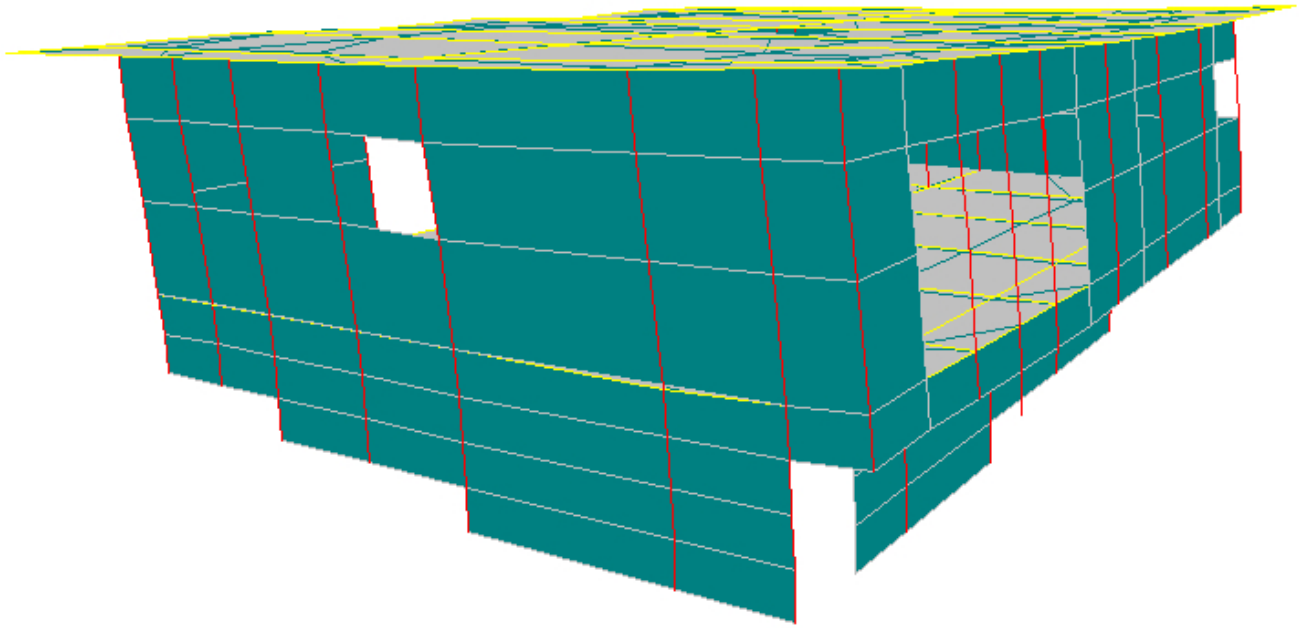
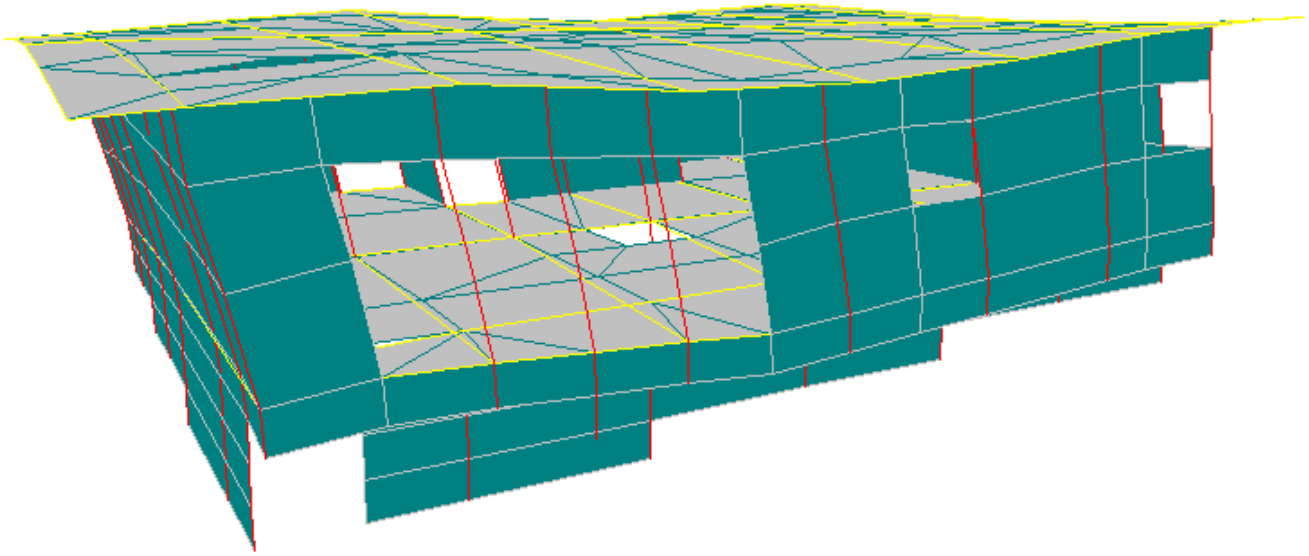
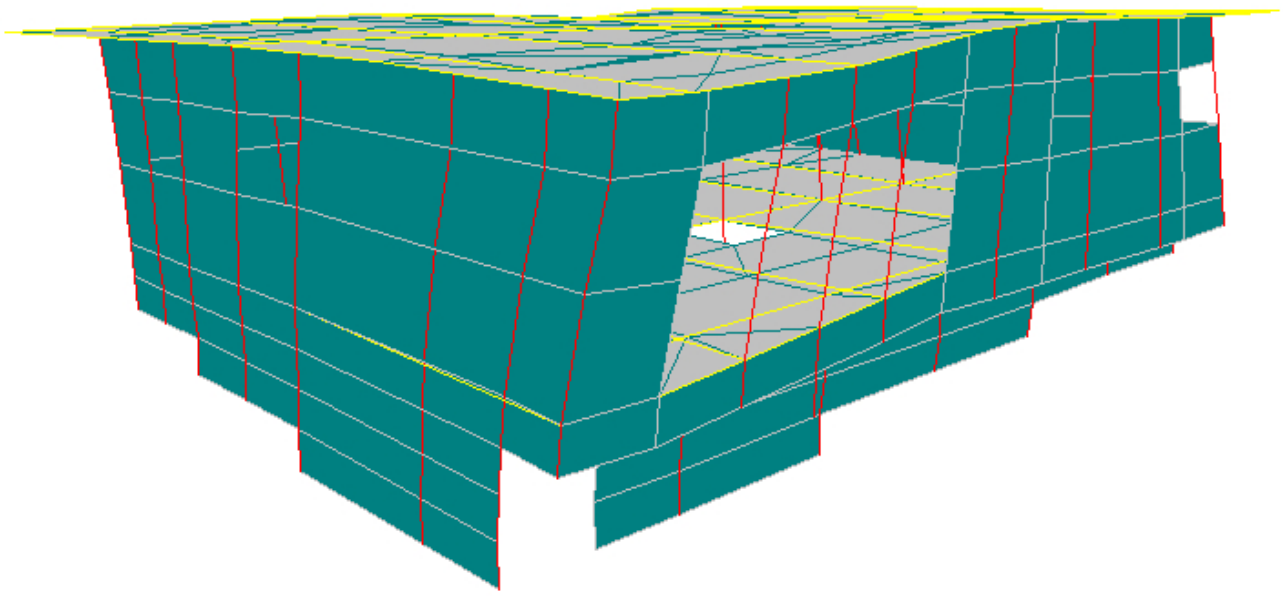
Seismic Demands for Exterior Walls **SECTION 01**



