 = 157.0796
                   No stirups, ns1 = 2.00
             ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                h2 = 250.00
                As2 = Astir2*ns2 = 157.0796
                   No stirups, ns2 = 2.00
             ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                h3 = 250.00
                As3 = Astir3*ns3 = 157.0796
                   No stirups, ns3 = 0.00
         -------------------------------------------------------------------
             Asec = 750000.00
             s_1 = 150.00
             s_2 = 150.00
             s_3 = 200.00
           fywe = 625.00
           fce  = 25.00
         From ((5.A5), TBDY),  TBDY:  cc = 0.00202463
             c  = confinement factor = 1.00246
      y1 = 0.00140044
     sh1 = 0.0044814
    ft1 = 420.1317
    fy1 = 350.1097
     su1 = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/ld = 0.30
         su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu1_nominal = 0.08,
        For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
        characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
          with fs1 = fs = 350.1097
          with Es1 = Es = 200000.00
      y2 = 0.00140044
     sh2 = 0.0044814
    ft2 = 420.1317
    fy2 = 350.1097
     su2 = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/lb,min = 0.30
         su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu2_nominal = 0.08,
        For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
        characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
          with fs2 = fs = 350.1097
          with Es2 = Es = 200000.00
      yv = 0.00140044
     shv = 0.0044814
    ftv = 420.1317
    fyv = 350.1097
     suv = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/ld = 0.30
         suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esuv_nominal = 0.08,
        considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
        For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
        characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
```

with fsv = fs = 350.1097
with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
b = 2940.00
d = 178.00
d' = 12.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
u = su (4.1) = 3.0889637E-005
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------------------
-------------------------------------------------------------------------
-------------------------------------------------------------------------
Calculation of Mu2+
-------------------------------------------------------------------------

-------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
u = 3.0306889E-005
Mu = 2.0658E+008
-------------------------------------------------------------------------
with full section properties:
b = 3000.00
d = 208.00
d' = 42.00
v = 0.00176852
N = 27588.841
fc = 25.00
co (5A.5, TBDY) = 0.002
Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
The Shear_factor is considered equal to 1 (pure moment strength)
From (5.4b), TBDY:  cu = 0.0035
we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx,  fy) = 0.00
where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
----------------------------------------------------------------
fx = 0.00
af = 0.00
b = 250.00
h = 3000.00
From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
bw = 250.00
effective stress from (A.35), ff,e = 757.2164
----------------------------------------------------------------
fy = 0.00
af = 0.00
b = 3000.00
h = 250.00
From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
bw = 3000.00

effective stress from (A.35), ff,e = 954.4864

---------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
 u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
  ase1 = 0.00
   sh_1 = 150.00
   bo_1 = 190.00
   ho_1 = 540.00
    bi2_1 = 655400.00
  ase2 = 0.00
   sh_2 = 150.00
   bo_2 = 190.00
   ho_2 = 540.00
    bi2_2 = 655400.00
  ase3 = 0 (grid does not provide confinement)
  psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

---------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
  ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
   h1 = 600.00
   As1 = Astir1*ns1 = 157.0796
    No stirups, ns1 = 2.00
  ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
   h2 = 600.00
   As2 = Astir2*ns2 = 157.0796
    No stirups, ns2 = 2.00
  ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
   h3 = 1800.00
   As3 = Astir3*ns3 = 0.00
    No stirups, ns3 = 2.00

---------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
  ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
   h1 = 250.00
   As1 = Astir1*ns1 = 157.0796
    No stirups, ns1 = 2.00
  ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
   h2 = 250.00
   As2 = Astir2*ns2 = 157.0796
    No stirups, ns2 = 2.00
  ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
   h3 = 250.00
   As3 = Astir3*ns3 = 157.0796
    No stirups, ns3 = 0.00

---------------------------------------------------------------

  Asec = 750000.00
  s_1 = 150.00
  s_2 = 150.00
  s_3 = 200.00
fywe = 625.00
fce = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
  c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00

lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs1 = fs = 350.1097
  with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
b = 2940.00
d = 178.00
d' = 12.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
  c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
u = su (4.1) = 3.0306889E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30

---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
Calculation of Mu2-
---------------------------------------------------------------------

---------------------------------------------------------------------
Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
  φu = 3.0889637E-005
Mu = 2.4003E+008
---------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: εcu = 0.0035
      ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
    where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -----------------------------------------------------------------
      ωfx = 0.00
       αf = 0.00
         b = 250.00
         h = 3000.00
       From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
         bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    -----------------------------------------------------------------
      ωfy = 0.00
       αf = 0.00
         b = 3000.00
         h = 250.00
       From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
         bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    -----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       εu,f = 0.015
      αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
        αse1 = 0.00
           sh_1 = 150.00
           bo_1 = 190.00
           ho_1 = 540.00
            Σbi2_1 = 655400.00
        αse2 = 0.00
           sh_2 = 150.00
           bo_2 = 190.00
           ho_2 = 540.00
            Σbi2_2 = 655400.00
        αse3 = 0 (grid does not provide confinement)
      ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
    Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
    -----------------------------------------------------------------
      ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
        ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
           h1 = 600.00
           As1 = Astir1*ns1 = 157.0796
             No stirups, ns1 = 2.00

```
          ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
              h2 = 600.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
          ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
              h3 = 1800.00
              As3 = Astir3*ns3 = 0.00
                 No stirups, ns3 = 2.00
     -------------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
          ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
              h1 = 250.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
          ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
              h2 = 250.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
          ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
     -------------------------------------------------------------------
          Asec = 750000.00
          s_1 = 150.00
          s_2 = 150.00
          s_3 = 200.00
        fywe = 625.00
        fce  = 25.00
     From ((5.A5), TBDY),  TBDY:  cc = 0.00202463
          c  = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1,  sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2,  sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
```

suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and   yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
  2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
  v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =   su (4.1) = 3.0889637E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------
------------------------------------------------------------------
------------------------------------------------------------------
------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 1.0244E+006
------------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
    = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00

Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
 Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
 Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
 Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
 Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
 Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
   wf/sf = 1 (FRP strips adjacent to one another).
 In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
 where   is the angle of the crack direction (see KANEPE).
 This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
 as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
 orientation 1:  1 = b1 + 90° = 90.00
 Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
 total thickness per orientation, tf1 = NL*t/NoDir = 1.016
 dfv = d (figure 11.2, ACI 440) = 208.00
 ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
       with  fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
----------------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
-------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
 Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
 Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
 Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
 Vs3 = 0.00 is calculated for web, with:
    d = 200.00

Av = 0.00
       s = 200.00
      fy = 500.00
   Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.00
   Vf ((11-3)-(11.4), ACI 440) = 109599.773
      f = 0.95, for fully-wrapped sections
    wf/sf = 1 (FRP strips adjacent to one another).
   In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
   where   is the angle of the crack direction (see KANEPE).
   This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
   as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
   orientation 1:  1 = b1 + 90° = 90.00
   Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
   total thickness per orientation, tf1 = NL*t/NoDir = 1.016
   dfv = d (figure 11.2, ACI 440) = 208.00
   ffe ((11-5), ACI 440) = 259.312
      Ef = 64828.00
       fe = 0.004, from (11.6a), ACI 440
        with  fu = 0.01
   From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
      bw = 3000.00
-------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 2


-------------------------------------------------------------



Start Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)
Section Type: rcrws

Constant Properties
-------------------------------------------------------------
Knowledge Factor,   = 1.00
According to 10.7.2.3, ASCE 41-17, shear walls with
transverse reinforcement percentage,   n < 0.0015
are considered Force-Controlled and lower-bound strengths are used according to 7.5.1.3, ASCE 41-17
  n = 0.00069813
-----------------------------------------------------------------------------------
with   n = ps1 + ps2 + ps3, being the shear reinf. ratio in a plane perpedicular to the shear axis 3
 (pseudo-col.1 ps1 = As1*b1/s1 = (As1*h1/s1) / Ac = 0.00034907
        h1 = 250.00
        s1 = 150.00
        total area of hoops perpedicular to shear axis, As1 = 157.0796
 (pseudo-col.2 ps2 = As2*b2/s2 = (As2*h2/s2) / Ac = 0.00034907
        h2 = 250.00
        s2 = 150.00
        total area of hoops perpedicular to shear axis, As2 = 157.0796
  (grid      ps3 = As3*b3/s3 = (As3*h3/s3) / Ac = 0.00
        h3 = 250.00
        s3 = 200.00
        total area of hoops perpedicular to shear axis, As3 = 0.00
  total section area, Ac = 750000.00
-----------------------------------------------------------------------------------
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00

Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-------------------------------------------------------------

Stepwise Properties
-------------------------------------------------------------
Axial Force, F = -31026.87
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2865.133
     -Compression: Asl,com = 2865.133
        -Middle: Asl,mid = 1539.38
Mean Diameter of Tension Reinforcement, DbL = 17.33333
-------------------------------------------------------------
-------------------------------------------------------------


Considering wall controlled by Shear (shear control ratio > 1),
interstorey drift provided values are calculated
New component: From table 7-7, ASCE 41_17: Final chord rotation Capacity   $\theta_{u,R}$ = 1.0* $\theta_u$ = 0.015
from table 10-20:   $\theta_u$ = 0.015
with:
 - Condition i (shear wall and wall segments)
 - (As-As')*fy+P)/(tw*lw*fc') = -0.19220244
    As = 0.00
    As' = 7269.645
    fy = 500.00
    P = 31026.87
    tw = 250.00
    lw = 3000.00
    fc = 25.00


-------------------------------------------------------------
End Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)


-------------------------------------------------------------

# Calculation No. 11

wall W1, Floor 1

Limit State: Life Safety (data interpolation between analysis steps 1 and 2)

Analysis: Uniform + X

Check: Shear capacity VRd

Edge: Start

Local Axis: (3)



Start Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (a)
Section Type: rcrws

Constant Properties
-------------------------------------------------------------
Knowledge Factor,   = 1.00
Member Shear Force is generally considered as Force-Controlled Action according to Table C7-1, ASCE 41-17.
Lower-bound strengths are used for Force-Controlled Actions according to 7.5.1.3, ASCE 41-17
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min =lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00

Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
EDGE -A-
Bending Moment, Ma = 6.1793E+007
Shear Force, Va = -20889.844
EDGE -B-
Bending Moment, Mb = 889554.947
Shear Force, Vb = 20889.844
BOTH EDGES
Axial Force, F = -31026.87
Longitudinal Reinforcement Area Distribution (in 2 divisions)
      -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
      -Tension: Asl,ten = 2865.133
     -Compression: Asl,com = 2865.133
       -Middle: Asl,mid = 1539.38
Mean Diameter of Tension Reinforcement, DbL,ten = 17.33333
------------------------------------------------------------
------------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final Shear Capacity VR = 1.0*Vn = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vn < 0.83*fc'^0.5*h*d = 2.4900E+006
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 777478.649
  Mu/Vu-lw/2 = 1458.046 > 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00
    lw = 3000.00
    Mu = 6.1793E+007
    Vu = 20889.844
    Nu = 31026.87
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
  Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
   Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
   Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
    d = 1440.00
    Av = 157079.633
    s = 200.00
    fy = 500.00
   Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
    f = 0.95, for fully-wrapped sections

wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
  Ef = 64828.00
   fe = 0.004, from (11.6a), ACI 440
     with fu = 0.01
 From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
   bw = 250.00

-----------------------------------------------------------------
End Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (a)


-----------------------------------------------------------------


# Calculation No. 12

wall W1, Floor 1

Limit State: Life Safety (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Chord rotation capacity ( u)

Edge: Start

Local Axis: (3)



Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 3
(Bending local axis: 2)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------------
Knowledge Factor, = 1.00
Mean strength values are used for both shear and moment calculations.

Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-------------------------------------------------------------

Stepwise Properties
-------------------------------------------------------------
At local axis: 3
EDGE -A-
Shear Force, Va = 1.0097420E-028
EDGE -B-
Shear Force, Vb = -1.0097420E-028
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2865.133
     -Compression: Asl,com = 2865.133
        -Middle: Asl,mid = 0.00
        (According to 10.7.2.3 Asl,mid is setted equal to zero)
-----------------------------------------------------------
-----------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 1.02813
Member Controlled by Shear (Ve/Vr > 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 2.5600E+006
with
Mpr1 = Max(Mu1+ , Mu1-) = 3.8401E+009
    Mu1+ = 3.3585E+009, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
    Mu1- = 3.8401E+009, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 3.8401E+009

Mu2+ = 3.3585E+009, is the ultimate moment strength at the edge 2 of the member in the actual moment direction which is defined for the the static loading combination

Mu2- = 3.8401E+009, is the ultimate moment strength at the edge 2 of the member in the opposite moment direction which is defined for the the static loading combination

---------------------------------------------------------------------------

Calculation of Mu1+

---------------------------------------------------------------------------

---------------------------------------------------------------------------

Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:

φu = 2.0296703E-006

Mu = 3.3585E+009

---------------------------------------------------------------------------

with full section properties:

b = 250.00

d = 2957.00

d' = 43.00

ν = 0.0014928

N = 27588.841

fc = 25.00

εco (5A.5, TBDY) = 0.002

Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035

The Shear_factor is considered equal to 1 (pure moment strength)

From (5.4b), TBDY: εcu = 0.0035

ωwe ((5.4c), TBDY) = αse* ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00

where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)

-----------------------------------------------------------------

ωfx = 0.00

αf = 0.00

b = 250.00

h = 3000.00

From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128

bw = 250.00

effective stress from (A.35), ff,e = 757.2164

-----------------------------------------------------------------

ωfy = 0.00

αf = 0.00

b = 3000.00

h = 250.00

From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733

bw = 3000.00

effective stress from (A.35), ff,e = 954.4864

-----------------------------------------------------------------

R = 40.00

Effective FRP thickness, tf = NL*t*Cos(β1) = 1.016

fu,f = 1055.00

Ef = 64828.00

εu,f = 0.015

αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00

αse1 = 0.00

sh_1 = 150.00

bo_1 = 190.00

ho_1 = 540.00

bi2_1 = 655400.00

αse2 = 0.00

sh_2 = 150.00

bo_2 = 190.00

ho_2 = 540.00

bi2_2 = 655400.00

αse3 = 0 (grid does not provide confinement)

ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813

Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

-----------------------------------------------------------------

ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047

ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776

```
            h1 = 600.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
            h2 = 600.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
            h3 = 1800.00
            As3 = Astir3*ns3 = 0.00
               No stirups, ns3 = 2.00
    ------------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
         ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
            h1 = 250.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
            h2 = 250.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
            h3 = 250.00
            As3 = Astir3*ns3 = 157.0796
               No stirups, ns3 = 0.00
    ------------------------------------------------------------------
      Asec = 750000.00
      s_1 = 150.00
      s_2 = 150.00
      s_3 = 200.00
    fywe = 625.00
    fce  = 25.00
  From ((5.A5), TBDY), TBDY:  cc = 0.00202463
      c  = confinement factor = 1.00246
 y1 = 0.00140044
 sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
 su1 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu1_nominal = 0.08,
   For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
   characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
 y2 = 0.00140044
 sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
 yv = 0.00140044
```

shv = 0.0044814
  ftv = 420.1317
  fyv = 350.1097
   suv = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/ld = 0.30
       suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esuv_nominal = 0.08,
      considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
      For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
      characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fsv = fs = 350.1097
       with Esv = Es = 200000.00
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
   2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
  u =   su (4.1) = 2.0296703E-006
----------------------------------------------------------

Calculation of ratio lb/ld
----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Mu1-
--------------------------------------------------------------------

--------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0532423E-006
Mu = 3.8401E+009
--------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
     N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu = 0.0035
       we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
     where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
      -----------------------------------------------------------------

