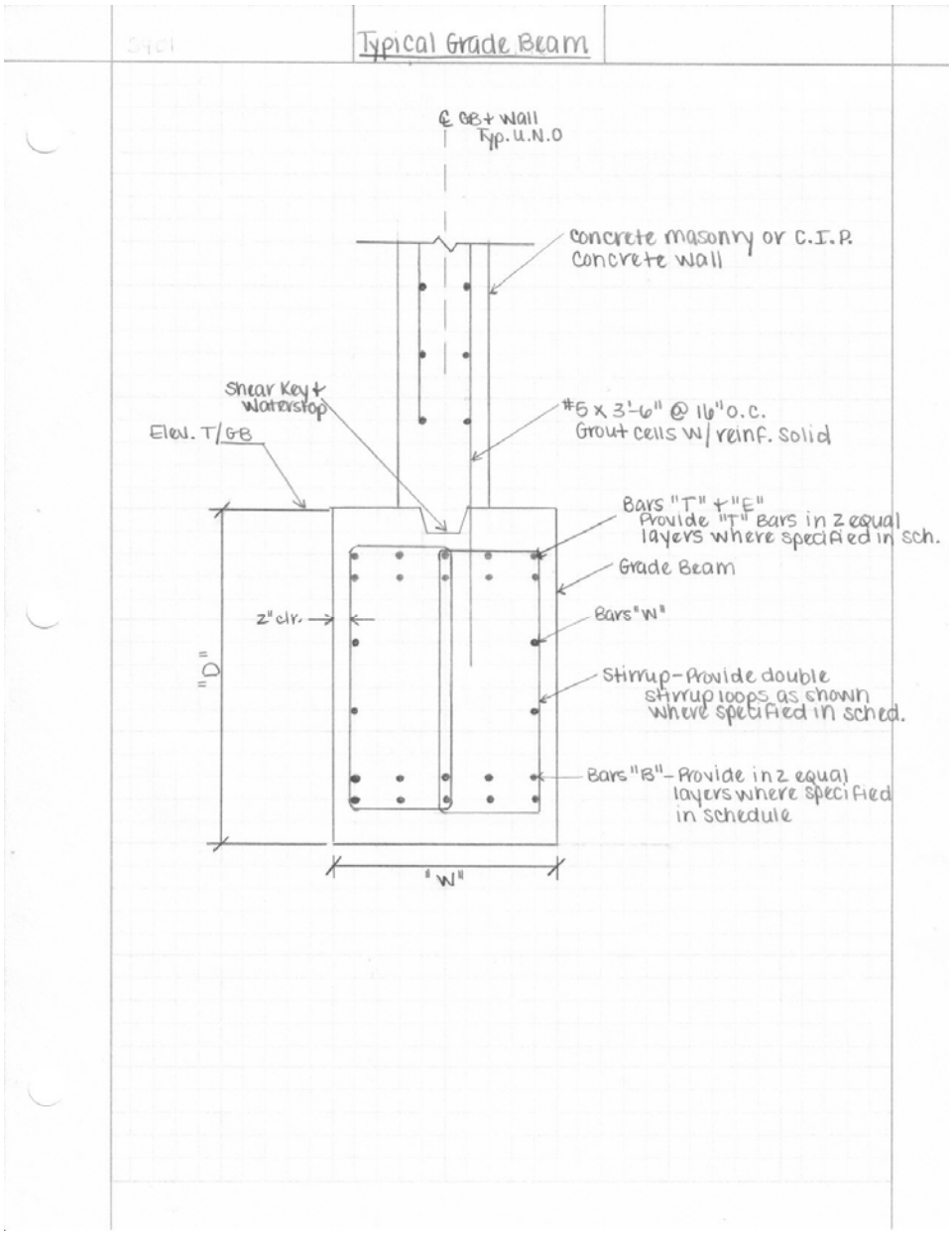
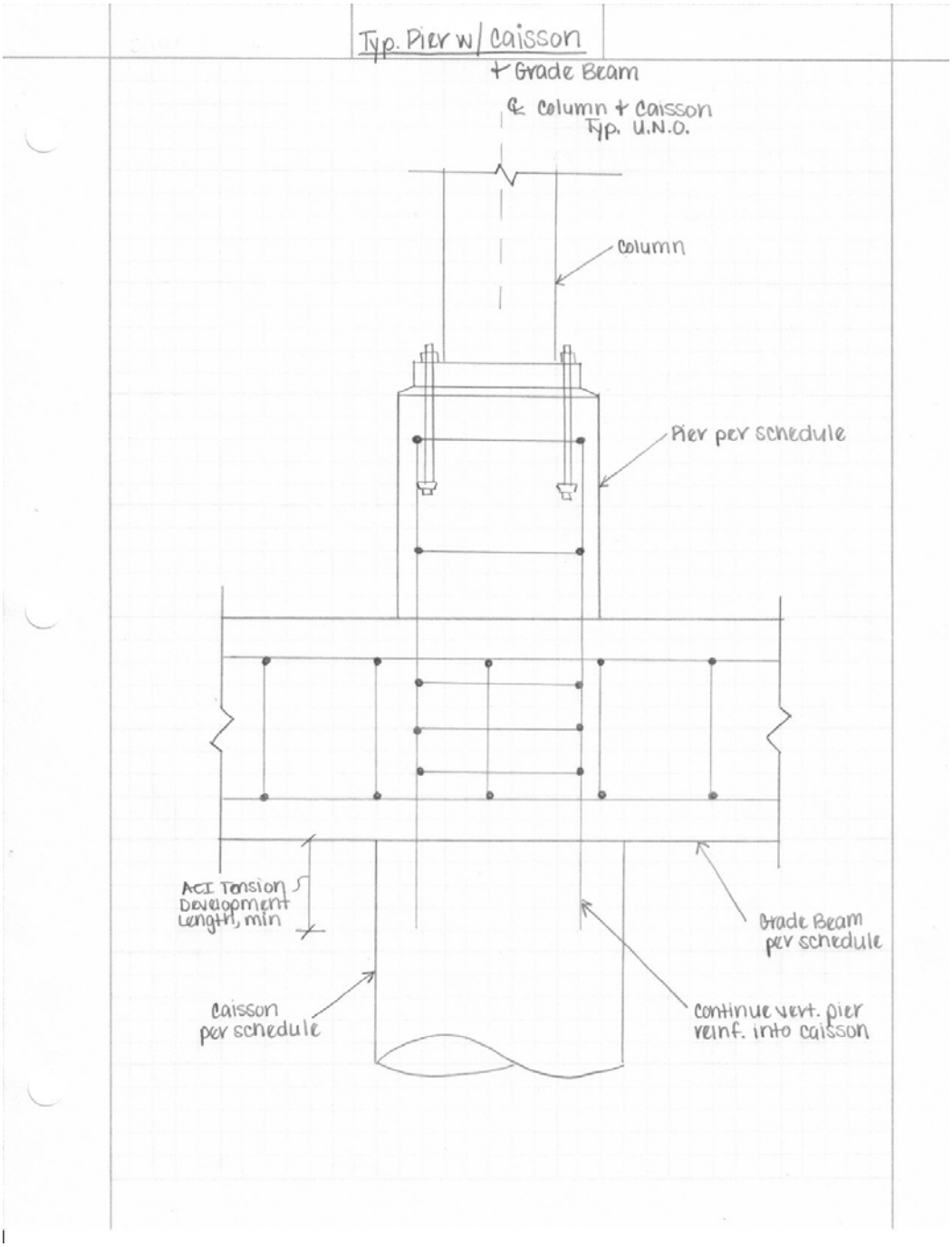
Appendix

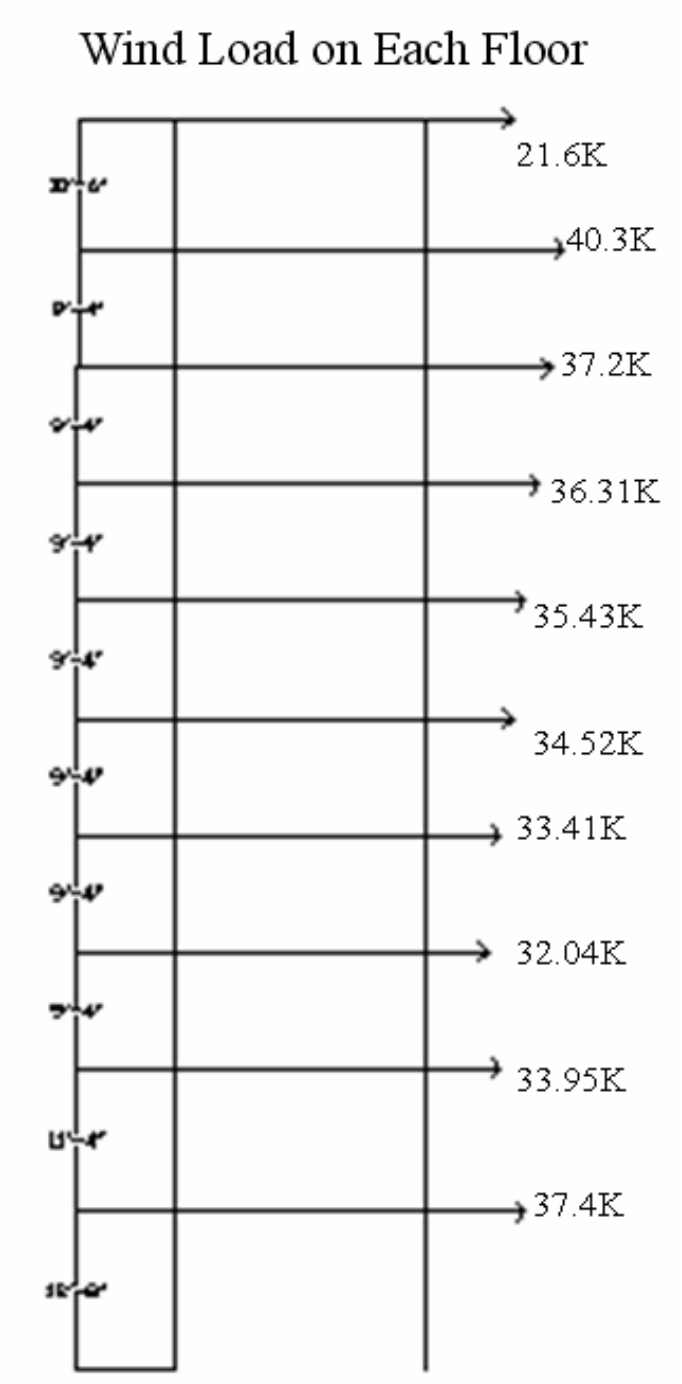
Existing Foundation Details



Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan



Wind Load Distribution



ADOSS Output

```
03-27-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
1
12:53:42 PM Licensed to: ae, university park, PA


                pppppp    ccccc    aaaaa
                p     p  c     c  a     a
                p     p  c     c        a
                p     p  c         aaaaaa
                p     p  c     c  a     a
                p     p  c     c  a     a
                pppppp    ccccc    aaaaaa
                p
                p


          AAA    DDDDD      OOO     SSSSS    SSSSS
         A   A   D    D    O   O   S     S  S     S
        A     A  D     D  O     O  S        S
        AAAAAAA  D     D  O     O   SSSSS    SSSSS
        A     A  D     D  O     O        S        S    ( ttttt mm   mm  )
        A     A  D    D    O   O   S     S  S     S   (    t   m m m m   )
        A     A  DDDDD      OOO     SSSSS    SSSSS     (   t   m  m  m  )


*********************************************************

 Computer program for ANALYSIS AND DESIGN OF SLAB SYSTEMS

*********************************************************



     Licensee stated above acknowledges that Portland Cement Association(PCA)
is not and cannot be responsible for either the accuracy or adequacy of the
```

material supplied as input for processing by the ADOSS(tm) computer program. Furthermore, PCA neither makes any warranty expressed nor implied with respect
to the correctness of the output prepared by the ADOSS(tm) program. Although PCA has endeavored to produce ADOSS(tm) error free the program is not and cannot be certified infallible. The final and only responsibility for analysis, design and engineering documents is the licensees. Accordingly, PCA
disclaims all responsibility in contract, negligence or other tort for any analysis, design or engineering documents prepared in connection with the use of the ADOSS(tm) program.

03-27-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 2
12:53:42 PM Licensed to: ae, university park, PA

FILE NAME UNTITLED.ADS

PROJECT ID. Thesis

SPAN ID. LeftEW

ENGINEER Nikki Hazy

DATE 03/27/06
TIME 12:46:10

UNITS U.S. in-lb
CODE ACI 318-89

SLAB SYSTEM FLAT PLATE
FRAME LOCATION INTERIOR

DESIGN METHOD STRENGTH DESIGN
MOMENTS AND SHEARS NOT PROPORTIONED

NUMBER OF SPANS 7

CONCRETE FACTORS		SLABS	BEAMS	COLUMNS
DENSITY(pcf)		150.0	150.0	150.0
TYPE		NORMAL WGT	NORMAL WGT	NORMAL WGT
f'c	(ksi)	4.0	4.0	4.0
fct	(psi)	423.7	423.7	423.7
fr	(psi)	474.3	474.3	474.3

```
REINFORCEMENT DETAILS: NON-PRESTRESSED
  YIELD STRENGTH Fy  =  60.00 ksi
  DISTANCE TO RF CENTER FROM TENSION FACE:
       AT SLAB TOP    =   1.50 in  OUTER LAYER
       AT SLAB BOTTOM =   1.50 in  OUTER LAYER
  MINIMUM FLEXURAL BAR SIZE:
       AT SLAB TOP    =  # 4
       AT SLAB BOTTOM =  # 4
  MINIMUM SPACING:
       IN SLAB =   6.00 in

03-27-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
3
12:53:42 PM Licensed to: ae, university park, PA

                                SPAN/LOADING DATA
                                *****************
```

SPAN NUMBER	LENGTH L1 (ft)	Tslab (in)	WIDTH LEFT (ft)	L2*** RIGHT (ft)	SLAB SYSTEM	DESIGN STRIP (ft)	COLUMN STRIP** (ft)	UNIFORM LOADS S. DL (psf)	LIVE (psf)
1*	1.1+	10.0	13.5	13.0	1	26.5	.0	25.0	80.0
2	8.0	10.0	13.5	13.0	1	26.5	4.0	25.0	80.0
3	27.0	10.0	13.5	13.0	1	26.5	13.3	25.0	80.0
4	27.0	10.0	13.5	13.0	1	26.5	13.3	25.0	80.0
5	27.0	10.0	13.5	13.0	1	26.5	13.3	25.0	80.0
6	27.0	10.0	13.5	13.0	1	26.5	13.3	25.0	80.0
7*	1.1+	10.0	13.5	13.0	1	26.5	.0	25.0	80.0

* -Indicates cantilever span information.
** -Strip width used for positive flexure.
***-L2 widths are 1/2 dist. to transverse column.
"E"-Indicates exterior strip.
+ -Indicates change in dimension due to support conditions.

PARTIAL LOADING DATA
****

PARTIAL LOADINGS ARE NOT SPECIFIED

03-27-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 4
12:53:42 PM Licensed to: ae, university park, PA

COLUMN/TORSIONAL DATA
****

COLUMN	COLUMN ABOVE SLAB			COLUMN BELOW SLAB			CAPITAL**		COLUMN MIDDLE	
NUMBER	C1 (in)	C2 (in)	HGT (ft)	C1 (in)	C2 (in)	HGT (ft)	EXTEN. (in)	DEPTH (in)	STRIP* (ft)	STRIP* (ft)
1	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	4.0	22.5
2	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	4.0	22.5
3	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	13.3	13.3
4	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	13.3	13.3
5	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	13.3	13.3
6	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	13.3	13.3

Columns with zero "C2" are round columns.
* -Strip width used for negative flexure.

**-Capital extension distance measured from face of column.

COLUMN NUMBER	TRANSVERSE BEAM WIDTH (in)	DEPTH (in)	ECCEN (in)	DROP PANEL/SOLID HEAD LEFT (ft)	RIGHT (ft)	WIDTH (ft)	THICK (in)	SUPPORT FIXITY* %
1	.0	.0	.0	.0	.0	.0	.0	100%
2	.0	.0	.0	.0	.0	.0	.0	100%
3	.0	.0	.0	.0	.0	.0	.0	100%
4	.0	.0	.0	.0	.0	.0	.0	100%
5	.0	.0	.0	.0	.0	.0	.0	100%
6	.0	.0	.0	.0	.0	.0	.0	100%

* -Support fixity of 0% denotes pinned condition.
Support fixity of 999% denotes fixed end condition.

LATERAL LOAD/OUTPUT DATA
****

LATERAL LOADS ARE NOT SPECIFIED

OUTPUT DATA
PATTERN LOADINGS: 1 THRU 4
PATTERN LIVE LOAD FACTOR (1-3) = 75%

LOAD FACTORS:
  U = 1.40*D + 1.70*L
  U = .75(1.40*D + 1.70*L + 1.70*W)
  U = .90*D + 1.30*W

OUTPUT OPTION(S):
  Input Echo
  Centerline Moments and Shears
  Column Strip Distribution Fac
  Shear Table
  Reinforcing Required
  Bar Sizing
  Additional Information
  Deflections
  Material Quantities

 THE CAPITAL AT COLUMN 1 HAS BEEN MODIFIED TO FALL WITHIN THE SPECIFIED
 SLAB, DROP OR BEAM DIMENSIONS
** NEW CAPITAL EXTENSION = .00 in. AT LEFT OF COLUMN.

 THE CAPITAL AT COLUMN 6 HAS BEEN MODIFIED TO FALL WITHIN THE SPECIFIED
 SLAB, DROP OR BEAM DIMENSIONS
** NEW CAPITAL EXTENSION = .00 in. AT RIGHT OF COLUMN.