First Mode Deformation (visually amplified) [Fig: 0301.01]

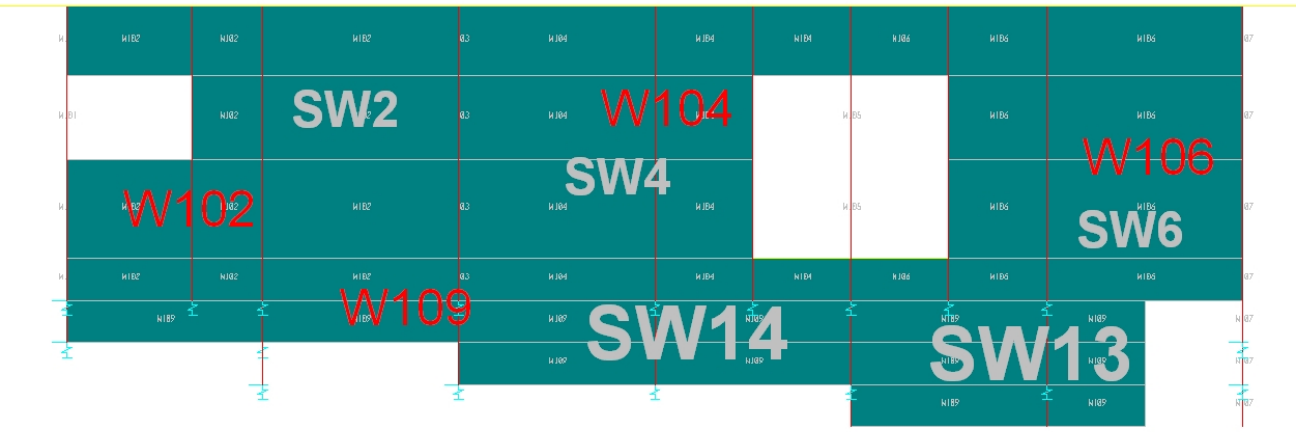


Second Mode Deformation (visually amplified) [Fig: 0301.02]