```
        fx = 0.00
         af = 0.00
            b = 250.00
            h = 3000.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
            bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ----------------------------------------------------------------
        fy = 0.00
         af = 0.00
            b = 3000.00
            h = 250.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
            bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ----------------------------------------------------------------
        R = 40.00
        Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
        fu,f = 1055.00
        Ef = 64828.00
         u,f = 0.015
        ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
            ase1 = 0.00
               sh_1 = 150.00
               bo_1 = 190.00
               ho_1 = 540.00
                bi2_1 = 655400.00
            ase2 = 0.00
               sh_2 = 150.00
                bo_2 = 190.00
                ho_2 = 540.00
                 bi2_2 = 655400.00
           ase3 = 0 (grid does not provide confinement)
           psh,min = Min(psh,x , psh,y) = 0.00069813
      Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
    earthquake detailing (90° closed stirrups)
     ----------------------------------------------------------------
        psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
           ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
              h1 = 600.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
              h2 = 600.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
              h3 = 1800.00
              As3 = Astir3*ns3 = 0.00
                 No stirups, ns3 = 2.00
     ----------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
           ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
              h1 = 250.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
              h2 = 250.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
     ----------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
```

```
              s_2 = 150.00
              s_3 = 200.00
          fywe = 625.00
           fce = 25.00
        From ((5.A5), TBDY), TBDY:  cc = 0.00202463
            c = confinement factor = 1.00246
      y1 = 0.00140044
     sh1 = 0.0044814
    ft1 = 420.1317
    fy1 = 350.1097
     su1 = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/ld = 0.30
        su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esu1_nominal = 0.08,
       For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
       characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fs1 = fs = 350.1097
        with Es1 = Es = 200000.00
      y2 = 0.00140044
     sh2 = 0.0044814
    ft2 = 420.1317
    fy2 = 350.1097
     su2 = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/lb,min = 0.30
        su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esu2_nominal = 0.08,
       For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
       characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fs2 = fs = 350.1097
        with Es2 = Es = 200000.00
      yv = 0.00140044
     shv = 0.0044814
    ftv = 420.1317
    fyv = 350.1097
     suv = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/ld = 0.30
        suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esuv_nominal = 0.08,
       considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
       For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
       characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fsv = fs = 350.1097
        with Esv = Es = 200000.00
      1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
      2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
      v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
  and confined core properties:
    b = 190.00
    d = 2927.00
    d' = 13.00
    fcc (5A.2, TBDY) = 25.06158
     cc (5A.5, TBDY) = 0.00202463
        c = confinement factor = 1.00246
      1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
      2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
```

v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
  su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
  u =   su (4.1) = 2.0532423E-006
----------------------------------------------------------------

Calculation of ratio lb/ld
----------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------------------
------------------------------------------------------------------------------
------------------------------------------------------------------------------
Calculation of Mu2+
------------------------------------------------------------------------------

------------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
   u = 2.0296703E-006
Mu = 3.3585E+009
------------------------------------------------------------------------------
with full section properties:
   b = 250.00
   d = 2957.00
   d' = 43.00
   v = 0.0014928
      N = 27588.841
   fc = 25.00
    co (5A.5, TBDY) = 0.002
   Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
      The Shear_factor is considered equal to 1 (pure moment strength)
      From (5.4b), TBDY:  cu = 0.0035
        we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
      where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
      -----------------------------------------------------------------
        fx = 0.00
         af = 0.00
            b = 250.00
            h = 3000.00
         From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
            bw = 250.00
         effective stress from (A.35), ff,e = 757.2164
      -----------------------------------------------------------------
        fy = 0.00
         af = 0.00
            b = 3000.00
            h = 250.00
         From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
            bw = 3000.00
         effective stress from (A.35), ff,e = 954.4864
      -----------------------------------------------------------------
         R = 40.00
         Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
         fu,f = 1055.00
         Ef = 64828.00
          u,f = 0.015
         ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
            ase1 = 0.00
               sh_1 = 150.00
               bo_1 = 190.00
               ho_1 = 540.00
                bi2_1 = 655400.00
         ase2 = 0.00

```
            sh_2 = 150.00
                bo_2 = 190.00
                ho_2 = 540.00
                  bi2_2 = 655400.00
            ase3 = 0 (grid does not provide confinement)
            psh,min = Min(psh,x , psh,y) = 0.00069813
       Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
         ------------------------------------------------------------------
            psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
               ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                  h1 = 600.00
                  As1 = Astir1*ns1 = 157.0796
                     No stirups, ns1 = 2.00
               ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
                  h2 = 600.00
                  As2 = Astir2*ns2 = 157.0796
                     No stirups, ns2 = 2.00
               ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                  h3 = 1800.00
                  As3 = Astir3*ns3 = 0.00
                     No stirups, ns3 = 2.00
         ------------------------------------------------------------------
            psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
               ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                  h1 = 250.00
                  As1 = Astir1*ns1 = 157.0796
                     No stirups, ns1 = 2.00
               ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                  h2 = 250.00
                  As2 = Astir2*ns2 = 157.0796
                     No stirups, ns2 = 2.00
               ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                  h3 = 250.00
                  As3 = Astir3*ns3 = 157.0796
                     No stirups, ns3 = 0.00
         ------------------------------------------------------------------
            Asec = 750000.00
            s_1 = 150.00
            s_2 = 150.00
            s_3 = 200.00
          fywe = 625.00
          fce  = 25.00
        From ((5.A5), TBDY), TBDY:  cc = 0.00202463
            c  = confinement factor = 1.00246
     y1 = 0.00140044
    sh1 = 0.0044814
   ft1 = 420.1317
   fy1 = 350.1097
    su1 = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
       and also multiplied by the shear_factor according to 15.7.1.4, with
       Shear_factor = 1.00
       lo/lou,min = lb/ld = 0.30
        su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
       From table 5A.1, TBDY: esu1_nominal = 0.08,
       For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
       characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fs1 = fs = 350.1097
        with Es1 = Es = 200000.00
     y2 = 0.00140044
    sh2 = 0.0044814
   ft2 = 420.1317
   fy2 = 350.1097
    su2 = 0.00512
       using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
```

and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
   2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
     c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
  u =   su (4.1) = 2.0296703E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
Calculation of Mu2-
-----------------------------------------------------------------------

-----------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0532423E-006
Mu = 3.8401E+009
-----------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00

d' = 43.00
v = 0.0014928
  N = 27588.841
fc = 25.00
 co (5A.5, TBDY) = 0.002
Final value of cu: cu* = shear_factor * Max( cu, cc) = 0.0035
  The Shear_factor is considered equal to 1 (pure moment strength)
  From (5.4b), TBDY: cu = 0.0035
   we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
  where f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
   --------------------------------------------------------------
   fx = 0.00
    af = 0.00
     b = 250.00
     h = 3000.00
    From EC8 A 4.4.3(6), pf = 2tf/bw = 0.008128
     bw = 250.00
    effective stress from (A.35), ff,e = 757.2164
   --------------------------------------------------------------
   fy = 0.00
    af = 0.00
     b = 3000.00
     h = 250.00
    From EC8 A 4.4.3(6), pf = 2tf/bw = 0.00067733
     bw = 3000.00
    effective stress from (A.35), ff,e = 954.4864
   --------------------------------------------------------------
   R = 40.00
   Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
   fu,f = 1055.00
   Ef = 64828.00
   u,f = 0.015
   ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
    ase1 = 0.00
     sh_1 = 150.00
     bo_1 = 190.00
     ho_1 = 540.00
     bi2_1 = 655400.00
    ase2 = 0.00
     sh_2 = 150.00
     bo_2 = 190.00
     ho_2 = 540.00
     bi2_2 = 655400.00
    ase3 = 0 (grid does not provide confinement)
    psh,min = Min(psh,x , psh,y) = 0.00069813
  Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
   --------------------------------------------------------------
   psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
    ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
     h1 = 600.00
     As1 = Astir1*ns1 = 157.0796
      No stirups, ns1 = 2.00
    ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
     h2 = 600.00
     As2 = Astir2*ns2 = 157.0796
      No stirups, ns2 = 2.00
    ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
     h3 = 1800.00
     As3 = Astir3*ns3 = 0.00
      No stirups, ns3 = 2.00
   --------------------------------------------------------------
   psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
    ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
     h1 = 250.00
     As1 = Astir1*ns1 = 157.0796
      No stirups, ns1 = 2.00

ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
            h2 = 250.00
            As2 = Astir2*ns2 = 157.0796
                No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
            h3 = 250.00
            As3 = Astir3*ns3 = 157.0796
                No stirups, ns3 = 0.00
    ------------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
       fce = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
      su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs1 = fs = 350.1097
      with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
      su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs2 = fs = 350.1097
      with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
      suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fsv = fs = 350.1097
      with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722

```
    2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
    v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
     c  = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
    v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
 u =   su (4.1) = 2.0532423E-006
-----------------------------------------------------------
```

Calculation of ratio lb/ld
```
-----------------------------------------------------------
```
Inadequate Lap Length with lb/ld = 0.30
```
----------------------------------------------------------------
----------------------------------------------------------------
----------------------------------------------------------------
----------------------------------------------------------------
```
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 2.4900E+006
```
----------------------------------------------------------------
```
Calculation of Shear Strength at edge 1, Vr1 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
```
-----------------------------------------------------------
```
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+   f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
```
-----------------------------------------------------------
```
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
     = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00
    lw = 3000.00
    Mu = 1.1486927E-009
    Vu = 1.0097420E-028
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
  Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
    d = 1440.00
    Av = 157079.633
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
```

f = 0.95, for fully-wrapped sections
wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
  Ef = 64828.00
   fe = 0.004, from (11.6a), ACI 440
    with fu = 0.01
 From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
   bw = 250.00
---------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
---------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
---------------------------------------------------------------
 From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
 Mu/Vu-lw/2 = 0.00 <= 0
    = 1 (normal-weight concrete)
   fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
   h = 250.00
   d = 2400.00
   lw = 3000.00
   Mu = 1.1486927E-009
   Vu = 1.0097420E-028
   Nu = 27588.841
 From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
 Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
   d = 480.00
   Av = 157079.633
   s = 150.00
   fy = 500.00
 Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
 Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
   d = 480.00
   Av = 157079.633
   s = 150.00
   fy = 500.00
 Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
 Vs3 = 565486.678 is calculated for web, with:
   d = 1440.00
   Av = 157079.633
   s = 200.00
   fy = 500.00
 Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
 Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
   f = 0.95, for fully-wrapped sections
wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
  Ef = 64828.00
   fe = 0.004, from (11.6a), ACI 440
    with fu = 0.01

From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 250.00
-----------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 3


-----------------------------------------------------------


Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 2
(Bending local axis: 3)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------
Knowledge Factor,    = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-----------------------------------------------------------


Stepwise Properties
-----------------------------------------------------------
At local axis: 2
EDGE -A-
Shear Force, Va = 1.7354940E-029
EDGE -B-
Shear Force, Vb = -1.7354940E-029
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
      -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)

```
        -Tension: Asl,ten = 2830.575
     -Compression: Asl,com = 2830.575
         -Middle: Asl,mid = 0.00
         (According to 10.7.2.3 Asl,mid is setted equal to zero)
-------------------------------------------------------------
-------------------------------------------------------------
```

Calculation of Shear Capacity ratio , $Ve/Vr = 0.15621236$
Member Controlled by Flexure $(Ve/Vr < 1)$
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 $Ve = (Mpr1 + Mpr2)/ln = 160017.271$
with
$Mpr1 = Max(Mu1+ , Mu1-) = 2.4003E+008$
  $Mu1+ = 2.0658E+008$, is the ultimate moment strength at the edge 1 of the member in the actual moment direction which is defined for the static loading combination
  $Mu1- = 2.4003E+008$, is the ultimate moment strength at the edge 1 of the member in the opposite moment direction which is defined for the static loading combination
$Mpr2 = Max(Mu2+ , Mu2-) = 2.4003E+008$
  $Mu2+ = 2.0658E+008$, is the ultimate moment strength at the edge 2 of the member in the actual moment direction which is defined for the the static loading combination
  $Mu2- = 2.4003E+008$, is the ultimate moment strength at the edge 2 of the member in the opposite moment direction which is defined for the the static loading combination

```
-----------------------------------------------------------------------------
```
Calculation of Mu1+
```
-----------------------------------------------------------------------------

-----------------------------------------------------------------------------
```
Calculation of ultimate curvature  u according to 4.1, Biskinis/Fardis 2013:
  $u = 3.0306889E-005$
$Mu = 2.0658E+008$
```
-----------------------------------------------------------------------------
```
with full section properties:
  $b = 3000.00$
  $d = 208.00$
  $d' = 42.00$
  $v = 0.00176852$
    $N = 27588.841$
  $fc = 25.00$
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where  f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -----------------------------------------------------------------
      fx = 0.00
       af = 0.00
         b = 250.00
         h = 3000.00
      From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
         bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
    -----------------------------------------------------------------
      fy = 0.00
       af = 0.00
         b = 3000.00
         h = 250.00
      From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
         bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864
    -----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
```

ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
   ase1 = 0.00
     sh_1 = 150.00
     bo_1 = 190.00
     ho_1 = 540.00
      bi2_1 = 655400.00
   ase2 = 0.00
     sh_2 = 150.00
     bo_2 = 190.00
     ho_2 = 540.00
      bi2_2 = 655400.00
   ase3 = 0 (grid does not provide confinement)
   psh,min = Min(psh,x , psh,y) = 0.00069813
 Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

------------------------------------------------------------------

   psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
    ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
     h1 = 600.00
     As1 = Astir1*ns1 = 157.0796
      No stirups, ns1 = 2.00
    ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
     h2 = 600.00
     As2 = Astir2*ns2 = 157.0796
      No stirups, ns2 = 2.00
    ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
     h3 = 1800.00
     As3 = Astir3*ns3 = 0.00
      No stirups, ns3 = 2.00

------------------------------------------------------------------

   psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
    ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
     h1 = 250.00
     As1 = Astir1*ns1 = 157.0796
      No stirups, ns1 = 2.00
    ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
     h2 = 250.00
     As2 = Astir2*ns2 = 157.0796
      No stirups, ns2 = 2.00
    ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
     h3 = 250.00
     As3 = Astir3*ns3 = 157.0796
      No stirups, ns3 = 0.00

------------------------------------------------------------------

   Asec = 750000.00
   s_1 = 150.00
   s_2 = 150.00
   s_3 = 200.00
  fywe = 625.00
  fce = 25.00
 From ((5.A5), TBDY), TBDY:  cc = 0.00202463
   c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
 using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
 and also multiplied by the shear_factor according to 15.7.1.4, with
 Shear_factor = 1.00
 lo/lou,min = lb/ld = 0.30
 su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
 From table 5A.1, TBDY: esu1_nominal = 0.08,
 For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
 characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
 with fs1 = fs = 350.1097

with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fsv = fs = 350.1097
     with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
  2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
  v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
  u =   su (4.1) = 3.0306889E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Mu1-
--------------------------------------------------------------------

--------------------------------------------------------------------

Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
  φu = 3.0889637E-005
Mu = 2.4003E+008
----------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: εcu = 0.0035
      ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
    where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      ωfx = 0.00
       αf = 0.00
          b = 250.00
          h = 3000.00
       From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
          bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      ωfy = 0.00
       αf = 0.00
          b = 3000.00
          h = 250.00
       From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
          bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    ----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        εu,f = 0.015
       αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
          αse1 = 0.00
             sh_1 = 150.00
             bo_1 = 190.00
             ho_1 = 540.00
              Σbi2_1 = 655400.00
          αse2 = 0.00
             sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
              Σbi2_2 = 655400.00
       αse3 = 0 (grid does not provide confinement)
       ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
    Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
    ----------------------------------------------------------------
       ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
          ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
             h1 = 600.00
             As1 = Astir1*ns1 = 157.0796
                No stirups, ns1 = 2.00
          ρs2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
             h2 = 600.00
             As2 = Astir2*ns2 = 157.0796
                No stirups, ns2 = 2.00
          ρs3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
             h3 = 1800.00
             As3 = Astir3*ns3 = 0.00

```
            No stirups, ns3 = 2.00
     -------------------------------------------------------------------
     psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
         ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
             h1 = 250.00
             As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
         ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
             h2 = 250.00
             As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
         ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
             h3 = 250.00
             As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
     -------------------------------------------------------------------
         Asec = 750000.00
         s_1 = 150.00
         s_2 = 150.00
         s_3 = 200.00
       fywe = 625.00
       fce  = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
         c  = confinement factor = 1.00246
 y1 = 0.00140044
 sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
 su1 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu1_nominal = 0.08,
   For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
   characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
 y2 = 0.00140044
 sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
 yv = 0.00140044
 shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
 suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
```

considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
 For calculation of esuv_nominal and   yv, shv,ftv,fyv, it is considered
 characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
   with fsv = fs = 350.1097
   with Esv = Es = 200000.00
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
 2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
 v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
     c  = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
    v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =   su (4.1) = 3.0889637E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------
-----------------------------------------------------------------
-----------------------------------------------------------------
Calculation of Mu2+
-----------------------------------------------------------------

-----------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0306889E-005
Mu = 2.0658E+008
-----------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of   cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
     we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ------------------------------------------------------------------
      fx = 0.00
      af = 0.00
        b = 250.00
        h = 3000.00
      From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
        bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
    ------------------------------------------------------------------
      fy = 0.00
      af = 0.00