**SLAB SPAN 2 IS NOT A TWO WAY SYSTEM.
THE SLAB DESIGN MUST BE PERFORMED MANUALLY.

**TOTAL UNFACTORED DEAD LOAD = 466.192 kips
  LIVE LOAD = 250.513 kips

03-27-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 6
12:53:42 PM Licensed to: ae, university park, PA

---- STATICS PRINT-OUT FOR GRAVITY LOAD ANALYSIS ----
****

J O I N T M O M E N T S (ft - kips)

JOINT	PATTERN-1				PATTERN-2			
NUMBER	LEFT	RIGHT	TOP	BOTTOM	LEFT	RIGHT	TOP	BOTTOM
1	-4.6	-12.3	8.4	8.4	-4.6	-39.7	22.2	22.2
2	-299.5	462.3	-81.4	-81.4	-290.5	461.7	-85.6	-85.6
3	-550.7	541.6	4.5	4.5	-498.7	377.7	60.5	60.5
4	-531.8	529.3	1.3	1.3	-369.2	478.5	-54.7	-54.7
5	-554.6	593.7	-19.6	-19.6	-508.8	440.6	34.1	34.1
6	-350.5	4.6	172.9	172.9	-210.6	4.6	103.0	103.0
JOINT	PATTERN-3				PATTERN-4			
NUMBER	LEFT	RIGHT	TOP	BOTTOM	LEFT	RIGHT	TOP	BOTTOM
1	-3.0	-10.6	6.8	6.8	-5.2	-33.3	19.2	19.2
2	-191.7	280.7	-44.5	-44.5	-319.7	492.2	-86.2	-86.2
3	-411.8	500.5	-44.4	-44.4	-603.6	582.2	10.7	10.7
4	-480.5	364.5	58.0	58.0	-563.3	558.9	2.2	2.2
5	-391.4	543.9	-76.2	-76.2	-596.8	652.6	-27.9	-27.9
6	-352.0	3.0	174.5	174.5	-373.0	5.2	183.9	183.9

J O I N T S H E A R S (kips)

JOINT	PATTERN-1		PATTERN-2		PATTERN-3		PATTERN-4	
NUMBER	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
1	-8.5	5.6	-8.5	-19.4	-5.6	7.4	-9.5	-7.9
2	-74.3	109.7	-63.1	109.8	-58.0	69.9	-80.4	119.2
3	-115.4	113.9	-112.6	75.0	-79.6	112.0	-127.5	124.1
4	-113.1	112.7	-74.4	110.1	-110.5	73.7	-122.7	122.0
5	-114.6	120.8	-112.3	83.2	-75.7	118.3	-124.8	133.7
6	-103.8	8.5	-66.2	8.5	-104.1	5.6	-113.0	9.5

DESIGN MOMENT ENVELOPES AT CRITICAL SECTIONS FROM SUPPORTS

COL NUM	LOAD TYPE	CROSS SECTN		DESIGN MOMENT (ft-k)	DISTANCE CR.SECTN (ft)	LOAD PTRN	MAX.I.P. DISTANCE (ft)	LOAD PTRN
1	TOTL	LEFT	TOP	-3.5	.190	4	1.083	1
			BOT	.0	.000	0	.000	0
		RGHT	TOP	.0	.000	0	2.800	3
			BOT	-15.8	1.292	4	.000	0
2	TOTL	LEFT	TOP	-215.6	1.400	4	.000	0
			BOT	.0	.000	0	.000	0
		RGHT	TOP	323.3	1.500	4	5.400	2
			BOT	.0	.000	0	.000	0
3	TOTL	LEFT	TOP	-422.3	1.500	4	6.750	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	406.1	1.500	4	6.750	2
			BOT	.0	.000	0	.000	0
4	TOTL	LEFT	TOP	-389.2	1.500	4	6.750	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	385.9	1.500	4	6.750	3
			BOT	.0	.000	0	.000	0
5	TOTL	LEFT	TOP	-419.6	1.500	4	6.750	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	462.0	1.500	4	6.750	2
			BOT	.0	.000	0	.000	0

```
6     TOTL LEFT  TOP     -234.4        1.292        4         4.050        2
                 BOT         .0         .000        0          .000        0

           RGHT  TOP        3.5         .190        4         1.083        1
                 BOT         .0         .000        0          .000        0

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

03-27-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
8
12:53:42 PM Licensed to: ae, university park, PA


            DESIGN MOMENT ENVELOPES AT CRITICAL SECTIONS ALONG SPANS
            *******************************************************

 ---------------------------------------------------------------------------
--
  SPAN   LOAD       CRITICAL   DESIGN   LOAD  MAX. I.P.  LOAD  MAX. I.P.
LOAD
  NUM    TYPE       SECTION    MOMENT   PTRN  DIST LEFT  PTRN  DIST RGHT
PTRN
                      (ft)     (ft-k)          (ft)            (ft)
 ---------------------------------------------------------------------------
--
    2    TOTL       .600  TOP        .0    0        .000    0        .000    0
                          BOT      14.4    1      -1.000    2       -.600    0

    3    TOTL     12.825  TOP        .0    0        .000    0        .000    0
                          BOT     290.1    4       7.425    1       8.775    1

    4    TOTL     14.175  TOP        .0    0        .000    0        .000    0
                          BOT     263.2    3       8.775    1       7.425    1

    5    TOTL     12.825  TOP        .0    0        .000    0        .000    0
                          BOT     260.2    2       7.425    1       8.775    2

    6    TOTL     14.175  TOP        .0    0        .000    0        .000    0
                          BOT     329.4    4       8.775    3       8.775    1

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

DISTRIBUTION OF DESIGN MOMENTS AT SUPPORTS
****

COL NUM	CROSS SECTN	TOTAL MOMENT (ft-k)	TOTAL-VERT DIFFERENCE (ft-k) (%)	COLUMN STRIP MOMENT (ft-k) (%)	BEAM MOMENT (ft-k) (%)	MIDDLE STRIP MOMENT (ft-k) (%)
1	LEFT TOP	-3.5	.0 (0)	-3.5 (98)	.0 (0)	-.1 (1)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	-15.8	.0 (0)	-15.6 (98)	.0 (0)	-.2 (1)
2	LEFT TOP	-215.6	.0 (0)	-161.7 (75)	.0 (0)	-53.9 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	323.3	.0 (0)	242.5 (75)	.0 (0)	80.8 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
3	LEFT TOP	-422.3	.0 (0)	-316.7 (75)	.0 (0)	-105.6 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	406.1	.0 (0)	304.6 (75)	.0 (0)	101.5 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)

```
4  LEFT TOP  -389.2      .0 (  0)  -291.9 ( 75)      .0 (  0)   -97.3 ( 25)
           BOT      .0      .0 (  0)      .0 (  0)      .0 (  0)      .0 (
0)

      RGHT TOP   385.9      .0 (  0)   289.4 ( 75)      .0 (  0)    96.5 (
25)
           BOT      .0      .0 (  0)      .0 (  0)      .0 (  0)      .0 (
0)

   5  LEFT TOP  -419.6      .0 (  0)  -314.7 ( 75)      .0 (  0)  -104.9 (
25)
           BOT      .0      .0 (  0)      .0 (  0)      .0 (  0)      .0 (
0)

      RGHT TOP   462.0      .0 (  0)   346.5 ( 75)      .0 (  0)   115.5 (
25)
           BOT      .0      .0 (  0)      .0 (  0)      .0 (  0)      .0 (
0)

   6  LEFT TOP  -234.4      .0 (  0)  -230.8 ( 98)      .0 (  0)    -3.6 (
1)
           BOT      .0      .0 (  0)      .0 (  0)      .0 (  0)      .0 (
0)

      RGHT TOP     3.5      .0 (  0)     3.5 ( 98)      .0 (  0)      .1 (
1)
           BOT      .0      .0 (  0)      .0 (  0)      .0 (  0)      .0 (
0)

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

DISTRIBUTION OF DESIGN MOMENTS IN SPANS
****

SPAN NUM	CROSS SECTN		TOTAL MOMENT (ft-k)	TOTAL-VERT DIFFERENCE (ft-k) (%)	COLUMN STRIP MOMENT (ft-k) (%)	BEAM MOMENT (ft-k) (%)	MIDDLE STRIP MOMENT (ft-k) (%)
2	.60	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	14.4	.0 (0)	8.6 (60)	.0 (0)	5.8 (39)
3	12.82	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	290.1	.0 (0)	174.1 (60)	.0 (0)	116.1 (39)
4	14.18	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	263.2	.0 (0)	157.9 (60)	.0 (0)	105.3 (40)
5	12.82	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	260.2	.0 (0)	156.1 (60)	.0 (0)	104.1 (39)
6	14.18	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	329.4	.0 (0)	197.6 (60)	.0 (0)	131.8 (40)

03-27-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 11
12:53:42 PM Licensed to: ae, university park, PA

S H E A R A N A L Y S I S
****

NOTE--Allowable shear stress in slabs = 252.96 psi when ratio of col. dim. (long/short) is less than 2.0.

--Wide beam shear (see "CODE") is not computed, check manually.

--After the column numbers, C = Corner, E = Exterior, I = Interior.

D I R E C T S H E A R			A R O U N D	W I T H T R A N S F E R O F M O M E N T C O L U M N					
COL. NO.	ALLOW. STRESS (psi)	PATT NO.	REACTION (kips)	SHEAR STRESS (psi)	PATT NO.	REACTION (kips)	UNBAL. MOMENT (ft-k)	SHEAR TRANSFR (ft-k)	SHEAR STRESS (psi)
1E	252.96	1	11.6	13.97	2	.0	-54.7	-20.4	51.09
2I	247.27	4	195.7	152.17	4	195.7	172.5	69.0	195.18
3I	247.27	4	247.6	192.55	4	247.6	-21.4	-8.5	197.88
4I	247.27	4	240.7	187.16	4	240.7	-4.4	-1.8	188.25
5I	247.27	4	254.6	197.94	4	254.6	55.8	22.3	211.86
6E	252.96	4	119.6	143.93	4	119.6	-251.0	-93.5	247.48

03-27-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 12
12:53:42 PM Licensed to: ae, university park, PA

N E G A T I V E R E I N F O R C E M E N T
****

COLUMN NUMBER	PATT NO.	LOCATION @COL	FACE	TOTAL DESIGN (ft-k)	COLUMN STRIP AREA (sq.in)	COLUMN STRIP WIDTH (ft)	MIDDLE STRIP AREA (sq.in)	MIDDLE STRIP WIDTH (ft)
1**	4	L		-3.5	.86	4.0	4.86	22.5
2	4		R	323.3	7.58	4.0	4.86	22.5
3	4	L		-422.3	8.78	13.3	2.86	13.3
4	4	L		-389.2	8.06	13.3	2.86	13.3
5	4		R	462.0	9.67	13.3	3.08	13.3
6	4	L		-234.4	6.29	13.3	2.86	13.3

** - Positive reinforcement required, compute manually.

P O S I T I V E R E I N F O R C E M E N T
****

SPAN NUMBER	PATT NO.	LOCATION FROM LEFT (ft)	TOTAL DESIGN (ft-k)	COLUMN STRIP AREA (sq.in)	COLUMN STRIP WIDTH (ft)	MIDDLE STRIP AREA (sq.in)	MIDDLE STRIP WIDTH (ft)
2	1	.6	14.4	.86	4.0	4.86	22.5
3	4	12.8	290.1	4.70	13.3	3.10	13.3
4	3	14.2	263.2	4.25	13.3	2.86	13.3
5	2	12.8	260.2	4.20	13.3	2.86	13.3
6	4	14.2	329.4	5.35	13.3	3.53	13.3

D E S I G N R E S U L T S
****

NOTE--The schedule given below is a guide for proper reinforcement placement and is based on reasonable engineering judgement. Unusual boundary and/or loading conditions may require modification of this schedule.

N E G A T I V E R E I N F O R C E M E N T
****

COLUMN NUMBER	COLUMN STRIP LONG BARS NO	SIZE	LEFT (ft)	RIGHT (ft)	COLUMN STRIP SHORT BARS NO	SIZE	LEFT (ft)	RIGHT (ft)	MIDDLE STRIP LONG BARS NO	SIZE	LEFT (ft)	RIGHT (ft)
1**	3	# 4	1.08	3.51	2	# 4	1.08	2.25	25	# 4	1.08	3.51
2	3	#10	8.53	8.53	3	#10	7.00	7.10	25	# 4	6.55	6.95
3	10	# 6	8.53	8.53	10	# 6	6.05	6.05	15	# 4	8.30	8.30
4	10	# 6	8.53	8.53	9	# 6	6.05	6.05	15	# 4	8.30	8.30
5	11	# 6	8.53	8.53	11	# 6	6.05	6.05	16	# 4	8.30	8.30
6	11	# 5	8.53	1.08	10	# 5	6.05	1.08	15	# 4	6.55	1.08

** - Positive reinforcement required, design manually.

P O S I T I V E R E I N F O R C E M E N T
****

COLUMN	COLUMN STRIP	MIDDLE STRIP

SPAN NUMBER	LONG BARS * NO	SIZE	LENGTH (ft)	SHORT BARS * NO	SIZE	LENGTH (ft)	LONG BARS * NO	SIZE	LENGTH (ft)	SHORT BARS * NO	SIZE	LENGTH (ft)
2	3	# 4	7.17	2	# 4	6.42	13	# 4	7.67	12	# 4	6.22
3	12	# 4	26.50	12	# 4	20.25	8	# 4	27.50	8	# 4	18.90
4	11	# 4	26.50	11	# 4	20.25	8	# 4	27.50	7	# 4	18.90
5	11	# 4	26.50	10	# 4	20.25	8	# 4	27.50	7	# 4	18.90
6	9	# 5	26.17	9	# 5	23.04	9	# 4	26.67	9	# 4	22.37

A D D I T I O N A L I N F O R M A T I O N A T S U P P O R T S
****

COLUMN NUMBER	* REINF. SUMMARY* ADD'L R/F REQ'D DUE TO UNBALANCED (U.) MOMENT TRANSFER * W/O U. MOMENT * REQ'D - PROV'D*	MAX.U. MOMENT *	*GAMMA* -f	FLEXURAL TRANSFER *	*PATT* CRITICAL *NO.	SECTION - AREA - R/F SLABW *	
	(sq.in) (sq.in)	(ft-k) *	*	(ft-k) *	* (ft)	(sq.in)	
1	5.72	6.00	-44.4	.63	-27.8	2	5.5	.74	0	# 4
2	12.44	12.62	172.5	.60	103.5	4	5.5	2.83	0	#10
3	11.65	11.80	-121.0	.60	-72.6	2	5.5	1.96	0	# 6
4	10.92	11.36	-116.0	.60	-69.6	3	5.5	1.87	0	# 6
5	12.75	12.88	152.5	.60	91.5	3	5.5	2.49	0	# 6
6	9.15	9.51	-367.8	.63	-230.9	4	5.5	6.75	14	# 5

NOTE: Zero transfer "CRITICAL SLABW" indicates no support dimensions given for transfer.
If beam(s) are present, transfer mode may be due to beam shear and/or torsion, check manually.

A D D I T I O N A L I N F O R M A T I O N F O R
I N - S P A N C O N D I T I O N S
****

SPAN NUMBER	* REINF. SUMMARY * AT MIDSPAN * REQ'D. - PROV'D. * (sq.in) (sq.in) *	TOTAL FACTORED SPAN STATIC DESIGN MOMENT (W/O PARTIAL LOADS) (ft-k)
2	5.72 6.00	28.7

3	7.79	8.00	660.2
4	7.11	7.40	660.2
5	7.06	7.20	660.2
6	8.88	9.18	660.2

03-27-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 15
12:53:42 PM Licensed to: ae, university park, PA

D E F L E C T I O N A N A L Y S I S
****

NOTES--The deflections below must be combined with those of the analysis in the perpendicular direction. Consult users manual for method of combination and limitations.

--Spans 1 and 7 are cantilevers.

--Time-dependent deflections are in addition to those shown and must be computed as a multiplier of the dead load(DL) deflection. See "CODE" for range of multipliers.

--Deflections due to concentrated or partialloads may be larger at the point of application than those shown at the centerline. Deflections are computed as from an average uniform loading derived from the sum of all loads applied to the span.

--Modulus of elasticity of concrete, Ec = 3834. ksi

		COLUMN STRIP			MIDDLE STRIP		
SPAN NUMBER	DEAD LOAD Ieff. (in^4)	DEFLECTION DUE TO: DEAD (in)	LIVE (in)	TOTAL (in)	DEFLECTION DUE TO: DEAD (in)	LIVE (in)	TOTAL (in)
1	26500.	.001	.001	.002	.001	.001	.002
2	26500.	-.002	-.001	-.002	-.005	-.003	-.007
3	23806.	.155	.143	.298	.082	.073	.155
4	22484.	.147	.134	.281	.070	.064	.134
5	22416.	.144	.131	.274	.067	.062	.128
6	23605.	.191	.151	.342	.094	.068	.161
7	26500.	-.011	-.006	-.016	-.011	-.006	-.017

Q U A N T I T Y E S T I M A T E S
****

TOTAL QUANTITIES

CONCRETE	....	96.6	cu.yd
FORMWORK	....	3131.	sq.ft
REINFORCEMENT (IN THE DIRECTION OF ANALYSIS)			
(NEGATIVE)	....	2829.	lbs
(POSITIVE)	....	2663.	lbs

SUMMARY OF QUANTITIES

CONCRETE	....	.83	cu.ft/sq.ft
FORMWORK	....	1.00	sq.ft/sq.ft
REINFORCEMENT**	....	1.75	lbs / sq.ft

**(IN THE DIRECTION OF ANALYSIS)

* Program completed as requested *

```
03-21-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
1
 9:08:18 PM Licensed to: ae, university park, PA



              ppppppp    ccccc    aaaaa
              p      p  c     c  a     a
              p      p  c     c        a
              p      p  c          aaaaaa
              p      p  c     c  a     a
              p      p  c     c  a     a
              ppppppp    ccccc    aaaaaa
              p
              p


        AAA    DDDDD      OOO     SSSSS    SSSSS
       A   A   D    D    O   O   S     S  S     S
      A     A  D     D  O     O  S        S
      AAAAAAA  D     D  O     O   SSSSS    SSSSS
      A     A  D     D  O     O        S        S    ( ttttt mm   mm  )
      A     A  D    D    O   O   S     S  S     S   (    t   m m m m   )
      A     A  DDDDD      OOO     SSSSS    SSSSS     (   t   m  m  m  )



*********************************************************

 Computer program for ANALYSIS AND DESIGN OF SLAB SYSTEMS

*********************************************************



     Licensee stated above acknowledges that Portland Cement Association(PCA)
is not and cannot be responsible for either the accuracy or adequacy of the
material supplied as input for processing by the ADOSS(tm) computer program.
Furthermore, PCA neither makes any warranty expressed nor implied with
respect
```

to the correctness of the output prepared by the ADOSS(tm) program. Although PCA has endeavored to produce ADOSS(tm) error free the program is not and cannot be certified infallible. The final and only responsibility for analysis, design and engineering documents is the licensees. Accordingly, PCA
disclaims all responsibility in contract, negligence or other tort for any analysis, design or engineering documents prepared in connection with the use of the ADOSS(tm) program.

03-21-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 2
9:08:18 PM Licensed to: ae, university park, PA

FILE NAME P:\THESIS\ADOSS\TYPICAL1.ADS

PROJECT ID. Thesis

SPAN ID. Typical First

ENGINEER Nikki Hazy

DATE 03/19/06
TIME 22:52:01

UNITS U.S. in-lb
CODE ACI 318-89

SLAB SYSTEM FLAT PLATE
FRAME LOCATION INTERIOR

DESIGN METHOD STRENGTH DESIGN
MOMENTS AND SHEARS NOT PROPORTIONED

NUMBER OF SPANS 4

CONCRETE FACTORS		SLABS	BEAMS	COLUMNS
DENSITY(pcf)		150.0	150.0	150.0
TYPE		NORMAL WGT	NORMAL WGT	NORMAL WGT
f'c	(ksi)	4.0	4.0	4.0
fct	(psi)	423.7	423.7	423.7
fr	(psi)	474.3	474.3	474.3

REINFORCEMENT DETAILS: NON-PRESTRESSED
YIELD STRENGTH Fy = 60.00 ksi
DISTANCE TO RF CENTER FROM TENSION FACE:

```
AT SLAB TOP    =   1.50 in  OUTER LAYER
       AT SLAB BOTTOM =   1.50 in  OUTER LAYER
  MINIMUM FLEXURAL BAR SIZE:
       AT SLAB TOP    =  # 4
       AT SLAB BOTTOM =  # 4
  MINIMUM SPACING:
       IN SLAB =   6.00 in

03-21-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
3
 9:08:18 PM Licensed to: ae, university park, PA

                                SPAN/LOADING DATA
                                *****************

_____________________________________________________________________________
___
| SPAN |LENGTH  Tslab |  WIDTH  L2***|  SLAB  | DESIGN  COLUMN | UNIFORM
LOADS |
|NUMBER|  L1          | LEFT   RIGHT | SYSTEM | STRIP   STRIP**| S. DL   LIVE
|
|      | (ft)    (in) | (ft)    (ft) |        |  (ft)    (ft)  |(psf  ) (psf
)|
|------|--------------|--------------|--------|----------------|-------------
--|
|      |              |              |        |                |
|
|   1* |   1.1+  10.0 | 13.5   13.5  |    1   |   27.0      .0 |   25.0
80.0 |
|   2  |  27.0   10.0 | 13.5   13.5  |    1   |   27.0    13.5 |   25.0
80.0 |
|   3  |  26.0   10.0 | 13.5   13.5  |    1   |   27.0    13.0 |   25.0
80.0 |
|   4* |   1.1+  10.0 | 13.5   13.5  |    1   |   27.0      .0 |   25.0
80.0 |
|______|______________|______________|________|________________|_____________
__|

*  -Indicates cantilever span information.
** -Strip width used for positive flexure.
***-L2 widths are 1/2 dist. to transverse column.
"E"-Indicates exterior strip.
+  -Indicates change in dimension due to support conditions.


                                PARTIAL LOADING DATA
                                ********************
```

03-21-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 4
9:08:18 PM Licensed to: ae, university park, PA

COLUMN/TORSIONAL DATA
****

COLUMN NUMBER	COLUMN ABOVE SLAB C1 (in)	C2 (in)	HGT (ft)	COLUMN BELOW SLAB C1 (in)	C2 (in)	HGT (ft)	CAPITAL** EXTEN. (in)	DEPTH (in)	COLUMN MIDDLE STRIP* (ft)	STRIP* (ft)
1	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	13.5	13.5
2	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	13.0	14.0
3	26.0	26.0	6.0	26.0	26.0	6.0	5.0	5.0	13.0	14.0

Columns with zero "C2" are round columns.
* -Strip width used for negative flexure.
**-Capital extension distance measured from face of column.