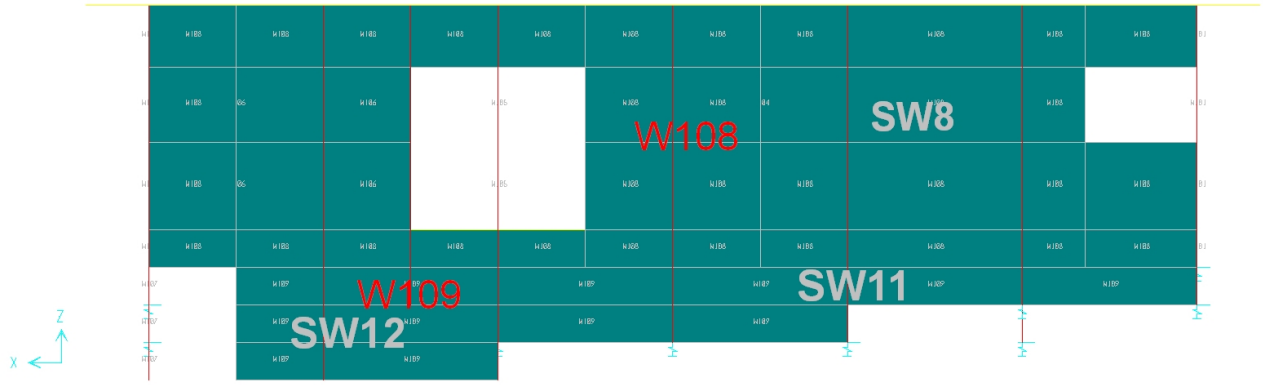
Third Mode Deformation (visually amplified) [Fig: 0301.03]

SW7 - South Shear Wall Elements SW101 [Fig: 0301.04]



SW2, SW4, SW6 West Shear Wall Elements - SW102, SW104, SW106 [Fig: 0301.05]

SW1 North Shear Wall Elements - SW101 [Fig: 0301.06]



SW8 East Shear Wall Elements - SW108 [Fig: 0301.07]

ETABS Input Summary [Table: 0301.01]

```
LOAD CASE DEFINITION DATA
LOAD LTYP       I      II     III       A       B       C      D1      D2
   1    0   0.000   0.000   0.000   1.000   0.300   0.300   0.000   0.000
   2    0   0.000   0.000   0.000   0.300   1.000   0.300   0.000   0.000
FOR DYNAMICS BY THE RESPONSE SPECTRUM METHOD
DYNAMIC 1 . . . SPECTRAL DIRECTION 1
DYNAMIC 2 . . . SPECTRAL DIRECTION 2
FOR DYNAMICS BY THE TIME HISTORY METHOD
DYNAMIC 1 . . . TIME HISTORY MODAL ANALYSIS
DYNAMIC 2 . . . NOT USED
DISPLACEMENT MAXIMA & MINIMA  IN FRAME
WITH (COLUMN#,CASE#)
               LOCAL      LOCAL      LOCAL      LOCAL      LOCAL      LOCAL
              X-TRAN     Y-TRAN     Z-TRAN    XX-ROTN    YY-ROTN    ZZ-ROTN
     MIN    -0.01984   -0.00393   -0.50598   -0.00893   -0.00189   -0.00138
          (   2,  2) (  27,  1) (  63,  2) (  67,  2) (  16,  1) (   8,  2)
     MAX     0.69920    0.81052    0.23803    0.00282    0.00678    0.00167
          (  64,  1) (  82,  2) (  49,  2) (   2,  1) (  12,  1) (   7,  2)
WALL FORCE MAXIMA & MINIMA  IN FRAME
WITH (ELEM#,CASE#)
               MAJOR      MAJOR      MINOR      MINOR      AXIAL  TORSIONAL
              MOMENT      SHEAR     MOMENT      SHEAR      FORCE     MOMENT
     MIN -0.1581E+03-0.3731E+01-0.6057E-03-0.6914E-04-0.9540E+00-0.3589E-02
          ( 101,  2) ( 101,  2) ( 104,  2) ( 104,  2) ( 107,  2) ( 108,  1)
     MAX  0.1578E+03 0.2337E+01 0.6388E-03 0.5147E-04 0.7663E+00 0.2476E-02
          ( 107,  2) ( 107,  2) ( 104,  2) ( 102,  2) ( 102,  2) ( 107,  2)
FLOOR  FORCE MAXIMA & MINIMA  IN FRAME
WITH (ELEM#,CASE#)
PROP           FORCE      FORCE
  ID              11         22
   1
     MIN -0.3585E-03-0.1514E-02
          (   8,  2) (   8,  2)
     MAX  0.2953E-03 0.1413E-02
          (  14,  2) (   8,  2)
   2
     MIN -0.9517E-04-0.4019E-03
          (   8,  2) (   8,  2)
     MAX  0.7838E-04 0.3752E-03
          (  14,  2) (   8,  2)
```

