



LENGTH 2150-2400-2600 cm

LOADS :Variable 800+ Permanent 1200 = 2000 Dan/ml

Cast in place concrete and self-weigth excluded

LENGTH
2600 cm

.T_RCAEC2 ENGISOFT-ing.F.PINARDI-DESENZANO(BS) tel 030-9912152
.DATE (mm-gg-aa) 09-23-2008
..Prestressed concrete members pre-tensioned and bonded
.EUROCODE 2-DESIGN OF STRUCTURES UNI ENV 1992-1-1:
.General rules and rules for buildings Simple support Beam
.STANDARD GIRDERS
.P MAX 2000
UNIT MEASURE
UNIT FORCE : daN
UNIT LENGTH : cm
* Exposure Class XD3 *
. 3 - Corrosion induced by chlorides
. Cyclic wet and dry
* Relative Humidity* 55 %
Geometric mechanical properties.
.LOAD 1ø PHASE (Cast in place concrete) 6
.LOAD 2ø PHASE (perm.) 8
.LOAD 2ø PHASE (var.) 12
.HEIGHT Cast in place concrete 20
.Charact.Cubic Strength. in place concrete 300
.WIDTH (Cast in place concrete) 120
.DESIGN LENGHT 2570
.EFFECTIVE LENGHT 2600
.SUPERIOR CONVENTIONAL REINFORCING BARS 5
.SUPERIOR BARS DISTANCE FORM SUP. BORDER 5
.INFERIOR CONVENTIONAL REINFORCING BARS 8
.INFERIOR BARS DISTANCE FORM INF. BORDER 6
.CANTILEVER FINAL MOMENT 15
.MAX CANTILEVER TRANSPORT-HOISTING 150
.MAX STRESS BARS CRACKING (1600-4500) 2200
.like previewed by UNI ENV 1992-1-1 table 4.11
Materials properties
.Rck= 550.00 Rckj= 400.00 Fck= 456.50 Fckj= 332.00
.Fctmf= 46.72 Fctk= 50.62 Fctmi= 37.78 Fctkj= 40.93
.Fyk= 4290.23 Ftk= 5387.73 Fpk= 18629.19 Fp1k= 16665.08
.Jack tension= 14018.27 losses % 1000H = 2.20 losses % 5000H = 2.80
.T_RCAEC2 E-MAIL studio@engisoft.org WEB www.engisoft.org

.T_RCAEC2 ENGISOFT-ing.F.PINARDI-DESENZANO (BS) tel 030-9912152

BENDING verifications

INITIAL				MOMENT			

STRESS MAX.=		.6*Fckj=		CONCRETE		BARS	
		199.20		.7*Ftk=		3771.41	

DISTANCE	STRESS SUP.	STRESS INF.	STRESS SUP.	STRESS INF.	BARS sup	BENDING	

1300.00	54.47	154.00	342.97	868.05	0.10	1.078E+07	
1190.00	54.14	154.37	341.23	869.98	0.10	1.072E+07	
1080.00	52.91	155.74	334.71	877.18	0.10	1.050E+07	
970.00	50.78	158.12	323.41	889.67	0.10	1.013E+07	
860.00	47.74	161.50	307.33	907.44	0.10	9.600E+06	
750.00	43.80	165.88	286.48	930.50	0.10	8.911E+06	
640.00	38.96	171.28	260.84	958.84	0.10	8.063E+06	
530.00	33.22	177.67	230.42	992.47	0.10	7.058E+06	
510.00	32.08	178.95	224.37	999.15	0.10	6.858E+06	
400.00	28.39	170.56	201.66	951.66	0.10	5.666E+06	
310.00	22.14	177.57	168.57	988.53	0.10	4.573E+06	
200.00	16.83	170.86	137.24	949.81	0.10	3.094E+06	
150.00	12.66	175.56	115.14	974.51	0.68	2.370E+06	
110.00	9.21	179.46	96.91	995.03	0.55	1.766E+06	

HOISTING				AND TRANSPORT			

STRESS MAX.=		.6*Fckj=		CONCRETE		BARS	
		199.20		.7*Ftk=		3771.41	

DISTANCE	STRESS SUP.	STRESS INF.	STRESS SUP.	STRESS INF.	BARS sup	BENDING	

1300.00	48.65	160.48	312.15	902.12	0.10	9.759E+06	
1190.00	48.13	161.06	309.40	905.15	0.10	9.668E+06	
1080.00	46.57	162.80	301.16	914.27	0.10	9.396E+06	
970.00	43.98	165.69	287.42	929.46	0.10	8.942E+06	
860.00	40.35	169.73	268.18	950.73	0.10	8.306E+06	
750.00	35.68	174.94	243.44	978.07	0.10	7.488E+06	
640.00	29.97	181.29	213.21	1011.49	0.10	6.489E+06	
530.00	23.23	188.81	177.48	1050.99	0.10	5.308E+06	
510.00	21.89	190.30	170.39	1058.82	0.10	5.074E+06	
400.00	17.02	183.31	141.48	1018.72	0.10	3.678E+06	
310.00	9.72	191.51	102.81	1061.81	0.10	2.402E+06	
200.00	2.98	186.51	63.95	1032.13	0.10	6.756E+05	
150.00	-1.86	191.98	38.32	1060.89	0.68	-1.689E+05	
110.00	-1.41	191.47	40.69	1058.23	0.55	-9.084E+04	

