Appendix I

Center of Mass x= 89.308 f'm= 3000 psi
y= 128.136 E= 2700 ksi

Wall	b (in.)	d (ft.)	h(ft.)	I (in^4)	Aw(in^2)	kx (k/in.)	ky (k/in.)	x (ft.)	y (ft.)	kx*x	ky*y
N-Frame	-	-	-	-	-	111.00	0.00	0.00	0.00	0	0
S-Frame	-	-	-	-	-	36.00	0.00	210.00	0.00	7560	0
NS-1	16.00	21.75	37.50	23706108.00	4176.00	0.00	1707.90	0.00	44.50	0	76001.77
NS-2	16.00	21.75	37.50	23706108.00	4176.00	0.00	1707.90	0.00	54.08	0	92369.19
NS-3	16.00	21.75	37.50	23706108.00	4176.00	0.00	1707.90	0.00	68.83	0	117560.8
NS-4	16.00	28.46	37.50	53101997.83	5464.00	0.00	3370.93	0.00	177.00	0	596654.9
NS-5	20.00	23.82	50.00	38938326.51	5717.50	0.00	1261.20	0.00	210.29	0	265220.4
NS-6	20.00	23.82	50.00	38938326.51	5717.50	0.00	1261.20	0.00	219.88	0	277306.9
WE-1	16.00	27.00	37.50	45349632.00	5184.00	2963.40	0.00	48.75	0.00	144465.8	0
WE-2	20.00	9.58	50.00	2534791.67	2300.00	92.69	0.00	72.57	0.00	6726.654	0
WE-3	16.00	26.08	37.50	40885729.33	5008.00	2719.79	0.00	77.21	0.00	209990.3	0
WE-4	16.00	26.00	37.50	40495104.00	4992.00	2698.13	0.00	114.21	0.00	308149.4	0
WE-5	16.00	9.58	37.50	2027833.33	1840.00	172.43	0.00	109.63	0.00	18902.15	0
						8793.44	11017.05			695794.2	1425114

e_x= -10.1815
e_y= 1.219297

All Walls

Center of Mass x= 89.308 P_x= 267.05 f'm= 3000 psi
y= 128.136 P_y= 191.99 E= 2700 ksi

Wall	b (in.)	d (ft.)	h(ft.)	I (in^4)	Aw(in^2)	ky (k/in.)	kx (k/in.)	x (ft.)	y (ft.)	ky*x	kx*y
N-Frame	-	-	-	-	-	111.00	0.00	0.00	0.00	0	0
S-Frame	-	-	-	-	-	36.00	0.00	210.00	0.00	7560	0
						147.00	0.00			7560	0

e_x= -37.8794 T_x= -7272.47
e_y= #DIV/0! T_y= #DIV/0!

Frames Only

Center of Mass x= 89.308 P_x= 267.05 f'm= 3000 psi
y= 128.136 P_y= 191.99 E= 2700 ksi

Wall	b (in.)	d (ft.)	h(ft.)	I (in^4)	Aw(in^2)	ky (k/in.)	kx (k/in.)	x (ft.)	y (ft.)	ky*x	kx*y
N-Frame	-	-	-	-	-	111.00	0.00	0.00	0.00	0	0
S-Frame	-	-	-	-	-	36.00	0.00	210.00	0.00	7560	0
NS-1	16.00	21.75	37.50	2.37E+07	4176.00	0.00	1707.90	0.00	44.50	0	76001.77
NS-2	16.00	21.75	37.50	2.37E+07	4176.00	0.00	1707.90	0.00	54.08	0	92369.19
NS-5	20.00	23.82	50.00	3.89E+07	5717.50	0.00	1261.20	0.00	210.29	0	265220.4
NS-6	20.00	23.82	50.00	3.89E+07	5717.50	0.00	1261.20	0.00	219.88	0	277306.9
WE-2	20.00	9.58	50.00	2.53E+06	2300.00	92.69	0.00	72.57	0.00	6726.654	0
WE-5	16.00	9.58	37.50	2.03E+06	1840.00	172.43	0.00	109.63	0.00	18902.15	0
						412.11	5938.21			33188.8	710898.3

e_x= -8.77489 T_x= -1684.69
e_y= -8.42018 T_y= -2248.61

Stairwell

Center of Mass x= 89.308 P_x= 267.05 f'm= 3000 psi
y= 128.136 P_y= 191.99 E= 2700 ksi

Wall	b (in.)	d (ft.)	h(ft.)	I (in^4)	Aw(in^2)	ky (k/in.)	kx (k/in.)	x (ft.)	y (ft.)	ky*x	kx*y
N-Frame	-	-	-	-	-	111.00	0.00	0.00	0.00	0	0
S-Frame	-	-	-	-	-	36.00	0.00	210.00	0.00	7560	0
NS-3	16.00	21.75	37.50	2.37E+07	4176.00	0.00	1707.90	0.00	68.83	0	117560.8
NS-4	16.00	28.46	37.50	5.31E+07	5464.00	0.00	3370.93	0.00	177.00	0	596654.9
WE-1	16.00	27.00	37.50	4.53E+07	5184.00	2963.40	0.00	48.75	0.00	144465.8	0
WE-4	16.00	26.00	37.50	4.05E+07	4992.00	2698.13	0.00	114.21	0.00	308149.4	0
						5808.53	5078.84			460175.2	714215.7

e_x= -10.084 T_x= -1936.03
e_y= 12.48985 T_y= 3335.414

Bath-Mech

Center of Mass	x=	89.308	P_x=	267.05	f'm=	3000 psi
	y=	128.136	P_y=	191.99	E=	2700 ksi

Wall	b (in.)	d (ft.)	h(ft.)	I (in^4)	Aw(in^2)	ky (k/in.)	kx (k/in.)	x (ft.)	y (ft.)	ky*x	kx*y
N-Frame	-	-	-	-	-	111.00	0.00	0.00	0.00	0	0
S-Frame	-	-	-	-	-	36.00	0.00	210.00	0.00	7560	0
NS-2	16.00	21.75	37.50	23706108.00	4176.00	0.00	1707.90	0.00	54.08	0	92369.19
NS-3	16.00	21.75	37.50	23706108.00	4176.00	0.00	1707.90	0.00	68.83	0	117560.8
NS-4	16.00	28.46	37.50	53101997.83	5464.00	0.00	3370.93	0.00	177.00	0	596654.9
NS-5	20.00	23.82	50.00	38938326.51	5717.50	0.00	1261.20	0.00	210.29	0	265220.4
WE-1	16.00	27.00	37.50	45349632.00	5184.00	2963.40	0.00	48.75	0.00	144465.8	0
WE-4	16.00	26.00	37.50	40495104.00	4992.00	2698.13	0.00	114.21	0.00	308149.4	0
WE-5	16.00	9.58	37.50	2027833.33	1840.00	172.43	0.00	109.63	0.00	18902.15	0
						5980.96	8047.94			479077.3	1071805

e_x=	-9.2076	T_x=	-1767.77
e_y=	5.041526	T_y=	1346.34

Stair-Bath

Center of Mass	x=	89.308	P_x=	267.05	f'm=	3000 psi
	y=	128.136	P_y=	191.99	E=	2700 ksi

Wall	b (in.)	d (ft.)	h(ft.)	I (in^4)	Aw(in^2)	ky (k/in.)	kx (k/in.)	x (ft.)	y (ft.)	ky*x	kx*y
N-Frame	-	-	-	-	-	111.00	0.00	0.00	0.00	0	0
S-Frame	-	-	-	-	-	36.00	0.00	210.00	0.00	7560	0
NS-2	16.00	21.75	37.50	2.37E+07	4176.00	0.00	1707.90	0.00	54.08	0	92369.19
NS-3	16.00	21.75	37.50	2.37E+07	4176.00	0.00	1707.90	0.00	68.83	0	117560.8
NS-4	16.00	28.46	37.50	5.31E+07	5464.00	0.00	3370.93	0.00	177.00	0	596654.9
NS-5	20.00	23.82	50.00	3.89E+07	5717.50	0.00	1261.20	0.00	210.29	0	265220.4
WE-3	16.00	26.08	37.50	4.09E+07	5008.00	2719.79	0.00	77.21	0.00	209990.3	0
WE-4	16.00	26.00	37.50	4.05E+07	4992.00	2698.13	0.00	114.21	0.00	308149.4	0
						5564.92	8047.94			525699.6	1071805

e_x=	5.158677	T_x=	990.4144
e_y=	5.041526	T_y=	1346.34

Wall	ky	kx	k	x	y	d	k*d	k*d^2	P_x	P_y	P_Tx	P_Ty	V_Px	V_Py
N-Frame	111.00	0.00	111.00	-89.31	-128.14	-89.31	-9.91E+03	8.85E+05	0.00	3.83	0.28	-0.38	0.28	3.45
S-Frame	36.00	0.00	36.00	120.69	-128.14	120.69	4.34E+03	5.24E+05	0.00	1.24	-0.12	0.17	0.12	1.41
NS-2	0.00	1707.90	1707.90	-89.31	-74.05	-74.05	-1.26E+05	9.37E+06	56.67	0.00	3.54	-4.81	60.21	4.81
NS-3	0.00	1707.90	1707.90	-89.31	-59.30	-59.30	-1.01E+05	6.01E+06	56.67	0.00	2.83	-3.85	59.50	3.85
NS-4	0.00	3370.93	3370.93	-89.31	48.86	48.86	1.65E+05	8.05E+06	111.86	0.00	-4.61	6.26	107.25	6.26
NS-5	0.00	1261.20	1261.20	-89.31	82.16	82.16	1.04E+05	8.51E+06	41.85	0.00	-2.90	3.94	38.95	3.94
WE-3	2719.79	0.00	2719.79	-12.10	-128.14	-12.10	-3.29E+04	3.98E+05	0.00	93.83	0.92	-1.25	0.92	92.58
WE-4	2698.13	0.00	2698.13	24.90	-128.14	24.90	6.72E+04	1.67E+06	0.00	93.09	-1.88	2.55	1.88	95.64
	5564.92	8047.94	13612.87					3.54E+07						