ETABS Eigenvalues [Table: 0301.02]

```
STRUCTURAL TIME PERIODS AND FREQUENCIES
  MODE                   PERIOD           FREQUENCY       CIRCULAR/FREQ
NUMBER                   (TIME)  (CYCLES/UNIT TIME) (RADIANS/UNIT TIME)
     1                  0.53952             1.85350            11.64587
```

2	0.50634	1.97497	12.40909
3	0.37881	2.63987	16.58676
4	0.30659	3.26171	20.49392
5	0.20504	4.87714	30.64400
6	0.14072	7.10646	44.65123
7	0.12038	8.30735	52.19664
8	0.08812	11.34803	71.30178
9	0.08684	11.51536	72.35314
10	0.07069	14.14602	88.88208

MODAL PARTICIPATION FACTORS

MODE NUMBER	X-TRANS DIRECTION	Y-TRANS DIRECTION	Z-ROTN DIRECTION
1	0.07285	-0.28556	-7.40594
2	0.25636	0.08404	4.39616
3	0.00221	-0.00654	60.91933
4	-0.01250	0.02421	-5.27632
5	0.00713	-0.19737	-7.02955
6	-0.21966	0.02749	-14.44215
7	-0.10070	-0.06390	38.72897
8	-0.03686	0.00040	-2.49839
9	0.00698	0.01739	-3.82790
10	-0.00496	-0.00627	5.59411

MODAL DIRECTION FACTORS

MODE NUMBER	X-TRANS DIRECTION	Y-TRANS DIRECTION	Z-ROTN DIRECTION
1	7.71274	91.27298	1.01429
2	92.18805	7.46448	0.34747
3	0.21077	2.38354	97.40569
4	9.06374	32.81362	58.12264
5	0.08223	89.05951	10.85826
6	83.98605	1.48230	14.53164
7	15.85965	10.89143	73.24892
8	98.80493	0.51433	0.68074
9	0.59747	98.63851	0.76402
10	0.91519	0.97642	98.10839

EFFECTIVE MASS FACTORS

NUMBER	%-MASS	<%-SUM>	%-MASS	<%-SUM>	%-MASS	<%-SUM>
1	3.90	< 3.9>	59.92	< 59.9>	0.96	< 1.0>
2	48.29	< 52.2>	5.19	< 65.1>	0.34	< 1.3>
3	0.00	< 52.2>	0.03	< 65.1>	64.68	< 66.0>
4	0.11	< 52.3>	0.43	< 65.6>	0.49	< 66.5>
5	0.04	< 52.3>	28.62	< 94.2>	0.86	< 67.3>
6	35.45	< 87.8>	0.56	< 94.7>	3.64	< 71.0>
7	7.45	< 95.3>	3.00	< 97.8>	26.14	< 97.1>
8	1.00	< 96.3>	0.00	< 97.8>	0.11	< 97.2>
9	0.04	< 96.3>	0.22	< 98.0>	0.26	< 97.5>
10	0.02	< 96.3>	0.03	< 98.0>	0.55	< 98.0>

ETABS Story Shears [Table: 0301.03]

```
COORDINATES OF CENTERS OF CUMULATIVE MASS & CENTERS OF RIGIDITY
STORY  DIAPHRAGM /----------CENTER OF MASS----------//--CENTER OF RIGIDITY--/
LEVEL     NUMBER        MASS  ORDINATE-X  ORDINATE-Y  ORDINATE-X  ORDINATE-Y
ROOF
               1       0.046     277.763     202.598     264.774     203.475
WINTOP
               1       0.054     278.706     200.942     262.890     190.041
WINBOT
               1       0.063     278.026     198.763     245.047     203.759
FLOOR
               1       0.130     280.866     205.918     171.905     238.081
FNDTOP
               1       0.134     282.490     208.273      43.027     297.137
FNDMID
               1       0.135     284.189     209.256     532.139     347.254
FNDBOT
               1       0.136     285.420     209.878     283.134     204.655

STATIC LOAD CONDITION LATERAL STORY SHEARS FOR ALL DIAPHRAGMS
VALUES ARE AT THE GLOBAL ORIGIN IN THE GLOBAL COORDINATES
                /--------------------LOAD  CONDITIONS---------------------/
LEVEL     DIRN           I        II       III         A         B         C
ROOF         X        0.00      0.00      0.00      4.66      0.00      0.00
ROOF         Y        0.00      0.00      0.00      0.00      4.66      0.00
WINTOP       X        0.00      0.00      0.00      5.34      0.00      0.00
WINTOP       Y        0.00      0.00      0.00      0.00      5.34      0.00
WINBOT       X        0.00      0.00      0.00      5.89      0.00      0.00
WINBOT       Y        0.00      0.00      0.00      0.00      5.89      0.00
FLOOR        X        0.00      0.00      0.00      8.20      0.00      0.00
FLOOR        Y        0.00      0.00      0.00      0.00      8.20      0.00
FNDTOP       X        0.00      0.00      0.00      8.27      0.00      0.00
FNDTOP       Y        0.00      0.00      0.00      0.00      8.27      0.00
FNDMID       X        0.00      0.00      0.00      8.29      0.00      0.00
FNDMID       Y        0.00      0.00      0.00      0.00      8.29      0.00
FNDBOT       X        0.00      0.00      0.00      8.29      0.00      0.00
FNDBOT       Y        0.00      0.00      0.00      0.00      8.29      0.00
```