```
                b = 3000.00
                h = 250.00
          From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
                bw = 3000.00
          effective stress from (A.35), ff,e = 954.4864
       ---------------------------------------------------------------
          R = 40.00
          Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
          fu,f = 1055.00
          Ef = 64828.00
           u,f = 0.015
          ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
             ase1 = 0.00
                sh_1 = 150.00
                bo_1 = 190.00
                ho_1 = 540.00
                 bi2_1 = 655400.00
             ase2 = 0.00
                sh_2 = 150.00
                 bo_2 = 190.00
                 ho_2 = 540.00
                  bi2_2 = 655400.00
          ase3 = 0 (grid does not provide confinement)
          psh,min = Min(psh,x , psh,y) = 0.00069813
      Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
   earthquake detailing (90° closed stirrups)
       ---------------------------------------------------------------
          psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
             ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                h1 = 600.00
                As1 = Astir1*ns1 = 157.0796
                  No stirups, ns1 = 2.00
             ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
                h2 = 600.00
                As2 = Astir2*ns2 = 157.0796
                  No stirups, ns2 = 2.00
             ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                h3 = 1800.00
                As3 = Astir3*ns3 = 0.00
                  No stirups, ns3 = 2.00
       ---------------------------------------------------------------
          psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
             ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                h1 = 250.00
                As1 = Astir1*ns1 = 157.0796
                  No stirups, ns1 = 2.00
             ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                h2 = 250.00
                As2 = Astir2*ns2 = 157.0796
                  No stirups, ns2 = 2.00
             ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                h3 = 250.00
                As3 = Astir3*ns3 = 157.0796
                  No stirups, ns3 = 0.00
       ---------------------------------------------------------------
             Asec = 750000.00
             s_1 = 150.00
             s_2 = 150.00
             s_3 = 200.00
          fywe = 625.00
          fce  = 25.00
       From ((5.A5), TBDY), TBDY:  cc = 0.00202463
          c = confinement factor = 1.00246
     y1 = 0.00140044
    sh1 = 0.0044814
  ft1 = 420.1317
  fy1 = 350.1097
```

su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu1_nominal = 0.08,
  For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
  characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs1 = fs = 350.1097
  with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
b = 2940.00
d = 178.00
d' = 12.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
  c  = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
u =    su (4.1) = 3.0306889E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
Calculation of Mu2-
---------------------------------------------------------------------

---------------------------------------------------------------------
Calculation of ultimate curvature   $\varphi u$ according to 4.1, Biskinis/Fardis 2013:
  $\varphi u$ = 3.0889637E-005
Mu = 2.4003E+008
---------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   $\varepsilon$co (5A.5, TBDY) = 0.002
  Final value of  $\varepsilon$cu:  $\varepsilon$cu* = shear_factor * Max( $\varepsilon$cu, $\varepsilon$cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  $\varepsilon$cu = 0.0035
      $\omega$we ((5.4c), TBDY) = $\alpha$se* $\rho$sh,min*fywe/fce+Min( $\omega$fx,  $\omega$fy) = 0.00
    where  $\omega$f = $\alpha$f*$\rho$f*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ---------------------------------------------------------------
      $\omega$fx = 0.00
       $\alpha$f = 0.00
         b = 250.00
         h = 3000.00
       From EC8 A.4.4.3(6), $\rho$f = 2tf/bw = 0.008128
         bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    ---------------------------------------------------------------
      $\omega$fy = 0.00
       $\alpha$f = 0.00
         b = 3000.00
         h = 250.00
       From EC8 A.4.4.3(6), $\rho$f = 2tf/bw = 0.00067733
         bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    ---------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       $\varepsilon$u,f = 0.015
      $\alpha$se ((5.4d), TBDY) = ($\alpha$se1*Acol1+$\alpha$se2*Acol2+$\alpha$se3*Aweb)/Asec = 0.00
        $\alpha$se1 = 0.00
          sh_1 = 150.00
          bo_1 = 190.00
          ho_1 = 540.00
           bi2_1 = 655400.00
        $\alpha$se2 = 0.00
          sh_2 = 150.00
            bo_2 = 190.00
            ho_2 = 540.00
             bi2_2 = 655400.00
      $\alpha$se3 = 0 (grid does not provide confinement)
      $\rho$sh,min = Min($\rho$sh,x , $\rho$sh,y) = 0.00069813
    Expression ((5.4d), TBDY) for $\rho$sh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
      ---------------------------------------------------------------
      $\rho$sh,x = $\rho$s1,x+$\rho$s2,x+$\rho$s3,x = 0.00356047

ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
    h1 = 600.00
    As1 = Astir1*ns1 = 157.0796
      No stirups, ns1 = 2.00
ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
    h2 = 600.00
    As2 = Astir2*ns2 = 157.0796
      No stirups, ns2 = 2.00
ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
    h3 = 1800.00
    As3 = Astir3*ns3 = 0.00
      No stirups, ns3 = 2.00

------------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
    ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
      h1 = 250.00
      As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
    ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
      h2 = 250.00
      As2 = Astir2*ns2 = 157.0796
        No stirups, ns2 = 2.00
    ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
      h3 = 250.00
      As3 = Astir3*ns3 = 157.0796
        No stirups, ns3 = 0.00

------------------------------------------------------------------

Asec = 750000.00
s_1 = 150.00
s_2 = 150.00
s_3 = 200.00
fywe = 625.00
fce = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
  c  = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu1_nominal = 0.08,
  For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
  characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs1 = fs = 350.1097
  with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00

yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
  2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
  v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
     c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =   su (4.1) = 3.0889637E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
----------------------------------------------------------------------------
----------------------------------------------------------------------------
----------------------------------------------------------------------------
----------------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 1.0244E+006
----------------------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
     = 1 (normal-weight concrete)
   fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
   h = 3000.00
   d = 200.00
   lw = 250.00
   Mu = 3.7289358E-011
   Vu = 1.7354940E-029
   Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:

```
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
     d = 200.00
     Av = 0.00
     s = 200.00
     fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:  1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 208.00
  ffe ((11-5), ACI 440) = 259.312
     Ef = 64828.00
      fe = 0.004, from (11.6a), ACI 440
        with  fu = 0.01
   From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
     bw = 3000.00
----------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
-----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-----------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
     fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
     h = 3000.00
     d = 200.00
     lw = 250.00
     Mu = 3.7289358E-011
     Vu = 1.7354940E-029
     Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
     d = 200.00
     Av = 157079.633
     s = 150.00
     fy = 500.00
```

Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.50
   Vs3 = 0.00 is calculated for web, with:
      d = 200.00
      Av = 0.00
      s = 200.00
      fy = 500.00
   Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    2(1-s/d) = 0.00
   Vf ((11-3)-(11.4), ACI 440) = 109599.773
      $\phi$f = 0.95, for fully-wrapped sections
    wf/sf = 1 (FRP strips adjacent to one another).
   In (11.3) sin $\alpha$ + cos $\alpha$ is replaced with (cot $\theta$ +cota)sina which is more a generalised expression,
   where $\theta$ is the angle of the crack direction (see KANEPE).
   This later relation, considered as a function Vf($\theta$, $\alpha$), is implemented for every different fiber orientation ai,
   as well as for 2 crack directions, $\theta$ =45° and $\theta$ =-45° to take into consideration the cyclic seismic loading.
   orientation 1: $\alpha$1 = b1 + 90° = 90.00
   Vf = Min(|Vf(45, $\alpha$1)|,|Vf(-45,a1)|), with:
   total thickness per orientation, tf1 = NL*t/NoDir = 1.016
   dfv = d (figure 11.2, ACI 440) = 208.00
   ffe ((11-5), ACI 440) = 259.312
      Ef = 64828.00
       $\epsilon$fe = 0.004, from (11.6a), ACI 440
         with $\epsilon$fu = 0.01
    From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
      bw = 3000.00
--------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 2


--------------------------------------------------------------


Start Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (a)
Section Type: rcrws

Constant Properties
--------------------------------------------------------------
Knowledge Factor, $\kappa$ = 1.00
According to 10.7.2.3, ASCE 41-17, shear walls with
transverse reinforcement percentage, $\rho$n < 0.0015
are considered Force-Controlled and lower-bound strengths are used according to 7.5.1.3, ASCE 41-17
 $\rho$n = 0.00069813
---------------------------------------------------------------------------
with $\rho$n = ps1 + ps2 + ps3, being the shear reinf. ratio in a plane perpedicular to the shear axis 2
 (pseudo-col.1 ps1 = As1*b1/s1 = (As1*h1/s1) / Ac = 0.00034907
         h1 = 250.00
         s1 = 150.00
         total area of hoops perpedicular to shear axis, As1 = 157.0796
 (pseudo-col.2 ps2 = As2*b2/s2 = (As2*h2/s2) / Ac = 0.00034907
         h2 = 250.00
         s2 = 150.00
         total area of hoops perpedicular to shear axis, As2 = 157.0796
 (grid     ps3 = As3*b3/s3 = (As3*h3/s3) / Ac = 0.00
         h3 = 250.00
         s3 = 200.00
         total area of hoops perpedicular to shear axis, As3 = 0.00
  total section area, Ac = 750000.00
---------------------------------------------------------------------------------
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00

Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-------------------------------------------------------------

Stepwise Properties
-------------------------------------------------------------
Bending Moment, M = -1.6039204E-011
Shear Force, V2 = -1.2948432E-014
Shear Force, V3 = -20889.844
Axial Force, F = -31026.87
Longitudinal Reinforcement Area Distribution (in 2 divisions)
      -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
      -Tension: Asl,ten = 2830.575
     -Compression: Asl,com = 2830.575
        -Middle: Asl,mid = 1608.495
Mean Diameter of Tension Reinforcement, DbL = 16.46154
-------------------------------------------------------------
-------------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final chord rotation Capacity  $\theta_{u,R}$ = 1.0* $\theta_u$ = 0.00918702
  $\theta_u$ = $\theta_y$ + $\theta_p$ = 0.00918702


-----------------------------------------------------
 - Calculation of  $\theta_y$ -
-----------------------------------------------------
 $\theta_y$ = (My*lp)/(EI)Eff = 0.00118702 ((10-5), ASCE 41-17))
  My = 1.8257E+008
  (EI)Eff = 0.35*Ec*I (table 10-5)
   Ec*I = 1.0547E+014
  lp = 0.5*d = 0.5*(0.8*h) = 240.00
-------------------------------------------------------------
-------------------------------------------------------------

Calculation of Yielding Moment My
-------------------------------------------------------------
Calculation of  $\phi_y$ and My according to Annex 7   -
-------------------------------------------------------------
 $\phi_y$ = Min( $\phi_y$_ten,  $\phi_y$_com)
  $\phi_y$_ten = 8.9780154E-006
  with ((10.1), ASCE 41-17) fy = Min(fy, 1.25*fy*(lb/ld)^2/3) = 280.0878
     d = 208.00
     $\xi_y$ = 0.25007038
     A = 0.0118276
     B = 0.00717877

with pt = 0.00453618
           pc = 0.00453618
           pv = 0.00257772
           N = 31026.87
           b = 3000.00
           " = 0.20192308
  y_comp = 3.2320012E-005
 with fc* (12.3, (ACI 440)) = 25.002
      fc = 25.00
      fl = 0.17503396
      b = 3000.00
      h = 250.00
      Ag = 750000.00
      From (12.9), ACI 440: ka = 0.0036426
         g = pt + pc + pv = 0.01165007
      rc = 40.00
      Ae/Ac = 0.52453487
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
    effective strain from (12.5) and (12.12), efe = 0.004
      fu = 0.01
     Ef = 64828.00
    Ec = 26999.444
     y = 0.24794626
    A = 0.01150092
    B = 0.00700125
     with Es = 200000.00
------------------------------------------------------------
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30


------------------------------------------------------------
 - Calculation of  p -
------------------------------------------------------------
Considering wall controlled by flexure (shear control ratio < = 1),
from table 10-19:  p = 0.008
with:
 - Condition i (shear wall and wall segments)
 - (As-As')*fy+P)/(tw*lw*fc') = -0.19220244
    As = 0.00
    As' = 7269.645
    fy = 500.00
    P = 31026.87
    tw = 3000.00
    lw = 250.00
    fc = 25.00
 - V/(tw*lw*fc^0.5) = 4.1582360E-020, NOTE: units in lb & in
 - Confined Boundary: No
   Boundary hoops spacing exceed 8db (s1 > 8*db or s2 > 8*db )
   Boundary Trans. Reinf. does not exceed 50% of ACI 318 provision (Vw1 + Vw2 > 0.50*(V-Vc-Vw3)
   With
   Boundary Element 1:
    Vw1 = 104719.755
    s1 = 150.00
   Boundary Element 2:
    Vw2 = 104719.755
    s2 = 150.00
   Grid Shear Force, Vw3 = 0.00
   Concrete Shear Force, Vc = 218457.549
 (The variables above have already been given in Shear control ratio calculation)
    Mean diameter of all bars, db = 17.33333
    Design Shear Force, V = 1.2948432E-014


------------------------------------------------------------
End Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1

At local axis: 3
Integration Section: (a)

----------------------------------------------------------

# Calculation No. 13

wall W1, Floor 1

Limit State: Life Safety (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Shear capacity VRd

Edge: End

Local Axis: (2)

Start Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (d)
Section Type: rcrws

Constant Properties
----------------------------------------------------------
Knowledge Factor,   = 1.00
Member Shear Force is generally considered as Force-Controlled Action according to Table C7-1, ASCE 41-17.
Lower-bound strengths are used for Force-Controlled Actions according to 7.5.1.3, ASCE 41-17
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member

Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min =lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, $t = 1.016$
Tensile Strength, $ffu = 1055.00$
Tensile Modulus, $Ef = 64828.00$
Elongation, $efu = 0.01$
Number of directions, $NoDir = 1$
Fiber orientations, bi: 0.00°
Number of layers, $NL = 1$
Radius of rounding corners, $R = 40.00$
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
EDGE -A-
Bending Moment, $Ma = -1.6039204E-011$
Shear Force, $Va = -1.2948432E-014$
EDGE -B-
Bending Moment, $Mb = -2.4510145E-011$
Shear Force, $Vb = 1.2948432E-014$
BOTH EDGES
Axial Force, $F = -31026.87$
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: $Aslt = 0.00$
      -Compression: $Aslc = 7269.645$
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: $Asl,ten = 2830.575$
      -Compression: $Asl,com = 2830.575$
          -Middle: $Asl,mid = 1608.495$
Mean Diameter of Tension Reinforcement, $DbL,ten = 16.46154$
------------------------------------------------------------
------------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final Shear Capacity $VR = 1.0*Vn = 401964.647$
From (22.5.1.1) and 11.5.4.3, ACI 318-14: $Vn < 0.83*fc'^0.5*h*d = 401964.647$
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: $Vc = 193125.108$
  $Mu/Vu-lw/2 = 1767.905 > 0$
      $= 1$ (normal-weight concrete)
    $fc' = 25.00$, but $fc^0.5 <= 8.3$ MPa (22.5.3.1, ACI 318-14)
    $h = 3000.00$
    $d = 200.00$
    $lw = 250.00$
    $Mu = 2.4510145E-011$
    $Vu = 1.2948432E-014$
    $Nu = 31026.87$
  From (11.5.4.8), ACI 318-14: $Vs = Vs1 + Vs2 + Vs3 = 104719.755$
  $Vs1 = 52359.878$ is calculated for pseudo-Column 1, with:
    $d = 200.00$
    $Av = 157079.633$
    $s = 150.00$
    $fy = 500.00$
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
    $2(1-s/d) = 0.50$
  $Vs2 = 52359.878$ is calculated for pseudo-Column 2, with:
    $d = 200.00$
    $Av = 157079.633$

s = 150.00
fy = 500.00
Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
2(1-s/d) = 0.50
Vs3 = 0.00 is calculated for web, with:
d = 200.00
Av = 0.00
s = 200.00
fy = 500.00
Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
2(1-s/d) = 0.00
Vf ((11-3)-(11.4), ACI 440) = 109599.773
φf = 0.95, for fully-wrapped sections
wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions, =45° and =-45° to take into consideration the cyclic seismic loading.
orientation 1: 1 = b1 + 90° = 90.00
Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 208.00
ffe ((11-5), ACI 440) = 259.312
Ef = 64828.00
fe = 0.004, from (11.6a), ACI 440
with fu = 0.01
From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
bw = 3000.00
---------------------------------------------------------------
End Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (d)

---------------------------------------------------------------

# Calculation No. 14

wall W1, Floor 1

Limit State: Life Safety (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Chord rotation capacity ( u)

Edge: End

Local Axis: (2)

Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 3
(Bending local axis: 2)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------------
Knowledge Factor,    = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-----------------------------------------------------------------

Stepwise Properties
-----------------------------------------------------------------
At local axis: 3
EDGE -A-
Shear Force, Va = 1.0097420E-028
EDGE -B-
Shear Force, Vb = -1.0097420E-028

BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2865.133
    -Compression: Asl,com = 2865.133
        -Middle: Asl,mid = 0.00
        (According to 10.7.2.3 Asl,mid is setted equal to zero)
------------------------------------------------------------
------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 1.02813
Member Controlled by Shear (Ve/Vr > 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 2.5600E+006
with
Mpr1 = Max(Mu1+ , Mu1-) = 3.8401E+009
  Mu1+ = 3.3585E+009, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
  Mu1- = 3.8401E+009, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 3.8401E+009
  Mu2+ = 3.3585E+009, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
  Mu2- = 3.8401E+009, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination


----------------------------------------------------------------------------
Calculation of Mu1+
----------------------------------------------------------------------------


----------------------------------------------------------------------------
Calculation of ultimate curvature   $\phi$u according to 4.1, Biskinis/Fardis 2013:
  $\phi$u = 2.0296703E-006
Mu = 3.3585E+009
----------------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   $\epsilon$co (5A.5, TBDY) = 0.002
  Final value of  $\epsilon$cu:  $\epsilon$cu* = shear_factor * Max( $\epsilon$cu,  $\epsilon$cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  $\epsilon$cu = 0.0035
      $\omega$we ((5.4c), TBDY) = $\alpha$se* $\rho$sh,min*fywe/fce+Min( $\omega$fx,  $\omega$fy) = 0.00
    where  $\omega$f = $\alpha$f*$\rho$f*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      $\omega$fx = 0.00
      $\alpha$f = 0.00
        b = 250.00
        h = 3000.00
      From EC8 A.4.4.3(6), $\rho$f = 2tf/bw = 0.008128
        bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      $\omega$fy = 0.00
      $\alpha$f = 0.00
        b = 3000.00
        h = 250.00
      From EC8 A.4.4.3(6), $\rho$f = 2tf/bw = 0.00067733
        bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864