Wall	V_ult	A_n (in^2)	D (ft.)
N-Frame	3.45	47.95	-
S-Frame 2	1.41	19.54	-
NS-2	60.21	836.24	4.36
NS-3	59.50	826.46	4.30
NS-4	107.25	1489.57	7.76
NS-5	38.95	541.00	2.25
WE-3	92.58	1285.86	6.70
WE-4	95.64	1328.33	6.92

South-West

Center of Mass	x=	89.308	P_x=	267.05	f'm=	3000	psi				
	y=	128.136	P_y=	191.99	E=	2700	ksi				

Wall	b (in.)	d (ft.)	h(ft.)	I (in^4)	Aw(in^2)	ky (k/in.)	kx (k/in.)	x (ft.)	y (ft.)	ky*x	kx*y
N-Frame	-	-	-	-	-	200.00	0.00	0.00	0.00	0	0
S-Frame	-	-	-	-	-	39.00	0.00	210.00	0.00	8190	0
NS-2	16.00	14.00	37.50	6.32E+06	2688.00	0.00	512.34	0.00	54.08	0	27709.16
NS-3	16.00	10.00	37.50	2.30E+06	1920.00	0.00	195.16	0.00	68.83	0	13433.17
NS-4	16.00	16.00	37.50	9.44E+06	3072.00	0.00	744.65	0.00	177.00	0	131802.6
NS-5	20.00	14.00	50.00	7.90E+06	3360.00	0.00	281.04	0.00	210.29	0	59100.11
WE-3	16.00	20.00	37.50	1.84E+07	3840.00	1367.97	0.00	77.21	0.00	105618.5	0
WE-4	16.00	16.00	37.50	9.44E+06	3072.00	744.65	0.00	114.21	0.00	85044.93	0
						2351.62	1733.18			198853.5	232045

e_x=	-4.74763	T_x=	-911.498	
e_y=	5.747737	T_y=	1534.933	

Wall	ky	kx	k	x	y	d	k*d	k*d^2	P_x	P_y	P_Tx	P_Ty	V_Px	V_Py
N-Frame	200.00	0.00	200.00	-89.31	-128.14	-89.31	-1.79E+04	1.60E+06	0.00	16.33	-1.63	-2.74	1.63	13.59
S-Frame	39.00	0.00	39.00	120.69	-128.14	120.69	4.71E+03	5.68E+05	0.00	3.18	0.43	0.72	0.43	3.91
NS-2	0.00	512.34	512.34	-89.31	-74.05	-74.05	-3.79E+04	2.81E+06	78.94	0.00	-3.46	-5.83	75.48	5.83
NS-3	0.00	195.16	195.16	-89.31	-59.30	-59.30	-1.16E+04	6.86E+05	30.07	0.00	-1.06	-1.78	29.01	1.78
NS-4	0.00	744.65	744.65	-89.31	48.86	48.86	3.64E+04	1.78E+06	114.74	0.00	3.32	5.59	118.05	5.59
NS-5	0.00	281.04	281.04	-89.31	82.16	82.16	2.31E+04	1.90E+06	43.30	0.00	2.11	3.55	45.41	3.55
WE-3	1367.97	0.00	1367.97	-12.10	-128.14	-12.10	-1.66E+04	2.00E+05	0.00	111.68	-1.51	-2.54	1.51	109.14
WE-4	744.65	0.00	744.65	24.90	-128.14	24.90	1.85E+04	4.62E+05	0.00	60.79	1.69	2.85	1.69	63.64
	2351.62	1733.18	4084.80					1.00E+07						

Wall	V_ult	A_n (in^2)	D (ft.)	M (ft k)	f (psi)	V_n
N-Frame	13.59	188.69	-	-	-	-
S-Frame	3.91	54.26	-	-	-	-
NS-2	75.48	1048.37	5.46	1887.06	54	174.56
NS-3	29.01	402.98	2.10	725.36	31	67.10
NS-4	118.05	1639.63	8.54	2951.34	230	273.01
NS-5	45.41	630.67	2.63	1513.60	123	105.01
WE-3	109.14	1515.86	7.90	2728.54	231	252.40
WE-4	63.64	883.91	4.60	1591.04	139	147.18
Refined						

Appendix II

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03-28-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page   1
 6:44:15 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  )


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 Computer program for ANALYSIS AND DESIGN OF SLAB SYSTEMS

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03-28-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page   2
 6:44:15 PM Licensed to: ae, university park, PA

FILE NAME            E:\THESIS\SLAB\EQFR1.ADS

PROJECT ID.          Medical Office Building
                     ----------------------------------
SPAN ID.             East Exterior
                     ------------------

ENGINEER             Brendon Burley

DATE                 03/21/05
TIME                 10:06:38

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

SLAB SYSTEM          FLAT PLATE
FRAME LOCATION       EXTERIOR

DESIGN METHOD        STRENGTH DESIGN
MOMENTS AND SHEARS   NOT PROPORTIONED

NUMBER OF SPANS  4

CONCRETE FACTORS      SLABS         BEAMS        COLUMNS
  DENSITY(pcf  )      145.0         145.0         145.0
  TYPE             NORMAL WGT    NORMAL WGT    NORMAL WGT
  f'c    (ksi)          5.0           5.0           5.0
  fct    (psi)        473.8         473.8         473.8
  fr     (psi)        530.3         530.3         530.3


REINFORCEMENT DETAILS: NON-PRESTRESSED
  YIELD STRENGTH Fy  =  60.00 ksi
  DISTANCE TO RF CENTER FROM TENSION FACE:
       AT SLAB TOP    =   1.25 in  OUTER LAYER
       AT SLAB BOTTOM =   1.25 in  OUTER LAYER
  MINIMUM FLEXURAL BAR SIZE:
       AT SLAB TOP    =  # 4
       AT SLAB BOTTOM =  # 4
  MINIMUM SPACING:
       IN SLAB =   4.00 in

**SLAB THICKNESS IN SPAN  2 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH = 10.5 in

**SLAB THICKNESS IN SPAN  3 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH = 10.5 in

**TOTAL UNFACTORED DEAD LOAD =         141.139 kips
                  LIVE LOAD =         106.500 kips
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03-28-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 3
6:44:15 PM Licensed to: ae, university park, PA

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	-1.5	.175	4	1.000	1
		BOT	.0	.000	0	.000	0
	RGHT	TOP	130.9	1.000	3	2.800	2
		BOT	.0	.000	0	.000	0
2	TOTL LEFT	TOP	-311.0	1.000	1	8.400	2
		BOT	.0	.000	0	.000	0
	RGHT	TOP	293.6	1.000	1	9.800	3
		BOT	.0	.000	0	.000	0
3	TOTL LEFT	TOP	-333.2	1.000	1	7.000	4
		BOT	.0	.000	0	.000	0
	RGHT	TOP	406.2	1.000	4	14.000	1
		BOT	.0	.000	0	.000	0

DESIGN MOMENT ENVELOPES AT CRITICAL SECTIONS ALONG SPANS

SPAN NUM	LOAD TYPE	CRITICAL SECTION (ft)		DESIGN MOMENT (ft-k)	LOAD PTRN	MAX. I.P. DIST LEFT (ft)	LOAD PTRN	MAX. I.P. DIST RGHT (ft)	LOAD PTRN
2	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	227.4	3	10.500	1	9.100	3
3	TOTL	14.700	TOP	-.8	3	.000	0	.000	0
			BOT	176.4	2	9.100	2	7.700	2

COLUMN STRIP MOMENT DISTRIBUTION FACTORS AT SUPPORTS

COLM NUM	CROSS SECTN	L2/L1	ALPHA1	ALPHA1 *L2/L1	BETA(T)	STRIP FACT	BEAM FACT
1	LEFT	.54	.000	.000	.204	.980	.000
	RGHT	.54	.000	.000	.204	.980	.000
2	LEFT	.54	.000	.000	.000	.750	.000
	RGHT	.54	.000	.000	.000	.750	.000
3	LEFT	.54	.000	.000	.204	.980	.000
	RGHT	.54	.000	.000	.204	.980	.000