ETABS Force and Displacement Summary [Table: 0301.04]

```
LOAD CASE DEFINITION DATA
LOAD LTYP       I      II     III       A       B       C      D1      D2
   1    0   0.000   0.000   0.000   1.000   0.300   0.300   0.000   0.000
   2    0   0.000   0.000   0.000   0.300   1.000   0.300   0.000   0.000
FOR DYNAMICS BY THE RESPONSE SPECTRUM METHOD
DYNAMIC 1 . . . SPECTRAL DIRECTION 1
DYNAMIC 2 . . . SPECTRAL DIRECTION 2
FOR DYNAMICS BY THE TIME HISTORY METHOD
DYNAMIC 1 . . . TIME HISTORY MODAL ANALYSIS
DYNAMIC 2 . . . NOT USED
```

```
DISPLACEMENT MAXIMA & MINIMA  IN FRAME
WITH (COLUMN#,CASE#)
               LOCAL      LOCAL      LOCAL      LOCAL      LOCAL      LOCAL
              X-TRAN     Y-TRAN     Z-TRAN    XX-ROTN    YY-ROTN    ZZ-ROTN
     MIN    -0.01984   -0.00393   -0.50598   -0.00893   -0.00189   -0.00138
          (   2,  2) (  27,  1) (  63,  2) (  67,  2) (  16,  1) (   8,  2)
     MAX     0.69920    0.81052    0.23803    0.00282    0.00678    0.00167
          (  64,  1) (  82,  2) (  49,  2) (   2,  1) (  12,  1) (   7,  2)
WALL FORCE MAXIMA & MINIMA  IN FRAME
WITH (ELEM#,CASE#)
               MAJOR      MAJOR      MINOR      MINOR      AXIAL  TORSIONAL
              MOMENT      SHEAR     MOMENT      SHEAR      FORCE     MOMENT
     MIN -0.1581E+03-0.3731E+01-0.6057E-03-0.6914E-04-0.9540E+00-0.3589E-02
          ( 101,  2) ( 101,  2) ( 104,  2) ( 104,  2) ( 107,  2) ( 108,  1)
     MAX  0.1578E+03 0.2337E+01 0.6388E-03 0.5147E-04 0.7663E+00 0.2476E-02
          ( 107,  2) ( 107,  2) ( 104,  2) ( 102,  2) ( 102,  2) ( 107,  2)
FLOOR  FORCE MAXIMA & MINIMA  IN FRAME
WITH (ELEM#,CASE#)
PROP           FORCE      FORCE
  ID              11         22
   1
     MIN -0.3585E-03-0.1514E-02
          (   8,  2) (   8,  2)
     MAX  0.2953E-03 0.1413E-02
          (  14,  2) (   8,  2)
   2
     MIN -0.9517E-04-0.4019E-03
          (   8,  2) (   8,  2)
     MAX  0.7838E-04 0.3752E-03
          (  14,  2) (   8,  2)
```