```
        ----------------------------------------------------------------
        R = 40.00
        Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
        fu,f = 1055.00
        Ef = 64828.00
         u,f = 0.015
        ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
           ase1 = 0.00
              sh_1 = 150.00
              bo_1 = 190.00
              ho_1 = 540.00
               bi2_1 = 655400.00
           ase2 = 0.00
              sh_2 = 150.00
              bo_2 = 190.00
              ho_2 = 540.00
               bi2_2 = 655400.00
        ase3 = 0 (grid does not provide confinement)
        psh,min = Min(psh,x , psh,y) = 0.00069813
     Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
  earthquake detailing (90° closed stirrups)
        ----------------------------------------------------------------
        psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
           ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
              h1 = 600.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
              h2 = 600.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
              h3 = 1800.00
              As3 = Astir3*ns3 = 0.00
                 No stirups, ns3 = 2.00
        ----------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
           ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
              h1 = 250.00
              As1 = Astir1*ns1 = 157.0796
                 No stirups, ns1 = 2.00
           ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
              h2 = 250.00
              As2 = Astir2*ns2 = 157.0796
                 No stirups, ns2 = 2.00
           ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
              h3 = 250.00
              As3 = Astir3*ns3 = 157.0796
                 No stirups, ns3 = 0.00
        ----------------------------------------------------------------
           Asec = 750000.00
           s_1 = 150.00
           s_2 = 150.00
           s_3 = 200.00
        fywe = 625.00
        fce  = 25.00
     From ((5.A5), TBDY), TBDY:  cc = 0.00202463
          c  = confinement factor = 1.00246
    y1 = 0.00140044
   sh1 = 0.0044814
  ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
     using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
     and also multiplied by the shear_factor according to 15.7.1.4, with
     Shear_factor = 1.00
     lo/lou,min = lb/ld = 0.30
```

su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs1 = fs = 350.1097
  with Es1 = Es = 200000.00
 y2 = 0.00140044
 sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
 su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
 yv = 0.00140044
 shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
 suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
 2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
 v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c = confinement factor = 1.00246
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
  2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
  v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
 u =   su (4.1) = 2.0296703E-006
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------------

--------------------------------------------------------------------------
--------------------------------------------------------------------------
Calculation of Mu1-
--------------------------------------------------------------------------

--------------------------------------------------------------------------
Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
  φu = 2.0532423E-006
Mu = 3.8401E+009
--------------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  ν = 0.0014928
    N = 27588.841
  fc = 25.00
   εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max( εcu, εcc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY: εcu = 0.0035
       ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
     where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------------
       ωfx = 0.00
        αf = 0.00
           b = 250.00
           h = 3000.00
        From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
           bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ----------------------------------------------------------------
       ωfy = 0.00
        αf = 0.00
           b = 3000.00
           h = 250.00
        From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
           bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        εu,f = 0.015
       αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
          αse1 = 0.00
             sh_1 = 150.00
             bo_1 = 190.00
             ho_1 = 540.00
              bi2_1 = 655400.00
          αse2 = 0.00
             sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
              bi2_2 = 655400.00
       αse3 = 0 (grid does not provide confinement)
       ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
     Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
     ----------------------------------------------------------------
       ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
          ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
             h1 = 600.00
             As1 = Astir1*ns1 = 157.0796
                No stirups, ns1 = 2.00
          ρs2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776

```
            h2 = 600.00
            As2 = Astir2*ns2 = 157.0796
                No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
            h3 = 1800.00
            As3 = Astir3*ns3 = 0.00
                No stirups, ns3 = 2.00
    -------------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
            h1 = 250.00
            As1 = Astir1*ns1 = 157.0796
                No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
            h2 = 250.00
            As2 = Astir2*ns2 = 157.0796
                No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
            h3 = 250.00
            As3 = Astir3*ns3 = 157.0796
                No stirups, ns3 = 0.00
    -------------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
       fce  = 25.00
   From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c  = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
      su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs1 = fs = 350.1097
      with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
      su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs2 = fs = 350.1097
      with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
  suv = 0.00512
```

using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
 suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
 with fsv = fs = 350.1097
 with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
 2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
 v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
 u =   su (4.1) = 2.0532423E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
Calculation of Mu2+
-----------------------------------------------------------------------

-----------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
 u = 2.0296703E-006
Mu = 3.3585E+009
-----------------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
   N = 27588.841
 fc = 25.00
  co (5A.5, TBDY) = 0.002
 Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY:  cu = 0.0035
    we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min( fx,  fy) = 0.00
   where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ------------------------------------------------------------------
     fx = 0.00
      af = 0.00
        b = 250.00
        h = 3000.00

From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
   bw = 250.00
effective stress from (A.35), ff,e = 757.2164
----------------------------------------------------------------
  fy = 0.00
  af = 0.00
    b = 3000.00
    h = 250.00
 From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
   bw = 3000.00
 effective stress from (A.35), ff,e = 954.4864
----------------------------------------------------------------
  R = 40.00
  Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
  fu,f = 1055.00
  Ef = 64828.00
   u,f = 0.015
  ase ((5.4d), TBDY) = (ase1*Acol1 + ase2*Acol2 + ase3*Aweb)/Asec = 0.00
    ase1 = 0.00
      sh_1 = 150.00
      bo_1 = 190.00
      ho_1 = 540.00
       bi2_1 = 655400.00
    ase2 = 0.00
     sh_2 = 150.00
      bo_2 = 190.00
      ho_2 = 540.00
      bi2_2 = 655400.00
   ase3 = 0 (grid does not provide confinement)
   psh,min = Min(psh,x , psh,y) = 0.00069813
  Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
----------------------------------------------------------------
  psh,x = ps1,x + ps2,x + ps3,x = 0.00356047
    ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
      h1 = 600.00
      As1 = Astir1*ns1 = 157.0796
       No stirups, ns1 = 2.00
    ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
      h2 = 600.00
      As2 = Astir2*ns2 = 157.0796
       No stirups, ns2 = 2.00
    ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
      h3 = 1800.00
      As3 = Astir3*ns3 = 0.00
       No stirups, ns3 = 2.00
----------------------------------------------------------------
  psh,y = ps1,y + ps2,y + ps3,y = 0.00069813
    ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
      h1 = 250.00
      As1 = Astir1*ns1 = 157.0796
       No stirups, ns1 = 2.00
    ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
      h2 = 250.00
      As2 = Astir2*ns2 = 157.0796
       No stirups, ns2 = 2.00
    ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
      h3 = 250.00
      As3 = Astir3*ns3 = 157.0796
       No stirups, ns3 = 0.00
----------------------------------------------------------------
   Asec = 750000.00
   s_1 = 150.00
   s_2 = 150.00
   s_3 = 200.00
  fywe = 625.00
  fce = 25.00

From ((5.A5), TBDY), TBDY:  cc = 0.00202463
    c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
   su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu1_nominal = 0.08,
  For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
  characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
   y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs1 = fs = 350.1097
    with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
   su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
   y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
   suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
   y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
  2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
  v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
     c = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->

v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
 u =   su (4.1) = 2.0296703E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
---------------------------------------------------------------------
---------------------------------------------------------------------
---------------------------------------------------------------------
Calculation of Mu2-
---------------------------------------------------------------------

---------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0532423E-006
Mu = 3.8401E+009
---------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      fx = 0.00
       af = 0.00
          b = 250.00
          h = 3000.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
          bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      fy = 0.00
       af = 0.00
          b = 3000.00
          h = 250.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
          bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    ----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
         ase1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
            ho_1 = 540.00
             bi2_1 = 655400.00
         ase2 = 0.00
           sh_2 = 150.00
            bo_2 = 190.00
            ho_2 = 540.00
             bi2_2 = 655400.00

ase3 = 0 (grid does not provide confinement)
        psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
        ------------------------------------------------------------------
        psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
            ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                h1 = 600.00
                As1 = Astir1*ns1 = 157.0796
                    No stirups, ns1 = 2.00
            ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
                h2 = 600.00
                As2 = Astir2*ns2 = 157.0796
                    No stirups, ns2 = 2.00
            ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                h3 = 1800.00
                As3 = Astir3*ns3 = 0.00
                    No stirups, ns3 = 2.00
        ------------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
            ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                h1 = 250.00
                As1 = Astir1*ns1 = 157.0796
                    No stirups, ns1 = 2.00
            ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                h2 = 250.00
                As2 = Astir2*ns2 = 157.0796
                    No stirups, ns2 = 2.00
            ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                h3 = 250.00
                As3 = Astir3*ns3 = 157.0796
                    No stirups, ns3 = 0.00
        ------------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
      fce = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
fy1 = 350.1097
 su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs1 = fs = 350.1097
      with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032

From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
 y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs2 = fs = 350.1097
  with Es2 = Es = 200000.00
 yv = 0.00140044
 shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
 suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
   suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
   y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
  2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
  v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
 b = 190.00
 d = 2927.00
 d' = 13.00
 fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
  2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
  v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
 u =   su (4.1) = 2.0532423E-006
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------------
-------------------------------------------------------------------
-------------------------------------------------------------------
-------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 2.4900E+006
-----------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
-----------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-----------------------------------------------------------
 From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
 Mu/Vu-lw/2 = 0.00 <= 0
    = 1 (normal-weight concrete)
  fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
  h = 250.00
  d = 2400.00

lw = 3000.00
    Mu = 1.1486927E-009
    Vu = 1.0097420E-028
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
  Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
   Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
   Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
    d = 1440.00
    Av = 157079.633
    s = 200.00
    fy = 500.00
   Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:  1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 2957.00
  ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
      with  fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 250.00
--------------------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
----------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
----------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00
    lw = 3000.00
    Mu = 1.1486927E-009
    Vu = 1.0097420E-028
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
  Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
    d = 480.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
   Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
    d = 480.00
    Av = 157079.633

s = 150.00
        fy = 500.00
    Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
        d = 1440.00
        Av = 157079.633
        s = 200.00
        fy = 500.00
    Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
    Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
        f = 0.95, for fully-wrapped sections
      wf/sf = 1 (FRP strips adjacent to one another).
    In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
    where   is the angle of the crack direction (see KANEPE).
    This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
    as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
    orientation 1:   1 = b1 + 90° = 90.00
    Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
    total thickness per orientation, tf1 = NL*t/NoDir = 1.016
    dfv = d (figure 11.2, ACI 440) = 2957.00
    ffe ((11-5), ACI 440) = 259.312
        Ef = 64828.00
        fe = 0.004, from (11.6a), ACI 440
          with  fu = 0.01
    From (11-11), ACI 440: Vs + Vf < = 1.9929E+006
        bw = 250.00
-------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 3


-------------------------------------------------------------


Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 2
(Bending local axis: 3)
Section Type: rcrws

Constant Properties
-------------------------------------------------------------
Knowledge Factor,   = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon

Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
At local axis: 2
EDGE -A-
Shear Force, Va = 1.7354940E-029
EDGE -B-
Shear Force, Vb = -1.7354940E-029
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
       -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
       -Tension: Asl,ten = 2830.575
    -Compression: Asl,com = 2830.575
        -Middle: Asl,mid = 0.00
        (According to 10.7.2.3 Asl,mid is setted equal to zero)
------------------------------------------------------------
------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr  =  0.15621236
Member Controlled by Flexure (Ve/Vr < 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 160017.271
with
Mpr1 =  Max(Mu1+ , Mu1-) = 2.4003E+008
  Mu1+ = 2.0658E+008, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
  Mu1- = 2.4003E+008, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 =  Max(Mu2+ , Mu2-) = 2.4003E+008
  Mu2+ = 2.0658E+008, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
  Mu2- = 2.4003E+008, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination


---------------------------------------------------------------------------
Calculation of Mu1+
---------------------------------------------------------------------------


---------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0306889E-005
Mu = 2.0658E+008
---------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
     N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu = 0.0035

we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
------------------------------------------------------------------
  fx = 0.00
   af = 0.00
      b = 250.00
      h = 3000.00
   From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
      bw = 250.00
   effective stress from (A.35), ff,e = 757.2164
------------------------------------------------------------------
  fy = 0.00
   af = 0.00
      b = 3000.00
      h = 250.00
   From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
      bw = 3000.00
   effective stress from (A.35), ff,e = 954.4864
------------------------------------------------------------------
  R = 40.00
  Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
  fu,f = 1055.00
  Ef = 64828.00
   u,f = 0.015
  ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
      ase1 = 0.00
         sh_1 = 150.00
         bo_1 = 190.00
         ho_1 = 540.00
          bi2_1 = 655400.00
      ase2 = 0.00
        sh_2 = 150.00
         bo_2 = 190.00
         ho_2 = 540.00
          bi2_2 = 655400.00
     ase3 = 0 (grid does not provide confinement)
     psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
------------------------------------------------------------------
     psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
        ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
           h1 = 600.00
           As1 = Astir1*ns1 = 157.0796
              No stirups, ns1 = 2.00
        ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
           h2 = 600.00
           As2 = Astir2*ns2 = 157.0796
              No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
           h3 = 1800.00
           As3 = Astir3*ns3 = 0.00
              No stirups, ns3 = 2.00
------------------------------------------------------------------
     psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
           h1 = 250.00
           As1 = Astir1*ns1 = 157.0796
              No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
           h2 = 250.00
           As2 = Astir2*ns2 = 157.0796
              No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
           h3 = 250.00
           As3 = Astir3*ns3 = 157.0796
              No stirups, ns3 = 0.00