COLUMN NUMBER	TRANSVERSE BEAM WIDTH (in)	DEPTH (in)	ECCEN (in)	DROP PANEL/SOLID HEAD LEFT (ft)	RIGHT (ft)	WIDTH (ft)	THICK (in)	SUPPORT FIXITY* %
1	.0	.0	.0	.0	.0	.0	.0	100%
2	.0	.0	.0	.0	.0	.0	.0	100%

```
|    3   |    .0    .0    .0 |      .0        .0        .0      .0 |    100%
|
|________|___________________|_____________________________________|__________
|
```

```
* -Support fixity of 0% denotes pinned condition.
   Support fixity of 999% denotes fixed end condition.


03-21-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
5
 9:08:18 PM Licensed to: ae, university park, PA

                          LATERAL LOAD/OUTPUT DATA
                          ************************

LATERAL LOADS ARE SPECIFIED AS BEING CAUSED BY WIND

LATERAL LOAD FROM FLOORS ABOVE (Pa) =       .00 kips

LATERAL LOAD AT THIS FLOOR     (Pb) =       .00 kips

NOTE: The analysis procedure adopted by the program is approximate.

LATERAL LOADS DISTRIBUTED TO THE COLUMN AND MIDDLE STRIPS ACCORDING TO
CODE DISTRIBUTION FACTORS.



OUTPUT DATA
PATTERN LOADINGS:                 1 THRU 8
PATTERN LIVE LOAD FACTOR (1-3)  =    75%

LOAD FACTORS:
  U = 1.40*D + 1.70*L
  U =  .75( 1.40*D + 1.70*L + 1.70*W)
  U =  .90*D + 1.30*W


OUTPUT OPTION(S):
  Input Echo
  Centerline Moments and Shears
  Column Strip Distribution Fac
  Shear Table
  Reinforcing Required
  Bar Sizing
```

Additional Information
  Deflections
  Material Quantities

 THE CAPITAL AT COLUMN 1 HAS BEEN MODIFIED TO FALL WITHIN THE SPECIFIED
 SLAB, DROP OR BEAM DIMENSIONS
** NEW CAPITAL EXTENSION =   .00 in. AT LEFT OF COLUMN.

 THE CAPITAL AT COLUMN 3 HAS BEEN MODIFIED TO FALL WITHIN THE SPECIFIED
 SLAB, DROP OR BEAM DIMENSIONS
** NEW CAPITAL EXTENSION =   .00 in. AT RIGHT OF COLUMN.

**TOTAL UNFACTORED DEAD LOAD =   221.665 kips
                  LIVE LOAD =   119.160 kips

03-21-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page
6
 9:08:18 PM Licensed to: ae, university park, PA

             ---- STATICS PRINT-OUT FOR GRAVITY LOAD ANALYSIS ----
                  ****

                    J O I N T   M O M E N T S (ft - kips)

JOINT	PATTERN-1				PATTERN-2			
NUMBER	LEFT	RIGHT	TOP	BOTTOM	LEFT	RIGHT	TOP	BOTTOM
1	-4.7	349.0	-172.2	-172.2	-4.7	208.5	-101.9	-101.9
2	-614.8	593.1	10.8	10.8	-458.4	542.8	-42.2	-42.2
3	-315.0	4.7	155.1	155.1	-314.4	3.1	155.7	155.7
JOINT	PATTERN-3				PATTERN-4			
NUMBER	LEFT	RIGHT	TOP	BOTTOM	LEFT	RIGHT	TOP	BOTTOM
1	-3.1	348.5	-172.7	-172.7	-5.3	369.3	-182.0	-182.0
2	-569.6	449.0	60.3	60.3	-681.5	657.5	12.0	12.0
3	-182.9	4.7	89.1	89.1	-329.7	5.3	162.2	162.2

                      J O I N T S H E A R S (kips)

JOINT	PATTERN-1		PATTERN-2		PATTERN-3		PATTERN-4	
NUMBER	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
1	-8.7	105.1	-8.7	66.9	-5.7	105.1	-9.7	114.1
2	-123.8	120.5	-85.4	117.9	-121.5	83.5	-137.3	133.6

```
 3      -100.3     8.7    -100.3     5.7     -63.1     8.7    -108.4     9.7

03-21-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
7
 9:08:18 PM Licensed to: ae, university park, PA

         ---- STATICS PRINT-OUT FOR GRAVITY/LATERAL LOAD ANALYSIS ----
              ************************************************

                    J O I N T    M O M E N T S  ( ft - kips )
                    ---------------------------------------
JOINT               PATTERN-5                          PATTERN-6
NUMBER    LEFT    RIGHT    TOP    BOTTOM     LEFT    RIGHT    TOP    BOTTOM
-------------------------------------------------------------------------------
   1        -2.0   144.0   -71.0   -71.0      -2.0   144.0   -71.0   -71.0
   2      -265.8   256.5     4.7     4.7    -265.8   256.5     4.7     4.7
   3      -128.6     2.0    63.3    63.3    -128.6     2.0    63.3    63.3
JOINT               PATTERN-7                          PATTERN-8
NUMBER    LEFT    RIGHT    TOP    BOTTOM     LEFT    RIGHT    TOP    BOTTOM
-------------------------------------------------------------------------------
   1        -3.9   276.9  -136.5  -136.5      -3.9   276.9  -136.5  -136.5
   2      -511.1   493.1     9.0     9.0    -511.1   493.1     9.0     9.0
   3      -247.3     3.9   121.7   121.7    -247.3     3.9   121.7   121.7

                     J O I N T   S H E A R S  ( kips )
                     ---------------------------------
JOINT       PATTERN-5         PATTERN-6         PATTERN-7         PATTERN-8
NUMBER    LEFT    RIGHT     LEFT    RIGHT     LEFT    RIGHT     LEFT    RIGHT
-------------------------------------------------------------------------------
-
   1        -3.7    44.4      -3.7    44.4      -7.3    85.6      -7.3
85.6
   2       -53.5    52.0     -53.5    52.0    -103.0   100.2    -103.0
100.2
   3       -42.2     3.7     -42.2     3.7     -81.3     7.3     -81.3
7.3
  -------------------------------------------------------------------------------
-
```

DESIGN MOMENT ENVELOPES AT CRITICAL SECTIONS FROM SUPPORTS

COL NUM	LOAD TYPE	CROSS SECTN		DESIGN MOMENT (ft-k)	DISTANCE CR.SECTN (ft)	LOAD PTRN	MAX.I.P. DISTANCE (ft)	LOAD PTRN
1	TOTL	LEFT	TOP	-3.6	.190	4	1.083	1
			BOT	.0	.000	0	.000	0
		RGHT	TOP	229.4	1.292	4	4.050	2
			BOT	.0	.000	0	4.050	5
	VERT	LEFT	TOP	-3.6	.190	4	1.083	1
			BOT	.0	.000	0	.000	0
		RGHT	TOP	229.4	1.292	4	4.050	2
			BOT	.0	.000	0	.000	0
2	TOTL	LEFT	TOP	-485.8	1.500	4	6.750	2
			BOT	.0	.000	0	6.750	6
		RGHT	TOP	467.2	1.500	4	6.500	3
			BOT	.0	.000	0	6.500	5
	VERT	LEFT	TOP	-485.8	1.500	4	6.750	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	467.2	1.500	4	6.500	3
			BOT	.0	.000	0	.000	0
3	TOTL	LEFT	TOP	-197.2	1.292	4	3.900	2
			BOT	.0	.000	0	3.900	6
		RGHT	TOP	3.6	.190	4	1.083	1
			BOT	.0	.000	0	.000	0
	VERT	LEFT	TOP	-197.2	1.292	4	3.900	2

```
                    BOT          .0         .000        0          .000        0

                RGHT  TOP         3.6         .190        4         1.083        1
                      BOT          .0         .000        0          .000        0

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

03-21-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
9
 9:08:19 PM Licensed to: ae, university park, PA


            DESIGN MOMENT ENVELOPES AT CRITICAL SECTIONS ALONG SPANS
            *******************************************************

 ------------------------------------------------------------------------------
--
  SPAN   LOAD       CRITICAL   DESIGN   LOAD  MAX. I.P.  LOAD  MAX. I.P.
LOAD
  NUM    TYPE       SECTION    MOMENT   PTRN  DIST LEFT  PTRN  DIST RGHT
PTRN
                       (ft)     (ft-k)           (ft)             (ft)
 ------------------------------------------------------------------------------
--
    2    TOTL    12.825  TOP        .0    0        .000    0        .000    0
                         BOT      333.4    4       8.775    1       8.775    3

         VERT    12.825  TOP        .0    0        .000    0        .000    0
                         BOT      333.4    4       8.775    1       8.775    3

    3    TOTL    14.950  TOP        .0    0        .000    0        .000    0
                         BOT      304.4    4       9.750    2       7.150    1

         VERT    14.950  TOP        .0    0        .000    0        .000    0
                         BOT      304.4    4       9.750    2       7.150    1

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

DISTRIBUTION OF DESIGN MOMENTS AT SUPPORTS
****

COL NUM	CROSS SECTN	TOTAL MOMENT (ft-k)	TOTAL-VERT DIFFERENCE (ft-k) (%)	COLUMN STRIP MOMENT (ft-k) (%)	BEAM MOMENT (ft-k) (%)	MIDDLE STRIP MOMENT (ft-k) (%)
1	LEFT TOP	-3.6	.0 (0)	-3.5 (98)	.0 (0)	-.1 (1)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	229.4	.0 (0)	225.9 (98)	.0 (0)	3.5 (1)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
2	LEFT TOP	-485.8	.0 (0)	-364.3 (75)	.0 (0)	-121.4 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	467.2	.0 (0)	350.4 (75)	.0 (0)	116.8 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
3	LEFT TOP	-197.2	.0 (0)	-194.2 (98)	.0 (0)	-3.0 (1)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	3.6	.0 (0)	3.5 (98)	.0 (0)	.1 (1)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)

DISTRIBUTION OF DESIGN MOMENTS IN SPANS
****

SPAN NUM	CROSS SECTN		TOTAL MOMENT (ft-k)	TOTAL-VERT DIFFERENCE (ft-k) (%)	COLUMN STRIP MOMENT (ft-k) (%)	BEAM MOMENT (ft-k) (%)	MIDDLE STRIP MOMENT (ft-k) (%)
2	12.82	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	333.4	.0 (0)	200.1 (60)	.0 (0)	133.4 (40)
	12.82	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	333.4	.0 (0)	200.1 (60)	.0 (0)	133.4 (40)
3	14.95	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	304.4	.0 (0)	182.6 (60)	.0 (0)	121.7 (39)

DISTRIBUTION OF DESIGN MOMENTS IN SPANS
****

SPAN NUM	CROSS SECTN	TOTAL MOMENT (ft-k)	TOTAL-VERT DIFFERENCE (ft-k) (%)	COLUMN STRIP MOMENT (ft-k) (%)	BEAM MOMENT (ft-k) (%)	MIDDLE STRIP MOMENT (ft-k) (%)
14.95	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	304.4	.0 (0)	182.6 (60)	.0 (0)	121.7 (40)

03-21-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 12
9:08:19 PM Licensed to: ae, university park, PA

S H E A R A N A L Y S I S
****

NOTE--Allowable shear stress in slabs = 252.96 psi when ratio of col. dim. (long/short) is less than 2.0.

--Wide beam shear (see "CODE") is not computed, check manually.

--After the column numbers, C = Corner, E = Exterior, I = Interior.

D I R E C T S H E A R A R O U N D			W I T H T R A N S F E R O F C O L U M N			M O M E N T		
COL. NO.	ALLOW. STRESS (psi)	PATT NO.	REACTION (kips)	SHEAR STRESS (psi)	PATT NO.	REACTION (kips)	UNBAL. MOMENT (ft-k)	SHEAR TRANSFR (ft-k)	SHEAR STRESS (psi)
1E	252.96	4	120.9	145.51	4	120.9	245.9	91.6	246.95
2I	247.27	4	267.0	207.59	4	267.0	-24.1	-9.6	213.59
3E	252.96	4	115.2	138.64	4	115.2	-211.7	-78.9	226.00

N E G A T I V E R E I N F O R C E M E N T

COLUMN NUMBER	PATT NO.	LOCATION @COL FACE	TOTAL DESIGN (ft-k)	COLUMN STRIP AREA (sq.in)	COLUMN STRIP WIDTH (ft)	MIDDLE STRIP AREA (sq.in)	MIDDLE STRIP WIDTH (ft)
1	4	|| R	229.4	6.15	13.5	2.92	13.5
2	4	L ||	-485.8	10.22	13.0	3.24	14.0
3	4	L ||	-197.2	5.26	13.0	3.02	14.0

P O S I T I V E R E I N F O R C E M E N T

SPAN NUMBER	PATT NO.	LOCATION FROM LEFT (ft)	TOTAL DESIGN (ft-k)	COLUMN STRIP AREA (sq.in)	COLUMN STRIP WIDTH (ft)	MIDDLE STRIP AREA (sq.in)	MIDDLE STRIP WIDTH (ft)
2	4	12.8	333.4	5.42	13.5	3.57	13.5
3	4	14.9	304.4	4.94	13.0	3.25	14.0

03-21-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 14
9:08:19 PM Licensed to: ae, university park, PA

D E S I G N R E S U L T S
****

NOTE--The schedule given below is a guide for proper reinforcement placement and is based on reasonable engineering judgement. Unusual boundary and/or loading conditions may require modification of this schedule.

N E G A T I V E R E I N F O R C E M E N T
****

	* C O L U M N S T R I P				*M I D D L E S T R I P			
	* LONG BARS			* SHORT BARS			* LONG BARS	
COLUMN	* -B A R - L E N G T H-			* -B A R - L E N G T H-			* -B A R - L E N G T H-	
NUMBER	* NO SIZE	LEFT (ft)	RIGHT (ft)	* NO SIZE	LEFT (ft)	RIGHT (ft)	* NO SIZE	LEFT (ft)	RIGHT (ft)
1	10 # 5	1.08	8.53	10 # 5	1.08	6.05	15 # 4	1.08	6.55
2	9 # 7	8.53	8.53	8 # 7	6.05	6.05	16 # 4	8.30	8.05
3	9 # 5	8.23	1.08	8 # 5	5.85	1.08	15 # 4	6.33	1.08

P O S I T I V E R E I N F O R C E M E N T
****

	* C O L U M N S T R I P			* M I D D L E S T R I P					
	* LONG BARS			* SHORT BARS			* LONG BARS			* SHORT BARS		
SPAN	* ---- B A R ----			* ---- B A R ----			* ---- B A R ----			* ---- B A R ----		
NUMBER	* NO SIZE	LENGTH (ft)		* NO SIZE	LENGTH (ft)		* NO SIZE	LENGTH (ft)		* NO SIZE	LENGTH (ft)	

```
 ------------------------------------------------------------------------
---
    2      9   # 5  26.17    9   # 5  23.04    9   # 4  26.67    9   # 4
22.37
    3      8   # 5  25.17    8   # 5  22.17    9   # 4  25.67    8   # 4
21.52



03-21-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page
15
 9:08:19 PM Licensed to: ae, university park, PA

       A D D I T I O N A L   I N F O R M A T I O N   A T  S U P P O R T S
       ********************************************************************

        * REINF. SUMMARY* ADD'L R/F REQ'D DUE TO UNBALANCED (U.) MOMENT
TRANSFER
 COLUMN * -------------* ------------------------------------------------
---
 NUMBER * W/O U. MOMENT * MAX.U. *GAMMA* FLEXURAL  *PATT* CRITICAL    SECTION
        * REQ'D - PROV'D* MOMENT * -f  * TRANSFER  *NO. * SLABW  - AREA -
R/F
        *(sq.in) (sq.in)* (ft-k) *     *  (ft-k) *    * (ft)   (sq.in)
------------------------------------------------------------------------
--
   1       9.06     9.20   364.0    .63    228.4      4     5.5    6.67 14  #
5
   2      13.46*   13.40  -120.7    .60    -72.4      3     5.5    1.95  0  #
7
   3       8.28*    8.27  -324.4    .63   -203.6      4     5.5    5.86 12  #
5

 NOTE: Zero transfer "CRITICAL SLABW" indicates no support dimensions
       given for transfer.
       If beam(s) are present, transfer mode may be due to beam shear
       and/or torsion, check manually.

 * - Indicates REQ'D reinforcement is greater than PROV'D (check bar
selection)
```

A D D I T I O N A L I N F O R M A T I O N F O R
I N - S P A N C O N D I T I O N S
****

SPAN NUMBER	REINF. SUMMARY AT MIDSPAN REQ'D. (sq.in)	REINF. SUMMARY AT MIDSPAN PROV'D. (sq.in)	TOTAL FACTORED SPAN STATIC DESIGN MOMENT (W/O PARTIAL LOADS) (ft-k)
2	8.99	9.18	672.6
3	8.18	8.36	617.7

D E F L E C T I O N A N A L Y S I S
****

NOTES--The deflections below must be combined with those of
the analysis in the perpendicular direction. Consult
users manual for method of combination and limitations.

--Spans 1 and 4 are cantilevers.

--Time-dependent deflections are in addition to those
shown and must be computed as a multiplier of the dead
load(DL) deflection. See "CODE" for range of multipliers.

--Deflections due to concentrated or partialloads may be larger
at the point of application than those shown at the centerline.
Deflections are computed as from an average uniform loading
derived from the sum of all loads applied to the span.

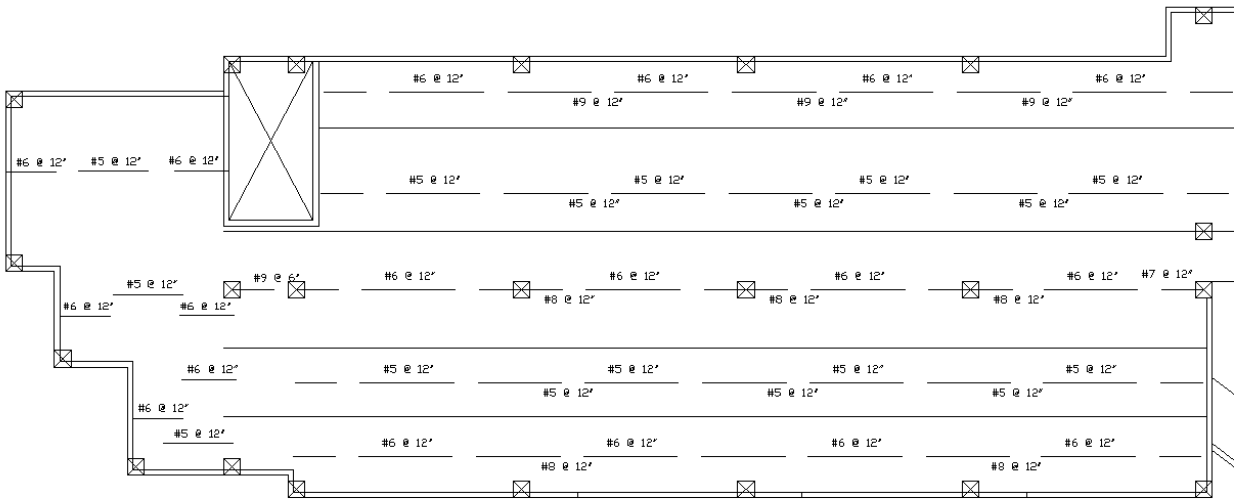
--Modulus of elasticity of concrete, Ec = 3834. ksi

SPAN NUMBER	COLUMN STRIP DEAD LOAD Ieff. (in^4)	COLUMN STRIP DEFLECTION DUE TO: DEAD (in)	COLUMN STRIP DEFLECTION DUE TO: LIVE (in)	COLUMN STRIP DEFLECTION DUE TO: TOTAL (in)	MIDDLE STRIP DEFLECTION DUE TO: DEAD (in)	MIDDLE STRIP DEFLECTION DUE TO: LIVE (in)	MIDDLE STRIP DEFLECTION DUE TO: TOTAL (in)
1	27000.	-.011	-.006	-.017	-.011	-.006	-.017
2	23940.	.190	.141	.331	.092	.063	.155
3	24151.	.164	.106	.269	.073	.045	.119

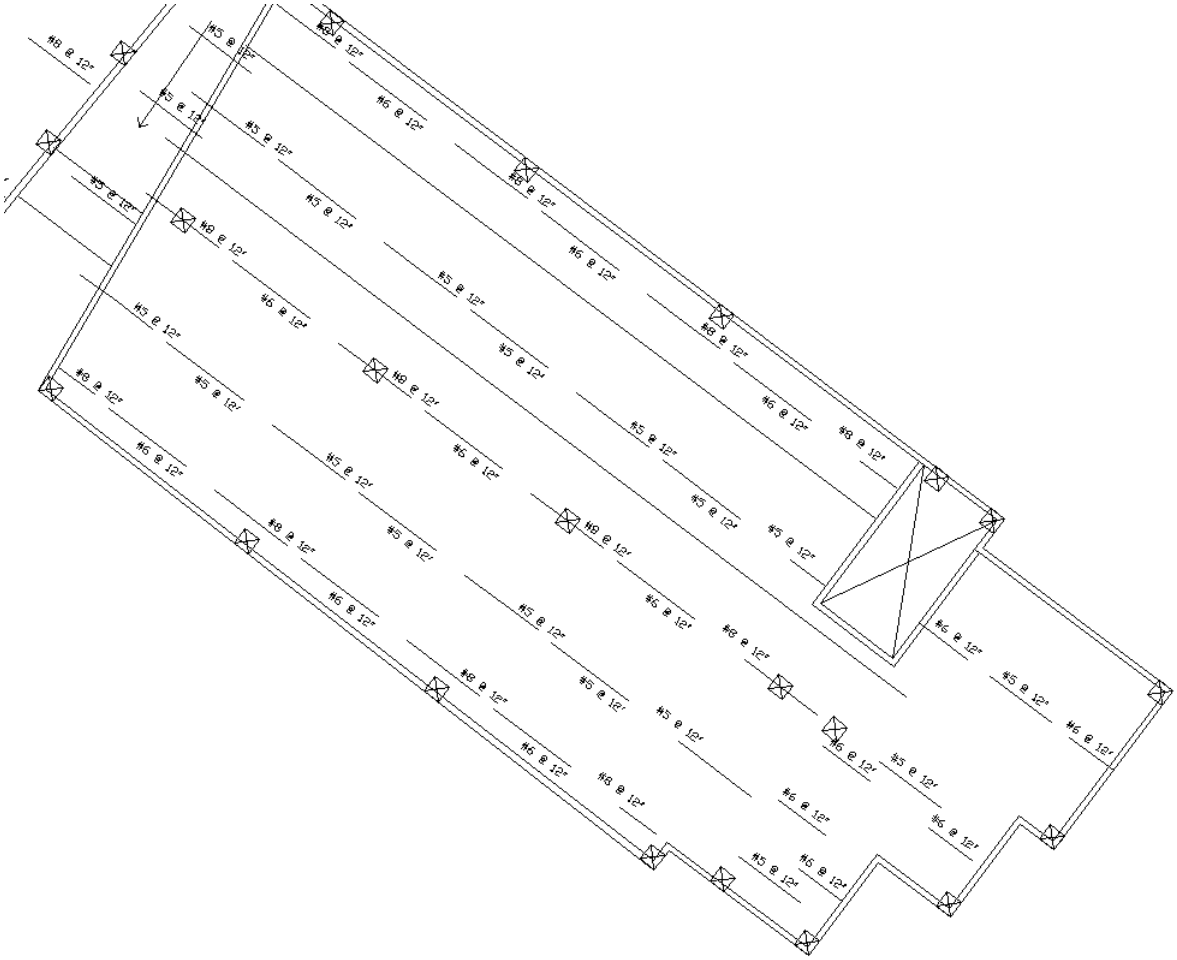
```
4       27000.    -.010    -.005    -.015     -.010    -.005    -.015