COLUMN STRIP MOMENT DISTRIBUTION FACTORS IN SPANS

SPAN NUM	L2/L1	ALPHA1	ALPHA1 *L2/L1	STRIP FACT	BEAM FACT
2	.54	.000	.000	.600	.000
3	.54	.000	.000	.600	.000

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	-1.5	.0 (0)	-1.5 (97)	.0 (0)	.0 (2)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	130.9	.0 (0)	128.2 (97)	.0 (0)	2.7 (2)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
2	LEFT TOP	-311.0	.0 (0)	-233.3 (75)	.0 (0)	-77.8 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	293.6	.0 (0)	220.2 (75)	.0 (0)	73.4 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
3	LEFT TOP	-333.2	.0 (0)	-326.4 (97)	.0 (0)	-6.8 (2)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	406.2	.0 (0)	397.9 (97)	.0 (0)	8.3 (2)
	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	13.30 TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	227.4	.0 (0)	136.5 (60)	.0 (0)	91.0 (39)
3	14.70 TOP	-.8	.0 (0)	-.5 (60)	.0 (0)	-.3 (40)
	BOT	176.4	.0 (0)	105.8 (60)	.0 (0)	70.6 (40)

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

NOTE--Allowable shear stress in slabs = 282.84 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)
1C	282.84	1	65.6	178.72	3	64.5	142.2	56.9	330.69*
2E	282.84	1	143.5	249.01	4	137.2	-43.9	-18.3	269.27
3E	282.84	1	137.9	239.19	3	103.2	186.0	77.3	311.47*

* - Shear stress exceeded.