```
                 ----------------------------------------------------------------
                    Asec = 750000.00
                     s_1 = 150.00
                     s_2 = 150.00
                     s_3 = 200.00
                   fywe = 625.00
                    fce  = 25.00
              From ((5.A5), TBDY),  TBDY:  cc = 0.00202463
                     c  = confinement factor = 1.00246
          y1 = 0.00140044
        sh1 = 0.0044814
      ft1 = 420.1317
      fy1 = 350.1097
        su1 = 0.00512
            using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
            and also multiplied by the shear_factor according to 15.7.1.4, with
            Shear_factor = 1.00
            lo/lou,min = lb/ld = 0.30
              su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
            From table 5A.1, TBDY: esu1_nominal = 0.08,
            For calculation of esu1_nominal and   y1, sh1,ft1,fy1, it is considered
            characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
              y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
              with fs1 = fs = 350.1097
              with Es1 = Es = 200000.00
          y2 = 0.00140044
        sh2 = 0.0044814
      ft2 = 420.1317
      fy2 = 350.1097
        su2 = 0.00512
            using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
            and also multiplied by the shear_factor according to 15.7.1.4, with
            Shear_factor = 1.00
            lo/lou,min = lb/lb,min = 0.30
              su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
            From table 5A.1, TBDY: esu2_nominal = 0.08,
            For calculation of esu2_nominal and   y2, sh2,ft2,fy2, it is considered
            characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
              y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
              with fs2 = fs = 350.1097
              with Es2 = Es = 200000.00
          yv = 0.00140044
        shv = 0.0044814
      ftv = 420.1317
      fyv = 350.1097
        suv = 0.00512
            using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
            and also multiplied by the shear_factor according to 15.7.1.4, with
            Shear_factor = 1.00
            lo/lou,min = lb/ld = 0.30
              suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
            From table 5A.1, TBDY: esuv_nominal = 0.08,
            considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
            For calculation of esuv_nominal and   yv, shv,ftv,fyv, it is considered
            characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
              y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
              with fsv = fs = 350.1097
              with Esv = Es = 200000.00
        1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
        2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
        v = Asl,mid/(b*d)*(fsv/fc) = 0.00
    and confined core properties:
      b = 2940.00
      d = 178.00
      d' = 12.00
      fcc (5A.2, TBDY) = 25.06158
        cc (5A.5, TBDY) = 0.00202463
```

```
      c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
  u =   su (4.1) = 3.0306889E-005
--------------------------------------------------------------

Calculation of ratio lb/ld
--------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
Calculation of Mu1-
-----------------------------------------------------------------------

-----------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0889637E-005
Mu = 2.4003E+008
-----------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    -----------------------------------------------------------------
      fx = 0.00
       af = 0.00
         b = 250.00
         h = 3000.00
       From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
         bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    -----------------------------------------------------------------
      fy = 0.00
       af = 0.00
         b = 3000.00
         h = 250.00
       From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
         bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    -----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        u,f = 0.015
       ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
         ase1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
```

```
                    ho_1 = 540.00
                       bi2_1 = 655400.00
               ase2 = 0.00
                   sh_2 = 150.00
                       bo_2 = 190.00
                       ho_2 = 540.00
                       bi2_2 = 655400.00
               ase3 = 0 (grid does not provide confinement)
               psh,min = Min(psh,x , psh,y) = 0.00069813
      Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
           -----------------------------------------------------------------
           psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
               ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                   h1 = 600.00
                   As1 = Astir1*ns1 = 157.0796
                       No stirups, ns1 = 2.00
               ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
                   h2 = 600.00
                   As2 = Astir2*ns2 = 157.0796
                       No stirups, ns2 = 2.00
               ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                   h3 = 1800.00
                   As3 = Astir3*ns3 = 0.00
                       No stirups, ns3 = 2.00
           -----------------------------------------------------------------
           psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
               ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                   h1 = 250.00
                   As1 = Astir1*ns1 = 157.0796
                       No stirups, ns1 = 2.00
               ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                   h2 = 250.00
                   As2 = Astir2*ns2 = 157.0796
                       No stirups, ns2 = 2.00
               ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                   h3 = 250.00
                   As3 = Astir3*ns3 = 157.0796
                       No stirups, ns3 = 0.00
           -----------------------------------------------------------------
               Asec = 750000.00
               s_1 = 150.00
               s_2 = 150.00
               s_3 = 200.00
             fywe = 625.00
             fce  = 25.00
         From ((5.A5), TBDY), TBDY:  cc = 0.00202463
               c  = confinement factor = 1.00246
       y1 = 0.00140044
      sh1 = 0.0044814
     ft1 = 420.1317
    fy1 = 350.1097
     su1 = 0.00512
        using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
        and also multiplied by the shear_factor according to 15.7.1.4, with
        Shear_factor = 1.00
        lo/lou,min = lb/ld = 0.30
         su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu1_nominal = 0.08,
        For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
        characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
         with fs1 = fs = 350.1097
         with Es1 = Es = 200000.00
       y2 = 0.00140044
      sh2 = 0.0044814
     ft2 = 420.1317
```

fy2 = 350.1097
 su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fsv = fs = 350.1097
     with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
  2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
  v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =   su (4.1) = 3.0889637E-005
-------------------------------------------------------------

Calculation of ratio lb/ld
-------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
------------------------------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------------------------------
Calculation of Mu2+
------------------------------------------------------------------------

------------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0306889E-005
Mu = 2.0658E+008
------------------------------------------------------------------------

with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of cu: $cu^* = shear\_factor * Max(cu, cc) = 0.0035$
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: cu = 0.0035
      we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
    where f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ---------------------------------------------------------------
      fx = 0.00
       af = 0.00
         b = 250.00
         h = 3000.00
      From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
         bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
    ---------------------------------------------------------------
      fy = 0.00
       af = 0.00
         b = 3000.00
         h = 250.00
      From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
         bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864
    ---------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
        ase1 = 0.00
          sh_1 = 150.00
          bo_1 = 190.00
          ho_1 = 540.00
           bi2_1 = 655400.00
        ase2 = 0.00
          sh_2 = 150.00
          bo_2 = 190.00
          ho_2 = 540.00
           bi2_2 = 655400.00
      ase3 = 0 (grid does not provide confinement)
      psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
    ---------------------------------------------------------------
      psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
        ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
          h1 = 600.00
          As1 = Astir1*ns1 = 157.0796
           No stirups, ns1 = 2.00
        ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
          h2 = 600.00
          As2 = Astir2*ns2 = 157.0796
           No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
          h3 = 1800.00
          As3 = Astir3*ns3 = 0.00
           No stirups, ns3 = 2.00
      ---------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907

```
            h1 = 250.00
            As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
         ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
            h2 = 250.00
            As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
         ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
            h3 = 250.00
            As3 = Astir3*ns3 = 157.0796
               No stirups, ns3 = 0.00
      --------------------------------------------------------------------
         Asec = 750000.00
         s_1 = 150.00
         s_2 = 150.00
         s_3 = 200.00
       fywe = 625.00
       fce = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c = confinement factor = 1.00246
   y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
   y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
   yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
```

```
        with  fsv =  fs =  350.1097
        with  Esv =  Es =  200000.00
      1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
      2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
      v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
    b = 2940.00
    d = 178.00
    d' = 12.00
    fcc (5A.2, TBDY) = 25.06158
      cc (5A.5, TBDY) = 0.00202463
         c = confinement factor = 1.00246
      1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
      2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
      v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
  su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
   u =   su (4.1) = 3.0306889E-005
-------------------------------------------------------------

Calculation of ratio lb/ld
-------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------------
-------------------------------------------------------------------
-------------------------------------------------------------------
Calculation of Mu2-
-------------------------------------------------------------------

-------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
   u = 3.0889637E-005
Mu = 2.4003E+008
-------------------------------------------------------------------
with full section properties:
    b = 3000.00
    d = 208.00
    d' = 42.00
    v = 0.00176852
      N = 27588.841
    fc = 25.00
      co (5A.5, TBDY) = 0.002
    Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
       The Shear_factor is considered equal to 1 (pure moment strength)
       From (5.4b), TBDY:  cu = 0.0035
         we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
       where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
         -------------------------------------------------------------------
         fx = 0.00
          af = 0.00
             b = 250.00
             h = 3000.00
          From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
             bw = 250.00
          effective stress from (A.35), ff,e = 757.2164
         -------------------------------------------------------------------
         fy = 0.00
          af = 0.00
             b = 3000.00
             h = 250.00
          From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
             bw = 3000.00
```

effective stress from (A.35), ff,e = 954.4864

-----------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
 u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
    ase1 = 0.00
        sh_1 = 150.00
        bo_1 = 190.00
        ho_1 = 540.00
          bi2_1 = 655400.00
    ase2 = 0.00
        sh_2 = 150.00
        bo_2 = 190.00
        ho_2 = 540.00
          bi2_2 = 655400.00
    ase3 = 0 (grid does not provide confinement)
    psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

-----------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
    ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
        h1 = 600.00
        As1 = Astir1*ns1 = 157.0796
          No stirups, ns1 = 2.00
    ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
        h2 = 600.00
        As2 = Astir2*ns2 = 157.0796
          No stirups, ns2 = 2.00
    ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
        h3 = 1800.00
        As3 = Astir3*ns3 = 0.00
          No stirups, ns3 = 2.00

-----------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
    ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
        h1 = 250.00
        As1 = Astir1*ns1 = 157.0796
          No stirups, ns1 = 2.00
    ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
        h2 = 250.00
        As2 = Astir2*ns2 = 157.0796
          No stirups, ns2 = 2.00
    ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
        h3 = 250.00
        As3 = Astir3*ns3 = 157.0796
          No stirups, ns3 = 0.00

-----------------------------------------------------------------

    Asec = 750000.00
    s_1 = 150.00
    s_2 = 150.00
    s_3 = 200.00
  fywe = 625.00
  fce  = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
    c  = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00

```
    lo/lou,min = lb/ld = 0.30
      su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
      y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs1 = fs = 350.1097
      with Es1 = Es = 200000.00
    y2 = 0.00140044
    sh2 = 0.0044814
   ft2 = 420.1317
   fy2 = 350.1097
    su2 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/lb,min = 0.30
       su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esu2_nominal = 0.08,
      For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
      characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
    yv = 0.00140044
    shv = 0.0044814
   ftv = 420.1317
   fyv = 350.1097
    suv = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/ld = 0.30
       suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esuv_nominal = 0.08,
      considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
      For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
      characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fsv = fs = 350.1097
       with Esv = Es = 200000.00
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
    2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
    v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
    cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
    v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =   su (4.1) = 3.0889637E-005
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
```

```
------------------------------------------------------------------
------------------------------------------------------------------
------------------------------------------------------------------
------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 1.0244E+006
------------------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
  2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
  2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
  2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:  1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 208.00
  ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
      with  fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
-----------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
```

```
--------------------------------------------------------------
   From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
   Mu/Vu-lw/2 = 0.00 < = 0
       = 1 (normal-weight concrete)
     fc' = 25.00, but fc^0.5 < = 8.3 MPa (22.5.3.1, ACI 318-14)
     h = 3000.00
     d = 200.00
     lw = 250.00
     Mu = 3.7289358E-011
     Vu = 1.7354940E-029
     Nu = 27588.841
   From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
   Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
      d = 200.00
      Av = 157079.633
      s = 150.00
      fy = 500.00
    Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
     2(1-s/d) = 0.50
   Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
      d = 200.00
      Av = 157079.633
      s = 150.00
      fy = 500.00
    Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
     2(1-s/d) = 0.50
   Vs3 = 0.00 is calculated for web, with:
      d = 200.00
      Av = 0.00
      s = 200.00
      fy = 500.00
    Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
     2(1-s/d) = 0.00
    Vf ((11-3)-(11.4), ACI 440) = 109599.773
       f = 0.95, for fully-wrapped sections
    wf/sf = 1 (FRP strips adjacent to one another).
    In (11.3) sin   + cos   is replaced with (cot +cota)sina which is more a generalised expression,
    where   is the angle of the crack direction (see KANEPE).
    This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
    as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
    orientation 1:   1 = b1 + 90° = 90.00
    Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
    total thickness per orientation, tf1 = NL*t/NoDir = 1.016
    dfv = d (figure 11.2, ACI 440) = 208.00
    ffe ((11-5), ACI 440) = 259.312
       Ef = 64828.00
        fe = 0.004, from (11.6a), ACI 440
         with  fu = 0.01
    From (11-11), ACI 440: Vs + Vf < = 1.9929E+006
       bw = 3000.00
--------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 2