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.|          |          rare load condition = Gk + Qk          |
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.|          |          CONCRETE          |          BARS          |          |
.|STRESS MAX.=          0.5*Fck=228.25          .7*Ftk=3771.41          |
-----
.|  DISTANCE |  STRESS |  STRESS |  STRESS |  STRESS |  BARS |  MOMENT  ||
.|          |  SUP.   |  INF.   |  SUP.   |  INF.   |  inf. |          |
-----
.  1300.00   126.81   -15.38   600.09   -39.62   0.10   3.225E+07
.  1190.00   125.84   -14.11   595.77   -33.88   0.10   3.201E+07
.  1080.00   122.95   -10.31   582.80   -16.69   0.10   3.130E+07
.   970.00   118.12    -3.97   561.18    11.92   0.10   3.012E+07
.   860.00   111.35    4.89   530.92    51.97   0.10   2.846E+07
.   750.00   102.66   16.29   492.02   103.46   0.10   2.634E+07
.   640.00    92.03   30.22   444.47   166.38   0.10   2.374E+07
.   530.00    79.47   46.68   388.27   240.73   0.10   2.067E+07
.   510.00    76.98   49.94   377.12   255.48   0.10   2.006E+07
.   400.00    64.41   60.48   319.58   301.90   0.10   1.643E+07
.   310.00    50.80   78.51   258.71   383.38   0.10   1.311E+07
.   200.00    34.73   93.76   185.56   451.10   0.10   8.616E+06
.   150.00    25.68  105.85   145.08   505.74   0.10   6.419E+06
.   110.00    18.18  115.89   111.59   551.16   0.10   4.592E+06
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.|  DISTANCE |first PHASE(place concrete+løper.)|
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.|          |  STRESS SUP. |  STRESS INF. |  MOMENT  |
-----
.  1.3000E+03  8.4360E+01  7.2614E+01  1.5733E+07
.  1.1900E+03  8.3705E+01  7.3241E+01  1.5618E+07
.  1.0800E+03  8.1740E+01  7.5110E+01  1.5272E+07
.   9.7000E+02  7.8465E+01  7.8221E+01  1.4695E+07
.   8.6000E+02  7.3880E+01  8.2573E+01  1.3888E+07
.   7.5000E+02  6.7986E+01  8.8167E+01  1.2851E+07
.   6.4000E+02  6.0781E+01  9.5003E+01  1.1582E+07
.   5.3000E+02  5.2267E+01  1.0308E+02  1.0084E+07
.   5.1000E+02  5.0578E+01  1.0468E+02  9.7864E+06
.   4.0000E+02  4.2790E+01  1.0551E+02  8.0151E+06
.   3.1000E+02  3.3551E+01  1.1443E+02  6.3944E+06
.   2.0000E+02  2.3396E+01  1.1748E+02  4.2040E+06
.   1.5000E+02  1.7235E+01  1.2352E+02  3.1321E+06
.   1.1000E+02  1.2145E+01  1.2853E+02  2.2403E+06
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.|  DISTANCE |second PHASE (2øper+var.)|
-----
.|          |  STRESS SUP. |  STRESS INF. |St.place concr. |  MOMENT  |
-----
.  1.3000E+03  4.2451E+01 -8.7998E+01  4.8107E+01  1.6512E+07
.  1.1900E+03  4.2140E+01 -8.7353E+01  4.7755E+01  1.6391E+07
.  1.0800E+03  4.1206E+01 -8.5418E+01  4.6697E+01  1.6028E+07
.   9.7000E+02  3.9651E+01 -8.2194E+01  4.4934E+01  1.5423E+07
.   8.6000E+02  3.7474E+01 -7.7680E+01  4.2467E+01  1.4576E+07
.   7.5000E+02  3.4674E+01 -7.1877E+01  3.9294E+01  1.3487E+07
.   6.4000E+02  3.1252E+01 -6.4784E+01  3.5416E+01  1.2156E+07
.   5.3000E+02  2.7208E+01 -5.6401E+01  3.0833E+01  1.0583E+07
.   5.1000E+02  2.6406E+01 -5.4738E+01  2.9924E+01  1.0271E+07
.   4.0000E+02  2.1622E+01 -4.5024E+01  2.4529E+01  8.4123E+06
.   3.1000E+02  1.7250E+01 -3.5920E+01  1.9569E+01  6.7113E+06

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. 2.0000E+02 1.1338E+01 -2.3718E+01 1.2876E+01 4.4123E+06
. 1.5000E+02 8.4424E+00 -1.7670E+01 9.5890E+00 3.2873E+06
. 1.1000E+02 6.0393E+00 -1.2639E+01 6.8594E+00 2.3513E+06
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.|          | quasi-permanent load = Gk + Qk * .6 |
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.|          |          CONCRETE          |          |
..|STRESS MAX.= .4 *Fck= 182.6
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.| DISTANCE | STRESS | STRESS | MOMENT | STRANDS |
.|          | SUP.   | INF.   |         | APPLIED |
-----
. 1300.00   116.62   5.74    2.828E+07 30
. 1190.00   115.73   6.85    2.807E+07 30
. 1080.00   113.06   10.19   2.745E+07 30
. 970.00    108.60   15.75   2.642E+07 30
. 860.00    102.36   23.54   2.497E+07 30
. 750.00    94.34    33.54   2.310E+07 30
. 640.00    84.53    45.77   2.082E+07 30
. 530.00    72.94    60.22   1.813E+07 30
. 510.00    70.65    63.08   1.759E+07 30
. 400.00    59.22    71.29   1.441E+07 28
. 310.00    46.66    87.13   1.149E+07 28
. 200.00    32.01    99.45   7.557E+06 26
. 150.00    23.65   110.09   5.630E+06 26
. 110.00    16.73   118.92   4.027E+06 26
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.| DISTANCE |first PHASE(place concrete+løper.)|
-----
.|          | STRESS SUP. | STRESS INF. | MOMENT |
-----
. 1.3000E+03 8.4360E+01 7.2614E+01 1.5733E+07
. 1.1900E+03 8.3705E+01 7.3241E+01 1.5618E+07
. 1.0800E+03 8.1740E+01 7.5110E+01 1.5272E+07
. 9.7000E+02 7.8465E+01 7.8221E+01 1.4695E+07
. 8.6000E+02 7.3880E+01 8.2573E+01 1.3888E+07
. 7.5000E+02 6.7986E+01 8.8167E+01 1.2851E+07
. 6.4000E+02 6.0781E+01 9.5003E+01 1.1582E+07
. 5.3000E+02 5.2267E+01 1.0308E+02 1.0084E+07
. 5.1000E+02 5.0578E+01 1.0468E+02 9.7864E+06
. 4.0000E+02 4.2790E+01 1.0551E+02 8.0151E+06
. 3.1000E+02 3.3551E+01 1.1443E+02 6.3944E+06
. 2.0000E+02 2.3396E+01 1.1748E+02 4.2040E+06
. 1.5000E+02 1.7235E+01 1.2352E+02 3.1321E+06
. 1.1000E+02 1.2145E+01 1.2853E+02 2.2403E+06
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.| DISTANCE |second PHASE (2øper+var.)|          |
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.|          | STRESS SUP. |STRESS INF|St.place concr.| MOMENT |
-----
. 1.3000E+03 3.2263E+01 -6.6878E+01 3.6561E+01 1.2549E+07
. 1.1900E+03 3.2026E+01 -6.6388E+01 3.6294E+01 1.2457E+07
. 1.0800E+03 3.1317E+01 -6.4918E+01 3.5490E+01 1.2181E+07
. 9.7000E+02 3.0135E+01 -6.2468E+01 3.4150E+01 1.1722E+07
. 8.6000E+02 2.8480E+01 -5.9037E+01 3.2275E+01 1.1078E+07
. 7.5000E+02 2.6352E+01 -5.4626E+01 2.9863E+01 1.0250E+07
. 6.4000E+02 2.3752E+01 -4.9236E+01 2.6916E+01 9.2388E+06
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. 5.3000E+02 2.0678E+01 -4.2865E+01 2.3433E+01 8.0433E+06
. 5.1000E+02 2.0069E+01 -4.1601E+01 2.2743E+01 7.8062E+06
. 4.0000E+02 1.6432E+01 -3.4218E+01 1.8642E+01 6.3933E+06
. 3.1000E+02 1.3110E+01 -2.7299E+01 1.4872E+01 5.1006E+06
. 2.0000E+02 8.6168E+00 -1.8025E+01 9.7860E+00 3.3533E+06
. 1.5000E+02 6.4162E+00 -1.3429E+01 7.2877E+00 2.4983E+06
. 1.1000E+02 4.5899E+00 -9.6053E+00 5.2131E+00 1.7870E+06
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.| CRACKING VERIFICATION Exposure Class XD3
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. Decompression: COMPRESSED SECTION LEVEL (Respect bottom )
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DISTANCE	TRANSPORT		MOMENT FINAL	
	LEVEL SUP.	LEVEL INF.	LEVEL SUP.	LEVEL INF.
1300.00	115.00	0.00	115.00	12.44
1190.00	115.00	0.00	115.00	11.60
1080.00	115.00	0.00	115.00	8.90
970.00	115.00	0.00	115.00	3.74
860.00	115.00	0.00	115.00	0.00
750.00	115.00	0.00	115.00	0.00
640.00	115.00	0.00	115.00	0.00
530.00	115.00	0.00	115.00	0.00
510.00	115.00	0.00	115.00	0.00
400.00	115.00	0.00	115.00	0.00
310.00	115.00	0.00	115.00	0.00
200.00	115.00	0.00	115.00	0.00
150.00	113.90	0.00	115.00	0.00
110.00	114.16	0.00	115.00	0.00