* Program completed as requested *

```
03-28-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page   1
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                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  )


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 Computer program for ANALYSIS AND DESIGN OF SLAB SYSTEMS

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03-28-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page   2
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FILE NAME            E:\THESIS\SLAB\EQFR2.ADS

PROJECT ID.          Medical Office Building
                     ----------------------------------
SPAN ID.             North Exterior
                     ------------------

ENGINEER             Brendon Burley

DATE                 03/21/05
TIME                 10:06:38

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

SLAB SYSTEM          BEAM-SUPPORTED SLAB
FRAME LOCATION       EXTERIOR

DESIGN METHOD        STRENGTH DESIGN
MOMENTS AND SHEARS   NOT PROPORTIONED

NUMBER OF SPANS  9

CONCRETE FACTORS      SLABS         BEAMS        COLUMNS
  DENSITY(pcf  )      145.0         145.0         145.0
  TYPE             NORMAL WGT    NORMAL WGT    NORMAL WGT
  f'c    (ksi)          5.0           5.0           5.0
  fct    (psi)        473.8         473.8         473.8
  fr     (psi)        530.3         530.3         530.3


REINFORCEMENT DETAILS: NON-PRESTRESSED
  YIELD STRENGTH (flexural) Fy  =  60.00 ksi
  YIELD STRENGTH (stirrups) Fyv =  60.00 ksi
  DISTANCE TO RF CENTER FROM TENSION FACE:
       AT SLAB TOP    =   1.25 in  OUTER LAYER
       AT SLAB BOTTOM =   1.25 in  OUTER LAYER
       AT BEAM TOP    =   1.50 in  OUTER LAYER
       AT BEAM BOTTOM =   1.50 in
  FLEXURAL BAR SIZES:    MINIMUM | MAXIMUM
       AT SLAB TOP    =   # 4
       AT SLAB BOTTOM =   # 4
       AT BEAM TOP    =   # 4       #14
       IN BEAM BOTTOM =   # 4       #14
  MINIMUM SPACING:
       IN SLAB =   4.00 in
       IN BEAM =   1.00 in

**TOTAL UNFACTORED DEAD LOAD =         443.238 kips
                  LIVE LOAD =         297.001 kips
  ------------------------------------------------------------------------
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03-28-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 3
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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	-1.5	.175	4	1.000	1
			BOT	.0	.000	0	.000	0
		RGHT	TOP	115.0	1.000	3	2.800	2
			BOT	.0	.000	0	.000	0
2	TOTL	LEFT	TOP	-339.3	1.000	1	8.400	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	323.4	1.000	1	9.800	3
			BOT	.0	.000	0	.000	0
3	TOTL	LEFT	TOP	-295.4	1.000	1	8.400	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	297.6	1.000	1	8.400	2
			BOT	.0	.000	0	.000	0
4	TOTL	LEFT	TOP	-301.7	1.000	1	8.400	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	301.2	1.000	1	8.400	3
			BOT	.0	.000	0	.000	0
5	TOTL	LEFT	TOP	-301.2	1.000	1	8.400	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	301.7	1.000	1	8.400	2
			BOT	.0	.000	0	.000	0
6	TOTL	LEFT	TOP	-297.6	1.000	1	8.400	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	295.4	1.000	1	8.400	3
			BOT	.0	.000	0	.000	0
7	TOTL	LEFT	TOP	-323.4	1.000	1	9.800	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	339.3	1.000	1	8.400	2
			BOT	.0	.000	0	.000	0

03-28-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 4
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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
8	TOTL	LEFT TOP	-115.0	1.000	3	2.800	2
		BOT	.0	.000	0	.000	0
		RGHT TOP	1.5	.175	4	1.000	1
		BOT	.0	.000	0	.000	0

03-28-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 5
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DESIGN MOMENT ENVELOPES AT CRITICAL SECTIONS ALONG SPANS

SPAN NUM	LOAD TYPE	CRITICAL SECTION (ft)		DESIGN MOMENT (ft-k)	LOAD PTRN	MAX. I.P. DIST LEFT (ft)	LOAD PTRN	MAX. I.P. DIST RGHT (ft)	LOAD PTRN
2	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	247.2	3	10.500	1	9.100	3
3	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	195.9	2	9.100	2	7.700	1
4	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	206.2	3	7.700	1	9.100	3
5	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	203.9	2	9.100	2	7.700	2
6	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	206.2	3	9.100	3	7.700	1
7	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	195.9	2	7.700	1	9.100	2
8	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	247.2	3	9.100	3	10.500	1

COLUMN STRIP MOMENT DISTRIBUTION FACTORS AT SUPPORTS

COLM NUM	CROSS SECTN	L2/L1	ALPHA1	ALPHA1 *L2/L1	BETA(T)	STRIP FACT	BEAM FACT
1	LEFT	.54	2.602	1.394	.204	.991	.850
	RGHT	.54	2.602	1.394	.204	.991	.850
2	LEFT	.54	2.602	1.394	.000	.889	.850
	RGHT	.54	2.602	1.394	.000	.889	.850
3	LEFT	.54	2.602	1.394	.000	.889	.850
	RGHT	.54	2.602	1.394	.000	.889	.850
4	LEFT	.54	2.602	1.394	.000	.889	.850
	RGHT	.54	2.602	1.394	.000	.889	.850
5	LEFT	.54	2.602	1.394	.000	.889	.850
	RGHT	.54	2.602	1.394	.000	.889	.850
6	LEFT	.54	2.602	1.394	.000	.889	.850
	RGHT	.54	2.602	1.394	.000	.889	.850
7	LEFT	.54	2.602	1.394	.000	.889	.850
	RGHT	.54	2.602	1.394	.000	.889	.850
8	LEFT	.54	2.602	1.394	.204	.991	.850
	RGHT	.54	2.602	1.394	.204	.991	.850

COLUMN STRIP MOMENT DISTRIBUTION FACTORS IN SPANS

SPAN NUM	L2/L1	ALPHA1	ALPHA1 *L2/L1	STRIP FACT	BEAM FACT
2	.54	2.602	1.394	.889	.850
3	.54	2.602	1.394	.889	.850
4	.54	2.602	1.394	.889	.850

COLUMN STRIP MOMENT DISTRIBUTION FACTORS IN SPANS

SPAN NUM	L2/L1	ALPHA1	ALPHA1 *L2/L1	STRIP FACT	BEAM FACT
5	.54	2.602	1.394	.889	.850
6	.54	2.602	1.394	.889	.850
7	.54	2.602	1.394	.889	.850
8	.54	2.602	1.394	.889	.850

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DISTRIBUTION OF DESIGN MOMENTS AT SUPPORTS
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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	-1.5	.0 (0)	-.2 (14)	-1.3 (84)	.0 (0)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	115.0	.0 (0)	17.1 (14)	96.8 (84)	1.0 (0)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
2	LEFT TOP	-339.3	.0 (0)	-45.3 (13)	-256.5 (75)	-37.6 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	323.4	.0 (0)	43.1 (13)	244.4 (75)	35.8 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
3	LEFT TOP	-295.4	.0 (0)	-39.4 (13)	-223.3 (75)	-32.7 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	297.6	.0 (0)	39.7 (13)	225.0 (75)	33.0 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
4	LEFT TOP	-301.7	.0 (0)	-40.2 (13)	-228.0 (75)	-33.4 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	301.2	.0 (0)	40.2 (13)	227.6 (75)	33.3 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
5	LEFT TOP	-301.2	.0 (0)	-40.2 (13)	-227.6 (75)	-33.3 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	301.7	.0 (0)	40.2 (13)	228.0 (75)	33.4 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
6	LEFT TOP	-297.6	.0 (0)	-39.7 (13)	-225.0 (75)	-33.0 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	295.4	.0 (0)	39.4 (13)	223.3 (75)	32.7 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
7	LEFT TOP	-323.4	.0 (0)	-43.1 (13)	-244.4 (75)	-35.8 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	339.3	.0 (0)	45.3 (13)	256.5 (75)	37.6 (11)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)

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) (%)
8	LEFT TOP	-115.0	.0 (0)	-17.1 (14)	-96.8 (84)	-1.0 (0)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	1.5	.0 (0)	.2 (14)	1.3 (84)	.0 (0)
	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	13.30 TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	247.2	.0 (0)	33.0 (13)	186.9 (75)	27.4 (11)
3	14.70 TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	195.9	.0 (0)	26.1 (13)	148.1 (75)	21.7 (11)
4	13.30 TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	206.2	.0 (0)	27.5 (13)	155.8 (75)	22.8 (11)
5	14.70 TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	203.9	.0 (0)	27.2 (13)	154.1 (75)	22.6 (11)
6	14.70 TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	206.2	.0 (0)	27.5 (13)	155.8 (75)	22.8 (11)
7	13.30 TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	195.9	.0 (0)	26.1 (13)	148.1 (75)	21.7 (11)
8	14.70 TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	BOT	247.2	.0 (0)	33.0 (13)	186.9 (75)	27.4 (11)

03-28-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 10
6:42:04 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 = 282.84 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)
1C	282.84	1	68.3	114.40	1	68.3	106.0	42.4	153.52
2E	282.84	1	154.8	149.48	1	154.8	-20.9	-8.7	155.84
3E	282.84	1	146.6	141.55	1	146.6	2.9	1.2	142.44
4E	282.84	1	147.7	142.67	1	147.7	-.7	-.3	142.88
5E	282.84	1	147.7	142.67	1	147.7	.7	.3	142.88
6E	282.84	1	146.6	141.55	1	146.6	-2.9	-1.2	142.44
7E	282.84	1	154.8	149.48	1	154.8	20.9	8.7	155.84
8C	282.84	1	68.3	114.40	1	68.3	-106.0	-42.4	153.52

03-28-** ADOSS(tm) 6.01 Proprietary Software of PORTLAND CEMENT ASSN. Page 11
6:42:04 PM Licensed to: ae, university park, PA

B E A M S H E A R R E Q U I R E M E N T S (kips, sq.in./in., ft.)
****

NOTE--Allowable shear stress in beams = 141.42 psi (see "CODE").

BEAM SPAN NO.	PATT. NO.	LEFT Vu@d SHEAR	SIDE Av/s @d	FRACTIONAL DIST. ALONG SPAN Av/s .175	Av/s .375	Av/s .625	Av/s .825	RIGHT Av/s @d	SIDE Vu@d SHEAR	LEFT Vc/2. DIST.
1 * *		Span length equal to column size or zero								* *
2	3	51.3	.015*	.015*	.000	.000	.015*	.015*	-62.9	9.10
2	1	47.8	.015*	.015*	.000	.015*	.015*	.015	-66.4	9.10
3	1	61.5	.015*	.015*	.000	.000	.015*	.015*	-52.7	10.50
3	1	54.7	.015*	.015*	.000	.000	.015*	.015*	-59.5	10.50
4	1	60.2	.015*	.015*	.000	.000	.015*	.015*	-54.1	10.50
4	1	53.7	.015*	.015*	.000	.000	.015*	.015*	-60.5	10.50
5	1	60.3	.015*	.015*	.000	.000	.015*	.015*	-53.9	10.50
5	1	53.9	.015*	.015*	.000	.000	.015*	.015*	-60.3	10.50
6	1	60.5	.015*	.015*	.000	.000	.015*	.015*	-53.7	10.50
6	1	54.1	.015*	.015*	.000	.000	.015*	.015*	-60.2	10.50
7	1	59.5	.015*	.015*	.000	.000	.015*	.015*	-54.7	10.50
7	1	52.7	.015*	.015*	.000	.000	.015*	.015*	-61.5	10.50
8	1	66.4	.015	.015*	.015*	.000	.015*	.015*	-47.8	11.90
8	3	62.9	.015*	.015*	.000	.000	.015*	.015*	-51.3	11.90
9 * *		Span length equal to column size or zero								* *

NOTES: 1.) To obtain stirrup spacing, divide stirrup area by Av/s value above.
2.) To obtain stirrup area, multiply spacing by Av/s value.
3.) Local effects due to loadings applied at other segments along beam span must be calculated manually.
4.) Symbols following Av/s values:
* - minimum shear 50*bw/Fyv - based on beam dimensions.
x - Vs exceeds 2*Vc, maximum stirrup spacing must be halved.
+ - Av/s value at segment located within effective depth.

* Program completed as requested *

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03-26-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page   1
 9:25:10 AM Licensed to: ae, university park, PA
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                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  )
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 Computer program for ANALYSIS AND DESIGN OF SLAB SYSTEMS

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03-26-** ADOSS(tm) 6.01  Proprietary Software of PORTLAND CEMENT ASSN. Page   2
 9:25:10 AM Licensed to: ae, university park, PA

FILE NAME            P:\THESIS\EQFR3.ADS

PROJECT ID.          Medical Office Building
                     ----------------------------------
SPAN ID.
                     ------------------

ENGINEER             Brendon Burley

DATE                 03/21/05
TIME                 10:06:38

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 13

CONCRETE FACTORS      SLABS         BEAMS        COLUMNS
  DENSITY(pcf  )      145.0         145.0         145.0
  TYPE             NORMAL WGT    NORMAL WGT    NORMAL WGT
  f'c    (ksi)          5.0           5.0           5.0
  fct    (psi)        473.8         473.8         473.8
  fr     (psi)        530.3         530.3         530.3


REINFORCEMENT DETAILS: NON-PRESTRESSED
  YIELD STRENGTH Fy  =  60.00 ksi
  DISTANCE TO RF CENTER FROM TENSION FACE:
       AT SLAB TOP    =   1.25 in  OUTER LAYER
       AT SLAB BOTTOM =   1.25 in  OUTER LAYER