--------------------------------------------------------------


Start Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)
Section Type: rcrws

Constant Properties
--------------------------------------------------------------
Knowledge Factor,   = 1.00
According to 10.7.2.3, ASCE 41-17, shear walls with
transverse reinforcement percentage,   n < 0.0015
```

are considered Force-Controlled and lower-bound strengths are used according to 7.5.1.3, ASCE 41-17
  n = 0.00069813
----------------------------------------------------------------------------------------
with   n = ps1 + ps2 + ps3, being the shear reinf. ratio in a plane perpedicular to the shear axis 3
 (pseudo-col.1 ps1 = As1*b1/s1 = (As1*h1/s1) / Ac = 0.00034907
          h1 = 250.00
          s1 = 150.00
          total area of hoops perpedicular to shear axis, As1 = 157.0796
 (pseudo-col.2 ps2 = As2*b2/s2 = (As2*h2/s2) / Ac = 0.00034907
          h2 = 250.00
          s2 = 150.00
          total area of hoops perpedicular to shear axis, As2 = 157.0796
 (grid       ps3 = As3*b3/s3 = (As3*h3/s3) / Ac = 0.00
          h3 = 250.00
          s3 = 200.00
          total area of hoops perpedicular to shear axis, As3 = 0.00
  total section area, Ac = 750000.00
----------------------------------------------------------------------------------------
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
--------------------------------------------------------------

Stepwise Properties
--------------------------------------------------------------
Axial Force, F = -31026.87
Longitudinal Reinforcement Area Distribution (in 2 divisions)
       -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
       -Tension: Asl,ten = 2865.133
     -Compression: Asl,com = 2865.133
        -Middle: Asl,mid = 1539.38
Mean Diameter of Tension Reinforcement, DbL = 17.33333
--------------------------------------------------------------
--------------------------------------------------------------


Considering wall controlled by Shear (shear control ratio > 1),
interstorey drift provided values are calculated
New component: From table 7-7, ASCE 41_17: Final chord rotation Capacity   u,R = 1.0*  u = 0.015
from table 10-20:  u = 0.015

with:
 - Condition i (shear wall and wall segments)
 - (As-As')*fy+P)/(tw*lw*fc') = -0.19220244
    As = 0.00
    As' = 7269.645
    fy = 500.00
    P = 31026.87
    tw = 250.00
    lw = 3000.00
    fc = 25.00

------------------------------------------------------------
End Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 2
Integration Section: (a)

------------------------------------------------------------

## Calculation No. 15

wall W1, Floor 1

Limit State: Life Safety (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Shear capacity VRd

Edge: End

Local Axis: (3)



Start Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (d)
Section Type: rcrws

Constant Properties
------------------------------------------------------------
Knowledge Factor,   = 1.00
Member Shear Force is generally considered as Force-Controlled Action according to Table C7-1, ASCE 41-17.

Lower-bound strengths are used for Force-Controlled Actions according to 7.5.1.3, ASCE 41-17
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min =lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-----------------------------------------------------------

Stepwise Properties
-----------------------------------------------------------
EDGE -A-
Bending Moment, Ma = 6.1793E+007
Shear Force, Va = -20889.844
EDGE -B-
Bending Moment, Mb = 889554.947
Shear Force, Vb = 20889.844
BOTH EDGES
Axial Force, F = -31026.87
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2865.133
      -Compression: Asl,com = 2865.133
         -Middle: Asl,mid = 1539.38
Mean Diameter of Tension Reinforcement, DbL,ten = 17.33333
-----------------------------------------------------------
-----------------------------------------------------------


New component: From table 7-7, ASCE 41_17: Final Shear Capacity VR = 1.0*Vn = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vn < 0.83*fc'^0.5*h*d  = 2.4900E+006
-----------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw' is replaced by 'Vw+   f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-----------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 816205.374
  Mu/Vu-lw/2 = -1457.417 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 250.00
    d = 2400.00
    lw = 3000.00
    Mu = 889554.947

Vu = 20889.844
Nu = 31026.87
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
  d = 480.00
  Av = 157079.633
  s = 150.00
  fy = 500.00
Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
  d = 480.00
  Av = 157079.633
  s = 150.00
  fy = 500.00
Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs3 = 565486.678 is calculated for web, with:
  d = 1440.00
  Av = 157079.633
  s = 200.00
  fy = 500.00
Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
  f = 0.95, for fully-wrapped sections
wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where  is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
orientation 1:  1 = b1 + 90° = 90.00
Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
  Ef = 64828.00
   fe = 0.004, from (11.6a), ACI 440
    with  fu = 0.01
From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
  bw = 250.00
------------------------------------------------------------
End Of Calculation of Shear Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (d)

------------------------------------------------------------

## Calculation No. 16

wall W1, Floor 1

Limit State: Life Safety (data interpolation between analysis steps 1 and 2)

Analysis: Uniform +X

Check: Chord rotation capacity ( u)

Edge: End

Local Axis: (3)

Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 3
(Bending local axis: 2)
Section Type: rcrws

Constant Properties
-----------------------------------------------------------------
Knowledge Factor,    = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
##############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
##############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
-----------------------------------------------------------------

Stepwise Properties
-----------------------------------------------------------------
At local axis: 3
EDGE -A-
Shear Force, Va = 1.0097420E-028
EDGE -B-
Shear Force, Vb = -1.0097420E-028

BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
     -Tension: Aslt = 0.00
   -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
     -Tension: Asl,ten = 2865.133
   -Compression: Asl,com = 2865.133
    -Middle: Asl,mid = 0.00
    (According to 10.7.2.3 Asl,mid is setted equal to zero)
------------------------------------------------------------
------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 1.02813
Member Controlled by Shear (Ve/Vr > 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 2.5600E+006
with
Mpr1 = Max(Mu1+ , Mu1-) = 3.8401E+009
  Mu1+ = 3.3585E+009, is the ultimate moment strength at the edge 1 of the member in the actual moment direction which is defined for the static loading combination
  Mu1- = 3.8401E+009, is the ultimate moment strength at the edge 1 of the member in the opposite moment direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 3.8401E+009
  Mu2+ = 3.3585E+009, is the ultimate moment strength at the edge 2 of the member in the actual moment direction which is defined for the the static loading combination
  Mu2- = 3.8401E+009, is the ultimate moment strength at the edge 2 of the member in the opposite moment direction which is defined for the the static loading combination


----------------------------------------------------------------
Calculation of Mu1+
----------------------------------------------------------------


----------------------------------------------------------------
Calculation of ultimate curvature  φu according to 4.1, Biskinis/Fardis 2013:
 φu = 2.0296703E-006
Mu = 3.3585E+009
----------------------------------------------------------------
with full section properties:
 b = 250.00
 d = 2957.00
 d' = 43.00
 v = 0.0014928
  N = 27588.841
 fc = 25.00
  εco (5A.5, TBDY) = 0.002
 Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
   The Shear_factor is considered equal to 1 (pure moment strength)
   From (5.4b), TBDY: εcu = 0.0035
    ωwe ((5.4c), TBDY) = ρase* sh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
   where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
    ωfx = 0.00
    αf = 0.00
     b = 250.00
     h = 3000.00
    From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
     bw = 250.00
    effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
    ωfy = 0.00
    αf = 0.00
     b = 3000.00
     h = 250.00
    From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
     bw = 3000.00
    effective stress from (A.35), ff,e = 954.4864

```
--------------------------------------------------------------------
    R = 40.00
    Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
    fu,f = 1055.00
    Ef = 64828.00
     u,f = 0.015
    ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
        ase1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
            ho_1 = 540.00
             bi2_1 = 655400.00
        ase2 = 0.00
            sh_2 = 150.00
            bo_2 = 190.00
            ho_2 = 540.00
             bi2_2 = 655400.00
        ase3 = 0 (grid does not provide confinement)
        psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
        --------------------------------------------------------------
        psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
            ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
                h1 = 600.00
                As1 = Astir1*ns1 = 157.0796
                    No stirups, ns1 = 2.00
            ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
                h2 = 600.00
                As2 = Astir2*ns2 = 157.0796
                    No stirups, ns2 = 2.00
            ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                h3 = 1800.00
                As3 = Astir3*ns3 = 0.00
                    No stirups, ns3 = 2.00
        --------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
            ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                h1 = 250.00
                As1 = Astir1*ns1 = 157.0796
                    No stirups, ns1 = 2.00
            ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                h2 = 250.00
                As2 = Astir2*ns2 = 157.0796
                    No stirups, ns2 = 2.00
            ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                h3 = 250.00
                As3 = Astir3*ns3 = 157.0796
                    No stirups, ns3 = 0.00
        --------------------------------------------------------------
            Asec = 750000.00
            s_1 = 150.00
            s_2 = 150.00
            s_3 = 200.00
        fywe = 625.00
        fce  = 25.00
    From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c  = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
```

su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
        From table 5A.1, TBDY: esu1_nominal = 0.08,
        For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
        characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
         y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
         with fs1 = fs = 350.1097
         with Es1 = Es = 200000.00
    y2 = 0.00140044
    sh2 = 0.0044814
   ft2 = 420.1317
   fy2 = 350.1097
    su2 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/lb,min = 0.30
       su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esu2_nominal = 0.08,
      For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
      characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fs2 = fs = 350.1097
       with Es2 = Es = 200000.00
    yv = 0.00140044
    shv = 0.0044814
   ftv = 420.1317
   fyv = 350.1097
    suv = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/ld = 0.30
       suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esuv_nominal = 0.08,
      considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
      For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
      characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
       y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
       with fsv = fs = 350.1097
       with Esv = Es = 200000.00
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
    2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
    cc (5A.5, TBDY) = 0.00202463
      c = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
  su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
  u =   su (4.1) = 2.0296703E-006
-----------------------------------------------------------

Calculation of ratio lb/ld
-----------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------------

---------------------------------------------------------------------
---------------------------------------------------------------------
Calculation of Mu1-
---------------------------------------------------------------------


---------------------------------------------------------------------
Calculation of ultimate curvature φu according to 4.1, Biskinis/Fardis 2013:
φu = 2.0532423E-006
Mu = 3.8401E+009
---------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
  εco (5A.5, TBDY) = 0.002
  Final value of εcu: εcu* = shear_factor * Max(εcu, εcc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY: εcu = 0.0035
      ωwe ((5.4c), TBDY) = αse*ρsh,min*fywe/fce+Min(ωfx, ωfy) = 0.00
    where ωf = αf*ρf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      ωfx = 0.00
      αf = 0.00
        b = 250.00
        h = 3000.00
      From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.008128
        bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      ωfy = 0.00
      αf = 0.00
        b = 3000.00
        h = 250.00
      From EC8 A.4.4.3(6), ρf = 2tf/bw = 0.00067733
        bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864
    ----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
      εu,f = 0.015
      αse ((5.4d), TBDY) = (αse1*Acol1+αse2*Acol2+αse3*Aweb)/Asec = 0.00
        αse1 = 0.00
          sh_1 = 150.00
          bo_1 = 190.00
          ho_1 = 540.00
          Σbi2_1 = 655400.00
        αse2 = 0.00
          sh_2 = 150.00
          bo_2 = 190.00
          ho_2 = 540.00
          Σbi2_2 = 655400.00
      αse3 = 0 (grid does not provide confinement)
      ρsh,min = Min(ρsh,x , ρsh,y) = 0.00069813
    Expression ((5.4d), TBDY) for ρsh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
      ----------------------------------------------------------------
      ρsh,x = ρs1,x+ρs2,x+ρs3,x = 0.00356047
        ρs1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
          h1 = 600.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ρs2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776

```
                h2 = 600.00
                As2 = Astir2*ns2 = 157.0796
                    No stirups, ns2 = 2.00
              ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
                h3 = 1800.00
                As3 = Astir3*ns3 = 0.00
                    No stirups, ns3 = 2.00
      ------------------------------------------------------------------
        psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
            ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
                h1 = 250.00
                As1 = Astir1*ns1 = 157.0796
                    No stirups, ns1 = 2.00
            ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
                h2 = 250.00
                As2 = Astir2*ns2 = 157.0796
                    No stirups, ns2 = 2.00
            ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
                h3 = 250.00
                As3 = Astir3*ns3 = 157.0796
                    No stirups, ns3 = 0.00
      ------------------------------------------------------------------
          Asec = 750000.00
          s_1 = 150.00
          s_2 = 150.00
          s_3 = 200.00
        fywe = 625.00
        fce  = 25.00
     From ((5.A5), TBDY): cc = 0.00202463
          c = confinement factor = 1.00246
  y1 = 0.00140044
  sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
  su1 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/ld = 0.30
        su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esu1_nominal = 0.08,
      For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
      characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fs1 = fs = 350.1097
        with Es1 = Es = 200000.00
  y2 = 0.00140044
  sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
  su2 = 0.00512
      using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
      and also multiplied by the shear_factor according to 15.7.1.4, with
      Shear_factor = 1.00
      lo/lou,min = lb/lb,min = 0.30
        su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
      From table 5A.1, TBDY: esu2_nominal = 0.08,
      For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
      characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
        y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
        with fs2 = fs = 350.1097
        with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
  suv = 0.00512
```

using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fsv = fs = 350.1097
  with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
  2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
  v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
  b = 190.00
  d = 2927.00
  d' = 13.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
    v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
 u =  su (4.1) = 2.0532423E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
----------------------------------------------------------------
----------------------------------------------------------------
----------------------------------------------------------------
Calculation of Mu2+
----------------------------------------------------------------

----------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0296703E-006
Mu = 3.3585E+009
----------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min( fx,  fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
      ---------------------------------------------------------------
       fx = 0.00
        af = 0.00
          b = 250.00
          h = 3000.00

From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
   bw = 250.00
effective stress from (A.35), ff,e = 757.2164

---------------------------------------------------------------

fy = 0.00
af = 0.00
  b = 3000.00
  h = 250.00
From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
   bw = 3000.00
effective stress from (A.35), ff,e = 954.4864

---------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
 u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
   ase1 = 0.00
     sh_1 = 150.00
     bo_1 = 190.00
     ho_1 = 540.00
      bi2_1 = 655400.00
  ase2 = 0.00
    sh_2 = 150.00
     bo_2 = 190.00
     ho_2 = 540.00
     bi2_2 = 655400.00
  ase3 = 0 (grid does not provide confinement)
  psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

---------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
  ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
    h1 = 600.00
    As1 = Astir1*ns1 = 157.0796
     No stirups, ns1 = 2.00
  ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
    h2 = 600.00
    As2 = Astir2*ns2 = 157.0796
     No stirups, ns2 = 2.00
  ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
    h3 = 1800.00
    As3 = Astir3*ns3 = 0.00
     No stirups, ns3 = 2.00

---------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
  ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
    h1 = 250.00
    As1 = Astir1*ns1 = 157.0796
     No stirups, ns1 = 2.00
  ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
    h2 = 250.00
    As2 = Astir2*ns2 = 157.0796
     No stirups, ns2 = 2.00
  ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
    h3 = 250.00
    As3 = Astir3*ns3 = 157.0796
     No stirups, ns3 = 0.00

---------------------------------------------------------------

  Asec = 750000.00
  s_1 = 150.00
  s_2 = 150.00
  s_3 = 200.00
fywe = 625.00
fce = 25.00

From ((5.A5), TBDY), TBDY:  cc = 0.00202463
     c = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu1_nominal = 0.08,
  For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
  characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
   with fs1 = fs = 350.1097
   with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
  su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
   with fs2 = fs = 350.1097
   with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
  suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
   with fsv = fs = 350.1097
   with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
b = 190.00
d = 2927.00
d' = 13.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
   c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->

v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.14691336
Mu = MRc (4.14) = 3.3585E+009
 u =   su (4.1) = 2.0296703E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
----------------------------------------------------------------------
----------------------------------------------------------------------
----------------------------------------------------------------------
Calculation of Mu2-
----------------------------------------------------------------------

----------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 2.0532423E-006
Mu = 3.8401E+009
----------------------------------------------------------------------
with full section properties:
  b = 250.00
  d = 2957.00
  d' = 43.00
  v = 0.0014928
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+ Min(  fx,   fy) = 0.00
    where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      fx = 0.00
       af = 0.00
          b = 250.00
          h = 3000.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
          bw = 250.00
      effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      fy = 0.00
       af = 0.00
          b = 3000.00
          h = 250.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
          bw = 3000.00
      effective stress from (A.35), ff,e = 954.4864
    ----------------------------------------------------------------
      R = 40.00
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
      fu,f = 1055.00
      Ef = 64828.00
       u,f = 0.015
      ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
        ase1 = 0.00
           sh_1 = 150.00
           bo_1 = 190.00
           ho_1 = 540.00
            bi2_1 = 655400.00
        ase2 = 0.00
          sh_2 = 150.00
           bo_2 = 190.00
           ho_2 = 540.00
            bi2_2 = 655400.00

ase3 = 0 (grid does not provide confinement)
    psh,min = Min(psh,x , psh,y) = 0.00069813
  Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
    ------------------------------------------------------------------
    psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
      ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
        h1 = 600.00
        As1 = Astir1*ns1 = 157.0796
          No stirups, ns1 = 2.00
      ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
        h2 = 600.00
        As2 = Astir2*ns2 = 157.0796
          No stirups, ns2 = 2.00
      ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
        h3 = 1800.00
        As3 = Astir3*ns3 = 0.00
          No stirups, ns3 = 2.00
    ------------------------------------------------------------------
    psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
      ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
        h1 = 250.00
        As1 = Astir1*ns1 = 157.0796
          No stirups, ns1 = 2.00
      ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
        h2 = 250.00
        As2 = Astir2*ns2 = 157.0796
          No stirups, ns2 = 2.00
      ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
        h3 = 250.00
        As3 = Astir3*ns3 = 157.0796
          No stirups, ns3 = 0.00
    ------------------------------------------------------------------
    Asec = 750000.00
    s_1 = 150.00
    s_2 = 150.00
    s_3 = 200.00
  fywe = 625.00
  fce = 25.00
 From ((5.A5), TBDY), TBDY: cc = 0.00202463
    c = confinement factor = 1.00246
 y1 = 0.00140044
 sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
 su1 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
   su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu1_nominal = 0.08,
  For calculation of esu1_nominal and y1, sh1,ft1,fy1, it is considered
  characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
   y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
   with fs1 = fs = 350.1097
   with Es1 = Es = 200000.00
 y2 = 0.00140044
 sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
   su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032

From table 5A.1, TBDY: esu2_nominal = 0.08,
For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fs2 = fs = 350.1097
with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
suv = 0.00512
using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
and also multiplied by the shear_factor according to 15.7.1.4, with
Shear_factor = 1.00
lo/lou,min = lb/ld = 0.30
suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esuv_nominal = 0.08,
considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered
characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
with fsv = fs = 350.1097
with Esv = Es = 200000.00
1 = Asl,ten/(b*d)*(fs1/fc) = 0.05427722
2 = Asl,com/(b*d)*(fs2/fc) = 0.05427722
v = Asl,mid/(b*d)*(fsv/fc) = 0.0291621
and confined core properties:
b = 190.00
d = 2927.00
d' = 13.00
fcc (5A.2, TBDY) = 25.06158
cc (5A.5, TBDY) = 0.00202463
c = confinement factor = 1.00246
1 = Asl,ten/(b*d)*(fs1/fc) = 0.07214938
2 = Asl,com/(b*d)*(fs2/fc) = 0.07214938
v = Asl,mid/(b*d)*(fsv/fc) = 0.03876447
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.15670711
Mu = MRc (4.14) = 3.8401E+009
u = su (4.1) = 2.0532423E-006
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 2.4900E+006
------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+ f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------
From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
Mu/Vu-lw/2 = 0.00 <= 0
= 1 (normal-weight concrete)
fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
h = 250.00
d = 2400.00

lw = 3000.00
Mu = 1.1486927E-009
Vu = 1.0097420E-028
Nu = 27588.841
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
   d = 480.00
   Av = 157079.633
   s = 150.00
   fy = 500.00
 Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
   d = 480.00
   Av = 157079.633
   s = 150.00
   fy = 500.00
 Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs3 = 565486.678 is calculated for web, with:
   d = 1440.00
   Av = 157079.633
   s = 200.00
   fy = 500.00
 Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
 Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
   f = 0.95, for fully-wrapped sections
 wf/sf = 1 (FRP strips adjacent to one another).
In (11.3) sin + cos is replaced with (cot +cota)sina which is more a generalised expression,
where   is the angle of the crack direction (see KANEPE).
This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
orientation 1:   1 = b1 + 90° = 90.00
Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
total thickness per orientation, tf1 = NL*t/NoDir = 1.016
dfv = d (figure 11.2, ACI 440) = 2957.00
ffe ((11-5), ACI 440) = 259.312
   Ef = 64828.00
    fe = 0.004, from (11.6a), ACI 440
     with  fu = 0.01
 From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
   bw = 250.00
------------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 2.4900E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
------------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
------------------------------------------------------------------
 From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
 Mu/Vu-lw/2 = 0.00 <= 0
     = 1 (normal-weight concrete)
   fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
   h = 250.00
   d = 2400.00
   lw = 3000.00
   Mu = 1.1486927E-009
   Vu = 1.0097420E-028
   Nu = 27588.841
From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 1.0681E+006
Vs1 = 251327.412 is calculated for pseudo-Column 1, with:
   d = 480.00
   Av = 157079.633
   s = 150.00
   fy = 500.00
 Vs1 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
Vs2 = 251327.412 is calculated for pseudo-Column 2, with:
   d = 480.00
   Av = 157079.633

s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vs3 = 565486.678 is calculated for web, with:
    d = 1440.00
    Av = 157079.633
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 1 (s<d/2, according to ASCE 41-17,10.3.4)
  Vf ((11-3)-(11.4), ACI 440) = 1.5581E+006
    f = 0.95, for fully-wrapped sections
   wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:   1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45, 1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 2957.00
  ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
       with  fu = 0.01
   From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 250.00
---------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 3


---------------------------------------------------------------


Start Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At Shear local axis: 2
(Bending local axis: 3)
Section Type: rcrws

Constant Properties
---------------------------------------------------------------
Knowledge Factor,   = 1.00
Mean strength values are used for both shear and moment calculations.
Consequently:
New material of Secondary Member: Concrete Strength, fc = fcm = 25.00
New material of Secondary Member: Steel Strength, fs = fsm = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
###############################################################
Note: Especially for the calculation of moment strengths,
the above steel re-bar strengths are multiplied by 1.25 according to R18.6.5, ACI 318-14
New material: Steel Strength, fs = 1.25*fsm = 625.00
###############################################################
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Mean Confinement Factor overall section = 1.00246
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lo/lou,min = 0.30
FRP Wrapping Data
Type: Carbon

Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi: 0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
------------------------------------------------------------

Stepwise Properties
------------------------------------------------------------
At local axis: 2
EDGE -A-
Shear Force, Va = 1.7354940E-029
EDGE -B-
Shear Force, Vb = -1.7354940E-029
BOTH EDGES
Axial Force, F = -27588.841
Longitudinal Reinforcement Area Distribution (in 2 divisions)
      -Tension: Aslt = 0.00
    -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
      -Tension: Asl,ten = 2830.575
    -Compression: Asl,com = 2830.575
       -Middle: Asl,mid = 0.00
       (According to 10.7.2.3 Asl,mid is setted equal to zero)
------------------------------------------------------------
------------------------------------------------------------


Calculation of Shear Capacity ratio , Ve/Vr = 0.15621236
Member Controlled by Flexure (Ve/Vr < 1)
Calculation of Shear Demand from fig. R18.6.5, ACI 318-14 Ve = (Mpr1 + Mpr2)/ln = 160017.271
with
Mpr1 = Max(Mu1+ , Mu1-) = 2.4003E+008
  Mu1+ = 2.0658E+008, is the ultimate moment strength at the edge 1 of the member in the actual moment direction
which is defined for the static loading combination
  Mu1- = 2.4003E+008, is the ultimate moment strength at the edge 1 of the member in the opposite moment
direction which is defined for the static loading combination
Mpr2 = Max(Mu2+ , Mu2-) = 2.4003E+008
  Mu2+ = 2.0658E+008, is the ultimate moment strength at the edge 2 of the member in the actual moment direction
which is defined for the the static loading combination
  Mu2- = 2.4003E+008, is the ultimate moment strength at the edge 2 of the member in the opposite moment
direction which is defined for the the static loading combination

---------------------------------------------------------------------------
Calculation of Mu1+
---------------------------------------------------------------------------

---------------------------------------------------------------------------
Calculation of ultimate curvature  u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0306889E-005
Mu = 2.0658E+008
---------------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035

we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx, fy) = 0.00
where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)

-----------------------------------------------------------------

fx = 0.00
af = 0.00
   b = 250.00
   h = 3000.00
From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
   bw = 250.00
effective stress from (A.35), ff,e = 757.2164

-----------------------------------------------------------------

fy = 0.00
af = 0.00
   b = 3000.00
   h = 250.00
From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
   bw = 3000.00
effective stress from (A.35), ff,e = 954.4864

-----------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
 u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
   ase1 = 0.00
      sh_1 = 150.00
      bo_1 = 190.00
      ho_1 = 540.00
       bi2_1 = 655400.00
   ase2 = 0.00
      sh_2 = 150.00
      bo_2 = 190.00
      ho_2 = 540.00
       bi2_2 = 655400.00
   ase3 = 0 (grid does not provide confinement)
   psh,min = Min(psh,x , psh,y) = 0.00069813
Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)

-----------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
   ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
      h1 = 600.00
      As1 = Astir1*ns1 = 157.0796
         No stirups, ns1 = 2.00
   ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
      h2 = 600.00
      As2 = Astir2*ns2 = 157.0796
         No stirups, ns2 = 2.00
   ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
      h3 = 1800.00
      As3 = Astir3*ns3 = 0.00
         No stirups, ns3 = 2.00

-----------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
   ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
      h1 = 250.00
      As1 = Astir1*ns1 = 157.0796
         No stirups, ns1 = 2.00
   ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
      h2 = 250.00
      As2 = Astir2*ns2 = 157.0796
         No stirups, ns2 = 2.00
   ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
      h3 = 250.00
      As3 = Astir3*ns3 = 157.0796
         No stirups, ns3 = 0.00