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. PRESTRESSING STEEL MUST REMAIN FOR 2.5 cm
. INSIDE COMPRESSED ZONE
. SATIFIED VERIFICATION
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DISTANCE	BORDER	STRESS BARS		FOR LEMBO	CRACKING	
		AREA	AREA		AREA	AREA
1300.00	SEC.COMPRESSED			SEC.COMPRESSED		
1190.00	SEC.COMPRESSED			SEC.COMPRESSED		
1080.00	SEC.COMPRESSED			SEC.COMPRESSED		
970.00	SEC.COMPRESSED			SEC.COMPRESSED		
860.00	SEC.COMPRESSED			SEC.COMPRESSED		
750.00	SEC.COMPRESSED			SEC.COMPRESSED		
640.00	SEC.COMPRESSED			SEC.COMPRESSED		
530.00	SEC.COMPRESSED			SEC.COMPRESSED		
510.00	SEC.COMPRESSED			SEC.COMPRESSED		
400.00	SEC.COMPRESSED			SEC.COMPRESSED		
310.00	SEC.COMPRESSED			SEC.COMPRESSED		
200.00	SEC.COMPRESSED			SEC.COMPRESSED		
150.00	SUP.	0.28	0.68	1973.72	SEC.COMPRESSED	
110.00	SUP.	0.22	0.55	1983.38	SEC.COMPRESSED	

see Table 4.11 and 4.12 point 4.4.2.3 EC2

PRESTRESSING			STEEL			
DISTANCE	MOMENT	INITIAL	RARE LOAD	CONDITION		
	STRESS var.	bar.Strands	STRESS var.	bar.Str.	Dbi Str.	N.Str.
1300.00	13078.18	140.67	10461.94	55.14	28.00	30
1190.00	13076.43	140.88	10451.69	55.96	28.00	30
1080.00	13069.87	141.68	10420.19	58.42	28.00	30
970.00	13058.50	143.07	10367.44	62.52	28.00	30
860.00	13042.31	145.04	10293.45	68.24	28.00	30
750.00	13021.31	147.60	10198.21	75.60	28.00	30
640.00	12995.51	150.74	10081.72	84.60	28.00	30
530.00	12964.89	154.47	9943.98	95.23	28.00	30
510.00	12958.80	155.21	9916.66	97.34	28.00	30
400.00	13007.54	146.47	10030.17	98.38	28.93	28
310.00	12973.45	150.55	9878.28	109.96	28.93	28
200.00	13012.25	142.82	9949.54	114.01	30.00	26
150.00	12989.01	145.53	9846.96	121.72	30.00	26
110.00	12969.69	147.80	9761.64	128.14	30.00	26

PRESTRESSING			LOSSES			
DISTANCE	Immediate	shrinkage	creep	relaxation	Comb.tot.	Loads
1300.00	300.09	817.00	1834.64	163.94	2780.19	447.76
1190.00	300.09	817.00	1842.19	163.94	2787.65	444.00
1080.00	300.09	817.00	1864.63	163.94	2809.81	433.67
970.00	300.09	817.00	1901.96	163.94	2846.67	416.79
860.00	300.09	817.00	1954.18	163.94	2898.23	393.34
750.00	300.09	817.00	2021.29	163.94	2964.49	363.34
640.00	300.09	817.00	2103.29	163.94	3045.46	326.77
530.00	300.09	817.00	2200.17	163.94	3141.13	283.64
510.00	300.09	817.00	2219.39	163.94	3160.10	275.09
400.00	300.09	817.00	2139.24	163.94	3083.54	225.36
310.00	300.09	817.00	2244.91	163.94	3187.98	178.61
200.00	300.09	817.00	2190.73	163.94	3137.06	116.06
150.00	300.09	817.00	2261.23	163.94	3206.79	85.03
110.00	300.09	817.00	2319.89	163.94	3264.82	59.21

BOW HEIGHT						
MOMENT INITIAL			MOMENT FINAL			
self-weight	prestress	TOTAL	PERM.+s-weight	VARIABLE	TOTAL	

-2.2426E+00 4.7068E+00 2.4642E+00 4.7902E-01 -1.1154E+00 7.0488E-01
 Kvisc= 3.8
 Length/Bow Ist.= 4085.63 >=1000 Length/Bow inf.= 1794.992 >=500

*** BENDING ULTIMATE LIMIT STATES

DISTANCE	ELONG%. PRECAST	ELONG%. STRANDS	ELONG%. p.concr.	ELONG%. BARS SUP.	ELONG%. BARS INF.	DIST n-n SUP.BORDER	Mr/Md >1
Md = 1.4 * Mpp + 1.4 * Mper + 1.5 * Mvar							
1300.000	1.492	14.979	3.500	0.930	10.759	13.274	1.220
1190.000	1.490	14.977	3.500	0.928	10.763	13.254	1.227
1080.000	1.483	14.971	3.500	0.921	10.773	13.192	1.252
970.000	1.497	14.814	3.500	0.941	10.632	13.457	1.319
860.000	1.483	14.801	3.500	0.926	10.657	13.312	1.387
750.000	1.463	14.785	3.500	0.906	10.689	13.126	1.487
640.000	1.465	14.615	3.500	0.913	10.567	13.271	1.664
530.000	1.463	14.440	3.500	0.916	10.451	13.381	1.924
510.000	1.457	14.435	3.500	0.910	10.460	13.327	1.978
400.000	1.445	14.456	3.500	0.900	10.420	13.271	2.411
310.000	1.415	14.427	3.500	0.870	10.470	12.976	2.984
200.000	1.419	14.290	3.500	0.883	10.282	13.223	4.600
150.000	1.400	14.271	3.500	0.862	10.315	13.023	6.133
110.000	1.383	14.255	3.500	0.845	10.342	12.858	8.511

*** Geometric mechanical properties sections with steel

SEC. dist.	Area	Dist.Bar.	Mom.In.	Mod.Res.	Mod.Res.	Mod.Res.
support	A	Dbi	J n-n	Wi	Ws	Wsc
1300.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
1190.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
1080.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
970.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
860.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
750.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
640.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
530.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
510.00	7.246E+03	7.758E+01	1.456E+07	1.876E+05	3.890E+05	2.535E+05
400.00	7.229E+03	7.769E+01	1.452E+07	1.868E+05	3.891E+05	2.533E+05
310.00	7.229E+03	7.769E+01	1.452E+07	1.868E+05	3.891E+05	2.533E+05
200.00	7.213E+03	7.781E+01	1.447E+07	1.860E+05	3.892E+05	2.531E+05
150.00	7.216E+03	7.782E+01	1.448E+07	1.860E+05	3.894E+05	2.532E+05
110.00	7.215E+03	7.782E+01	1.448E+07	1.860E+05	3.893E+05	2.532E+05