  MINIMUM FLEXURAL BAR SIZE:
       AT SLAB TOP    =  # 4
       AT SLAB BOTTOM =  # 4
  MINIMUM SPACING:
       IN SLAB =   3.00 in

**SLAB THICKNESS IN SPAN  3 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in

**SLAB THICKNESS IN SPAN  4 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in

**SLAB THICKNESS IN SPAN  5 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in

**SLAB THICKNESS IN SPAN  6 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in
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**SLAB THICKNESS IN SPAN  7 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in

**SLAB THICKNESS IN SPAN  8 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in

**SLAB THICKNESS IN SPAN  9 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in

**SLAB THICKNESS IN SPAN 10 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in

**SLAB THICKNESS IN SPAN 11 IS INADEQUATE W/O A DEFLECTION CHECK
  REQUIRED DEPTH =  9.6 in

**TOTAL UNFACTORED DEAD LOAD =        1170.208 kips
                  LIVE LOAD =         868.000 kips
  ------------------------------------------------------------------------------
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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	-4.9	.175	4	1.000	1
			BOT	.0	.000	0	.000	0
		RGHT	TOP	404.1	1.000	3	5.600	3
			BOT	.0	.000	0	.000	0
2	TOTL	LEFT	TOP	-532.4	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	529.0	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
3	TOTL	LEFT	TOP	-521.3	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	523.0	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
4	TOTL	LEFT	TOP	-525.6	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	525.3	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
5	TOTL	LEFT	TOP	-524.9	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	525.0	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
6	TOTL	LEFT	TOP	-525.0	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	525.0	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
7	TOTL	LEFT	TOP	-525.0	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	525.0	.960	1	8.400	2
			BOT	.0	.000	0	.000	0

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
8	TOTL	LEFT	TOP	-525.0	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	524.9	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
9	TOTL	LEFT	TOP	-525.3	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	525.6	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
10	TOTL	LEFT	TOP	-523.0	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
		RGHT	TOP	521.3	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
11	TOTL	LEFT	TOP	-529.0	.960	1	8.400	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	532.4	.960	1	8.400	2
			BOT	.0	.000	0	.000	0
12	TOTL	LEFT	TOP	-404.1	1.000	3	5.600	3
			BOT	.0	.000	0	.000	0
		RGHT	TOP	4.9	.175	4	1.000	1
			BOT	.0	.000	0	.000	0

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DESIGN MOMENT ENVELOPES AT CRITICAL SECTIONS ALONG SPANS

SPAN NUM	LOAD TYPE	CRITICAL SECTION (ft)		DESIGN MOMENT (ft-k)	LOAD PTRN	MAX. I.P. DIST LEFT (ft)	LOAD PTRN	MAX. I.P. DIST RGHT (ft)	LOAD PTRN
2	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	358.9	3	10.500	2	7.700	1
3	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	351.5	2	9.100	1	7.700	1
4	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	360.8	3	9.100	1	7.700	1
5	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	360.6	2	9.100	1	7.700	1
6	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	360.8	3	9.100	1	7.700	1
7	TOTL	14.700	TOP	.0	0	.000	0	.000	0
			BOT	360.8	2	9.100	1	7.700	1
8	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	360.8	3	7.700	1	9.100	1
9	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	360.6	2	7.700	1	9.100	1
10	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	360.8	3	7.700	1	9.100	1
11	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	351.5	2	7.700	1	9.100	1
12	TOTL	13.300	TOP	.0	0	.000	0	.000	0
			BOT	358.9	3	7.700	1	10.500	2

COLUMN STRIP MOMENT DISTRIBUTION FACTORS AT SUPPORTS

COLM NUM	CROSS SECTN	L2/L1	ALPHA1	ALPHA1 *L2/L1	BETA(T)	STRIP FACT	BEAM FACT
1	LEFT	1.00	.000	.000	.658	.934	.000
	RGHT	1.00	.000	.000	.658	.934	.000
2	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
3	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
4	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
5	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
6	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
7	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
8	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
9	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
10	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
11	LEFT	1.00	.000	.000	.000	.750	.000
	RGHT	1.00	.000	.000	.000	.750	.000
12	LEFT	1.00	.000	.000	.658	.934	.000
	RGHT	1.00	.000	.000	.658	.934	.000
2		1.00	.000	.000	.600	.000	
3		1.00	.000	.000	.600	.000	

COLUMN STRIP MOMENT DISTRIBUTION FACTORS IN SPANS

SPAN NUM	L2/L1	ALPHA1	ALPHA1 *L2/L1	STRIP FACT	BEAM FACT
4	1.00	.000	.000	.600	.000
5	1.00	.000	.000	.600	.000
6	1.00	.000	.000	.600	.000
7	1.00	.000	.000	.600	.000
8	1.00	.000	.000	.600	.000
9	1.00	.000	.000	.600	.000
10	1.00	.000	.000	.600	.000
11	1.00	.000	.000	.600	.000
12	1.00	.000	.000	.600	.000

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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	-4.9	.0 (0)	-4.6 (93)	.0 (0)	-.3 (6)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	404.1	.0 (0)	377.5 (93)	.0 (0)	26.6 (6)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
2	LEFT TOP	-532.4	.0 (0)	-399.3 (75)	.0 (0)	-133.1 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	529.0	.0 (0)	396.7 (75)	.0 (0)	132.2 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
3	LEFT TOP	-521.3	.0 (0)	-391.0 (75)	.0 (0)	-130.3 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	523.0	.0 (0)	392.3 (75)	.0 (0)	130.8 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
4	LEFT TOP	-525.6	.0 (0)	-394.2 (75)	.0 (0)	-131.4 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	525.3	.0 (0)	394.0 (75)	.0 (0)	131.3 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
5	LEFT TOP	-524.9	.0 (0)	-393.7 (75)	.0 (0)	-131.2 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	525.0	.0 (0)	393.7 (75)	.0 (0)	131.2 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
6	LEFT TOP	-525.0	.0 (0)	-393.8 (75)	.0 (0)	-131.3 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	525.0	.0 (0)	393.8 (75)	.0 (0)	131.3 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
7	LEFT TOP	-525.0	.0 (0)	-393.8 (75)	.0 (0)	-131.3 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	525.0	.0 (0)	393.8 (75)	.0 (0)	131.3 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)

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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) (%)
8	LEFT TOP	-525.0	.0 (0)	-393.7 (75)	.0 (0)	-131.2 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	524.9	.0 (0)	393.7 (75)	.0 (0)	131.2 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
9	LEFT TOP	-525.3	.0 (0)	-394.0 (75)	.0 (0)	-131.3 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	525.6	.0 (0)	394.2 (75)	.0 (0)	131.4 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
10	LEFT TOP	-523.0	.0 (0)	-392.3 (75)	.0 (0)	-130.8 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	521.3	.0 (0)	391.0 (75)	.0 (0)	130.3 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
11	LEFT TOP	-529.0	.0 (0)	-396.7 (75)	.0 (0)	-132.2 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	532.4	.0 (0)	399.3 (75)	.0 (0)	133.1 (25)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
12	LEFT TOP	-404.1	.0 (0)	-377.5 (93)	.0 (0)	-26.6 (6)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
	RGHT TOP	4.9	.0 (0)	4.6 (93)	.0 (0)	.3 (6)
	BOT	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)

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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	14.70	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	358.9	.0 (0)	215.3 (60)	.0 (0)	143.6 (40)
3	14.70	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	351.5	.0 (0)	210.9 (60)	.0 (0)	140.6 (39)
4	14.70	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	360.8	.0 (0)	216.5 (60)	.0 (0)	144.3 (40)
5	14.70	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	360.6	.0 (0)	216.3 (60)	.0 (0)	144.2 (40)
6	14.70	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	360.8	.0 (0)	216.5 (60)	.0 (0)	144.3 (39)
7	14.70	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	360.8	.0 (0)	216.5 (60)	.0 (0)	144.3 (40)
8	13.30	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	360.8	.0 (0)	216.5 (60)	.0 (0)	144.3 (39)
9	13.30	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	360.6	.0 (0)	216.3 (60)	.0 (0)	144.2 (39)
10	13.30	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	360.8	.0 (0)	216.5 (60)	.0 (0)	144.3 (40)
11	13.30	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	351.5	.0 (0)	210.9 (60)	.0 (0)	140.6 (39)
12	13.30	TOP	.0	.0 (0)	.0 (0)	.0 (0)	.0 (0)
		BOT	358.9	.0 (0)	215.3 (60)	.0 (0)	143.6 (39)

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

NOTE--Allowable shear stress in slabs = 282.84 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 W I T H T R A N S F E R O F 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)
			A R O U N D			C O L U M N			
1E	282.84	1	140.4	135.58	3	137.4	492.7	189.4	363.54*
2I	282.84	1	261.7	322.53*	4	256.0	-22.0	-8.8	328.03*
3I	282.84	1	259.7	320.05*	1	259.7	2.2	.9	321.28*
4I	282.84	1	260.4	321.01*	1	260.4	-.3	-.1	321.20*
5I	282.84	1	260.3	320.85*	1	260.3	.1	.0	320.89*
6I	282.84	1	260.3	320.88*	1	260.3	.0	.0	320.89*
7I	282.84	1	260.3	320.88*	1	260.3	.0	.0	320.89*
8I	282.84	1	260.3	320.85*	1	260.3	-.1	.0	320.89*
9I	282.84	1	260.4	321.01*	1	260.4	.3	.1	321.20*
10I	282.84	1	259.7	320.05*	1	259.7	-2.2	-.9	321.28*
11I	282.84	1	261.7	322.53*	4	256.0	22.0	8.8	328.03*
12E	282.84	1	140.4	135.58	3	137.4	-492.7	-189.4	363.54*

* - Shear stress exceeded.

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T R A N S V E R S E B E A M S H E A R A N D T O R S I O N
R E Q U I R E M E N T S (kips, ft-k, SQ.in, /,in.)
****

LEFT SIDE

BEAM No.	PATT. NO.	Vu@d SHEAR	Vc@d SHEAR	Tu@d TORSION	Tc@d TORSION	Av/s @d	At/s @d	Atot/s @d	Al @d
1	3	33.9	7.6	207.1	46.6	.024x	.118x	.259x	8.24
2	* *		Transverse beam not specified						* *
3	* *		Transverse beam not specified						* *
4	* *		Transverse beam not specified						* *
5	* *		Transverse beam not specified						* *
6	* *		Transverse beam not specified						* *
7	* *		Transverse beam not specified						* *
8	* *		Transverse beam not specified						* *
9	* *		Transverse beam not specified						* *
10	* *		Transverse beam not specified						* *
11	* *		Transverse beam not specified						* *
12	3	33.9	7.6	207.1	46.6	.024x	.118x	.259x	8.24

RIGHT SIDE

BEAM No.	PATT. NO.	Vu@d SHEAR	Vc@d SHEAR	Tu@d TORSION	Tc@d TORSION	Av/s @d	At/s @d	Atot/s @d	Al @d
1	3	33.9	7.6	207.1	46.6	.024x	.118x	.259x	8.24
2	* *		Transverse beam not specified						* *
3	* *		Transverse beam not specified						* *
4	* *		Transverse beam not specified						* *
5	* *		Transverse beam not specified						* *
6	* *		Transverse beam not specified						* *
7	* *		Transverse beam not specified						* *
8	* *		Transverse beam not specified						* *
9	* *		Transverse beam not specified						* *
10	* *		Transverse beam not specified						* *
11	* *		Transverse beam not specified						* *
12	3	33.9	7.6	207.1	46.6	.024x	.118x	.259x	8.24

NOTES: 1.) Deep beam analysis not considered.
2.) Loads assumed applied from above beam.
3.) Moment and shear at concentrated load must be checked manually if located along transverse beam.
4.) Symbols following Av/s values:
* - Minimum shear 50.*bw/Fyv - based on beam dimensions.
x - Vs exceeds 4*Vc, increase member section.
5.) Symbols following At/s values:
* - Minimum torsion 50.*bw/Fyv - based on beam dimensions.
x - Ts exceeds 4*Tc, increase member section.
6.) Symbols following Atot/s values:
* - Minimum torsion 50.*bw/Fyv - based on beam dimensions.
7.) Redistribution of torque is not considered.
8.) Detail first stirrup @ 3 inches.