```
------------------------------------------------------------------------
        Asec = 750000.00
         s_1 = 150.00
         s_2 = 150.00
         s_3 = 200.00
       fywe = 625.00
        fce  = 25.00
     From ((5.A5), TBDY):  cc = 0.00202463
         c  = confinement factor = 1.00246
   y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and   y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs1 = fs = 350.1097
      with Es1 = Es = 200000.00
   y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
 fy2 = 350.1097
  su2 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu2_nominal = 0.08,
    For calculation of esu2_nominal and   y2, sh2,ft2,fy2, it is considered
    characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fs2 = fs = 350.1097
      with Es2 = Es = 200000.00
   yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esuv_nominal = 0.08,
    considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
    For calculation of esuv_nominal and   yv, shv,ftv,fyv, it is considered
    characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
      with fsv = fs = 350.1097
      with Esv = Es = 200000.00
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
    2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
 and confined core properties:
   b = 2940.00
   d = 178.00
   d' = 12.00
   fcc (5A.2, TBDY) = 25.06158
    cc (5A.5, TBDY) = 0.00202463
```

```
     c  = confinement factor = 1.00246
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
   2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
  u =   su (4.1) = 3.0306889E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
--------------------------------------------------------------------
--------------------------------------------------------------------
--------------------------------------------------------------------
Calculation of Mu1-
--------------------------------------------------------------------

--------------------------------------------------------------------
Calculation of ultimate curvature    u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0889637E-005
Mu = 2.4003E+008
--------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of   cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu = 0.0035
       we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
     where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------
       fx = 0.00
        af = 0.00
          b = 250.00
          h = 3000.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.008128
          bw = 250.00
        effective stress from (A.35), ff,e = 757.2164
     ----------------------------------------------------------
       fy = 0.00
        af = 0.00
          b = 3000.00
          h = 250.00
        From EC8 A4.4.3(6), pf = 2tf/bw = 0.00067733
          bw = 3000.00
        effective stress from (A.35), ff,e = 954.4864
     ----------------------------------------------------------
        R = 40.00
        Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
        fu,f = 1055.00
        Ef = 64828.00
         u,f = 0.015
        ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
          ase1 = 0.00
            sh_1 = 150.00
            bo_1 = 190.00
```

```
            ho_1 = 540.00
              bi2_1 = 655400.00
        ase2 = 0.00
          sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
              bi2_2 = 655400.00
        ase3 = 0 (grid does not provide confinement)
        psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)
      ----------------------------------------------------------------
      psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
        ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
          h1 = 600.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
          h2 = 600.00
          As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
          h3 = 1800.00
          As3 = Astir3*ns3 = 0.00
            No stirups, ns3 = 2.00
      ----------------------------------------------------------------
      psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
        ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
          h1 = 250.00
          As1 = Astir1*ns1 = 157.0796
            No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
          h2 = 250.00
          As2 = Astir2*ns2 = 157.0796
            No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
          h3 = 250.00
          As3 = Astir3*ns3 = 157.0796
            No stirups, ns3 = 0.00
      ----------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
      fce  = 25.00
   From ((5.A5), TBDY, TBDY:  cc = 0.00202463
        c  = confinement factor = 1.00246
   y1 = 0.00140044
  sh1 = 0.0044814
 ft1 = 420.1317
 fy1 = 350.1097
  su1 = 0.00512
    using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
    and also multiplied by the shear_factor according to 15.7.1.4, with
    Shear_factor = 1.00
    lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
    From table 5A.1, TBDY: esu1_nominal = 0.08,
    For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
    characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^ 2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
   y2 = 0.00140044
  sh2 = 0.0044814
 ft2 = 420.1317
```

fy2 = 350.1097
  su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
    su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fs2 = fs = 350.1097
    with Es2 = Es = 200000.00
  yv = 0.00140044
  shv = 0.0044814
 ftv = 420.1317
 fyv = 350.1097
  suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
    suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
    y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
    with fsv = fs = 350.1097
    with Esv = Es = 200000.00
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
  2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
  v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
  cc (5A.5, TBDY) = 0.00202463
    c  = confinement factor = 1.00246
  1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
  2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
  v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
 ' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
 su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
 u =  su (4.1) = 3.0889637E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-------------------------------------------------------------------------
-------------------------------------------------------------------------
-------------------------------------------------------------------------
Calculation of Mu2+
-------------------------------------------------------------------------

-------------------------------------------------------------------------
Calculation of ultimate curvature  u according to 4.1, Biskinis/Fardis 2013:
 u = 3.0306889E-005
Mu = 2.0658E+008
-------------------------------------------------------------------------

with full section properties:

  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu, cc) = 0.0035
    The Shear_factor is considered equal to 1 (pure moment strength)
    From (5.4b), TBDY:  cu = 0.0035
      we ((5.4c), TBDY) = ase* sh,min*fywe/fce+Min( fx,  fy) = 0.00
    where  f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
    ----------------------------------------------------------------
      fx = 0.00
       af = 0.00
          b = 250.00
          h = 3000.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
          bw = 250.00
       effective stress from (A.35), ff,e = 757.2164
    ----------------------------------------------------------------
      fy = 0.00
       af = 0.00
          b = 3000.00
          h = 250.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
          bw = 3000.00
       effective stress from (A.35), ff,e = 954.4864
    ----------------------------------------------------------------
       R = 40.00
       Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
       fu,f = 1055.00
       Ef = 64828.00
        u,f = 0.015
       ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
          ase1 = 0.00
             sh_1 = 150.00
             bo_1 = 190.00
             ho_1 = 540.00
              bi2_1 = 655400.00
          ase2 = 0.00
            sh_2 = 150.00
             bo_2 = 190.00
             ho_2 = 540.00
              bi2_2 = 655400.00
       ase3 = 0 (grid does not provide confinement)
       psh,min = Min(psh,x , psh,y) = 0.00069813
    Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without earthquake detailing (90° closed stirrups)
    ----------------------------------------------------------------
       psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
          ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
             h1 = 600.00
             As1 = Astir1*ns1 = 157.0796
               No stirups, ns1 = 2.00
          ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
             h2 = 600.00
             As2 = Astir2*ns2 = 157.0796
               No stirups, ns2 = 2.00
          ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
             h3 = 1800.00
             As3 = Astir3*ns3 = 0.00
               No stirups, ns3 = 2.00
    ----------------------------------------------------------------
       psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
          ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907

```
            h1 = 250.00
            As1 = Astir1*ns1 = 157.0796
                No stirups, ns1 = 2.00
        ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
            h2 = 250.00
            As2 = Astir2*ns2 = 157.0796
                No stirups, ns2 = 2.00
        ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
            h3 = 250.00
            As3 = Astir3*ns3 = 157.0796
                No stirups, ns3 = 0.00
   ----------------------------------------------------------------
        Asec = 750000.00
        s_1 = 150.00
        s_2 = 150.00
        s_3 = 200.00
      fywe = 625.00
      fce = 25.00
   From ((5.A5), TBDY), TBDY:  cc = 0.00202463
        c  = confinement factor = 1.00246
 y1 = 0.00140044
 sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
 su1 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
     su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu1_nominal = 0.08,
   For calculation of esu1_nominal and  y1, sh1,ft1,fy1, it is considered
   characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs1 = fs = 350.1097
     with Es1 = Es = 200000.00
 y2 = 0.00140044
 sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/lb,min = 0.30
     su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esu2_nominal = 0.08,
   For calculation of esu2_nominal and  y2, sh2,ft2,fy2, it is considered
   characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
     with fs2 = fs = 350.1097
     with Es2 = Es = 200000.00
 yv = 0.00140044
 shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
 suv = 0.00512
   using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
   and also multiplied by the shear_factor according to 15.7.1.4, with
   Shear_factor = 1.00
   lo/lou,min = lb/ld = 0.30
     suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
   From table 5A.1, TBDY: esuv_nominal = 0.08,
   considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
   For calculation of esuv_nominal and  yv, shv,ftv,fyv, it is considered
   characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
     y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
```

```
      with fsv = fs =  350.1097
      with Esv = Es =  200000.00
   1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
   2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
   v = Asl,mid/(b*d)*(fsv/fc) = 0.00
and confined core properties:
  b = 2940.00
  d = 178.00
  d' = 12.00
  fcc (5A.2, TBDY) = 25.06158
   cc (5A.5, TBDY) = 0.00202463
      c  = confinement factor = 1.00246
    1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
    2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
    v = Asl,mid/(b*d)*(fsv/fc) = 0.00
Case/Assumption: Unconfinesd full section - Steel rupture
  ' satisfies Eq. (4.3)
--->
 v < vs,y2 - LHS eq.(4.5) is satisfied
--->
  su (4.9) = 0.18779572
Mu = MRc (4.14) = 2.0658E+008
  u =   su (4.1) = 3.0306889E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
Calculation of Mu2-
-----------------------------------------------------------------------