ETABS Eigenvalues [Table: 0301.05]

```
STRUCTURAL TIME PERIODS AND FREQUENCIES
  MODE                   PERIOD           FREQUENCY       CIRCULAR/FREQ
NUMBER                   (TIME)  (CYCLES/UNIT TIME) (RADIANS/UNIT TIME)
     1                  0.53952             1.85350            11.64587
     2                  0.50634             1.97497            12.40909
     3                  0.37881             2.63987            16.58676
     4                  0.30659             3.26171            20.49392
     5                  0.20504             4.87714            30.64400
     6                  0.14072             7.10646            44.65123
     7                  0.12038             8.30735            52.19664
     8                  0.08812            11.34803            71.30178
     9                  0.08684            11.51536            72.35314
    10                  0.07069            14.14602            88.88208
MODAL PARTICIPATION FACTORS
  MODE                  X-TRANS             Y-TRANS              Z-ROTN
NUMBER                DIRECTION           DIRECTION           DIRECTION
```

```
     1                 0.07285           -0.28556           -7.40594
     2                 0.25636            0.08404            4.39616
     3                 0.00221           -0.00654           60.91933
     4                -0.01250            0.02421           -5.27632
     5                 0.00713           -0.19737           -7.02955
     6                -0.21966            0.02749          -14.44215
     7                -0.10070           -0.06390           38.72897
     8                -0.03686            0.00040           -2.49839
     9                 0.00698            0.01739           -3.82790
    10                -0.00496           -0.00627            5.59411
MODAL DIRECTION FACTORS
  MODE                  X-TRANS            Y-TRANS              Z-ROTN
NUMBER                DIRECTION          DIRECTION            DIRECTION
     1                 7.71274           91.27298            1.01429
     2                92.18805            7.46448            0.34747
     3                 0.21077            2.38354           97.40569
     4                 9.06374           32.81362           58.12264
     5                 0.08223           89.05951           10.85826
     6                83.98605            1.48230           14.53164
     7                15.85965           10.89143           73.24892
     8                98.80493            0.51433            0.68074
     9                 0.59747           98.63851            0.76402
    10                 0.91519            0.97642           98.10839
EFFECTIVE MASS FACTORS
NUMBER        %-MASS  <%-SUM>     %-MASS  <%-SUM>     %-MASS  <%-SUM>
     1          3.90  <  3.9>      59.92  < 59.9>       0.96  <  1.0>
     2         48.29  < 52.2>       5.19  < 65.1>       0.34  <  1.3>
     3          0.00  < 52.2>       0.03  < 65.1>      64.68  < 66.0>
     4          0.11  < 52.3>       0.43  < 65.6>       0.49  < 66.5>
     5          0.04  < 52.3>      28.62  < 94.2>       0.86  < 67.3>
     6         35.45  < 87.8>       0.56  < 94.7>       3.64  < 71.0>
     7          7.45  < 95.3>       3.00  < 97.8>      26.14  < 97.1>
     8          1.00  < 96.3>       0.00  < 97.8>       0.11  < 97.2>
     9          0.04  < 96.3>       0.22  < 98.0>       0.26  < 97.5>
    10          0.02  < 96.3>       0.03  < 98.0>       0.55  < 98.0>
```

ETABS Story Shears [Table: 0301.06]

```
COORDINATES OF CENTERS OF CUMULATIVE MASS & CENTERS OF RIGIDITY
STORY  DIAPHRAGM /----------CENTER OF MASS----------//--CENTER OF RIGIDITY--/
LEVEL     NUMBER        MASS  ORDINATE-X  ORDINATE-Y  ORDINATE-X  ORDINATE-Y
ROOF
               1       0.046     277.763     202.598     264.774     203.475
WINTOP
               1       0.054     278.706     200.942     262.890     190.041
WINBOT
               1       0.063     278.026     198.763     245.047     203.759
FLOOR
               1       0.130     280.866     205.918     171.905     238.081
```

```
FNDTOP
               1       0.134     282.490     208.273      43.027     297.137
FNDMID
               1       0.135     284.189     209.256     532.139     347.254
FNDBOT
               1       0.136     285.420     209.878     283.134     204.655

STATIC LOAD CONDITION LATERAL STORY SHEARS FOR ALL DIAPHRAGMS
VALUES ARE AT THE GLOBAL ORIGIN IN THE GLOBAL COORDINATES
               /---------------------LOAD  CONDITIONS---------------------/
LEVEL     DIRN           I        II       III         A         B         C
ROOF         X        0.00      0.00      0.00      4.66      0.00      0.00
ROOF         Y        0.00      0.00      0.00      0.00      4.66      0.00
WINTOP       X        0.00      0.00      0.00      5.34      0.00      0.00
WINTOP       Y        0.00      0.00      0.00      0.00      5.34      0.00
WINBOT       X        0.00      0.00      0.00      5.89      0.00      0.00
WINBOT       Y        0.00      0.00      0.00      0.00      5.89      0.00
FLOOR        X        0.00      0.00      0.00      8.20      0.00      0.00
FLOOR        Y        0.00      0.00      0.00      0.00      8.20      0.00
FNDTOP       X        0.00      0.00      0.00      8.27      0.00      0.00
FNDTOP       Y        0.00      0.00      0.00      0.00      8.27      0.00
FNDMID       X        0.00      0.00      0.00      8.29      0.00      0.00
FNDMID       Y        0.00      0.00      0.00      0.00      8.29      0.00
FNDBOT       X        0.00      0.00      0.00      8.29      0.00      0.00
FNDBOT       Y        0.00      0.00      0.00      0.00      8.29      0.00
```