```
 * PROGRAM DESIGN LIMITS EXCEEDED! ...REVISE SLAB DATA

                              Program terminated.
```

Appendix III

Shearheads.EES

```
A_trib = 28*28
c_1 = 23.04/12
c_2 = 23.04/12
d = 7.75/12
w = 295

A_1 = (c_1+d)*(c_2+d)
b_o1 = 2*(c_1+d)+2*(c_2+d)

A_2 = A_1+(3/4*l_v1-(c_1+d)/2)*(c_2+d)+(3/4*l_v2-(c_2+d)/2)*(c_1+d)
b_o2 = 4*sqrt((3/4*l_v1-(c_1+d)/2)^2+((c_2+d)/2)^2)+4*sqrt((3/4*l_v2-(c_2+d)/2)^2+((c_1+d)/2)^2)

l_v1 = 3.75
l_v2 = 3.75

V_1 = w*(A_trib-A_1)
V_2 = w*(A_trib-A_2)

u_1 = V_1/(b_o1*d)/144
u_2 = V_2/(b_o2*d)/144

u_des_1 = 328.04

u_1/u_des_1 = u_2/u_des_2
```

Shearheads-Ext.EES

```
A_trib = 14*28
c_1 = 2
c_2 = 2
d = 7.75/12
w = 325

A_1 = (c_1+d)*(c_2+d)/2
b_o1 = (c_1+d)+(c_2+d)

A_2 = A_1+((3/4*l_v1-(c_1+d)/2)*(c_2+d)+(3/4*l_v2-(c_2+d)/2)*(c_1+d))/2
b_o2 = 2*sqrt((3/4*l_v1-(c_1+d)/2)^2+((c_2+d)/2)^2)+2*sqrt((3/4*l_v2-(c_2+d)/2)^2+((c_1+d)/2)^2)

l_v1 = 4.25
l_v2 = 4.25

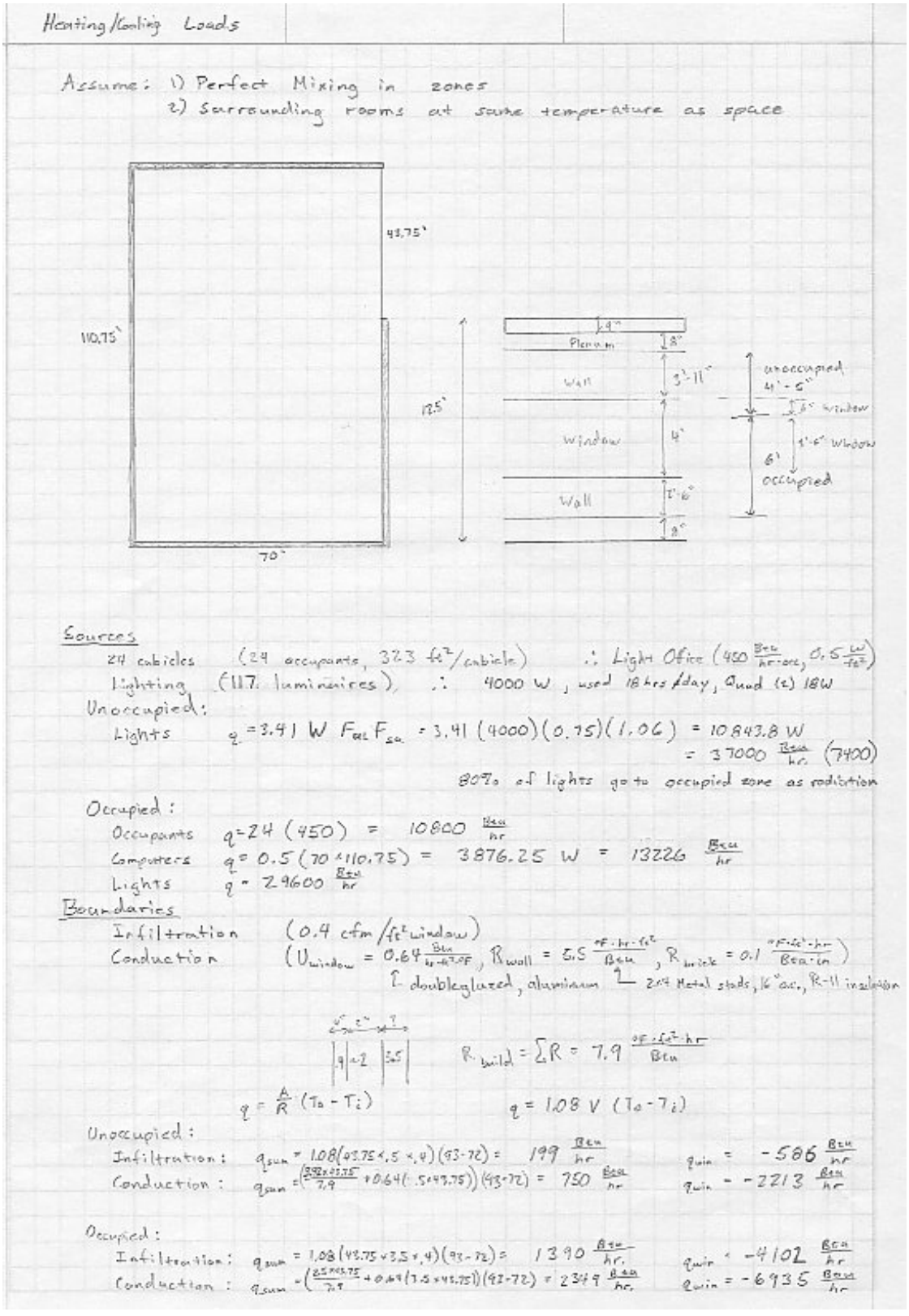
V_1 = w*(A_trib-A_1)
V_2 = w*(A_trib-A_2)