                 Q U A N T I T Y   E S T I M A T E S
                 ***********************************

TOTAL QUANTITIES
----------------
CONCRETE         ....        46.0 cu.yd
FORMWORK         ....      1490.  sq.ft
REINFORCEMENT (IN THE DIRECTION OF ANALYSIS)
 (NEGATIVE)      ....      1157.  lbs
 (POSITIVE)      ....      1421.  lbs

SUMMARY OF QUANTITIES
---------------------
CONCRETE         ....         .83  cu.ft/sq.ft
FORMWORK         ....        1.00  sq.ft/sq.ft
REINFORCEMENT**  ....        1.73  lbs / sq.ft

  **(IN THE DIRECTION OF ANALYSIS)

              * Program completed as requested *
```

Reinforcement Layouts

First Floor EW

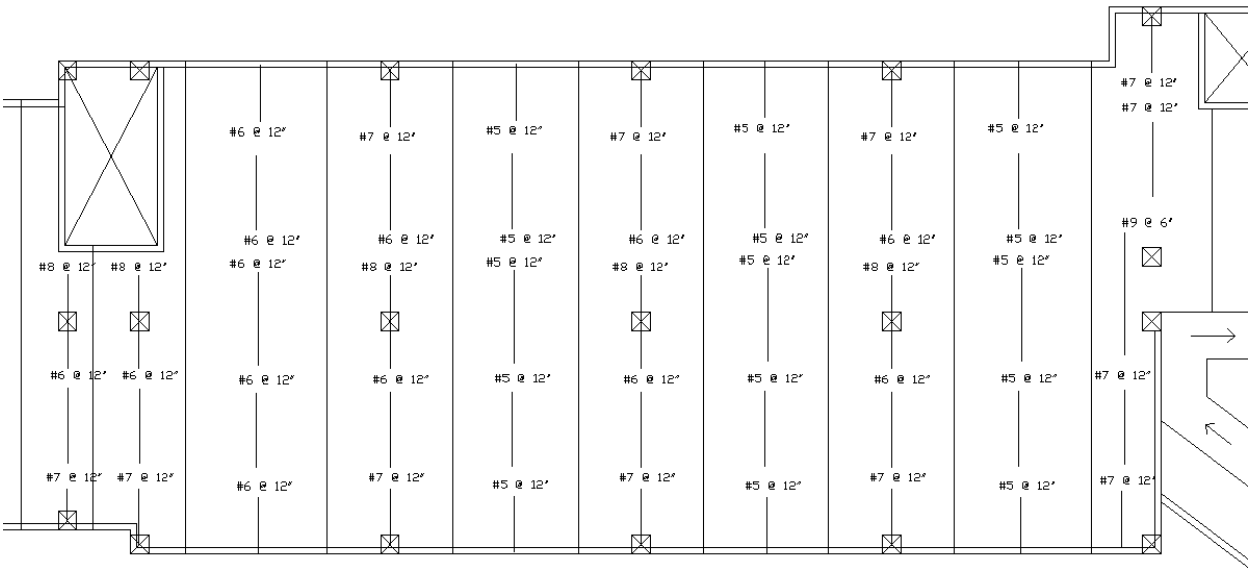


Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan

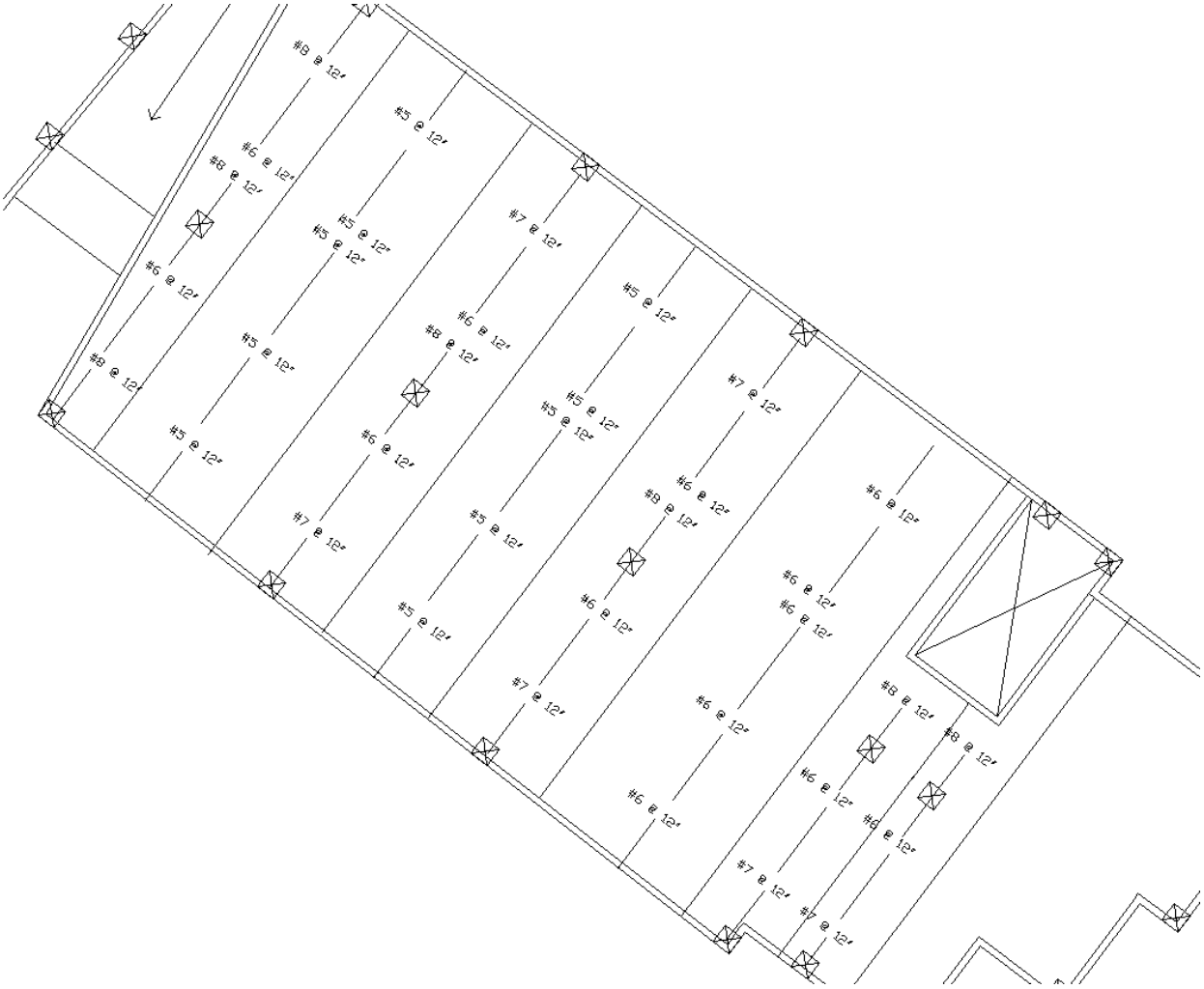


Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan

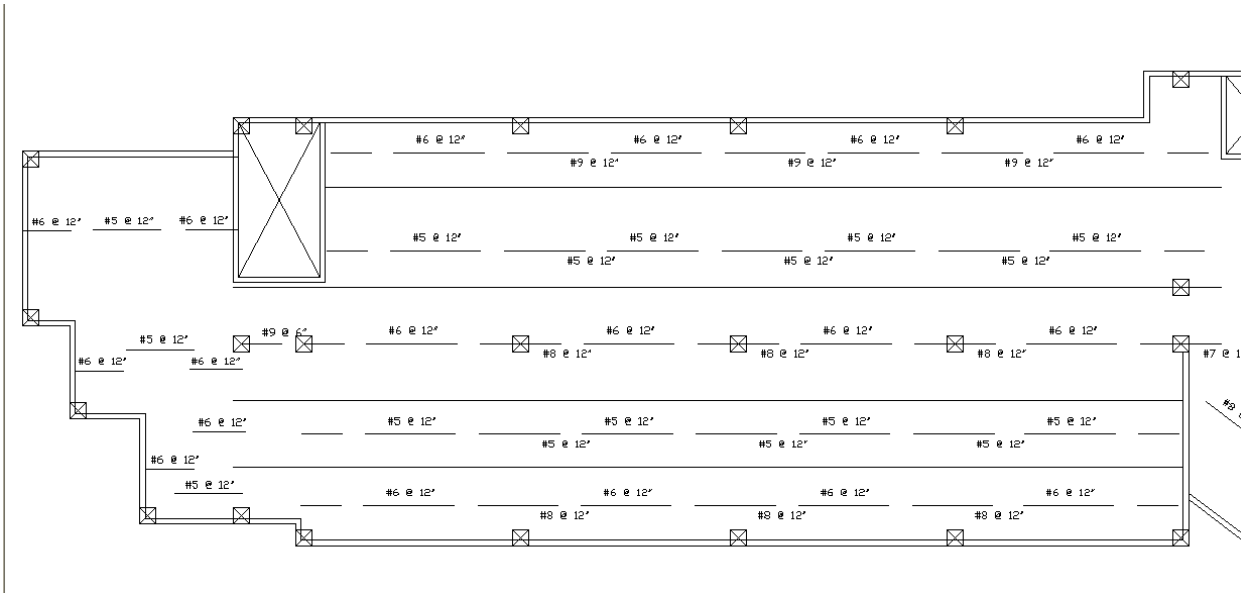
First Floor NS



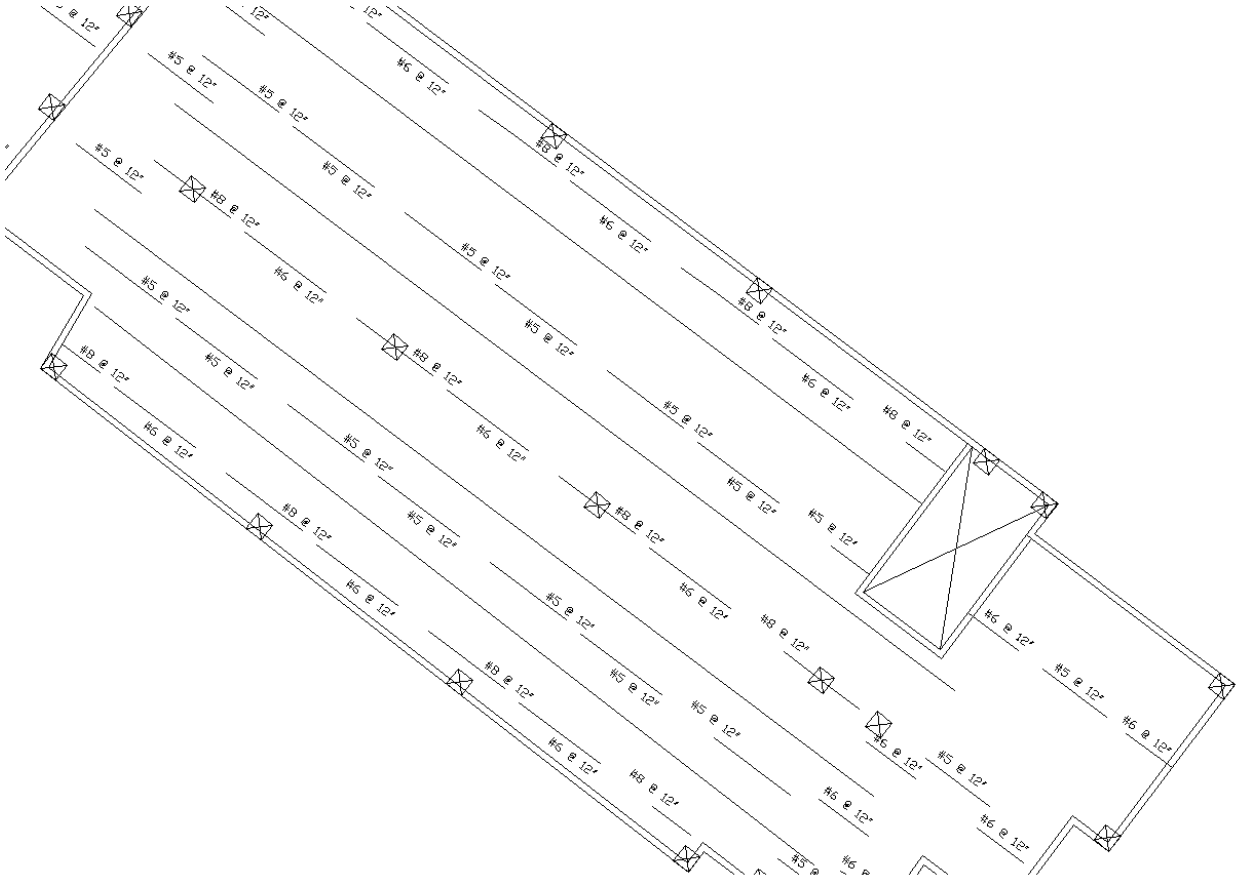
Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan



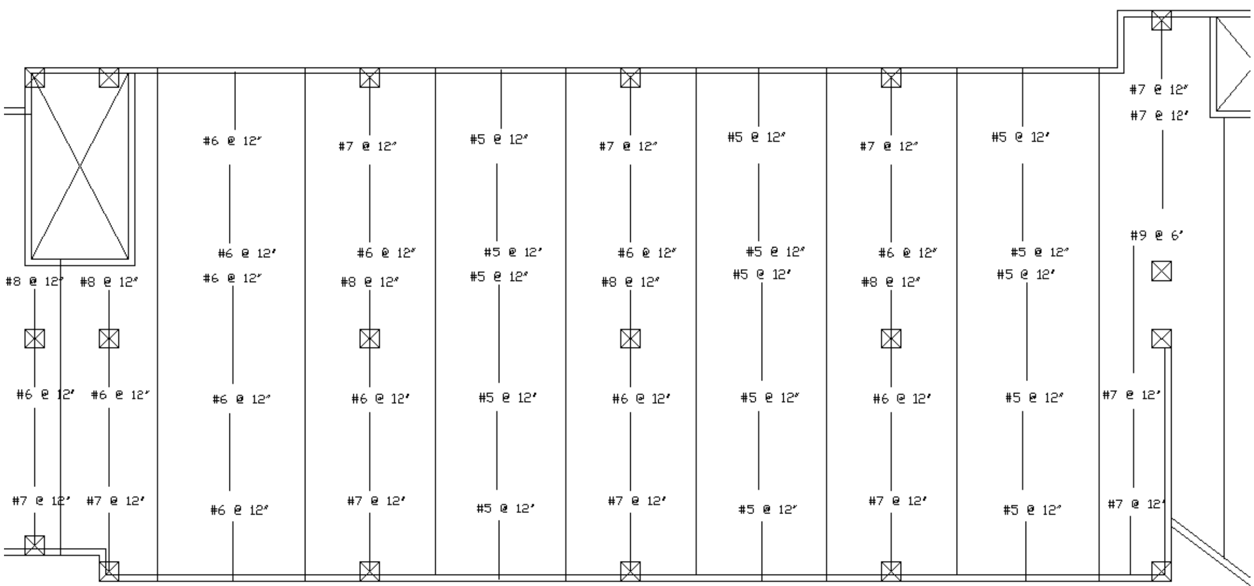
Second-Eighth Floors EW



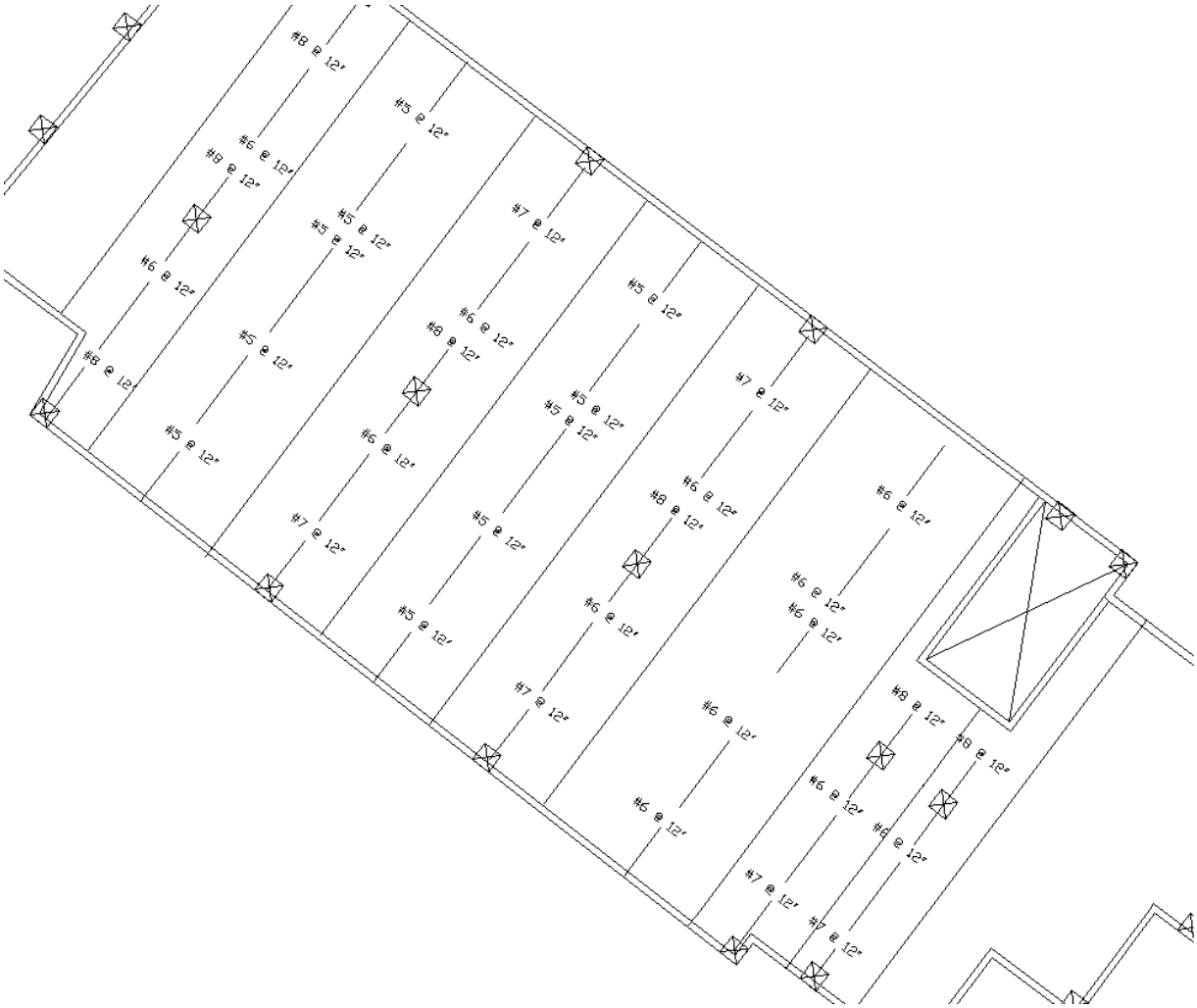
Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan



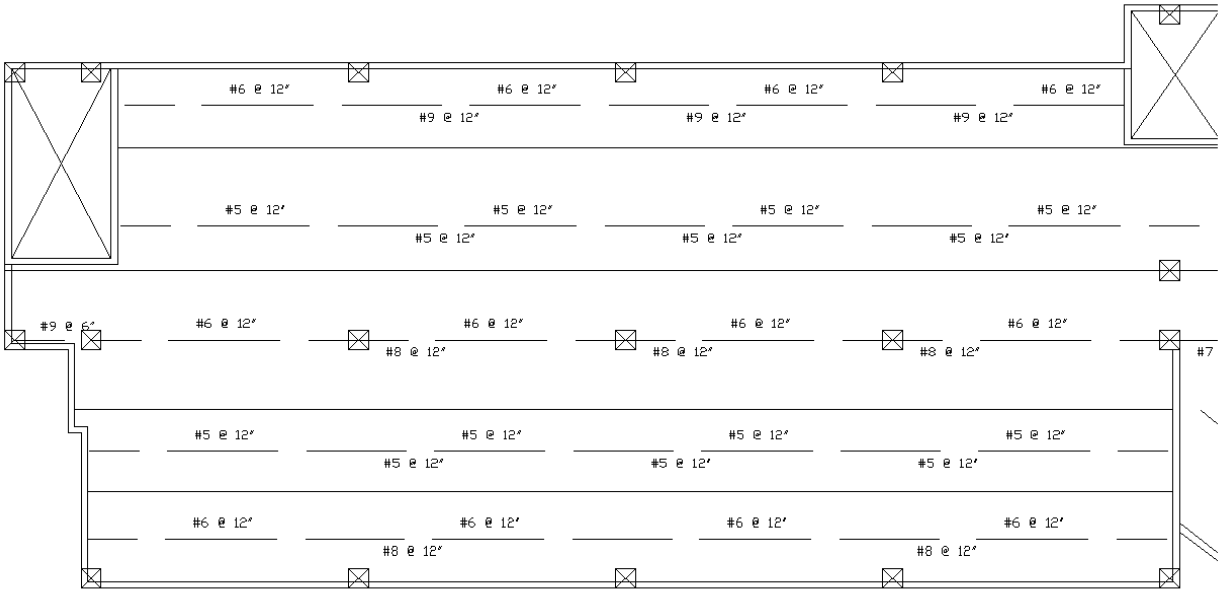
Second-Eighth Floors NS



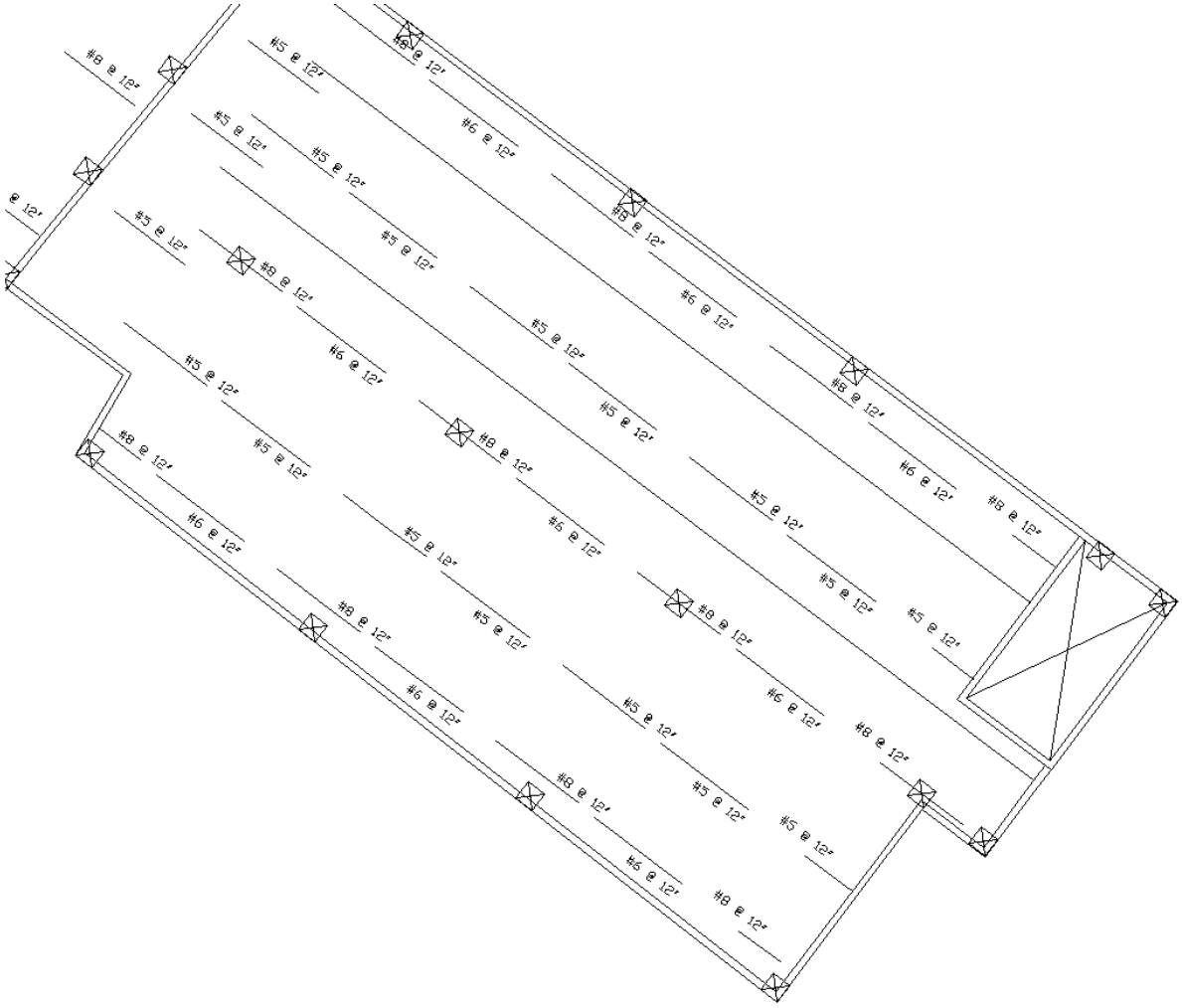
Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan



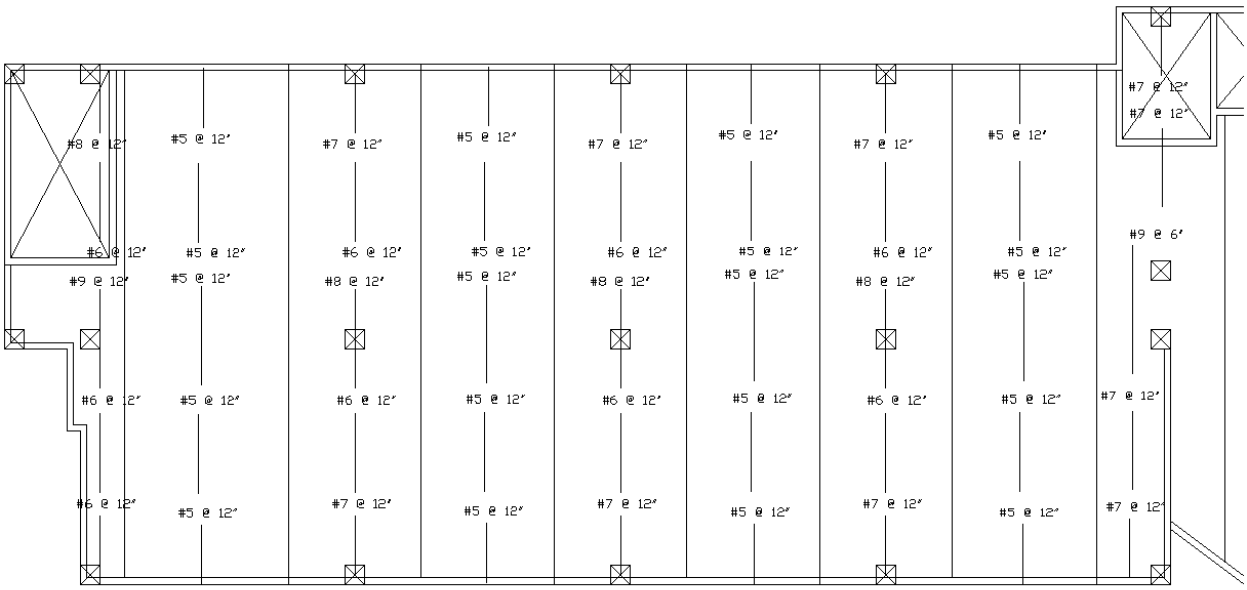
Ninth Floor EW



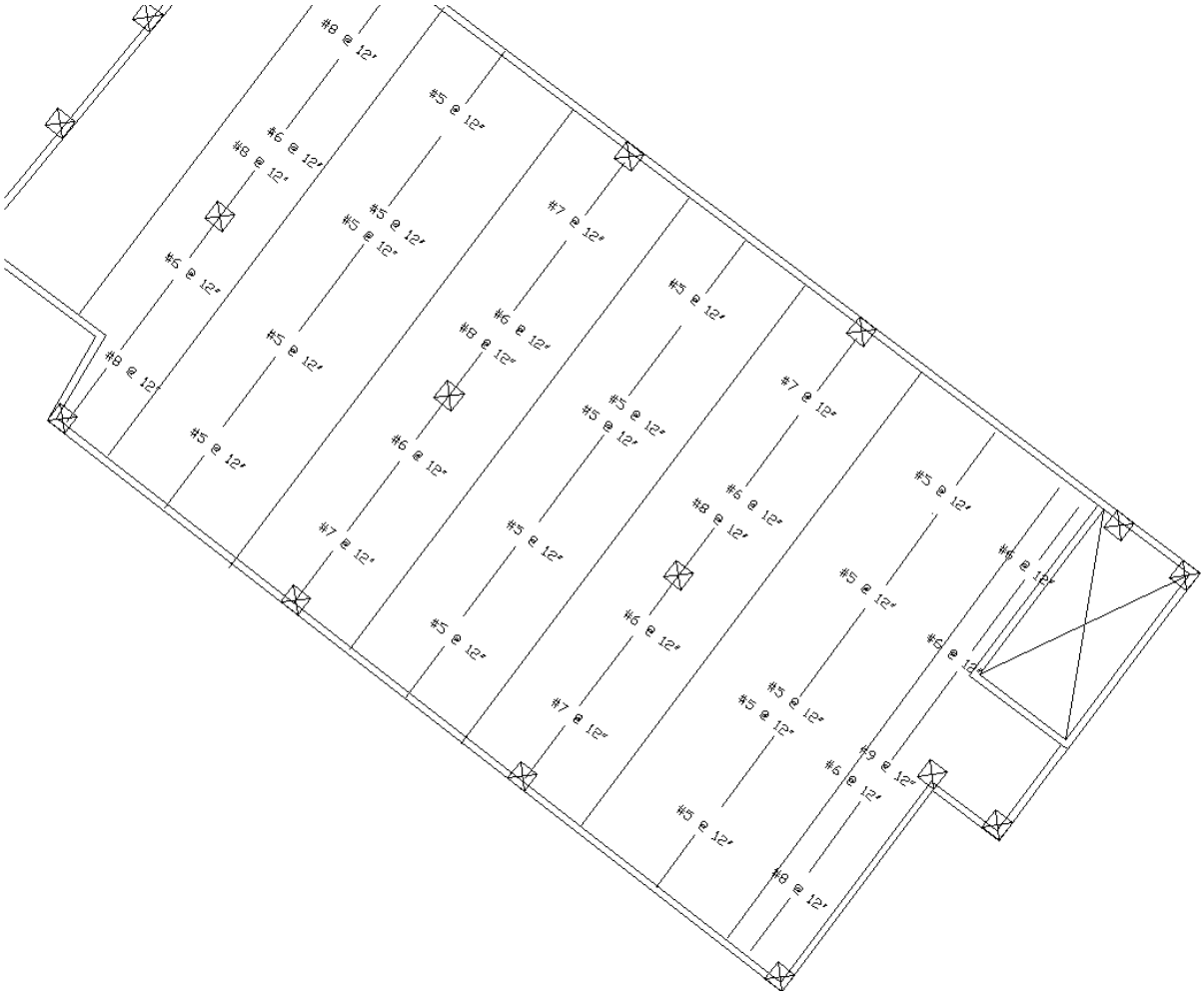
Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan



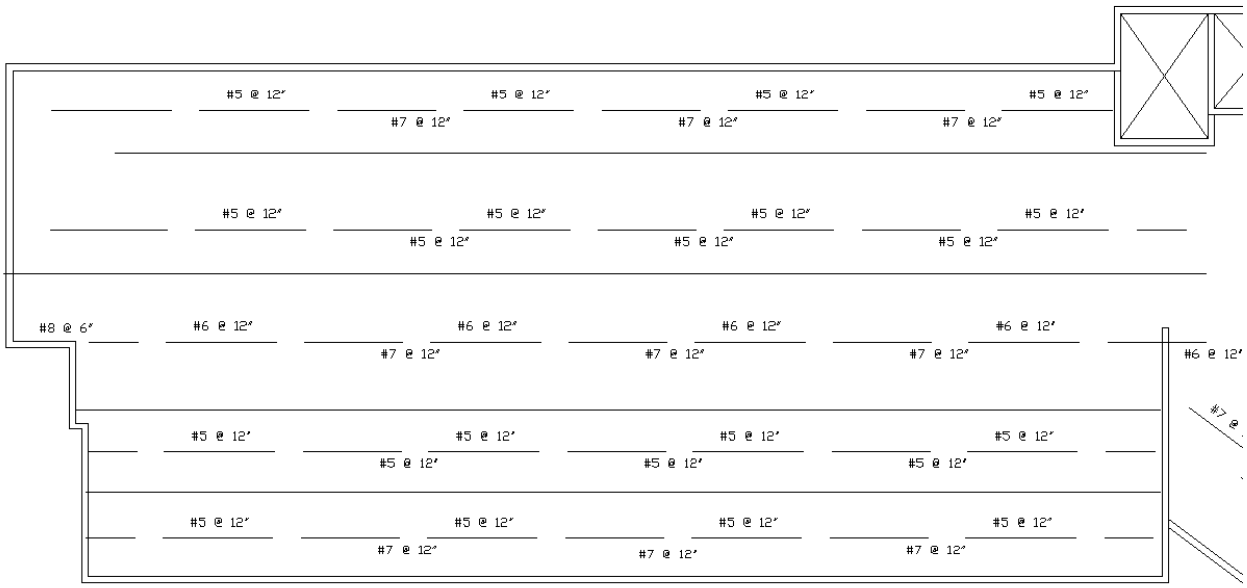
Ninth Floor NS



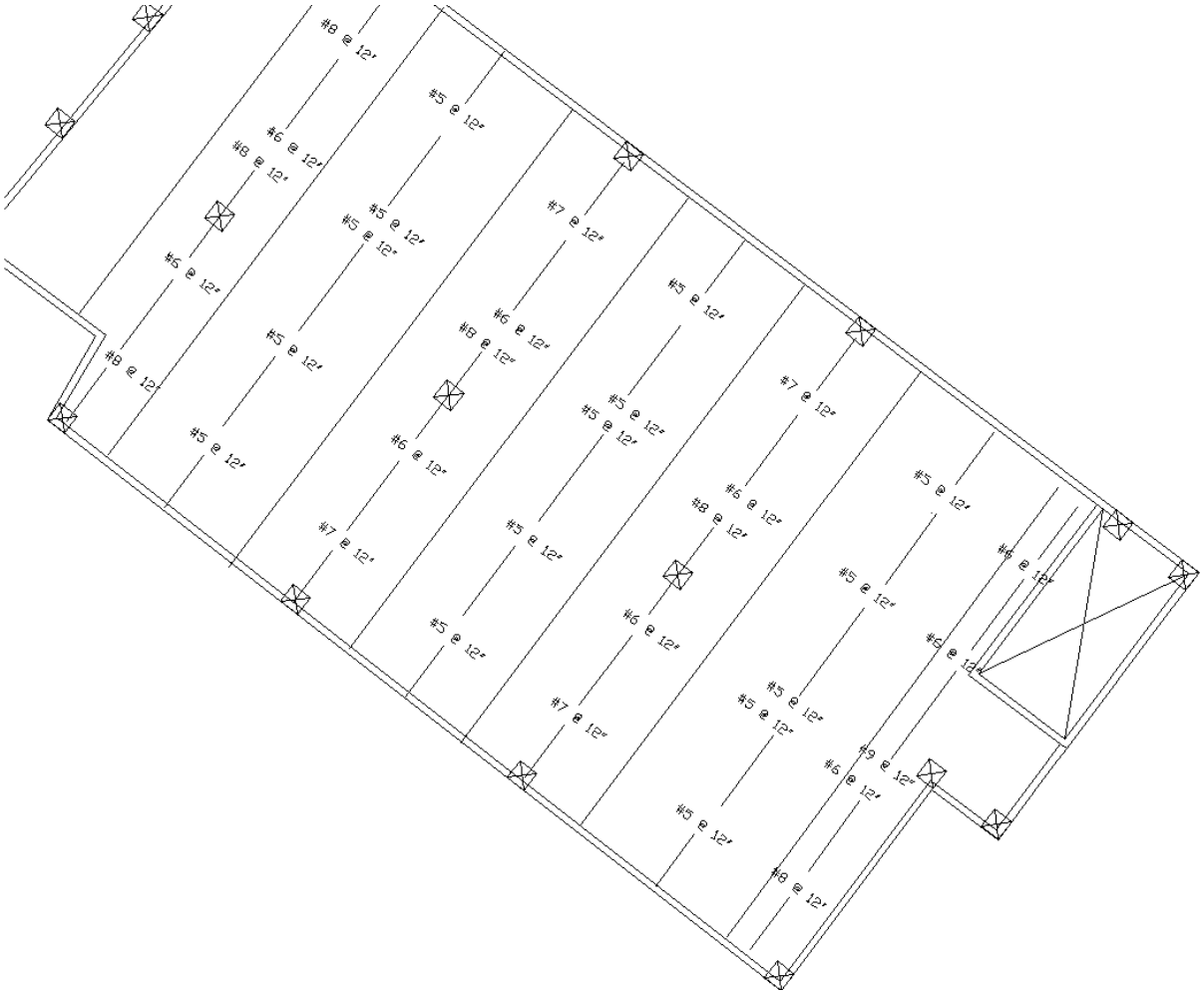
Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan



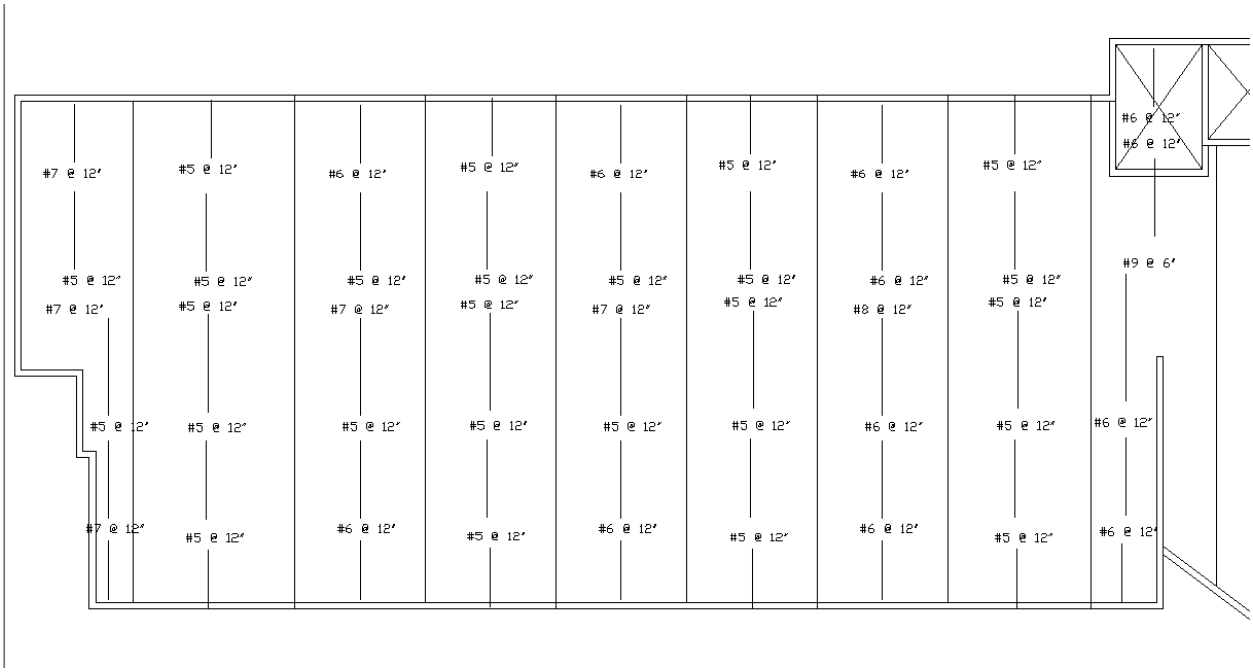
Roof EW


#5 @ 12"
#7 @ 12"
#5 @ 12"
#7 @ 12"
#5 @ 12"
#7 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#8 @ 6"
#6 @ 12"
#7 @ 12"
#6 @ 12"
#7 @ 12"
#6 @ 12"
#7 @ 12"
#6 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#7 @ 12"
#5 @ 12"
#7 @ 12"
#5 @ 12"
#7 @ 12"

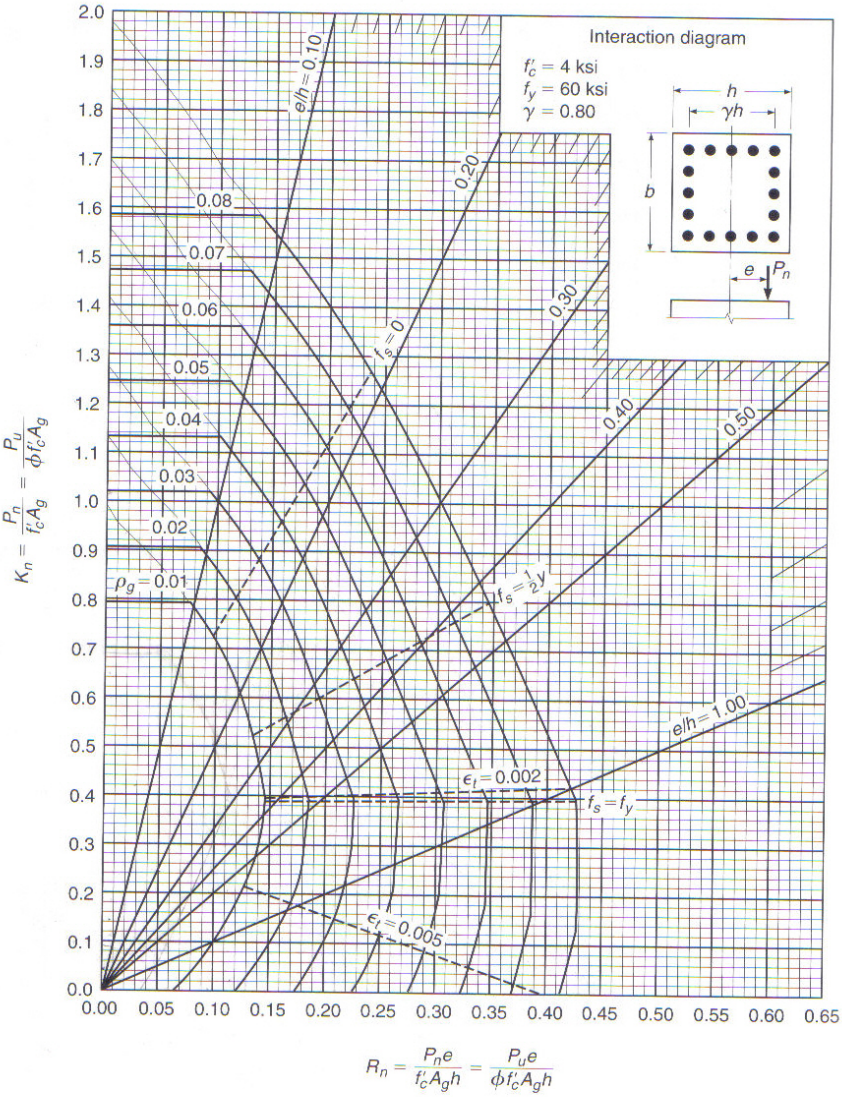
Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan



Roof NS


#7 @ 12"
#5 @ 12"
#6 @ 12"
#5 @ 12"
#6 @ 12"
#5 @ 12"
#6 @ 12"
#5 @ 12"
#6 @ 12"
#6 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#6 @ 12"
#5 @ 12"
#9 @ 6"
#7 @ 12"
#5 @ 12"
#7 @ 12"
#5 @ 12"
#7 @ 12"
#5 @ 12"
#5 @ 12"
#8 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#5 @ 12"
#6 @ 12"
#5 @ 12"
#6 @ 12"
#7 @ 12"
#5 @ 12"
#6 @ 12"
#5 @ 12"
#6 @ 12"
#5 @ 12"
#6 @ 12"
#5 @ 12"
#6 @ 12"

Interaction Diagram



GRAPH A.7
Column strength interaction diagram for rectangular section with bars on four faces and $\gamma = 0.80$ (for instructional use only).

Roof Column Schedule

Column	A_{trib} (ft^2)	P (lb)	M_{Ubal}	Size (in x in)	Reinfor.	Ties
A-6	378	72576	241.7	26 X 26	12-#7	#3@14"
A-6.5	135	25920	355.2	26 X 26	12-#7	#3@14"
B.3-0	0	0	0	26 X 26	-	-
B-1	75	14400	245.7	26 X 26	12-#7	#3@14"
B-2	280	53760	245.7	26 X 26	12-#7	#3@14"
B-3	405	77760	244.9	26 X 26	12-#7	#3@14"
B-4	405	103680	239.5	26 X 26	12-#7	#3@14"
B-5	405	103680	244.9	26 X 26	12-#7	#3@14"
B.6-6.5	-	50000	355.2	26 X 26	12-#7	#3@14"
B.7-6	168	32256	344	26 X 26	12-#7	#3@14"
B.8-0	0	0	0	26 X 26	-	-
C.3-6.2	-	50000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	0	0	0	26 X 26	-	#3@14"
C-1	75	14400	344.4	26 X 26	12-#7	#3@14"
C-2	680	130560	485.8	26 X 26	12-#7	#3@14"
C-3	702	134784	485.8	26 X 26	12-#7	#3@14"
C-4	702	179712	485.8	26 X 26	12-#7	#3@14"
C-5	702	179712	485.8	26 X 26	12-#7	#3@14"
C-6	304	58368	350.6	26 X 26	12-#7	#3@14"
D-0.6	0	0	0	26 X 26	-	-
D-1	0	0	0	26 X 26	-	-
E-2	175.5	33696	197.2	26 X 26	12-#7	#3@14"
E-3	336	64512	248.2	26 X 26	12-#7	#3@14"
E-4	336	86016	228.2	26 X 26	12-#7	#3@14"
E-5	336	86016	268.4	26 X 26	12-#7	#3@14"
E-6	312	59904	197.2	26 X 26	12-#7	#3@14"
E.5-6.8	84	16128	355.2	26 X 26	12-#7	#3@14"
F-6.8	90	17280	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	12960	245.7	26 X 26	12-#7	#3@14"
F-8	405	77760	244.5	26 X 26	12-#7	#3@14"
F-9	405	77760	244.9	26 X 26	12-#7	#3@14"
F-10	240	46080	241.7	26 X 26	12-#7	#3@14"
F-11	285	54720	245.7	26 X 26	12-#7	#3@14"
F.2-12	0	0	0	26 X 26	-	-
F.5-6.8	90	17280	355.2	26 X 26	12-#7	#3@14"
F.6-12	0	0	0	26 X 26	-	-
G-7	81	15552	344.4	26 X 26	12-#7	#3@14"
G-8	702	134784	485.8	26 X 26	12-#7	#3@14"
G-9	702	134784	485.8	26 X 26	12-#7	#3@14"
G-10	420	80640	485.8	26 X 26	12-#7	#3@14"
G-11	280	53760	344.4	26 X 26	12-#7	#3@14"
G.1-6.8	90	17280	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	0	0	0	26 X 26	-	-
G.6-6.8	84	16128	355.2	26 X 26	12-#7	#3@14"
H-11	0	0	0	26 X 26	-	-
H-11.5	0	0	0	26 X 26	-	-
I-7	204	39168	220.4	26 X 26	12-#7	#3@14"
I-8	336	64512	265	26 X 26	12-#7	#3@14"
I-9	336	64512	246	26 X 26	12-#7	#3@14"
I-10	97.5	18720	220.4	26 X 26	12-#7	#3@14"

Ninth Floor Column Schedule

A-G	378	175392	241.7	26 X 26	12-#7	#3@14"
A-G.5	135	62640	355.2	26 X 26	12-#7	#3@14"
B.3-0	0	0	0	26 X 26	-	-
B-1	75	34800	245.7	26 X 26	12-#7	#3@14"
B-2	280	129920	245.7	26 X 26	12-#7	#3@14"
B-3	405	187920	244.9	26 X 26	12-#7	#3@14"
B-4	405	213840	239.5	26 X 26	12-#7	#3@14"
B-5	405	213840	244.9	26 X 26	12-#7	#3@14"
B.G-G.5	-	100000	355.2	26 X 26	12-#7	#3@14"
B.7-G	168	77952	344	26 X 26	12-#7	#3@14"
B.8-0	0	0	0	26 X 26	-	-
C.3-G.2	-	100000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	0	0	0	26 X 26	-	-
C-1	75	34800	344.4	26 X 26	12-#7	#3@14"
C-2	680	315520	485.8	26 X 26	12-#7	#3@14"
C-3	702	325728	485.8	26 X 26	12-#7	#3@14"
C-4	702	370656	485.8	26 X 26	12-#7	#3@14"
C-5	702	370656	485.8	26 X 26	12-#7	#3@14"
C-6	304	141056	350.6	26 X 26	12-#7	#3@14"
D-0.6	0	0	0	26 X 26	-	-
D-1	0	0	0	26 X 26	-	-
E-2	175.5	81432	197.2	26 X 26	12-#7	#3@14"
E-3	336	155904	248.2	26 X 26	12-#7	#3@14"
E-4	336	177408	228.2	26 X 26	12-#7	#3@14"
E-5	336	177408	268.4	26 X 26	12-#7	#3@14"
E-6	312	144768	197.2	26 X 26	12-#7	#3@14"
E.5-G.8	84	38976	355.2	26 X 26	12-#7	#3@14"
F-G.8	90	41760	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	31320	245.7	26 X 26	12-#7	#3@14"
F-8	405	187920	244.5	26 X 26	12-#7	#3@14"
F-9	405	187920	244.9	26 X 26	12-#7	#3@14"
F-10	240	111360	241.7	26 X 26	12-#7	#3@14"
F-11	285	132240	245.7	26 X 26	12-#7	#3@14"
F.2-12	0	0	0	26 X 26	-	-
F.5-G.8	90	41760	355.2	26 X 26	12-#7	#3@14"
F.G-12	0	0	0	26 X 26	-	-
G-7	81	37584	344.4	26 X 26	12-#7	#3@14"
G-8	702	325728	485.8	26 X 26	12-#7	#3@14"
G-9	702	325728	485.8	26 X 26	12-#7	#3@14"
G-10	420	194880	485.8	26 X 26	12-#7	#3@14"
G-11	280	129920	344.4	26 X 26	12-#7	#3@14"
G.1-G.8	90	41760	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	0	0	0	26 X 26	-	-