*** SHEAR ULTIMATE LIMIT STATES

in SUPPORT (simple reinforced concrete)

.Vsd (shear design) = 71803.56 Vrd1 (concrete)= 16781.57

.Vrd2 (crushing) = 147229.7 SPREAD STIRRUPS = 21.4437

.STIRRUPS TOTAL/ML = 32.43193 loops place concr/ML = .749437

.BARS SUPPORT (BENDS+LOOPS) 13.02714 shear from head cm 15

.STRESS BARS inferior Td/As 974.71

.FIRST PRECOMPRESSED SECTION 100 from support

.Vsd (shear design) = 66215.73 Vrd1 (concrete)= 40095.04

.Vrd2 (crushing) = 158999 TOTAL STIRRUPS/ML = 7.934592

LOOPS place concr /ML = .9574671

.T_RCAEC2 E-MAIL studio@engisoft.org WEB www.engisoft.org

LENGTH
2400 cm

.Prestressed concrete members pre-tensioned and bonded
.EUROCODE 2-DESIGN OF STRUCTURES UNI ENV 1992-1-1:
.General rules and rules for buildings Simple support Beam

.STANDARD GIRDERS
.P MAX 2000

UNIT MEASURE

UNIT FORCE : daN
UNIT LENGTH : cm

* Exposure Class XD3 *
. 3 - Corrosion induced by chlorides
. Cyclic wet and dry

* Relative Humidity* 55 %

Geometric mechanical properties.

.LOAD 1ø PHASE (Cast in place concrete)	6
.LOAD 2ø PHASE (perm.)	8
.LOAD 2ø PHASE (var.)	12
.HEIGHT Cast in place concrete	20
.Charact.Cubic Strength. in place concrete	300
.WIDTH (Cast in place concrete)	120
.DESIGN LENGHT	2370
.EFFECTIVE LENGHT	2400
.SUPERIOR CONVENTIONAL REINFORCING BARS	5
.SUPERIOR BARS DISTANCE FORM SUP. BORDER	5
.INFERIOR CONVENTIONAL REINFORCING BARS	8
.INFERIOR BARS DISTANCE FORM INF. BORDER	6
.CANTILEVER FINAL MOMENT	15
.MAX CANTILEVER TRANSPORT-HOISTING	150
.MAX STRESS BARS CRACKING (1600-4500)	2200
.like previewed by UNI ENV 1992-1-1 table	4.11

Materials properties

.Rck=	550.00	Rckj=	400.00	Fck=	456.50	Fckj=	332.00
.Fctmf=	46.72	Fctk=	50.62	Fctmi=	37.78	Fctkj=	40.93
.Fyk=	4290.23	Ftk=	5387.73	Fpk=	18629.19	Fp1k=	16665.08
.Jack tension=	14018.27	losses % 1000H =	2.20	losses % 5000H =	2.80		



.T_RCAEC2 ENGISOFT-ing.F.PINARDI-DESENZANO(BS) tel 030-9912152

.
. .

TRACING Prestressing steel 0.6" diam.

.
. .

. 1150+		
. 1000+	O 20	
. 950+	O 19	
. 900+	O 18	
. 850+	O 17	
. 800+	O 16	
. 750+	O 15	
. 700+	O 14	
. 650+	O 13	
. 600+	* 12	
. 550+	* 11	
. 500+	* 10	
. 450+	* 9	
. 400+	* 8	
. 350+	O 7	
. 300+	* 6	
. 250+	*** 5	
. 200+	***** 4	
. 150+	***000*** 3	
. 100+	000000000 2	
. 50+	1	

. @@@	THEORETICAL BARYCENTRE.....	26
. @@@	EFFECTIVE BARYCENTRE	26.04167
. @@@	NUMBER OF Prest. steel.....	24
. TOTAL WEIGHT	DaN..	31334.16
. UNIT WEIGHT	DaN/cm	13.0559
. FILE STRUCTURE.....		bia63115
. FILE PRETENSION.....		bia63135

.T_RCAEC2 ENGISOFT-ing.F.PINARDI-DESENZANO(BS) tel 030-9912152

BENDING verifications

INITIAL MOMENT						
DISTANCE	STRESS SUP.	STRESS INF.	STRESS SUP.	STRESS INF.	BARS sup	BENDING
STRESS MAX.= .6*Fckj= 199.20 .7*Ftk= 3771.41						
1200.00	41.83	129.17	266.15	726.89	0.10	9.165E+06
1090.00	41.50	129.54	264.42	728.84	0.10	9.108E+06
980.00	40.27	130.93	257.93	736.16	0.10	8.892E+06
870.00	38.15	133.34	246.66	748.84	0.10	8.519E+06
760.00	35.12	136.77	230.64	766.88	0.10	7.988E+06
650.00	31.19	141.22	209.85	790.28	0.10	7.298E+06
540.00	26.36	146.69	184.29	819.05	0.10	6.451E+06
460.00	22.28	151.31	162.72	843.35	0.10	5.735E+06
350.00	19.00	141.86	141.98	790.13	0.10	4.615E+06
285.00	14.80	146.66	119.76	815.36	0.10	3.879E+06
175.00	10.06	138.65	91.28	769.65	1.35	2.508E+06
150.00	8.13	140.85	81.06	781.24	2.27	2.174E+06
110.00	5.00	144.47	64.52	800.28	2.08	1.623E+06

HOISTING AND TRANSPORT						
DISTANCE	STRESS SUP.	STRESS INF.	STRESS SUP.	STRESS INF.	BARS sup	BENDING
STRESS MAX.= .6*Fckj= 199.20 .7*Ftk= 3771.41						
1200.00	35.80	135.99	234.26	762.80	0.10	8.108E+06
1090.00	35.29	136.58	231.52	765.88	0.10	8.017E+06
980.00	33.73	138.34	223.30	775.14	0.10	7.744E+06
870.00	31.14	141.27	209.61	790.56	0.10	7.290E+06
760.00	27.52	145.37	190.43	812.15	0.10	6.654E+06
650.00	22.86	150.65	165.77	839.91	0.10	5.837E+06
540.00	17.17	157.10	135.64	873.83	0.10	4.838E+06
460.00	12.38	162.53	110.28	902.38	0.10	3.997E+06
350.00	7.98	154.44	83.68	856.33	0.10	2.684E+06
285.00	3.06	160.05	57.68	885.85	0.10	1.823E+06
175.00	-2.98	153.67	22.37	848.75	1.35	2.205E+05
150.00	-5.20	156.23	10.62	862.23	2.27	-1.689E+05
110.00	-4.75	155.72	12.97	859.52	2.08	-9.084E+04

rare load condition = Gk + Qk						
DISTANCE	STRESS SUP.	STRESS INF.	STRESS SUP.	STRESS INF.	BARS inf.	MOMENT
STRESS MAX.= 0.5*Fck=228.25 .7*Ftk=3771.41						
1200.00	103.93	-10.78	492.19	-23.88	0.10	2.742E+07
1090.00	102.96	-9.48	487.89	-18.00	0.10	2.719E+07