u_1 = V_1/(b_o1*d)/144
u_2 = V_2/(b_o2*d)/144

u_des_1 = 363.54

u_1/u_des_1 = u_2/u_des_2
```

Appendix IV


Heating/Cooling Loads
Assume: 1) Perfect Mixing in zones
2) Surrounding rooms at same temperature as space
43.75'
110.75'
70'
13.5'
1'-4"
Plenum
1'-8"
Wall
3'-11"
Window
4'
Wall
1'-6"
2'
unoccupied
4'-5"
8" window
1'-6" window
6'
occupied
Sources
24 cubicles (24 occupants, 323 ft²/cubicle) ∴ Light Office (450 Btu/hr·occ, 0.5 W/ft²)
Lighting (117 luminaires), ∴ 4000 W, used 18 hrs/day, Q_und (2) 18W
Unoccupied:
Lights q = 3.41 W F_al F_sa = 3.41 (4000)(0.75)(1.06) = 10843.8 W
= 37000 Btu/hr (7400)
80% of lights go to occupied zone as radiation
Occupied:
Occupants q = 24 (450) = 10800 Btu/hr
Computers q = 0.5 (70 × 110.75) = 3876.25 W = 13226 Btu/hr
Lights q = 29600 Btu/hr
Boundaries
Infiltration (0.4 cfm/ft² window)
Conduction (U_window = 0.64 Btu/hr·ft²·°F, R_wall = 5.5 °F·hr·ft²/Btu, R_brick = 0.1 °F·ft²·hr/Btu·in)
↳ doubleglazed, aluminum ↳ 2x4 Metal studs, 16" o.c., R-11 insulation
R_wall = ΣR = 7.9 °F·ft²·hr/Btu
q = A/R (T_o - T_i)
q = 1.08 V (T_o - T_i)
Unoccupied:
Infiltration: q_sum = 1.08(43.75 × 2.5 × .4)(93-72) = 199 Btu/hr q_win = -586 Btu/hr
Conduction: q_sum = ((43 × 43.75)/7.9 + 0.64(.5 × 43.75))(93-72) = 750 Btu/hr q_win = -2213 Btu/hr
Occupied:
Infiltration: q_sum = 1.08(43.75 × 3.5 × .4)(93-72) = 1390 Btu/hr. q_win = -4102 Btu/hr
Conduction: q_sum = ((85 × 43.75)/7.9 + 0.64(3.5 × 43.75))(93-72) = 2349 Btu/hr q_win = -6935 Btu/hr

Heating / Cooling Loads

Combined

Unoccupied: $q_{sum} = 8349 \frac{Btu}{hr}$ ← design case

$q_{win} = 4601 \frac{Btu}{hr}$

Occupied: $q_{sum} = 57365 \frac{Btu}{hr}$ ← design case

$q_{win} = 42589 \frac{Btu}{hr}$ ∴ always cooling

$T_{supply} = 65\,°F$
$T_{room} = 72\,°F$

$V = \frac{57365}{1.08(72-65)} = 7588$ cfm

$T_{exhaust} = \frac{8349}{1.08(7588)} + 72 = 73.0\,°F$

Chosen diffuser operates at 110 cfm max. Use 100 cfm/diffuser as an operable ventilation rate.

∴ Need 76 diffusers

Ventilation Requirements

$V_{bz} = R_p P_z + R_a A_z$

$P_z = 24$
$A_z = 110.75 \times 70 = 7752.5\ ft^2$

Table 6-1
$R_p = 5$ cfm/person
$R_a = 0.06$ cfm/ft²

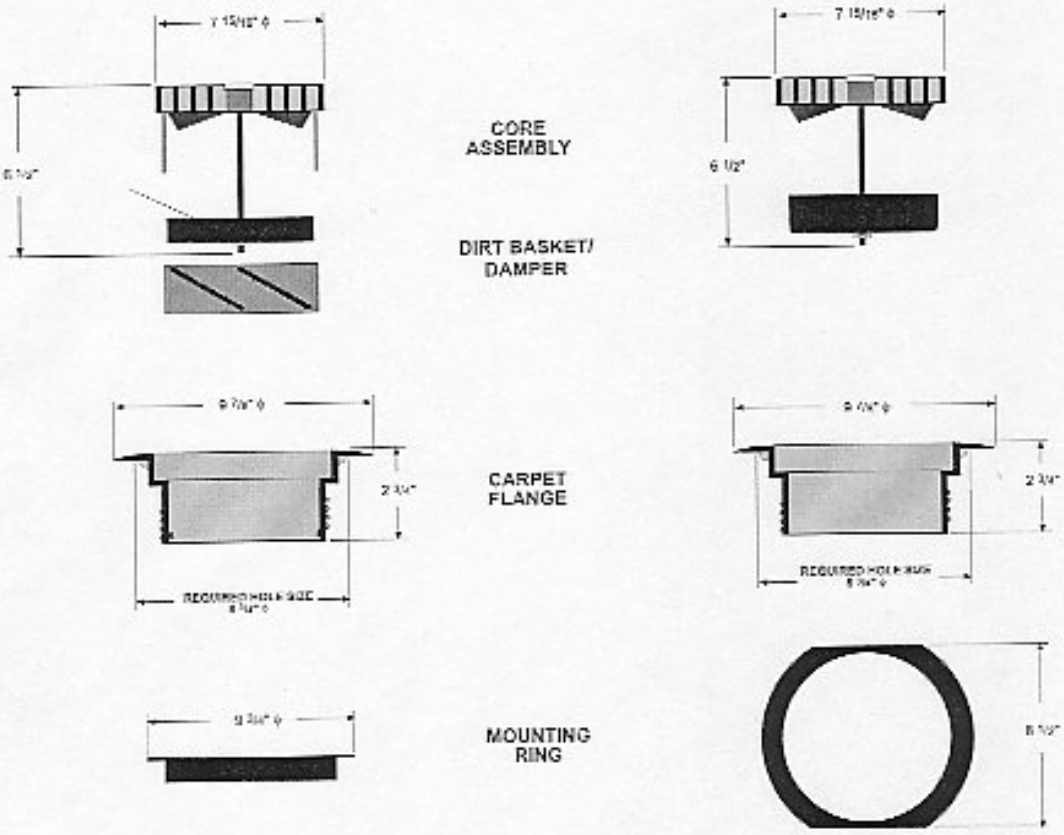
$V_{bz} = 5(24) + 0.06(7752.5) = 585$ cfm

Dimensional and Installation Information

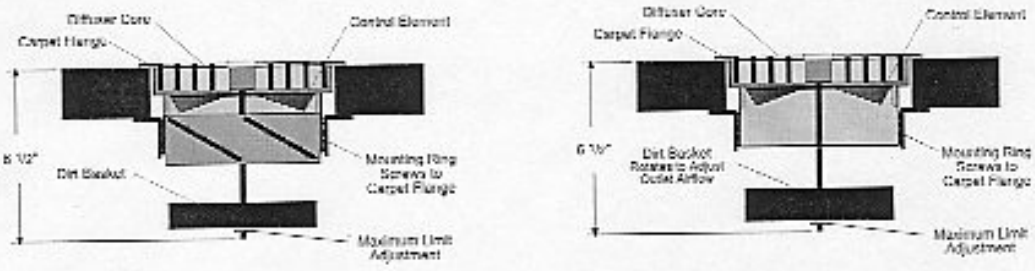
DIMENSIONAL INFORMATION

Models with OA (Exposed) Volume Adjustment

Models with SM (Concealed) Volume Adjustment



DIFFUSER INSTALLATION



NOTE: Diffuser Requires an 8 3/4" Diameter Hole for Mounting

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Specification and Ordering Information

Furnish and install **TROX** (FBA 200 aluminum, FBK 200 plastic) floor diffusers as indicated on plans. Diffusers shall incorporate a removeable core section, which consists of a series of concentric rings and deflection vanes to distribute the air in a 360° "swirl" pattern

An integral carpet flange shall support the diffuser core and prevent fraying of the carpet, providing a minimum 1/2" overlap. This flange shall mount to the floor system by means of a threaded mounting ring, allowing location upon completion of the raised floor /carpet installation without removal of carpet or floor tiles.

A catch basin shall be furnished to facilitate removal of dust, spills, and other objects that penetrate the outlet face.

Outlet airflow rates shall be limited to those resulting in a maximum terminal velocity of 50 fpm four feet directly above the diffuser face.

The diffuser core and trim ring shall be constructed of (aluminum for FBA, plastic for FBK) and their finish shall be (FBA: Brushed aluminum, FBK: Ash Grey,Black or Sandstone Beige). The catch basin and mounting ring shall be constructed of UL-94-V plastic (note: steel material is optional for model FBA).

Models with OA Volume Adjustment Only

The assembly shall allow occupant adjustment of the outlet airflow without necessitating the removal of any diffuser components. Adjustment shall require rotation of the diffuser face and be accomplished by hand without the use of tools or other devices. A visible indicator on the diffuser face shall provide evidence of the damper position at all times.

The outlet shall incorporate a means of imposing a maximum airflow setting without compromising the individual's ability to adjust the delivered airflow, except to the extent of the set limit.

DIFFUSER ORDER CODE

FBK - 1 - VF - K / 200 - OA

MODEL
FBK Plastic Construction
FBA Aluminum Core/Flange
Other components plastic
FBM Aluminum Core/Flange
Other components metallic

VOLUME ADJUSTMENT
OA Occupant Accessible
SM Concealed

DISCHARGE PATTERN
VF Vertical (Fixed)
EU Adjusteble (Horiz./Vertical)

FINISH
FBK (Plastic) Models
1 Ash Grey
2 Black
5 Sandstone Beige
FBA/FBM (Aluminum)
3 Silhouette (Black Interior)
4 Natural Aluminum

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Appendix V

9.30 LIGHTING CALCULATIONS

GENERAL INFORMATION

Project identification: Auditorium - Medical Office Building
(Give name of area and/or building and room number)

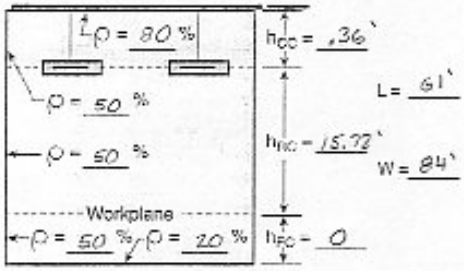
Average maintained illuminance for design: 200 lux or 20 footcandles

Luminaire data:
Manufacturer: Lithonia
Catalog number: F32T8/SP835

Lamp data:
Type and color: T-8
Number per luminaire: 2
Total lumens per luminaire: 5700

SELECTION OF COEFFICIENT OF UTILIZATION

Step 1: Fill in sketch at right



Step 2: Determine Cavity Ratios

Room Cavity Ratio, RCR = 2.23
Ceiling Cavity Ratio, CCR = 0.05
Floor Cavity Ratio, FCR = 0

Step 3: Obtain Effective Ceiling Cavity Reflectance (ρ_{cc}) ρ_{cc} = .77

Step 4: Obtain Effective Floor Cavity Reflectance (ρ_{FC}) ρ_{FC} = .20

Step 5: Obtain Coefficient of Utilization (CU) from Manufacturer's Data CU = .74

SELECTION OF LIGHT LOSS FACTORS

Nonrecoverable		Recoverable	
Luminaire ambient temperature	1.0	Room surface dirt depreciation RSDD	0.94
Voltage to luminaire	1.0	Lamp lumen depreciation LLD	0.80
Ballast factor	0.95	Lamp burnouts factor LBO	1.0
Luminaire surface depreciation	1.0	Luminaire dirt depreciation LDD	0.88