G.G-G.8	84	38976	355.2	26 X 26	12-#7	#3@14"
H-11	0	0	0	26 X 26	-	-
H-11.5	0	0	0	26 X 26	-	-
I-7	204	94656	220.4	26 X 26	12-#7	#3@14"
I-8	336	155904	265	26 X 26	12-#7	#3@14"
I-9	336	155904	246	26 X 26	12-#7	#3@14"
I-10	97.5	45240	220.4	26 X 26	12-#7	#3@14"

Eight Floor Column Schedule

A-G	378	278208	241.7	26 X 26	12-#7	#3@14"
A-G.5	135	99360	355.2	26 X 26	12-#7	#3@14"
B.3-0	130	35360	114.9	26 X 26	12-#7	#3@14"
B-1	255	104160	245.7	26 X 26	12-#7	#3@14"
B-2	280	206080	245.7	26 X 26	12-#7	#3@14"
B-3	405	298080	244.9	26 X 26	12-#7	#3@14"
B-4	405	324000	239.5	26 X 26	12-#7	#3@14"
B-5	405	324000	244.9	26 X 26	12-#7	#3@14"
B.G-G.5	-	150000	355.2	26 X 26	12-#7	#3@14"
B.7-G	168	123648	344	26 X 26	12-#7	#3@14"
B.8-0	78	21216	114.9	26 X 26	12-#7	#3@14"
C.3-G.2	-	150000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	60	16320	114.9	26 X 26	12-#7	#3@14"
C-1	205	90560	344.4	26 X 26	12-#7	#3@14"
C-2	680	500480	485.8	26 X 26	12-#7	#3@14"
C-3	702	516672	485.8	26 X 26	12-#7	#3@14"
C-4	702	561600	485.8	26 X 26	12-#7	#3@14"
C-5	702	561600	485.8	26 X 26	12-#7	#3@14"
C-6	304	223744	350.6	26 X 26	12-#7	#3@14"
D-0.6	91	24752	114.9	26 X 26	12-#7	#3@14"
D-1	130	35360	220.4	26 X 26	12-#7	#3@14"
E-2	180	130392	197.2	26 X 26	12-#7	#3@14"
E-3	336	247296	248.2	26 X 26	12-#7	#3@14"
E-4	336	268800	228.2	26 X 26	12-#7	#3@14"
E-5	336	268800	268.4	26 X 26	12-#7	#3@14"
E-6	312	229632	197.2	26 X 26	12-#7	#3@14"
E.5-6.8	84	61824	355.2	26 X 26	12-#7	#3@14"
F-6.8	90	66240	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	49680	245.7	26 X 26	12-#7	#3@14"
F-8	405	298080	244.5	26 X 26	12-#7	#3@14"
F-9	405	298080	244.9	26 X 26	12-#7	#3@14"
F-10	240	176640	241.7	26 X 26	12-#7	#3@14"
F-11	285	209760	245.7	26 X 26	12-#7	#3@14"
F.2-12	210	57120	114.2	26 X 26	12-#7	#3@14"
F.5-6.8	90	66240	355.2	26 X 26	12-#7	#3@14"
F.6-12	78	21216	114.2	26 X 26	12-#7	#3@14"
G-7	81	59616	344.4	26 X 26	12-#7	#3@14"
G-8	702	516672	485.8	26 X 26	12-#7	#3@14"
G-9	702	516672	485.8	26 X 26	12-#7	#3@14"
G-10	420	309120	485.8	26 X 26	12-#7	#3@14"
G-11	280	206080	344.4	26 X 26	12-#7	#3@14"
G.1-6.8	90	66240	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	205	55760	114.9	26 X 26	12-#7	#3@14"
G.6-6.8	84	61824	355.2	26 X 26	12-#7	#3@14"
H-11	132	35904	220.4	26 X 26	12-#7	#3@14"
H-11.5	84	22848	114.9	26 X 26	12-#7	#3@14"
I-7	204	150144	220.4	26 X 26	12-#7	#3@14"
I-8	336	247296	265	26 X 26	12-#7	#3@14"
I-9	336	247296	246	26 X 26	12-#7	#3@14"
I-10	144	84408	220.4	26 X 26	12-#7	#3@14"

Seventh Floor Column Schedule

A-G	378	381024	241.7	26 X 26	12-#7	#3@14"
A-G.5	135	136080	355.2	26 X 26	12-#7	#3@14"
B.3-0	130	70720	114.9	26 X 26	12-#7	#3@14"
B-1	255	173520	245.7	26 X 26	12-#7	#3@14"
B-2	280	282240	245.7	26 X 26	12-#7	#3@14"
B-3	405	408240	244.9	26 X 26	12-#7	#3@14"
B-4	405	434160	239.5	26 X 26	12-#7	#3@14"
B-5	405	434160	244.9	26 X 26	12-#7	#3@14"
B.G-G.5	-	200000	355.2	26 X 26	12-#7	#3@14"
B.7-G	168	169344	344	26 X 26	12-#7	#3@14"
B.8-0	78	42432	114.9	26 X 26	12-#7	#3@14"
C.3-G.2	-	200000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	60	32640	114.9	26 X 26	12-#7	#3@14"
C-1	205	146320	344.4	26 X 26	12-#7	#3@14"
C-2	680	685440	485.8	26 X 26	12-#7	#3@14"
C-3	702	707616	485.8	26 X 26	12-#7	#3@14"
C-4	702	752544	485.8	26 X 26	12-#7	#3@14"
C-5	702	752544	485.8	26 X 26	12-#7	#3@14"
C-6	304	306432	350.6	26 X 26	12-#7	#3@14"
D-0.6	91	49504	114.9	26 X 26	12-#7	#3@14"
D-1	130	70720	220.4	26 X 26	12-#7	#3@14"
E-2	180	179352	197.2	26 X 26	12-#7	#3@14"
E-3	336	338688	248.2	26 X 26	12-#7	#3@14"
E-4	336	360192	228.2	26 X 26	12-#7	#3@14"
E-5	336	360192	268.4	26 X 26	12-#7	#3@14"
E-6	312	314496	197.2	26 X 26	12-#7	#3@14"
E.5-G.8	84	84672	355.2	26 X 26	12-#7	#3@14"
F-G.8	90	90720	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	68040	245.7	26 X 26	12-#7	#3@14"
F-8	405	408240	244.5	26 X 26	12-#7	#3@14"
F-9	405	408240	244.9	26 X 26	12-#7	#3@14"
F-10	240	241920	241.7	26 X 26	12-#7	#3@14"
F-11	285	287280	245.7	26 X 26	12-#7	#3@14"
F.2-12	210	114240	114.2	26 X 26	12-#7	#3@14"
F.5-G.8	90	90720	355.2	26 X 26	12-#7	#3@14"
F.G-12	78	42432	114.2	26 X 26	12-#7	#3@14"
G-7	81	81648	344.4	26 X 26	12-#7	#3@14"
G-8	702	707616	485.8	26 X 26	12-#7	#3@14"
G-9	702	707616	485.8	26 X 26	12-#7	#3@14"
G-10	420	423360	485.8	26 X 26	12-#7	#3@14"
G-11	280	282240	344.4	26 X 26	12-#7	#3@14"
G.1-G.8	90	90720	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	205	111520	114.9	26 X 26	12-#7	#3@14"
G.6-G.8	84	84672	355.2	26 X 26	12-#7	#3@14"
H-11	132	71808	220.4	26 X 26	12-#7	#3@14"
H-11.5	84	45696	114.9	26 X 26	12-#7	#3@14"
I-7	204	205632	220.4	26 X 26	12-#7	#3@14"
I-8	336	338688	265	26 X 26	12-#7	#3@14"
I-9	336	338688	246	26 X 26	12-#7	#3@14"
I-10	144	123576	220.4	26 X 26	12-#7	#3@14"

Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan

Sixth Floor Column Schedule

A-G	378	483840	241.7	26 X 26	12-#7	#3@14"
A-G.5	135	172800	355.2	26 X 26	12-#7	#3@14"
B.3-0	130	106080	114.9	26 X 26	12-#7	#3@14"
B-1	255	242880	245.7	26 X 26	12-#7	#3@14"
B-2	280	358400	245.7	26 X 26	12-#7	#3@14"
B-3	405	518400	244.9	26 X 26	12-#7	#3@14"
B-4	405	544320	239.5	26 X 26	12-#7	#3@14"
B-5	405	544320	244.9	26 X 26	12-#7	#3@14"
B.G-G.5	-	250000	355.2	26 X 26	12-#7	#3@14"
B.7-G	168	215040	344	26 X 26	12-#7	#3@14"
B.8-0	78	63648	114.9	26 X 26	12-#7	#3@14"
C.3-G.2	-	250000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	60	48960	114.9	26 X 26	12-#7	#3@14"
C-1	205	202080	344.4	26 X 26	12-#7	#3@14"
C-2	680	870400	485.8	26 X 26	12-#7	#3@14"
C-3	702	898560	485.8	26 X 26	12-#7	#3@14"
C-4	702	943488	485.8	26 X 26	12-#7	#3@14"
C-5	702	943488	485.8	26 X 26	12-#7	#3@14"
C-6	304	389120	350.6	26 X 26	12-#7	#3@14"
D-0.6	91	74256	114.9	26 X 26	12-#7	#3@14"
D-1	130	106080	220.4	26 X 26	12-#7	#3@14"
E-2	180	228312	197.2	26 X 26	12-#7	#3@14"
E-3	336	430080	248.2	26 X 26	12-#7	#3@14"
E-4	336	451584	228.2	26 X 26	12-#7	#3@14"
E-5	336	451584	268.4	26 X 26	12-#7	#3@14"
E-6	312	399360	197.2	26 X 26	12-#7	#3@14"
E.5-G.8	84	107520	355.2	26 X 26	12-#7	#3@14"
F-G.8	90	115200	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	86400	245.7	26 X 26	12-#7	#3@14"
F-8	405	518400	244.5	26 X 26	12-#7	#3@14"
F-9	405	518400	244.9	26 X 26	12-#7	#3@14"
F-10	240	307200	241.7	26 X 26	12-#7	#3@14"
F-11	285	364800	245.7	26 X 26	12-#7	#3@14"
F.2-12	210	171360	114.2	26 X 26	12-#7	#3@14"
F.5-G.8	90	115200	355.2	26 X 26	12-#7	#3@14"
F.G-12	78	63648	114.2	26 X 26	12-#7	#3@14"
G-7	81	103680	344.4	26 X 26	12-#7	#3@14"
G-8	702	898560	485.8	26 X 26	12-#7	#3@14"