Seismic Capacities and D-C ratios for Exterior Walls SECTION 02

AWC4.3A Unit Shear Capacity Wood-Frame Shear Walls [1-7] [Table: 0301.07]

component	property	–	–	wood	sheath	–	–
panel	thick(in)	5/16	3/8	3/8	7/16	15/32	15/32
nail	depth(in)	1-1/4	1-1/4	1-3/8	1-3/8	1-3/8	1-1/2
nail	size	6d	6d	8d	8d	8d	10d
———	——-	——-	——-	——-	——-	——-	——-
edge nail	value						
———	——-	——-	——-	——-	——-	——-	——-
6-in	vs(plf)	360	400	440	480	520	620
OSB 6-in	Ga(kip/in)	13	11	17	15	13	22
PLY 6-in	Ga(kip/in)	9.5	6.5	12	11	10	14
4-in	vs(plf)	540	600	640	700	760	920
OSB 4-in	Ga(kip/in)	18	15	25	22	19	30
PLY 4-in	Ga(kip/in)	12	11	15	14	13	17
3-in	vs(plf)	700	780	820	900	960	1200
OSB 3-in	Ga(kip/in)	24	20	31	28	25	37
PLY 3-in	Ga(kip/in)	14	13	17	17	15	19
2-in	vs(plf)	900	1020	1060	1170	1280	1540
OSB 2-in	Ga(kip/in)	37	32	45	42	39	52
PLY 2-in	Ga(kip/in)	18	17	20	21	20	23

Table 4.3.3.5 Shear Capacity Adjustment Factor, Co [Table: 0301.08]

Wall Height - h	Maximum Opening Height [1]				
h	h/3	h/2	2h/3	5h/6	h
8’ Wall	2’-8”	4’-0”	5’-4”	6’-8”	8’-0”
10’ Wall	3’-4”	6-0”	6’-8”	8’-4”	10’-0”
Percent Full-Height Sheathing 2	Effective Shear Capacity Ratio				
10%	1.00	0.69	0.53	0.43	0.36
20%	1.00	0.71	0.56	0.45	0.38
30%	1.00	0.74	0.59	0.49	0.42
40%	1.00	0.77	0.63	0.53	0.45
50%	1.00	0.80	0.67	0.57	0.50
60%	1.00	0.83	0.71	0.63	0.56
70%	1.00	0.87	0.77	0.69	0.63
80%	1.00	0.91	0.83	0.77	0.71
90%	1.00	0.95	0.91	0.87	0.83
100%	1.00	1.00	1.00	1.00	1.00

```
[1] The maximum opening height shall be taken as the
maximum opening clear height in a perforated shear wall.
Where areas above and/or below an opening remain unsheathed,
the height of each opening shall be defined as the clear
height of the opening plus the unsheathed areas.

[2] The sum of the perforated shear wall segment lengths, ai,
```

divided by the total length of the perforated shear wall. Lengths of perforated shear wall segments with aspect ratios greater than 2:1 shall be adjusted in accordance with Section 4.3.4.3.

From table 4.3A the nominal unit strength of the shear walls is 520 plf. From table 4.3.3.5 the effective strength is between 50 and 100 percent of the nominal strength.

Effective Shearwall Capacity [Table: 0301.09]

Wall No.	Length (ft)	Openings (ft)	Solid (%)	coeff	v'(plf)	V (lbs)
SW1	30	12.6	58	0.83	432	12948
SW2	13.7	4.5	67	0.87	452	6198
SW3	5.8	0	100	1	520	3016
SW4	14.4	6.5	55	0.8	416	5990
SW5	5.8	0	100	1	520	3016
SW6	13.6	3.1	77	0.9	468	6365
SW7	30	8	73	0.87	452	13572
SW8	42	22.7	46	0.55	286	12012

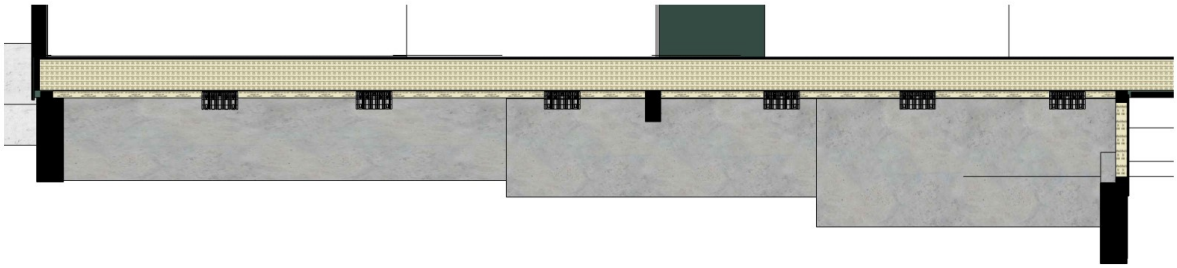
D-C ratios are shown for 6" oc boundary nails and estimated DC ratios if the existing 12" oc nailing is taken to have half the capacity. If the capacity is reduced by half to account for the 12" oc boundary nailing the shear walls have the capacity to meet the design loads.