.	980.00	100.08	-5.60	475.00	-0.41	0.10	2.648E+07
.	870.00	95.27	0.88	453.51	28.88	0.10	2.530E+07
.	760.00	88.54	9.94	423.44	69.87	0.10	2.364E+07
.	650.00	79.88	21.60	384.76	122.56	0.10	2.151E+07
.	540.00	69.30	35.84	337.50	186.96	0.10	1.892E+07
.	460.00	60.39	47.82	297.72	241.15	0.10	1.673E+07
.	350.00	48.77	56.26	244.24	277.91	0.10	1.331E+07
.	285.00	39.63	68.70	203.43	334.22	0.10	1.107E+07
.	175.00	24.91	81.25	136.12	389.55	0.10	6.905E+06
.	150.00	20.74	86.96	117.48	415.42	0.10	5.892E+06
.	110.00	13.93	96.37	87.12	458.01	0.10	4.220E+06

 .| DISTANCE |first PHASE(place concrete+løper.)|

STRESS SUP.	STRESS INF.	MOMENT		
.	1.2000E+03	6.7897E+01	6.4766E+01	1.3379E+07
.	1.0900E+03	6.7245E+01	6.5415E+01	1.3264E+07
.	9.8000E+02	6.5291E+01	6.7350E+01	1.2918E+07
.	8.7000E+02	6.2034E+01	7.0571E+01	1.2342E+07
.	7.6000E+02	5.7474E+01	7.5078E+01	1.1535E+07
.	6.5000E+02	5.1611E+01	8.0872E+01	1.0497E+07
.	5.4000E+02	4.4446E+01	8.7951E+01	9.2290E+06
.	4.6000E+02	3.8416E+01	9.3907E+01	8.1619E+06
.	3.5000E+02	3.1282E+01	9.3105E+01	6.4954E+06
.	2.8500E+02	2.5083E+01	9.9349E+01	5.4023E+06
.	1.7500E+02	1.5854E+01	1.0045E+02	3.3691E+06
.	1.5000E+02	1.3012E+01	1.0335E+02	2.8748E+06
.	1.1000E+02	8.3948E+00	1.0811E+02	2.0592E+06

 .| DISTANCE |second PHASE (2øper+var.)|

STRESS SUP.	STRESS INF.	St.place concr.	MOMENT		
.	1.2000E+03	3.6028E+01	-7.5550E+01	4.0940E+01	1.4042E+07
.	1.0900E+03	3.5718E+01	-7.4899E+01	4.0588E+01	1.3921E+07
.	9.8000E+02	3.4787E+01	-7.2946E+01	3.9529E+01	1.3558E+07
.	8.7000E+02	3.3234E+01	-6.9691E+01	3.7765E+01	1.2953E+07
.	7.6000E+02	3.1061E+01	-6.5134E+01	3.5296E+01	1.2106E+07
.	6.5000E+02	2.8267E+01	-5.9275E+01	3.2121E+01	1.1017E+07
.	5.4000E+02	2.4852E+01	-5.2114E+01	2.8240E+01	9.6863E+06
.	4.6000E+02	2.1979E+01	-4.6088E+01	2.4975E+01	8.5663E+06
.	3.5000E+02	1.7489E+01	-3.6849E+01	1.9896E+01	6.8173E+06
.	2.8500E+02	1.4546E+01	-3.0648E+01	1.6547E+01	5.6700E+06
.	1.7500E+02	9.0591E+00	-1.9201E+01	1.0320E+01	3.5360E+06
.	1.5000E+02	7.7233E+00	-1.6383E+01	8.8004E+00	3.0173E+06
.	1.1000E+02	5.5332E+00	-1.1735E+01	6.3046E+00	2.1613E+06

 .| | quasi-permanent load = Gk + Qk * .6 |

 .| | CONCRETE |
 ..|STRESS MAX.= .4 *Fck= 182.6

DISTANCE	STRESS SUP.	STRESS INF.	MOMENT	STRANDS APPLIED	
.	1200.00	95.28	7.35	2.405E+07	24

.	1090.00	94.39	8.49	2.384E+07	24
.	980.00	91.73	11.91	2.322E+07	24
.	870.00	87.29	17.61	2.219E+07	24
.	760.00	81.08	25.58	2.074E+07	24
.	650.00	73.09	35.82	1.887E+07	24
.	540.00	63.33	48.34	1.659E+07	24
.	460.00	55.12	58.88	1.467E+07	24
.	350.00	44.57	65.10	1.168E+07	22
.	285.00	36.14	76.06	9.712E+06	22
.	175.00	22.74	85.85	6.056E+06	20
.	150.00	18.88	90.89	5.168E+06	20
.	110.00	12.60	99.19	3.702E+06	20

.| DISTANCE |first PHASE(place concrete+løper.)|

.	STRESS SUP.	STRESS INF.	MOMENT	
.	1.2000E+03	6.7897E+01	6.4766E+01	1.3379E+07
.	1.0900E+03	6.7245E+01	6.5415E+01	1.3264E+07
.	9.8000E+02	6.5291E+01	6.7350E+01	1.2918E+07
.	8.7000E+02	6.2034E+01	7.0571E+01	1.2342E+07
.	7.6000E+02	5.7474E+01	7.5078E+01	1.1535E+07
.	6.5000E+02	5.1611E+01	8.0872E+01	1.0497E+07
.	5.4000E+02	4.4446E+01	8.7951E+01	9.2290E+06
.	4.6000E+02	3.8416E+01	9.3907E+01	8.1619E+06
.	3.5000E+02	3.1282E+01	9.3105E+01	6.4954E+06
.	2.8500E+02	2.5083E+01	9.9349E+01	5.4023E+06
.	1.7500E+02	1.5854E+01	1.0045E+02	3.3691E+06
.	1.5000E+02	1.3012E+01	1.0335E+02	2.8748E+06
.	1.1000E+02	8.3948E+00	1.0811E+02	2.0592E+06

.| DISTANCE |second PHASE (2øper+var.)|

.	STRESS SUP.	STRESS INF.	St.place concr.	MOMENT	
.	1.2000E+03	2.7382E+01	-5.7418E+01	3.1115E+01	1.0672E+07
.	1.0900E+03	2.7146E+01	-5.6924E+01	3.0847E+01	1.0580E+07
.	9.8000E+02	2.6438E+01	-5.5439E+01	3.0042E+01	1.0304E+07
.	8.7000E+02	2.5258E+01	-5.2965E+01	2.8702E+01	9.8445E+06
.	7.6000E+02	2.3607E+01	-4.9502E+01	2.6825E+01	9.2008E+06
.	6.5000E+02	2.1483E+01	-4.5049E+01	2.4412E+01	8.3731E+06
.	5.4000E+02	1.8888E+01	-3.9607E+01	2.1463E+01	7.3616E+06
.	4.6000E+02	1.6704E+01	-3.5027E+01	1.8981E+01	6.5104E+06
.	3.5000E+02	1.3291E+01	-2.8006E+01	1.5121E+01	5.1811E+06
.	2.8500E+02	1.1055E+01	-2.3293E+01	1.2576E+01	4.3092E+06
.	1.7500E+02	6.8849E+00	-1.4593E+01	7.8435E+00	2.6874E+06
.	1.5000E+02	5.8697E+00	-1.2451E+01	6.6883E+00	2.2931E+06
.	1.1000E+02	4.2052E+00	-8.9190E+00	4.7915E+00	1.6426E+06


```

-----
.| CRACKING VERIFICATION                               Exposure Class   XD3
-----
. Decompression: COMPRESSED SECTION LEVEL (Respect bottom )
-----
.| DISTANCE      |          TRANSPORT          |          MOMENT FINAL      |
-----
.|              | LEVEL SUP. | LEVEL INF. | LEVEL SUP. | LEVEL INF. |
-----
.      1200.00    115.00      0.00        115.00      10.81
.      1090.00    115.00      0.00        115.00       9.70
.      980.00     115.00      0.00        115.00       6.09
.      870.00     115.00      0.00        115.00       0.00
.      760.00     115.00      0.00        115.00       0.00
.      650.00     115.00      0.00        115.00       0.00
.      540.00     115.00      0.00        115.00       0.00
.      460.00     115.00      0.00        115.00       0.00
.      350.00     115.00      0.00        115.00       0.00
.      285.00     115.00      0.00        115.00       0.00
.      175.00     112.82      0.00        115.00       0.00
.      150.00     111.30      0.00        115.00       0.00
.      110.00     111.59      0.00        115.00       0.00