G-9	702	898560	485.8	26 X 26	12-#7	#3@14"
G-10	420	537600	485.8	26 X 26	12-#7	#3@14"
G-11	280	358400	344.4	26 X 26	12-#7	#3@14"
G.1-G.8	90	115200	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	205	167280	114.9	26 X 26	12-#7	#3@14"
G.6-G.8	84	107520	355.2	26 X 26	12-#7	#3@14"
H-11	132	107712	220.4	26 X 26	12-#7	#3@14"
H-11.5	84	68544	114.9	26 X 26	12-#7	#3@14"
I-7	204	261120	220.4	26 X 26	12-#7	#3@14"
I-8	336	430080	265	26 X 26	12-#7	#3@14"
I-9	336	430080	246	26 X 26	12-#7	#3@14"
I-10	144	162744	220.4	26 X 26	12-#7	#3@14"

Fifth Floor Column Schedule

A-G	378	586656	241.7	26 X 26	12-#7	#3@14"
A-G.5	135	209520	355.2	26 X 26	12-#7	#3@14"
B.3-0	130	141440	114.9	26 X 26	12-#7	#3@14"
B-1	255	312240	245.7	26 X 26	12-#7	#3@14"
B-2	280	434560	245.7	26 X 26	12-#7	#3@14"
B-3	405	628560	244.9	26 X 26	12-#7	#3@14"
B-4	405	654480	239.5	26 X 26	12-#7	#3@14"
B-5	405	654480	244.9	26 X 26	12-#7	#3@14"
B.6-G.5	-	300000	355.2	26 X 26	12-#7	#3@14"
B.7-G	168	260736	344	26 X 26	12-#7	#3@14"
B.8-0	78	84864	114.9	26 X 26	12-#7	#3@14"
C.3-G.2	-	300000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	60	65280	114.9	26 X 26	12-#7	#3@14"
C-1	205	257840	344.4	26 X 26	12-#7	#3@14"
C-2	680	1055360	485.8	26 X 26	12-#11	#4@22"
C-3	702	1089504	485.8	26 X 26	12-#11	#4@22"
C-4	702	1134432	485.8	26 X 26	12-#11	#4@22"
C-5	702	1134432	485.8	26 X 26	12-#11	#4@22"
C-6	304	471808	350.6	26 X 26	12-#7	#3@14"
D-0.6	91	99008	114.9	26 X 26	12-#7	#3@14"
D-1	130	141440	220.4	26 X 26	12-#7	#3@14"
E-2	180	277272	197.2	26 X 26	12-#7	#3@14"
E-3	336	521472	248.2	26 X 26	12-#7	#3@14"
E-4	336	542976	228.2	26 X 26	12-#7	#3@14"
E-5	336	542976	268.4	26 X 26	12-#7	#3@14"
E-6	312	484224	197.2	26 X 26	12-#7	#3@14"
E.5-6.8	84	130368	355.2	26 X 26	12-#7	#3@14"
F-6.8	90	139680	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	104760	245.7	26 X 26	12-#7	#3@14"
F-8	405	628560	244.5	26 X 26	12-#7	#3@14"
F-9	405	628560	244.9	26 X 26	12-#7	#3@14"
F-10	240	372480	241.7	26 X 26	12-#7	#3@14"
F-11	285	442320	245.7	26 X 26	12-#7	#3@14"
F.2-12	210	228480	114.2	26 X 26	12-#7	#3@14"
F.5-6.8	90	139680	355.2	26 X 26	12-#7	#3@14"
F.6-12	78	84864	114.2	26 X 26	12-#7	#3@14"
G-7	81	125712	344.4	26 X 26	12-#7	#3@14"
G-8	702	1089504	485.8	26 X 26	12-#11	#4@22"
G-9	702	1089504	485.8	26 X 26	12-#11	#4@22"
G-10	420	651840	485.8	26 X 26	12-#7	#3@14"
G-11	280	434560	344.4	26 X 26	12-#7	#3@14"
G.1-6.8	90	139680	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	205	223040	114.9	26 X 26	12-#7	#3@14"
G.6-6.8	84	130368	355.2	26 X 26	12-#7	#3@14"
H-11	132	143616	220.4	26 X 26	12-#7	#3@14"
H-11.5	84	91392	114.9	26 X 26	12-#7	#3@14"
I-7	204	316608	220.4	26 X 26	12-#7	#3@14"
I-8	336	521472	265	26 X 26	12-#7	#3@14"
I-9	336	521472	246	26 X 26	12-#7	#3@14"
I-10	144	201912	220.4	26 X 26	12-#7	#3@14"

Fourth Floor Column Schedule

A-6	378	689472	241.7	26 X 26	12-#7	#3@14"
A-6.5	135	246240	355.2	26 X 26	12-#7	#3@14"
B.3-0	130	176800	114.9	26 X 26	12-#7	#3@14"
B-1	255	381600	245.7	26 X 26	12-#7	#3@14"
B-2	280	510720	245.7	26 X 26	12-#7	#3@14"
B-3	405	738720	244.9	26 X 26	12-#7	#3@14"
B-4	405	764640	239.5	26 X 26	12-#7	#3@14"
B-5	405	764640	244.9	26 X 26	12-#7	#3@14"
B.6-6.5	-	350000	355.2	26 X 26	12-#7	#3@14"
B.7-6	168	306432	344	26 X 26	12-#7	#3@14"
B.8-0	78	106080	114.9	26 X 26	12-#7	#3@14"
C.3-6.2	-	350000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	60	81600	114.9	26 X 26	12-#7	#3@14"
C-1	205	313600	344.4	26 X 26	12-#7	#3@14"
C-2	680	1240320	485.8	26 X 26	12-#11	#4@22"
C-3	702	1280448	485.8	26 X 26	12-#11	#4@22"
C-4	702	1325376	485.8	26 X 26	12-#11	#4@22"
C-5	702	1325376	485.8	26 X 26	12-#11	#4@22"
C-6	304	554496	350.6	26 X 26	12-#7	#3@14"
D-0.6	91	123760	114.9	26 X 26	12-#7	#3@14"
D-1	130	176800	220.4	26 X 26	12-#7	#3@14"
E-2	180	326232	197.2	26 X 26	12-#7	#3@14"
E-3	336	612864	248.2	26 X 26	12-#7	#3@14"
E-4	336	634368	228.2	26 X 26	12-#7	#3@14"
E-5	336	634368	268.4	26 X 26	12-#7	#3@14"
E-6	312	569088	197.2	26 X 26	12-#7	#3@14"
E.5-6.8	84	153216	355.2	26 X 26	12-#7	#3@14"
F-6.8	90	164160	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	123120	245.7	26 X 26	12-#7	#3@14"
F-8	405	738720	244.5	26 X 26	12-#7	#3@14"
F-9	405	738720	244.9	26 X 26	12-#7	#3@14"
F-10	240	437760	241.7	26 X 26	12-#7	#3@14"
F-11	285	519840	245.7	26 X 26	12-#7	#3@14"
F.2-12	210	285600	114.2	26 X 26	12-#7	#3@14"
F.5-6.8	90	164160	355.2	26 X 26	12-#7	#3@14"
F.6-12	78	106080	114.2	26 X 26	12-#7	#3@14"
G-7	81	147744	344.4	26 X 26	12-#7	#3@14"
G-8	702	1280448	485.8	26 X 26	12-#11	#4@22"
G-9	702	1280448	485.8	26 X 26	12-#11	#4@22"
G-10	420	766080	485.8	26 X 26	12-#7	#3@14"
G-11	280	510720	344.4	26 X 26	12-#7	#3@14"
G.1-6.8	90	164160	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	205	278800	114.9	26 X 26	12-#7	#3@14"
G.6-6.8	84	153216	355.2	26 X 26	12-#7	#3@14"
H-11	132	179520	220.4	26 X 26	12-#7	#3@14"
H-11.5	84	114240	114.9	26 X 26	12-#7	#3@14"
I-7	204	372096	220.4	26 X 26	12-#7	#3@14"
I-8	336	612864	265	26 X 26	12-#7	#3@14"
I-9	336	612864	246	26 X 26	12-#7	#3@14"
I-10	144	241080	220.4	26 X 26	12-#7	#3@14"

Third Floor Column Schedule

A-6	378	792288	241.7	26 X 26	12-#7	#3@14"
A-6.5	135	282960	355.2	26 X 26	12-#7	#3@14"
B.3-0	130	212160	114.9	26 X 26	12-#7	#3@14"
B-1	255	450960	245.7	26 X 26	12-#7	#3@14"
B-2	280	586880	245.7	26 X 26	12-#7	#3@14"
B-3	405	848880	244.9	26 X 26	12-#7	#3@14"
B-4	405	874800	239.5	26 X 26	12-#7	#3@14"
B-5	405	874800	244.9	26 X 26	12-#7	#3@14"
B.6-6.5	-	400000	355.2	26 X 26	12-#7	#3@14"
B.7-6	168	352128	344	26 X 26	12-#7	#3@14"
B.8-0	78	127296	114.9	26 X 26	12-#7	#3@14"
C.3-6.2	-	400000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	60	97920	114.9	26 X 26	12-#7	#3@14"
C-1	205	369360	344.4	26 X 26	12-#7	#3@14"
C-2	680	1425280	485.8	26 X 26	12-#11	#4@22"
C-3	702	1471392	485.8	26 X 26	12-#11	#4@22"
C-4	702	1516320	485.8	26 X 26	12-#11	#4@22"
C-5	702	1516320	485.8	26 X 26	12-#11	#4@22"
C-6	304	637184	350.6	26 X 26	12-#7	#3@14"
D-0.6	91	148512	114.9	26 X 26	12-#7	#3@14"
D-1	130	212160	220.4	26 X 26	12-#7	#3@14"
E-2	180	375192	197.2	26 X 26	12-#7	#3@14"
E-3	336	704256	248.2	26 X 26	12-#7	#3@14"
E-4	336	725760	228.2	26 X 26	12-#7	#3@14"
E-5	336	725760	268.4	26 X 26	12-#7	#3@14"
E-6	312	653952	197.2	26 X 26	12-#7	#3@14"
E.5-6.8	84	176064	355.2	26 X 26	12-#7	#3@14"
F-6.8	90	188640	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	141480	245.7	26 X 26	12-#7	#3@14"
F-8	405	848880	244.5	26 X 26	12-#7	#3@14"
F-9	405	848880	244.9	26 X 26	12-#7	#3@14"
F-10	240	503040	241.7	26 X 26	12-#7	#3@14"
F-11	285	597360	245.7	26 X 26	12-#7	#3@14"