First Floor D-C Ratio [Table: 0301.10]

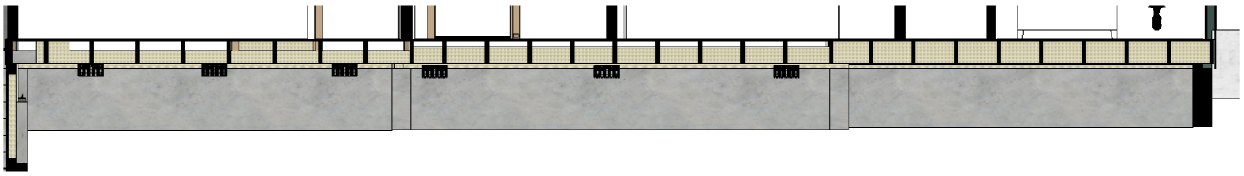
Label	Type	Vd (lbs)	Vc (lbs)	D-C (6”)	D-C (12”)
SW1	wall	4000	12948	0.3	0.6
SW2	wall	1500	6198	0.25	0.5
SW3	wall	-	-	-	-
SW4	wall	1500	5990	0.25	0.5
SW5	wall	-	-	-	-
SW6	wall	1500	6365	0.25	0.5
SW7	wall	4000	13572	0.3	0.6
SW8	wall	4000	12012	0.3	0.6

Seismic D-C ratios for Foundation Walls **SECTION 03**

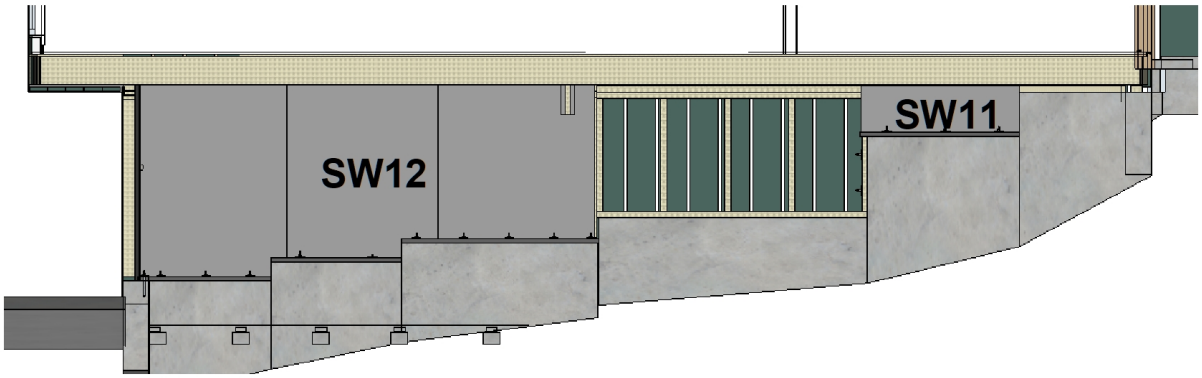
Foundation retrofits included Simpson retrofit foundation plates (URFP) and plywood shear walls with boundary nailing at 4" oc (see table 0201.05). The URFP capacity is 1500 lbs and the shear wall capacity is 960 plf.



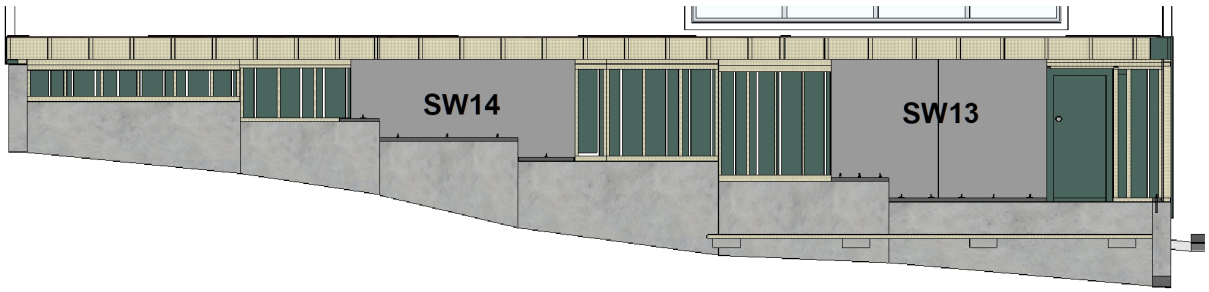
SW1 - North Elevation URFP [Fig: 0301.08]



SW4, SW6 - West Elevation URFP [Fig: 0301.09]



SW11, SW12 - South Elevation [Fig: 0301.10]



SW13, SW14 - East Elevation [Fig: 0301.11]

Foundation D-C Ratio [Table: 0301.11]

Label	Type	Vd (lbs)	Vc (lbs)	D-C
SW1	URFP	6000	9000	0.67
SW4	URFP	3000	4500	0.67
SW6	URFP	3000	4500	0.67
SW11-SW12	wall	6000	12000	0.5 (4” oc bdry)
SW13-SW14	wall	6000	12000	0.5 (4” oc bdry