```

. PRESTRESSING STEEL MUST REMAIN FOR 2.5 cm
INSIDE COMPRESSED ZONE
SATIFIED VERIFICATION

```

-----
.| VERIFICATION      STRESS      BARS      FOR      CRACKING      |
-----
.|              |          TRANSPORT          |          MOMENT FINAL      |
-----
.|DISTANCE  |BORDER  AREA      AREA  STRESS |LEMBO  AREA      AREA  STRESS
|
.|DISTANCE  |          MIN.      EFFECT.      |          MIN.      EFFECT.
-----
.      1200.00  SEC.COMPRESSED                                SEC.COMPRESSED
.      1090.00  SEC.COMPRESSED                                SEC.COMPRESSED
.      980.00   SEC.COMPRESSED                                SEC.COMPRESSED
.      870.00   SEC.COMPRESSED                                SEC.COMPRESSED
.      760.00   SEC.COMPRESSED                                SEC.COMPRESSED
.      650.00   SEC.COMPRESSED                                SEC.COMPRESSED
.      540.00   SEC.COMPRESSED                                SEC.COMPRESSED
.      460.00   SEC.COMPRESSED                                SEC.COMPRESSED
.      350.00   SEC.COMPRESSED                                SEC.COMPRESSED
.      285.00   SEC.COMPRESSED                                SEC.COMPRESSED
.      175.00  SUP.      0.54      1.35  1953.77  SEC.COMPRESSED
.      150.00  SUP.      0.91      2.27  1942.13  SEC.COMPRESSED
.      110.00  SUP.      0.83      2.08  1944.03  SEC.COMPRESSED

```

. see Table 4.11 and 4.12 point 4.4.2.3 EC2

PRESTRESSING			STEEL				
DISTANCE	MOMENT	INITIAL	RARE LOAD	CONDITION			
	STRESS var.	bar.Strands	STRESS var.	bar.Str.	Dbi Str.	N.Str.	
1200.00	13236.82	117.09	10871.93	42.40	26.04	24	
1090.00	13235.05	117.32	10861.29	43.28	26.04	24	
980.00	13228.42	118.18	10828.52	45.89	26.04	24	
870.00	13216.92	119.66	10773.63	50.25	26.04	24	
760.00	13200.56	121.76	10696.62	56.34	26.04	24	
650.00	13179.34	124.49	10597.49	64.17	26.04	24	
540.00	13153.26	127.85	10476.24	73.74	26.04	24	
460.00	13131.24	130.69	10374.17	81.80	26.04	24	
350.00	13184.64	121.31	10509.33	82.00	27.05	22	
285.00	13161.39	124.24	10402.60	90.31	27.05	22	
175.00	13206.13	115.78	10500.24	93.28	28.25	20	
150.00	13195.25	117.12	10450.86	97.06	28.25	20	
110.00	13177.34	119.32	10369.45	103.31	28.25	20	

PRESTRESSING			LOSSES			
DISTANCE	Immediate	shrinkage	creep	relaxation	Comb.tot.	Loads
1200.00	300.09	817.00	1526.83	163.94	2481.28	401.92
1090.00	300.09	817.00	1534.89	163.94	2489.26	397.94
980.00	300.09	817.00	1558.88	163.94	2513.00	387.04
870.00	300.09	817.00	1598.81	163.94	2552.51	369.21
760.00	300.09	817.00	1654.67	163.94	2607.78	344.46
650.00	300.09	817.00	1726.47	163.94	2678.82	312.78
540.00	300.09	817.00	1814.20	163.94	2765.62	274.18
460.00	300.09	817.00	1888.01	163.94	2838.65	241.75
350.00	300.09	817.00	1793.77	163.94	2747.82	192.23
285.00	300.09	817.00	1870.07	163.94	2823.39	158.91
175.00	300.09	817.00	1799.41	163.94	2755.84	97.52
150.00	300.09	817.00	1834.24	163.94	2790.36	82.40
110.00	300.09	817.00	1891.70	163.94	2847.31	57.44

BOW HEIGHT						
MOMENT		INITIAL		MOMENT FINAL		
self-weight	prestress	TOTAL	PERM.+s-weight	VARIABLE	TOTAL	

-1.6253E+00 3.4625E+00 1.8372E+00 3.8890E-01 -8.1136E-01 6.6645E-01
 Kvisc= 3.8
 Length/Bow Ist.= 5680.94 >=1000 Length/Bow inf.= 1987.818 >=500

*** BENDING ULTIMATE LIMIT STATES

DISTANCE	ELONG%. PRECAST	ELONG%. STRANDS	ELONG%. p.concr.	ELONG%. BARS SUP.	ELONG%. BARS INF.	DIST n-n SUP.BORDER	Mr/Md >1
.Md = 1.4 * Mpp + 1.4 * Mper + 1.5 * Mvar							
. 1200.000	1.184	16.796	3.500	0.557	12.489	9.440	1.215
. 1090.000	1.182	16.795	3.500	0.555	12.493	9.421	1.224
. 980.000	1.175	16.791	3.500	0.548	12.507	9.363	1.253
. 870.000	1.164	16.785	3.500	0.536	12.529	9.265	1.304
. 760.000	1.173	16.630	3.500	0.550	12.403	9.415	1.411
. 650.000	1.152	16.619	3.500	0.529	12.442	9.239	1.535
. 540.000	1.152	16.457	3.500	0.534	12.332	9.313	1.758
. 460.000	1.156	16.297	3.500	0.543	12.214	9.425	2.005
. 350.000	1.148	16.314	3.500	0.537	12.158	9.402	2.520
. 285.000	1.126	16.300	3.500	0.515	12.199	9.212	2.999
. 175.000	1.110	16.313	3.500	0.502	12.158	9.123	4.805
. 150.000	1.101	16.306	3.500	0.492	12.177	9.036	5.614
. 110.000	1.109	16.148	3.500	0.506	12.050	9.189	7.922