F.2-12	210	342720	114.2	26 X 26	12-#7	#3@14"
F.5-6.8	90	188640	355.2	26 X 26	12-#7	#3@14"
F.6-12	78	127296	114.2	26 X 26	12-#7	#3@14"
G-7	81	169776	344.4	26 X 26	12-#7	#3@14"
G-8	702	1471392	485.8	26 X 26	12-#11	#4@22"
G-9	702	1471392	485.8	26 X 26	12-#11	#4@22"
G-10	420	880320	485.8	26 X 26	12-#7	#3@14"
G-11	280	586880	344.4	26 X 26	12-#7	#3@14"
G.1-6.8	90	188640	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	205	334560	114.9	26 X 26	12-#7	#3@14"
G.6-6.8	84	176064	355.2	26 X 26	12-#7	#3@14"
H-11	132	215424	220.4	26 X 26	12-#7	#3@14"
H-11.5	84	137088	114.9	26 X 26	12-#7	#3@14"
I-7	204	427584	220.4	26 X 26	12-#7	#3@14"
I-8	336	704256	265	26 X 26	12-#7	#3@14"
I-9	336	704256	246	26 X 26	12-#7	#3@14"
I-10	144	280248	220.4	26 X 26	12-#7	#3@14"

Second Floor Column Schedule

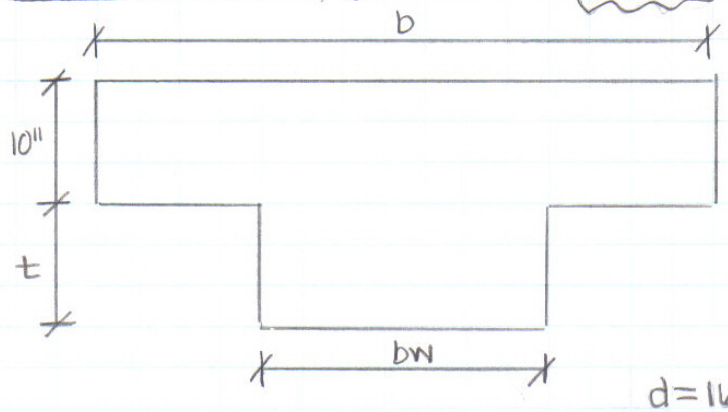
A-G	378	895104	241.7	26X26	12-#7	#3@14"
A-G.5	135	319680	355.2	26X26	12-#7	#3@14"
B.3-0	130	247520	114.9	26X26	12-#7	#3@14"
B-1	255	520320	245.7	26X26	12-#7	#3@14"
B-2	280	663040	245.7	26X26	12-#7	#3@14"
B-3	405	959040	244.9	26X26	12-#7	#3@14"
B-4	405	984960	239.5	26X26	12-#7	#3@14"
B-5	405	984960	244.9	26X26	12-#7	#3@14"
B.6-6.5	-	450000	355.2	26X26	12-#7	#3@14"
B.7-6	168	397824	344	26X26	12-#7	#3@14"
B.8-0	78	148512	114.9	26X26	12-#7	#3@14"
C.3-6.2	-	450000	355.2	26X26	12-#7	#3@14"
C.4-0.3	60	114240	114.9	26X26	12-#7	#3@14"
C-1	205	425120	344.4	26X26	12-#7	#3@14"
C-2	680	1610240	485.8	26X26	16-#11	#4@22"
C-3	702	1662336	485.8	26X26	16-#11	#4@22"
C-4	702	1707264	485.8	26X26	16-#11	#4@22"
C-5	702	1707264	485.8	26X26	16-#11	#4@22"
C-6	304	719872	350.6	26X26	12-#7	#3@14"
D-0.6	91	173264	114.9	26X26	12-#7	#3@14"
D-1	130	247520	220.4	26X26	12-#7	#3@14"
E-2	180	424152	197.2	26X26	12-#7	#3@14"
E-3	336	795648	248.2	26X26	12-#7	#3@14"
E-4	336	817152	228.2	26X26	12-#7	#3@14"
E-5	336	817152	268.4	26X26	12-#7	#3@14"
E-6	312	738816	197.2	26X26	12-#7	#3@14"
E.5-6.8	84	198912	355.2	26X26	12-#7	#3@14"
F-6.8	90	213120	355.8	26X26	12-#7	#3@14"
F-7	67.5	159840	245.7	26X26	12-#7	#3@14"
F-8	405	959040	244.5	26X26	12-#7	#3@14"
F-9	405	959040	244.9	26X26	12-#7	#3@14"
F-10	240	568320	241.7	26X26	12-#7	#3@14"
F-11	285	674880	245.7	26X26	12-#7	#3@14"
F.2-12	210	399840	114.2	26X26	12-#7	#3@14"
F.5-6.8	90	213120	355.2	26X26	12-#7	#3@14"
F.6-12	78	148512	114.2	26X26	12-#7	#3@14"
G-7	81	191808	344.4	26X26	12-#7	#3@14"
G-8	702	1662336	485.8	26X26	16-#11	#4@22"
G-9	702	1662336	485.8	26X26	16-#11	#4@22"
G-10	420	994560	485.8	26X26	12-#7	#3@14"
G-11	280	663040	344.4	26X26	12-#7	#3@14"
G.1-6.8	90	213120	355.2	26X26	12-#7	#3@14"
G.3-11.7	205	390320	114.9	26X26	12-#7	#3@14"
G.6-6.8	84	198912	355.2	26X26	12-#7	#3@14"
H-11	132	251328	220.4	26X26	12-#7	#3@14"
H-11.5	84	159936	114.9	26X26	12-#7	#3@14"
I-7	204	483072	220.4	26X26	12-#7	#3@14"
I-8	336	795648	265	26X26	12-#7	#3@14"
I-9	336	795648	246	26X26	12-#7	#3@14"
I-10	144	319416	220.4	26X26	12-#7	#3@14"

First Floor Column Schedule

A-6	378	997920	241.7	26 X 26	12-#7	#3@14"
A-6.5	135	356400	355.2	26 X 26	12-#7	#3@14"
B.3-0	130	282880	114.9	26 X 26	12-#7	#3@14"
B-1	255	589680	245.7	26 X 26	12-#7	#3@14"
B-2	280	739200	245.7	26 X 26	12-#7	#3@14"
B-3	405	1069200	244.9	26 X 26	12-#7	#3@14"
B-4	405	1095120	239.5	26 X 26	12-#7	#3@14"
B-5	405	1095120	244.9	26 X 26	12-#7	#3@14"
B.6-6.5	-	500000	355.2	26 X 26	12-#7	#3@14"
B.7-6	168	443520	344	26 X 26	12-#7	#3@14"
B.8-0	78	169728	114.9	26 X 26	12-#7	#3@14"
C.3-6.2	-	500000	355.2	26 X 26	12-#7	#3@14"
C.4-0.3	60	130560	114.9	26 X 26	12-#7	#3@14"
C-1	205	480880	344.4	26 X 26	12-#7	#3@14"
C-2	680	1795200	485.8	26 X 26	16-#11	#4@22"
C-3	702	1853280	485.8	26 X 26	16-#11	#4@22"
C-4	702	1898208	485.8	26 X 26	16-#11	#4@22"
C-5	702	1898208	485.8	26 X 26	16-#11	#4@22"
C-6	304	802560	350.6	26 X 26	12-#7	#3@14"
D-0.6	91	198016	114.9	26 X 26	12-#7	#3@14"
D-1	130	282880	220.4	26 X 26	12-#7	#3@14"
E-2	180	473112	197.2	26 X 26	12-#7	#3@14"
E-3	336	887040	248.2	26 X 26	12-#7	#3@14"
E-4	336	908544	228.2	26 X 26	12-#7	#3@14"
E-5	336	908544	268.4	26 X 26	12-#7	#3@14"
E-6	312	823680	197.2	26 X 26	12-#7	#3@14"
E.5-6.8	84	221760	355.2	26 X 26	12-#7	#3@14"
F-6.8	90	237600	355.8	26 X 26	12-#7	#3@14"
F-7	67.5	178200	245.7	26 X 26	12-#7	#3@14"
F-8	405	1069200	244.5	26 X 26	12-#7	#3@14"
F-9	405	1069200	244.9	26 X 26	12-#7	#3@14"
F-10	240	633600	241.7	26 X 26	12-#7	#3@14"
F-11	285	752400	245.7	26 X 26	12-#7	#3@14"
F.2-12	210	456960	114.2	26 X 26	12-#7	#3@14"
F.5-6.8	90	237600	355.2	26 X 26	12-#7	#3@14"
F.6-12	78	169728	114.2	26 X 26	12-#7	#3@14"
G-7	81	213840	344.4	26 X 26	12-#7	#3@14"
G-8	702	1853280	485.8	26 X 26	16-#11	#4@22"
G-9	702	1853280	485.8	26 X 26	16-#11	#4@22"
G-10	420	1108800	485.8	26 X 26	12-#7	#3@14"
G-11	280	739200	344.4	26 X 26	12-#7	#3@14"
G.1-6.8	90	237600	355.2	26 X 26	12-#7	#3@14"
G.3-11.7	205	446080	114.9	26 X 26	12-#7	#3@14"
G.6-6.8	84	221760	355.2	26 X 26	12-#7	#3@14"
H-11	132	287232	220.4	26 X 26	12-#7	#3@14"
H-11.5	84	182784	114.9	26 X 26	12-#7	#3@14"
I-7	204	538560	220.4	26 X 26	12-#7	#3@14"
I-8	336	887040	265	26 X 26	12-#7	#3@14"
I-9	336	887040	246	26 X 26	12-#7	#3@14"
I-10	144	358584	220.4	26 X 26	12-#7	#3@14"

Beam Design

Beam #1 (Floors 1→9) — Flexure



Try: $t = 6"$

$b_w = 24"$

$w_u = [1.2(25psf) + 1.6(80psf) + 1.2(150pcf)(10"/12)](90"/12) = 2985plf$

$M_u = wL^2/8 = 2985^{lb}/_{ft}(30ft)^2/8 = 335.8^{lk} = 4029.8^{lk}$

$d = 16" - 1.5" = 14.5"$

$$b = \begin{bmatrix} 8h_{f\,left} \\ 1/2\,L_{n\,left} \\ \min \end{bmatrix} + b_w + \begin{bmatrix} 8h_{f\,right} \\ 1/2\,L_{n\,right} \\ \min \end{bmatrix} = \begin{bmatrix} 8(10") = 80" \\ 1/2(20ft)(12in/ft) = 120" \\ \min \end{bmatrix} + 24" + \begin{bmatrix} 80" \\ 120" \\ \min \end{bmatrix}$$

$= 184" \leq L/4 = 1/4(30ft)(12^{in}/_{ft}) = 90"$

Assume $a \leq h_f$

$M_n = M_u/\phi = 4029.8^{lk}/0.9 = 4478^{lk}$ Assume $(d - a/2) = 0.9d = 13.05"$

$A_s = \frac{M_n}{f_y(0.9d)} = \frac{4478^{lk}}{60ksi(13.05")} = 5.72in^2$

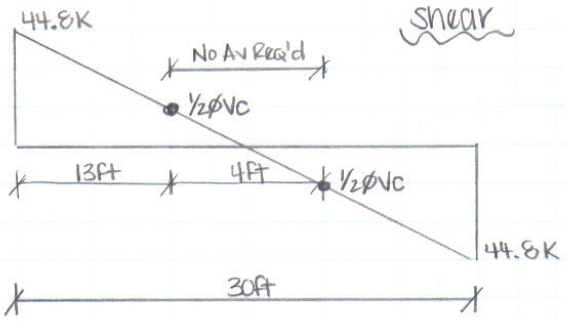
Try 2 rows of 4#8 ($A_s = 6.32in^2$) → $d = 16" - 3.5" = 12.5"$

$a = \frac{A_s f_y}{0.85 f_c' b} = \frac{6.32in^2(60ksi)}{0.85(4ksi)\,90"} = 1.24" < 10"$

$A_{s\min} = \frac{3\sqrt{f_c'}\,b_w d}{f_y} = \frac{3\sqrt{4000}(24")12.5"}{60000ksi} = 0.95in^2$ OK

$= \frac{200\,b_w d}{f_y} = \frac{200(24")12.5"}{60000ksi} = 1in^2$ OK

$\phi M_n = \phi A_s f_y (d - a/2) = 0.9(6.32in^2)(60ksi)(12.5" - 1.24"/2) = 4054.4^{lk}$ OK



Shear

$V_c = 2\sqrt{f'_c}\, b_w d$
$= 2\sqrt{4000}(24")12.5" = 37.95K$
$\frac{1}{2}\phi V_c = \frac{1}{2}(0.75)37.95K$
$= 14.23K$
slope = 2.99