-----------------------------------------------------------------------
Calculation of ultimate curvature   u according to 4.1, Biskinis/Fardis 2013:
  u = 3.0889637E-005
Mu = 2.4003E+008
-----------------------------------------------------------------------
with full section properties:
  b = 3000.00
  d = 208.00
  d' = 42.00
  v = 0.00176852
    N = 27588.841
  fc = 25.00
   co (5A.5, TBDY) = 0.002
  Final value of  cu:  cu* = shear_factor * Max( cu,  cc) = 0.0035
     The Shear_factor is considered equal to 1 (pure moment strength)
     From (5.4b), TBDY:  cu = 0.0035
       we ((5.4c), TBDY) = ase*  sh,min*fywe/fce+Min(  fx,   fy) = 0.00
     where   f = af*pf*ffe/fce is accounting for FRP contribution like EC8-part3 A.4.4.3(6)
     ----------------------------------------------------------------
       fx = 0.00
       af = 0.00
          b = 250.00
          h = 3000.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.008128
          bw = 250.00
       effective stress from (A.35), ff,e =  757.2164
     ----------------------------------------------------------------
       fy = 0.00
       af = 0.00
          b = 3000.00
          h = 250.00
       From EC8 A.4.4.3(6), pf = 2tf/bw = 0.00067733
          bw = 3000.00
```

effective stress from (A.35), ff,e = 954.4864

------------------------------------------------------------------

R = 40.00
Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
fu,f = 1055.00
Ef = 64828.00
 u,f = 0.015
ase ((5.4d), TBDY) = (ase1*Acol1+ase2*Acol2+ase3*Aweb)/Asec = 0.00
   ase1 = 0.00
      sh_1 = 150.00
      bo_1 = 190.00
      ho_1 = 540.00
        bi2_1 = 655400.00
   ase2 = 0.00
      sh_2 = 150.00
      bo_2 = 190.00
      ho_2 = 540.00
        bi2_2 = 655400.00
   ase3 = 0 (grid does not provide confinement)
   psh,min = Min(psh,x , psh,y) = 0.00069813
 Expression ((5.4d), TBDY) for psh,min has been miltiplied by 0.3 according to 15.7.1.3 for members without
earthquake detailing (90° closed stirrups)

------------------------------------------------------------------

psh,x = ps1,x+ps2,x+ps3,x = 0.00356047
   ps1,x (column 1) = (As1*h1/s_1)/Ac = 0.00083776
      h1 = 600.00
      As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
   ps2,x (column 2) = (As2*h2/s_2)/Ac = 0.00083776
      h2 = 600.00
      As2 = Astir2*ns2 = 157.0796
        No stirups, ns2 = 2.00
   ps3,x (web) = (As3*h3/s_3)/Ac = 0.00188496
      h3 = 1800.00
      As3 = Astir3*ns3 = 0.00
        No stirups, ns3 = 2.00

------------------------------------------------------------------

psh,y = ps1,y+ps2,y+ps3,y = 0.00069813
   ps1,y (column 1) = (As1*h1/s_1)/Ac = 0.00034907
      h1 = 250.00
      As1 = Astir1*ns1 = 157.0796
        No stirups, ns1 = 2.00
   ps2,y (column 2) = (As2*h2/s_2)/Ac = 0.00034907
      h2 = 250.00
      As2 = Astir2*ns2 = 157.0796
        No stirups, ns2 = 2.00
   ps3,y (web) = (As3*h3/s_3)/Ac = 0.00
      h3 = 250.00
      As3 = Astir3*ns3 = 157.0796
        No stirups, ns3 = 0.00

------------------------------------------------------------------

   Asec = 750000.00
   s_1 = 150.00
   s_2 = 150.00
   s_3 = 200.00
 fywe = 625.00
 fce  = 25.00
From ((5.A5), TBDY), TBDY:  cc = 0.00202463
   c  = confinement factor = 1.00246
y1 = 0.00140044
sh1 = 0.0044814
ft1 = 420.1317
fy1 = 350.1097
su1 = 0.00512
 using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
 and also multiplied by the shear_factor according to 15.7.1.4, with
 Shear_factor = 1.00

lo/lou,min = lb/ld = 0.30
  su1 = 0.4*esu1_nominal ((5.5), TBDY) = 0.032
From table 5A.1, TBDY: esu1_nominal = 0.08,
For calculation of esu1_nominal and y1, sh1,ft1,fy1, it is considered
characteristic value fsy1 = fs1/1.2, from table 5.1, TBDY.
  y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
  with fs1 = fs = 350.1097
  with Es1 = Es = 200000.00
y2 = 0.00140044
sh2 = 0.0044814
ft2 = 420.1317
fy2 = 350.1097
 su2 = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/lb,min = 0.30
   su2 = 0.4*esu2_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esu2_nominal = 0.08,
  For calculation of esu2_nominal and y2, sh2,ft2,fy2, it is considered
  characteristic value fsy2 = fs2/1.2, from table 5.1, TBDY.
   y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
   with fs2 = fs = 350.1097
   with Es2 = Es = 200000.00
yv = 0.00140044
shv = 0.0044814
ftv = 420.1317
fyv = 350.1097
 suv = 0.00512
  using (30) in Biskinis/Fardis (2013) multiplied with shear_factor
  and also multiplied by the shear_factor according to 15.7.1.4, with
  Shear_factor = 1.00
  lo/lou,min = lb/ld = 0.30
   suv = 0.4*esuv_nominal ((5.5), TBDY) = 0.032
  From table 5A.1, TBDY: esuv_nominal = 0.08,
  considering characteristic value fsyv = fsv/1.2, from table 5.1, TBDY
  For calculation of esuv_nominal and yv, shv,ftv,fyv, it is considered
  characteristic value fsyv = fsv/1.2, from table 5.1, TBDY.
   y1, sh1,ft1,fy1, are also multiplied by Min(1,1.25*(lb/ld)^2/3), from 10.3.5, ASCE 41-17.
   with fsv = fs = 350.1097
   with Esv = Es = 200000.00
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.0635264
 2 = Asl,com/(b*d)*(fs2/fc) = 0.0635264
 v = Asl,mid/(b*d)*(fsv/fc) = 0.03609935
and confined core properties:
b = 2940.00
d = 178.00
d' = 12.00
fcc (5A.2, TBDY) = 25.06158
 cc (5A.5, TBDY) = 0.00202463
  c = confinement factor = 1.00246
 1 = Asl,ten/(b*d)*(fs1/fc) = 0.07574806
 2 = Asl,com/(b*d)*(fs2/fc) = 0.07574806
 v = Asl,mid/(b*d)*(fsv/fc) = 0.0430444
Case/Assumption: Unconfinesd full section - Steel rupture
' satisfies Eq. (4.3)
--->
v < vs,y2 - LHS eq.(4.5) is satisfied
--->
su (4.9) = 0.20311835
Mu = MRc (4.14) = 2.4003E+008
u = su (4.1) = 3.0889637E-005
------------------------------------------------------------

Calculation of ratio lb/ld
------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30

```
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
Calculation of Shear Strength Vr = Min(Vr1,Vr2) = 1.0244E+006
-----------------------------------------------------------------------
Calculation of Shear Strength at edge 1, Vr1 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr1 = Vn < 0.83*fc'^0.5*h*d
-------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
-------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
       = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
  where    is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:   1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 208.00
  ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
       with  fu = 0.01
   From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
-------------------------------------------------------------------
Calculation of Shear Strength at edge 2, Vr2 = 1.0244E+006
From (22.5.1.1) and 11.5.4.3, ACI 318-14: Vr2 = Vn < 0.83*fc'^0.5*h*d
-------------------------------------------------------------
NOTE: In expression (22.5.1.1) 'Vw ' is replaced by 'Vw+  f*Vf'
where Vf is the contribution of FRPs (11.3), ACI 440).
```

```
------------------------------------------------------------------
  From Table (11.5.4.6(d-e)), ACI 318-14: Vc = 815517.768
  Mu/Vu-lw/2 = 0.00 <= 0
      = 1 (normal-weight concrete)
    fc' = 25.00, but fc^0.5 <= 8.3 MPa (22.5.3.1, ACI 318-14)
    h = 3000.00
    d = 200.00
    lw = 250.00
    Mu = 3.7289358E-011
    Vu = 1.7354940E-029
    Nu = 27588.841
  From (11.5.4.8), ACI 318-14: Vs = Vs1 + Vs2 + Vs3 = 104719.755
  Vs1 = 52359.878 is calculated for pseudo-Column 1, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs1 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs2 = 52359.878 is calculated for pseudo-Column 2, with:
    d = 200.00
    Av = 157079.633
    s = 150.00
    fy = 500.00
  Vs2 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.50
  Vs3 = 0.00 is calculated for web, with:
    d = 200.00
    Av = 0.00
    s = 200.00
    fy = 500.00
  Vs3 has been multiplied by 2(1-s/d) (s>d/2, according to ASCE 41-17,10.3.4)
   2(1-s/d) = 0.00
  Vf ((11-3)-(11.4), ACI 440) = 109599.773
    f = 0.95, for fully-wrapped sections
  wf/sf = 1 (FRP strips adjacent to one another).
  In (11.3) sin  + cos  is replaced with (cot +cota)sina which is more a generalised expression,
  where   is the angle of the crack direction (see KANEPE).
  This later relation, considered as a function Vf( , ), is implemented for every different fiber orientation ai,
  as well as for 2 crack directions,  =45° and  =-45° to take into consideration the cyclic seismic loading.
  orientation 1:   1 = b1 + 90° = 90.00
  Vf = Min(|Vf(45,  1)|,|Vf(-45,a1)|), with:
  total thickness per orientation, tf1 = NL*t/NoDir = 1.016
  dfv = d (figure 11.2, ACI 440) = 208.00
  ffe ((11-5), ACI 440) = 259.312
    Ef = 64828.00
     fe = 0.004, from (11.6a), ACI 440
      with  fu = 0.01
  From (11-11), ACI 440: Vs + Vf <= 1.9929E+006
    bw = 3000.00
------------------------------------------------------------------
End Of Calculation of Shear Capacity ratio for element: wall W1 of floor 1
At local axis: 2


------------------------------------------------------------------


Start Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (d)
Section Type: rcrws

Constant Properties
------------------------------------------------------------------
Knowledge Factor,   = 1.00
According to 10.7.2.3, ASCE 41-17, shear walls with
transverse reinforcement percentage,   n < 0.0015
```

are considered Force-Controlled and lower-bound strengths are used according to 7.5.1.3, ASCE 41-17
  n = 0.00069813
-------------------------------------------------------------------------------
with   n = ps1 + ps2 + ps3, being the shear reinf. ratio in a plane perpedicular to the shear axis 2
 (pseudo-col.1 ps1 = As1*b1/s1 = (As1*h1/s1) / Ac = 0.00034907
         h1 = 250.00
         s1 = 150.00
         total area of hoops perpedicular to shear axis, As1 = 157.0796
 (pseudo-col.2 ps2 = As2*b2/s2 = (As2*h2/s2) / Ac = 0.00034907
         h2 = 250.00
         s2 = 150.00
         total area of hoops perpedicular to shear axis, As2 = 157.0796
  (grid     ps3 = As3*b3/s3 = (As3*h3/s3) / Ac = 0.00
         h3 = 250.00
         s3 = 200.00
         total area of hoops perpedicular to shear axis, As3 = 0.00
  total section area, Ac = 750000.00
-------------------------------------------------------------------------------
Consequently:
New material of Secondary Member: Concrete Strength, fc = fc_lower_bound = 25.00
New material of Secondary Member: Steel Strength, fs = fs_lower_bound = 500.00
Concrete Elasticity, Ec = 26999.444
Steel Elasticity, Es = 200000.00
Total Height, Htot = 3000.00
Edges Width, Wedg = 250.00
Edges Height, Hedg = 600.00
Web Width, Wweb = 250.00
Cover Thickness, c = 25.00
Element Length, L = 3000.00
Secondary Member
Smooth Bars
Ductile Steel
Without Detailing for Earthquake Resistance (including stirrups not closed at 135°)
Longitudinal Bars With Ends Lapped Starting at the End Sections
Inadequate Lap Length with lb/ld = 0.30
FRP Wrapping Data
Type: Carbon
Cured laminate properties (design values)
Thickness, t = 1.016
Tensile Strength, ffu = 1055.00
Tensile Modulus, Ef = 64828.00
Elongation, efu = 0.01
Number of directions, NoDir = 1
Fiber orientations, bi:  0.00°
Number of layers, NL = 1
Radius of rounding corners, R = 40.00
--------------------------------------------------------------

Stepwise Properties
--------------------------------------------------------------
Bending Moment, M = -2.4510145E-011
Shear Force, V2 = 1.2948432E-014
Shear Force, V3 = 20889.844
Axial Force, F = -31026.87
Longitudinal Reinforcement Area Distribution (in 2 divisions)
        -Tension: Aslt = 0.00
     -Compression: Aslc = 7269.645
Longitudinal Reinforcement Area Distribution (in 3 divisions)
        -Tension: Asl,ten = 2830.575
     -Compression: Asl,com = 2830.575
         -Middle: Asl,mid = 1608.495
Mean Diameter of Tension Reinforcement, DbL = 16.46154
--------------------------------------------------------------
--------------------------------------------------------------

New component: From table 7-7, ASCE 41_17: Final chord rotation Capacity   u,R = 1.0*  u = 0.00918702

ᵤ = ᵧ + ₚ = 0.00918702

---------------------------------------------------------------
- Calculation of ᵧ -
---------------------------------------------------------------
ᵧ = (My*lp)/(EI)Eff = 0.00118702 ((10-5), ASCE 41-17))
 My = 1.8257E+008
 (EI)Eff = 0.35*Ec*I (table 10-5)
  Ec*I = 1.0547E+014
 lp = 0.5*d = 0.5*(0.8*h) = 240.00
---------------------------------------------------------------
---------------------------------------------------------------

Calculation of Yielding Moment My
---------------------------------------------------------------
Calculation of ᵧ and My according to Annex 7  -
---------------------------------------------------------------
 ᵧ = Min( ᵧ_ten, ᵧ_com)
 ᵧ_ten = 8.9780154E-006
 with ((10.1), ASCE 41-17) fy = Min(fy, 1.25*fy*(lb/ld)^2/3) = 280.0878
    d = 208.00
     ᵧ = 0.25007038
    A = 0.0118276
    B = 0.00717877
     with pt = 0.00453618
        pc = 0.00453618
        pv = 0.00257772
        N = 31026.87
        b = 3000.00
        " = 0.20192308
  ᵧ_comp = 3.2320012E-005
 with fc* (12.3, (ACI 440)) = 25.002
    fc = 25.00
    fl = 0.17503396
    b = 3000.00
    h = 250.00
    Ag = 750000.00
    From (12.9), ACI 440: ka = 0.0036426
       g = pt + pc + pv = 0.01165007
      rc = 40.00
      Ae/Ac = 0.52453487
      Effective FRP thickness, tf = NL*t*Cos(b1) = 1.016
    effective strain from (12.5) and (12.12), efe = 0.004
     fu = 0.01
    Ef = 64828.00
    Ec = 26999.444
     ᵧ = 0.24794626
    A = 0.01150092
    B = 0.00700125
     with Es = 200000.00
---------------------------------------------------------------
---------------------------------------------------------------

Calculation of ratio lb/ld
---------------------------------------------------------------
Inadequate Lap Length with lb/ld = 0.30

---------------------------------------------------------------
- Calculation of ₚ -
---------------------------------------------------------------
Considering wall controlled by flexure (shear control ratio <= 1),
from table 10-19: ₚ = 0.008
with:
- Condition i (shear wall and wall segments)
- (As-As')*fy+P)/(tw*lw*fc') = -0.19220244
   As = 0.00
   As' = 7269.645

fy = 500.00
P = 31026.87
tw = 3000.00
lw = 250.00
fc = 25.00
- $V/(tw*lw*fc^{0.5})$ = 4.1582360E-020, NOTE: units in lb & in
- Confined Boundary: No
  Boundary hoops spacing exceed 8db (s1 > 8*db or s2 > 8*db )
  Boundary Trans. Reinf. does not exceed 50% of ACI 318 provision (Vw1 + Vw2 > 0.50*(V-Vc-Vw3)
  With
  Boundary Element 1:
   Vw1 = 104719.755
   s1 = 150.00
  Boundary Element 2:
   Vw2 = 104719.755
   s2 = 150.00
  Grid Shear Force, Vw3 = 0.00
  Concrete Shear Force, Vc = 19312.5.108
(The variables above have already been given in Shear control ratio calculation)
  Mean diameter of all bars, db = 17.33333
  Design Shear Force, V = 1.2948432E-014


-------------------------------------------------------------
End Of Calculation of Chord Rotation Capacity for element: wall W1 of floor 1
At local axis: 3
Integration Section: (d)


-------------------------------------------------------------