*** Geometric mechanical properties sections with steel

SEC. dist.	Area	Dist.Bar.	Mom.In.	Mod.Res.	Mod.Res.	Mod.Res.
support	A	Dbi	J n-n	Wi	Ws	Wsc
. 1200.00	7.196E+03	7.787E+01	1.447E+07	1.859E+05	3.898E+05	2.533E+05
. 1090.00	7.196E+03	7.787E+01	1.447E+07	1.859E+05	3.898E+05	2.533E+05
. 980.00	7.196E+03	7.787E+01	1.447E+07	1.859E+05	3.898E+05	2.533E+05
. 870.00	7.196E+03	7.787E+01	1.447E+07	1.859E+05	3.898E+05	2.533E+05
. 760.00	7.196E+03	7.787E+01	1.447E+07	1.859E+05	3.898E+05	2.533E+05
. 650.00	7.196E+03	7.787E+01	1.447E+07	1.859E+05	3.898E+05	2.533E+05
. 540.00	7.196E+03	7.787E+01	1.447E+07	1.859E+05	3.898E+05	2.533E+05
. 460.00	7.196E+03	7.787E+01	1.447E+07	1.859E+05	3.898E+05	2.533E+05
. 350.00	7.179E+03	7.799E+01	1.443E+07	1.850E+05	3.898E+05	2.531E+05
. 285.00	7.179E+03	7.799E+01	1.443E+07	1.850E+05	3.898E+05	2.531E+05
. 175.00	7.169E+03	7.814E+01	1.439E+07	1.842E+05	3.903E+05	2.530E+05
. 150.00	7.173E+03	7.816E+01	1.439E+07	1.842E+05	3.907E+05	2.532E+05
. 110.00	7.173E+03	7.815E+01	1.439E+07	1.842E+05	3.906E+05	2.532E+05

*** SHEAR ULTIMATE LIMIT STATES

in SUPPORT (simple reinforced concrete)
.Vsd (shear design) = 66215.73 Vrd1 (concrete)= 16203.28
.Vrd2 (crushing) = 147229.7 SPREAD STIRRUPS = 17.48159
.STIRRUPS TOTAL/ML = 27.43527 loops place concr/ML = .710794
.BARS SUPPORT (BENDS+LOOPS) 12.58476 shear from head cm 15
.STRESS BARS inferior Td/As 1099.841

FIRST PRECOMPRESSED SECTION 100 from support
.Vsd (shear design) = 60627.91 Vrd1 (concrete)= 34169.85
.Vrd2 (crushing) = 158999 TOTAL STIRRUPS/ML = 7.354041
LOOPS place concr /ML = .9037678

.T_RCAEC2 E-MAIL studio@engisoft.org WEB www.engisoft.org

LENGTH
2150 cm

.T_RCAEC2 ENGISOFT-ing.F.PINARDI-DESENZANO (BS) tel 030-9912152
.DATE (mm-gg-aa) 09-23-2008
..Prestressed concrete members pre-tensioned and bonded
.EUROCODE 2-DESIGN OF STRUCTURES UNI ENV 1992-1-1:
.General rules and rules for buildings Simple support Beam
.STANDARD GIRDERS
.P MAX 2000
UNIT MEASURE
UNIT FORCE : daN
UNIT LENGTH : cm
* Exposure Class XD3 *
. 3 - Corrosion induced by chlorides
. Cyclic wet and dry
* Relative Humidity* 55 %
Geometric mechanical properties.
.LOAD 1ø PHASE (Cast in place concrete) 6
.LOAD 2ø PHASE (perm.) 8
.LOAD 2ø PHASE (var.) 12
.HEIGHT Cast in place concrete 20
.Charact.Cubic Strength. in place concrete 300
.WIDTH (Cast in place concrete) 120
.DESIGN LENGHT 2120
.EFFECTIVE LENGHT 2150
.SUPERIOR CONVENTIONAL REINFORCING BARS 5
.SUPERIOR BARS DISTANCE FORM SUP. BORDER 5
.INFERIOR CONVENTIONAL REINFORCING BARS 8
.INFERIOR BARS DISTANCE FORM INF. BORDER 6
.CANTILEVER FINAL MOMENT 15
.MAX CANTILEVER TRANSPORT-HOISTING 150
.MAX STRESS BARS CRACKING (1600-4500) 2200
.like previewed by UNI ENV 1992-1-1 table 4.11
Materials properties
.Rck= 550.00 Rckj= 400.00 Fck= 456.50 Fckj= 332.00
.Fctmf= 46.72 Fctk= 50.62 Fctmi= 37.78 Fctkj= 40.93
.Fyk= 4290.23 Ftk= 5387.73 Fpk= 18629.19 Fp1k= 16665.08
.Jack tension= 14018.27 losses % 1000H = 2.20 losses % 5000H = 2.80
.T_RCAEC2 E-MAIL studio@engisoft.org WEB www.engisoft.org

BENDING verifications

BENDING verifications							

INITIAL				MOMENT			

STRESS MAX.=		.6*Fckj=		CONCRETE		BARS	
		199.20		.7*Ftk=		3771.41	

DISTANCE	STRESS SUP.	STRESS INF.	STRESS SUP.	STRESS INF.	BARS sup	BENDING	

1075.00	28.31	103.58	184.22	581.28	0.10	7.333E+06	
965.00	27.98	103.95	182.50	583.26	0.10	7.276E+06	
855.00	26.76	105.36	176.02	590.70	0.10	7.060E+06	
745.00	24.64	107.81	164.80	603.58	0.10	6.687E+06	
635.00	21.62	111.29	148.83	621.91	0.10	6.156E+06	
525.00	17.70	115.81	128.12	645.69	0.10	5.466E+06	
415.00	12.88	121.36	102.65	674.92	0.10	4.619E+06	
410.00	12.64	121.64	101.38	676.38	0.10	4.577E+06	
300.00	9.95	110.84	83.61	615.87	0.45	3.564E+06	
260.00	7.59	113.55	71.16	630.12	1.79	3.157E+06	
150.00	3.14	104.54	44.01	578.97	5.75	1.929E+06	
110.00	0.40	107.78	29.59	596.04	5.40	1.443E+06	

HOISTING AND TRANSPORT							

CONCRETE				BARS			
STRESS MAX.=		.6*Fckj=		.7*Ftk=			
		199.20		3771.41			

DISTANCE	STRESS SUP.	STRESS INF.	STRESS SUP.	STRESS INF.	BARS sup	BENDING	

1075.00	22.18	110.64	151.80	618.50	0.10	6.254E+06	
965.00	21.66	111.24	149.07	621.64	0.10	6.164E+06	
855.00	20.11	113.03	140.88	631.04	0.10	5.891E+06	
745.00	17.53	116.00	127.23	646.70	0.10	5.437E+06	
635.00	13.92	120.17	108.12	668.64	0.10	4.801E+06	
525.00	9.27	125.52	83.56	696.84	0.10	3.983E+06	
415.00	3.59	132.07	53.53	731.31	0.10	2.984E+06	
410.00	3.31	132.40	52.03	733.03	0.10	2.935E+06	
300.00	-0.40	122.88	28.94	679.27	0.45	1.745E+06	
260.00	-3.12	126.04	14.54	695.92	1.79	1.268E+06	
150.00	-8.69	118.53	-18.40	652.71	5.75	-1.689E+05	
110.00	-8.25	118.01	-16.09	649.96	5.40	-9.084E+04	

rare load condition = Gk + Qk							

CONCRETE				BARS			
STRESS MAX.=		0.5*Fck=228.25		.7*Ftk=3771.41			

DISTANCE	STRESS SUP.	STRESS INF.	STRESS SUP.	STRESS INF.	BARS inf.	MOMENT	

1075.00	78.54	-5.56	372.50	-5.82	0.10	2.194E+07	
965.00	77.58	-4.23	368.23	0.20	0.10	2.171E+07	
855.00	74.71	-0.25	355.42	18.22	0.10	2.100E+07	