$V_{u\,at\,d} = 44.8K - 3(12.5"/12) = 41.68K = V_{u\,max}$

$V_s = \frac{V_u - \phi V_c}{\phi} = \frac{41.68K - 0.75(37.95K)}{0.75} = 17.62K$

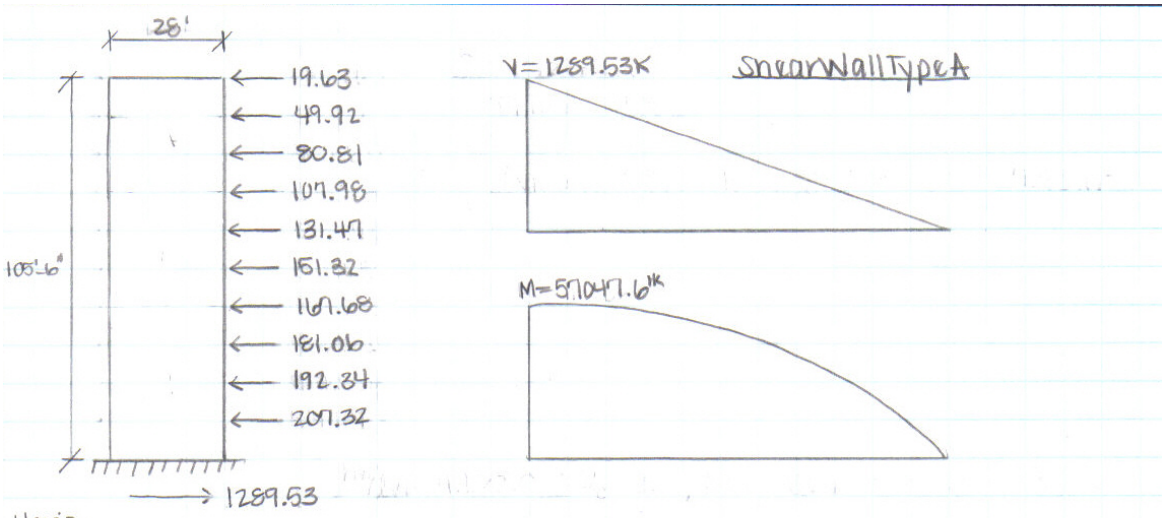
$s = \frac{A_v f_y d}{V_s} = \frac{0.22in^2(60Ksi)12.5"}{17.62K} = 9.36" \rightarrow 9"$

$\phi V_n = \phi V_c + \phi V_s = 0.75\left(37.95K + \frac{0.22in^2(60Ksi)12.5"}{9"}\right) = 42.21K$

$l_{v_i} = \frac{(44.8K - 42.21K)12}{3} = 10.36"$

1 at 2"
18 at 9"

Shear Wall Type A



Horiz

$$Vc = 2\sqrt{f'c}\,hd = 2\sqrt{4000psi}(10")(0.8)(28')12 = 340K$$

$$Vu \leq \phi Vn = \phi(Vc+Vs) \rightarrow Vu/\phi = {}^{1289.5K}/_{0.75} \leq 340K + Vs \rightarrow Vs \geq 1379.3K$$

$$Av = \frac{Vs(s_2)}{fy\,d} = \frac{1379.3K(12")}{60Ksi(0.8)28(12)} = 1.03in^2$$

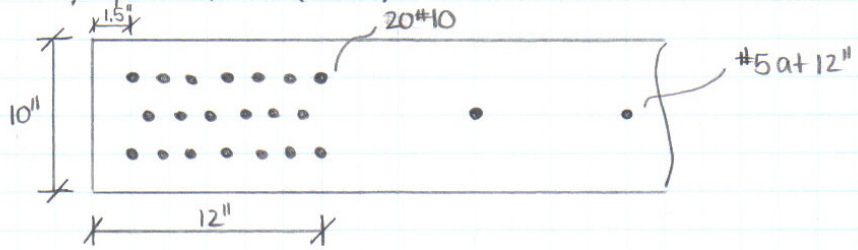
use #10 at 12"

Vert

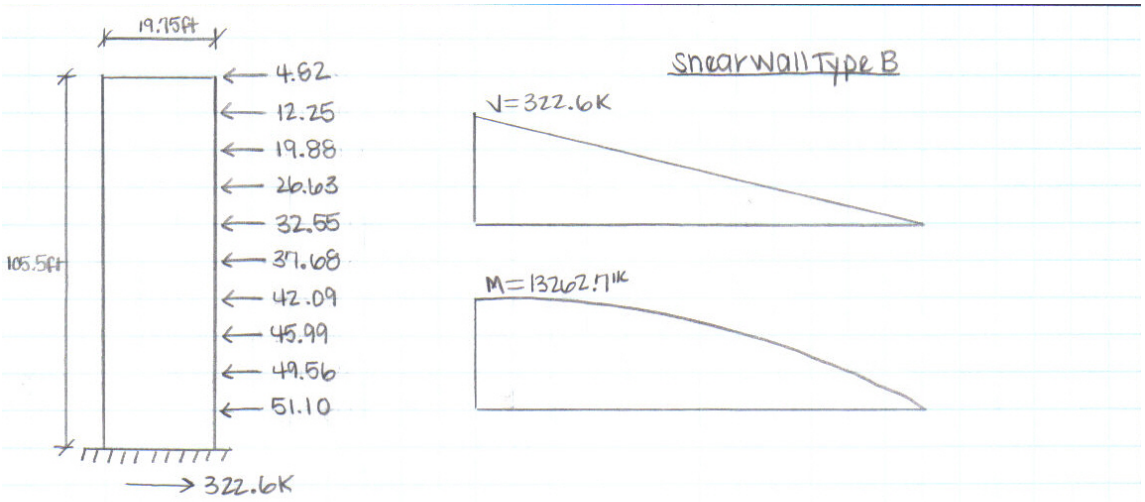
$$Mn = Mu/\phi = {}^{57049.1K}/_{0.9} = 63386.1K = Asfy(d-a/2)$$

Assume $(d-a/2) = 0.9d = 0.9(28ft)(12) = 302.4"$

$$As = \frac{Mn}{\phi fy(d-a/2)} = \frac{633867K(12)}{0.9(60Ksi)302.4"} = 46.61in^2$$



Shear Wall Type B



Horiz

$V_c = 2\sqrt{f'_c}\,b\,d = 2\sqrt{4000psi}\,(10")(0.8)(19.57')12 = 239.8K$

$V_u \le \phi V_n = \phi(V_c + V_s) \rightarrow V_u/\phi = 322.6K/0.75 \le 240K + V_s \rightarrow V_s = 191K$

$A_v = \frac{V_s(s_2)}{f_y d} = \frac{191K\,(12")}{60ksi\,(0.8)(19.75)12} = 0.20\,in^2$

$A_{vmin} = 0.0025(12")(10") = 0.30in^2$

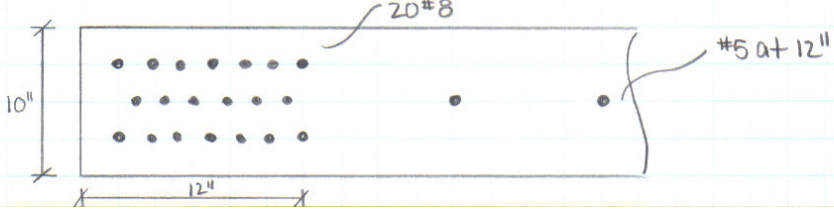
use #5 at 12"

Vert

$M_n = M_u/\phi = 13262.71IK/0.9 = 14736.3IK = A_s f_y (d - 9/2)$

Assume $(d - 9/2) = 0.9d = 0.9(19.25')12 = 207.9"$

$A_s = \frac{M_n}{\phi f_y (d - 9/2)} = \frac{14736.3IK(12)}{0.9(60ksi)207.9"} = 15.8in^2$



Thermal Gradient Calculations

U-Values	Source	
Maximum Allowable U-Value	ASHRAE std. 90.1-2004	0.064
Wall Construction U-Value	Carrier's Hourly Analysis	0.059

Temperatures (F)	
Winter Outdoor Temp	7
Summer Outdoor Temp	86
Winter Indoor Temp	70
Summer Indoor Temp	75

Q-Value	(Outdoor-Indoor)/R_{Total}
Q-Winter (Man. Wall)	3.555
Q-Summer (Man. Wall)	0.621

Dew Point Tempeatures (F)	Based on:	
Winter	75F, 50%RH	55
Summer	70F, 50%RH	51

Material	Thickness (in)	R-Value
Outside Air SR	0.00	0.33
4" Brick Veneer	4.00	0.43
Air Space	1.00	0.91
Board Insulation	2.00	13.89
Vapor Barrior	0.01	0.00
Air Spacae	3.50	0.91
GWB	0.63	0.56
Inside Air	0.00	0.69
Totals	**11.14**	**17.72**

ΔT	
Winter	Summer
1.184	0.207
1.539	0.269
3.235	0.565
49.381	8.622
0.000	0.000
3.235	0.565
1.991	0.348
2.435	0.425

Temp (F)	
Winter	Summer
7	86
8.18	85.79
9.72	85.52
12.96	84.96
62.34	76.34
62.34	76.34
65.57	75.77
67.56	75.43
70.00	75.00

Upper Campus Housing Project
Nicole Hazy
Structural
Advisor: Dr Hanagan

ASHRAE std. 90.1-2004

TABLE 5.5-5
Building Envelope Requirements For Climate Zone 5 (A,B,C)

	Nonresidential		Residential		Semiheated	
	Assembly	**Insulation Min.**	**Assembly**	**Insulation Min.**	**Assembly**	**Insulation Min.**
Opaque Elements	**Maximum**	**R-Value**	**Maximum**	**R-Value**	**Maximum**	**R-Value**
Roofs						
Insulation Entirely above Deck	U-0.063	R-15.0 ci	U-0.063	R-15.0 ci	U-0.173	R-5.0 ci
Metal Building	U-0.065	R-19.0	U-0.065	R-19.0	U-0.097	R-10.0
Attic and Other	U-0.034	R-30.0	U-0.027	R-38.0	U-0.053	R-19.0
Walls, Above Grade						
Mass	U-0.123	R-7.6 ci	U-0.090	R-11.4 ci	U-0.580	NR
Metal Building	U-0.113	R-13.0	U-0.057	R-13.0 + R-13.0	U-0.123	R-11.0
Steel Framed	U-0.084	R-13.0 + R-3.8 ci	U-0.064	R-13.0 + R-7.5 ci	U-0.124	R-13.0
Wood Framed and Other	U-0.089	R-13.0	U-0.089	R-13.0	U-0.089	R-13.0
Wall, Below Grade						
Below Grade Wall	C-1.140	NR	C-1.140	NR	C-1.140	NR
Floors						
Mass	U-0.087	R-8.3 ci	U-0.074	R-10.4 ci	U-0.322	NR
Steel Joist	U-0.052	R-19.0	U-0.038	R-30.0	U-0.069	R-13.0
Wood Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.066	R-13.0
Slab-On-Grade Floors						
Unheated	F-0.730	NR	F-0.730	NR	F-0.730	NR
Heated	F-0.840	R-10 for 36 in.	F-0.840	R-10 for 36 in.	F-1.020	R-7.5 for 12 in.
Opaque Doors						
Swinging	U-0.700		U-0.700		U-0.700	
Non-Swinging	U-1.450		U-0.500		U-1.450	
	Assembly	**Assembly Max.**	**Assembly**	**Assembly Max.**	**Assembly**	**Assembly Max.**
	Max. U	**SHGC (All**	**Max. U**	**SHGC (All**	**Max. U**	**SHGC (All**
	(Fixed/	**Orientations/**	**(Fixed/**	**Orientations/**	**(Fixed/**	**Orientations/**
Fenestration	**Operable)**	**North-Oriented)**	**Operable)**	**North-Oriented)**	**Operable)**	**North-Oriented)**
Vertical Glazing,% of Wall						
0-10.0%	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.49}$	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.49}$	$U_{fixed}^{-1.22}$	$SHGC_{all}^{-NR}$
	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.27}$	$SHGC_{north}^{NR}$
10.1-20.0%	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-1.22}$	$SHGC_{all}^{-NR}$
	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.27}$	$SHGC_{north}^{NR}$
20.1-30.0%	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-1.22}$	$SHGC_{all}^{-NR}$
	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.27}$	$SHGC_{north}^{NR}$
30.1-40.0%	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-0.57}$	$SHGC_{all}^{-0.39}$	$U_{fixed}^{-1.22}$	$SHGC_{all}^{-NR}$
	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-0.67}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.27}$	$SHGC_{north}^{NR}$
40.1-50.0%	$U_{fixed}^{-0.46}$	$SHGC_{all}^{-0.26}$	$U_{fixed}^{-0.46}$	$SHGC_{all}^{-0.26}$	$U_{fixed}^{-0.98}$	$SHGC_{all}^{-NR}$
	$U_{oper}^{-0.47}$	$SHGC_{north}^{-0.36}$	$U_{oper}^{-0.47}$	$SHGC_{north}^{-0.49}$	$U_{oper}^{-1.02}$	$SHGC_{north}^{NR}$
Skylight with Curb, Glass,% of Roof						
0-2.0%	$U_{all}^{-1.17}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-1.17}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-1.98}$	$SHGC_{all}^{-NR}$
2.1-5.0%	$U_{all}^{-1.17}$	$SHGC_{all}^{-0.39}$	$U_{all}^{-1.17}$	$SHGC_{all}^{-0.39}$	$U_{all}^{-1.98}$	$SHGC_{all}^{-NR}$
Skylight with Curb, Plastic,% of Roof						
0-2.0%	$U_{all}^{-1.10}$	$SHGC_{all}^{-0.77}$	$U_{all}^{-1.10}$	$SHGC_{all}^{-0.77}$	$U_{all}^{-1.90}$	$SHGC_{all}^{-NR}$
2.1-5.0%	$U_{all}^{-1.10}$	$SHGC_{all}^{-0.62}$	$U_{all}^{-1.10}$	$SHGC_{all}^{-0.62}$	$U_{all}^{-1.90}$	$SHGC_{all}^{-NR}$
Skylight without Curb, All,% of Roof						
0-2.0%	$U_{all}^{-0.69}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-0.69}$	$SHGC_{all}^{-0.49}$	$U_{all}^{-1.36}$	$SHGC_{all}^{-NR}$
2.1-5.0%	$U_{all}^{-0.69}$	$SHGC_{all}^{-0.39}$	$U_{all}^{-0.69}$	$SHGC_{all}^{-0.39}$	$U_{all}^{-1.36}$	$SHGC_{all}^{-NR}$

Summer Gradient