Total light loss factor, LLF (product of individual factors above) = 0.63

CALCULATIONS

(Average Maintained Illuminance)

$$\text{Number of Luminaires} = \frac{(\text{Illuminance}) \times (\text{Area})}{(\text{Lumens per Luminaire}) \times (\text{CU}) \times (\text{LLF})}$$

$$= \frac{20 \times (61 \times 84)}{5700 \times 0.74 \times 0.63} = 38.6 \rightarrow 40 \text{ luminaires}$$

$$\text{Illuminance} = \frac{(\text{Number of Luminaires}) \times (\text{Lumens per Luminaire}) \times (\text{CU}) \times (\text{LLF})}{(\text{Area})}$$

$$= \frac{40 \times (5700) \times 0.74 \times 0.63}{(61 \times 84)} = 20.7 \text{ fc}$$

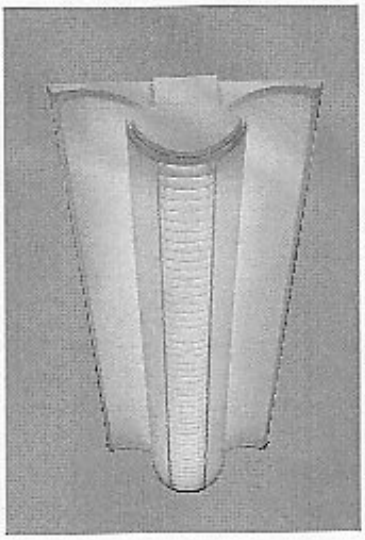
Calculated by: Brendon J. Burley Date: 3/29/2005

Figure 9-25. Average illuminance calculation sheet.

Architectural Lighting

Avante®

Surface/Suspended



Direct/Indirect Lighting

Intended Use

1x2 – ideal for general or task lighting in alcoves, narrow corridors and small spaces. *1x4* – suitable for general area or task-specific lighting in both new construction and remodeling. Especially suited for conference rooms, reception areas, health care institutions, education facilities and offices.

Features

Contemporary, low-profile construction, suitable for surface and suspended mounting, providing direct or semi-direct light distribution.

Rugged steel housing in 2', 4' or 8' field-joinable units for continuous rows.

Injection molded joiners with snap-on finished ends.

Available with popular Avante 1x4 shieldings - MDR, MDM and SBL.

Reflectors finished with high-reflectance, matte-white polyester powder paint for uniform light distribution.

Reflector option includes steel reflectors with or without semi-perforated option or diffuse Aluminum Stepped Reflector.

T5HO or T8 lamping configurations available.

Listings – UL Listed (standard). CSA Certified or NOM Certified (see Options).

Ordering Information

Example: **AVSM 2 32 MDR DLS MVOLT GEB10IS**

Series
- **AVSM** 1' wide, symmetric distribution
- **TAVSM** 1' wide lamps in tandem

Number of lamps
- **1, 2** [1] Not included.

Lamp type

17	17W	T8 (24")
32	32W	T8 (48")
14T5	14W	T5 (22")
28T5	28W	T5 (46")
24T5HO	24W	T5 (22")
CF40	40W	TT5 (21")
CF50	50W	TT5 (21")
CF55	55W	TT5 (21")
54T5HO	54W	T5 (46")

Diffuser
- **MDR** Metal diffuser, round holes
- **MDM** Metal diffuser, mini slots
- **SBL** Straight blade louver, round holes

Others available.

Light distribution
- **ULR** Uplight, round hole, perforated band[2]
- **DLS** Downlight, solid

Voltage
- **120**
- **277**
- **347**
- **MVOLT**[*]

Others available.

* 120-277V. Must specify GEB10IS or GEB10PS.

Options

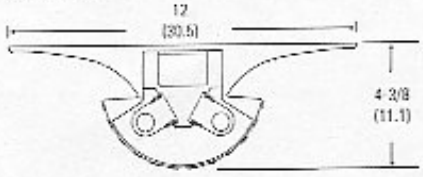
GEB	T8 electronic ballast, ≤20% THD
GEB10IS	T8 electronic ballast, ≤10% THD, instant start
GEB10PS	T5 electronic ballast, ≤10% THD, program start
GEB10RS	T8 electronic ballast, <10% THD, rapid start
ALG	Acrylic liner guard
GLR	Internal fast-blow fuse[3]
LP_	Lamped. Specify lamp type and color
NYC	New York City approved
CSA	CSA Certified
NOM	NOM Certified

Reflector Options

ASR	Aluminum Stepped Reflector[4]

NOTES:
1. Available with straight tube T5 or T8 lamps only.
2. For suspended mounting only.
3. Not available with MVOLT.
4. Not available with ULR.
5. Specify ballast manufacturer.

Dimensions shown in **inches (centimeters)** unless otherwise noted.



Availability and Dimensions

Nominal size	Series	Number of lamps	Lamp type	Length
1x2	AVSM	1, 2 1	17, 14T5, 24T5HO CF40, CF50, CF55	2'
1x4	AVSM	1, 2	32, 28T5, 54T5HO	4'
1x8	TAVSM	1, 2	32, 28T5, 54T5HO	8'

Ballast/Lamp Compatibility

	17	32	14T5	28T5	24T5HO	CF40	CF50	CF55	54T5HO
GEB	■	■					■ [5]	■ [5]	
GEB10IS		■							
GEB10PS			■	■	■				■
GEB10RS	■								

TEST:	LTL9551
MANUFAC:	LITHONIA LIGHTING
LUMCAT:	AVSM 2 32 SBL DLS
LUMINAIRE:	1X4 AVante, Surface or suspended Mount, 2 lamp T8 32 watt, Straight Blade Louver w/ perf'd sides, backed w/ acrylic overlay, Down Light Solid white steel reflector.
LAMPCAT:	F32T8/SP835
LAMP:	TWO 32-WATT T8 LINEAR FLUORESCENT.
_PRODUCTGROUP:	ARCHITECTURAL FLUORESCENT
_INFOLINK:	www.lithonia.com/visual/ies/ies.asp?vfile=
Number Lamps:	2
Lumens Per Lamp:	2850
Photometric Type:	Type C
Luminous Width:	1 ft
Luminous Length:	4 ft
Luminous Height:	0.33 ft
Ballast Factor:	1
Input Watts:	58
Efficiency (Total):	66.5 %
Efficiency (Up):	8.0 %
Efficiency (Down):	58.5 %

Spacing Criteria

Angle	Value
0	1.14
90	1.43

Candela Values:

0 22.5 45 67.5 90

0	925	925	925	925	925
2.5	905	907	936	927	933
5	900	903	930	924	931
7.5	893	896	926	920	929
10	878	884	917	915	922
12.5	867	872	909	913	924
15	845	854	897	907	921
17.5	826	837	885	902	916
20	805	820	872	894	914
22.5	784	799	857	885	907
25	755	774	839	873	899
27.5	728	751	821	859	889
30	701	727	799	849	883
32.5	666	696	777	835	871
35	636	670	757	820	859
37.5	601	638	732	805	845
40	568	610	711	787	831
42.5	528	579	685	768	814
45	495	550	666	752	797
47.5	457	515	635	730	778
50	417	483	610	709	757
52.5	379	451	585	688	738
55	340	419	557	667	722
57.5	303	386	532	652	702
60	263	350	507	633	685
62.5	232	322	486	617	666
65	202	292	464	596	642

67.5	180	267	446	582	626
70	152	243	426	562	605
72.5	130	223	408	542	584
75	108	204	391	523	563
77.5	88	188	374	506	544
80	69	177	361	490	527
82.5	50	163	346	475	512
85	33	151	326	451	485
87.5	18	144	315	439	476
90	6	133	302	427	464
92.5	14	123	286	412	448
95	15	108	270	393	433
97.5	14	72	253	377	419
100	12	35	222	354	399
102.5	9	24	181	326	374
105	11	16	110	284	336
107.5	6	12	66	226	287
110	6	9	44	139	207
112.5	2	6	24	93	132
115	3	5	13	69	101
117.5	3	4	3	43	68
120	0	0	0	0	0
122.5	0	0	0	0	0
125	0	0	0	0	0
127.5	0	0	0	0	0
130	0	0	0	0	0
132.5	0	0	0	0	0

135	0	0	0	0	0
137.5	0	0	0	0	0
140	0	0	0	0	0
142.5	0	0	0	0	0
145	0	0	0	0	0
147.5	0	0	0	0	0
150	0	0	0	0	0
152.5	0	0	0	0	0
155	0	0	0	0	0
157.5	0	0	0	0	0
160	0	0	0	0	0
162.5	0	0	0	0	0
165	0	0	0	0	0
167.5	0	0	0	0	0
170	0	0	0	0	0
172.5	0	0	0	0	0
175	0	0	0	0	0
177.5	0	0	0	0	0
180	0	0	0	0	0

Average Luminance (cd/sq.m)

	0	45	90
55	1,427	1,845	2,302
65	1,093	1,818	2,394
75	859	1,946	2,623
85	524	2,322	3,138

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