.	745.00	69.92	6.38	334.08	48.24	0.10	1.982E+07
.	635.00	63.22	15.66	304.20	90.25	0.10	1.816E+07
.	525.00	54.60	27.59	265.78	144.26	0.10	1.603E+07
.	415.00	44.07	42.17	218.82	210.26	0.10	1.344E+07
.	410.00	43.55	42.89	216.48	213.55	0.10	1.331E+07
.	300.00	33.28	48.45	168.84	237.07	0.10	1.021E+07
.	260.00	28.16	55.54	146.03	269.19	0.10	8.971E+06
.	150.00	14.84	64.98	84.68	310.23	0.10	5.233E+06
.	110.00	8.89	73.50	58.22	348.86	0.10	3.757E+06

 .| DISTANCE |first PHASE(place concrete+løper.)|

STRESS SUP.	STRESS INF.	MOMENT		
.	1.0750E+03	4.9767E+01	5.5496E+01	1.0706E+07
.	9.6500E+02	4.9119E+01	5.6169E+01	1.0590E+07
.	8.5500E+02	4.7176E+01	5.8176E+01	1.0244E+07
.	7.4500E+02	4.3938E+01	6.1518E+01	9.6680E+06
.	6.3500E+02	3.9405E+01	6.6194E+01	8.8610E+06
.	5.2500E+02	3.3577E+01	7.2205E+01	7.8234E+06
.	4.1500E+02	2.6454E+01	7.9551E+01	6.5552E+06
.	4.1000E+02	2.6100E+01	7.9916E+01	6.4921E+06
.	3.0000E+02	1.9895E+01	7.7010E+01	4.9829E+06
.	2.6000E+02	1.6420E+01	8.0627E+01	4.3769E+06
.	1.5000E+02	8.0174E+00	7.9685E+01	2.5533E+06
.	1.1000E+02	3.9926E+00	8.4056E+01	1.8329E+06

 .| DISTANCE |second PHASE (2øper+var.)|

STRESS SUP.	STRESS INF.	St.place concr.	MOMENT		
.	1.0750E+03	2.8769E+01	-6.1053E+01	3.2784E+01	1.1236E+07
.	9.6500E+02	2.8459E+01	-6.0396E+01	3.2431E+01	1.1115E+07
.	8.5500E+02	2.7530E+01	-5.8423E+01	3.1372E+01	1.0752E+07
.	7.4500E+02	2.5980E+01	-5.5136E+01	2.9607E+01	1.0147E+07
.	6.3500E+02	2.3812E+01	-5.0534E+01	2.7135E+01	9.3000E+06
.	5.2500E+02	2.1024E+01	-4.4616E+01	2.3958E+01	8.2110E+06
.	4.1500E+02	1.7616E+01	-3.7384E+01	2.0074E+01	6.8800E+06
.	4.1000E+02	1.7446E+01	-3.7024E+01	1.9881E+01	6.8138E+06
.	3.0000E+02	1.3386E+01	-2.8564E+01	1.5275E+01	5.2298E+06
.	2.6000E+02	1.1743E+01	-2.5088E+01	1.3404E+01	4.5938E+06
.	1.5000E+02	6.8250E+00	-1.4708E+01	7.8063E+00	2.6798E+06
.	1.1000E+02	4.9012E+00	-1.0559E+01	5.6055E+00	1.9238E+06

 .| | quasi-permanent load = Gk + Qk * .6 |

 .| | CONCRETE |
 ..|STRESS MAX.= .4 *Fck= 182.6

DISTANCE	STRESS SUP.	STRESS INF.	MOMENT	STRANDS APPLIED	
.	1075.00	71.63	9.10	1.924E+07	18
.	965.00	70.75	10.27	1.904E+07	18
.	855.00	68.10	13.77	1.842E+07	18
.	745.00	63.68	19.61	1.738E+07	18
.	635.00	57.50	27.79	1.593E+07	18

.	525.00	49.55	38.30	1.406E+07	18
.	415.00	39.84	51.14	1.178E+07	18
.	410.00	39.36	51.78	1.167E+07	18
.	300.00	30.07	55.30	8.957E+06	16
.	260.00	25.35	61.56	7.868E+06	16
.	150.00	13.20	68.51	4.590E+06	14
.	110.00	7.72	76.03	3.295E+06	14

 . | DISTANCE |first PHASE(place concrete+løper.) |

.		STRESS SUP.		STRESS INF.		MOMENT		
.		1.0750E+03		4.9767E+01		5.5496E+01		1.0706E+07
.		9.6500E+02		4.9119E+01		5.6169E+01		1.0590E+07
.		8.5500E+02		4.7176E+01		5.8176E+01		1.0244E+07
.		7.4500E+02		4.3938E+01		6.1518E+01		9.6680E+06
.		6.3500E+02		3.9405E+01		6.6194E+01		8.8610E+06
.		5.2500E+02		3.3577E+01		7.2205E+01		7.8234E+06
.		4.1500E+02		2.6454E+01		7.9551E+01		6.5552E+06
.		4.1000E+02		2.6100E+01		7.9916E+01		6.4921E+06
.		3.0000E+02		1.9895E+01		7.7010E+01		4.9829E+06
.		2.6000E+02		1.6420E+01		8.0627E+01		4.3769E+06
.		1.5000E+02		8.0174E+00		7.9685E+01		2.5533E+06
.		1.1000E+02		3.9926E+00		8.4056E+01		1.8329E+06

 . | DISTANCE |second PHASE (2øper+var.) |

.		STRESS SUP.		STRESS INF.		St.place concr.		MOMENT		
.		1.0750E+03		2.1864E+01		-4.6400E+01		2.4916E+01		8.5394E+06
.		9.6500E+02		2.1629E+01		-4.5901E+01		2.4648E+01		8.4474E+06
.		8.5500E+02		2.0922E+01		-4.4402E+01		2.3843E+01		8.1715E+06
.		7.4500E+02		1.9745E+01		-4.1903E+01		2.2501E+01		7.7117E+06
.		6.3500E+02		1.8097E+01		-3.8405E+01		2.0623E+01		7.0680E+06
.		5.2500E+02		1.5978E+01		-3.3908E+01		1.8208E+01		6.2404E+06
.		4.1500E+02		1.3388E+01		-2.8412E+01		1.5256E+01		5.2288E+06
.		4.1000E+02		1.3259E+01		-2.8138E+01		1.5110E+01		5.1785E+06
.		3.0000E+02		1.0174E+01		-2.1709E+01		1.1609E+01		3.9746E+06
.		2.6000E+02		8.9249E+00		-1.9067E+01		1.0187E+01		3.4913E+06
.		1.5000E+02		5.1870E+00		-1.1178E+01		5.9328E+00		2.0366E+06
.		1.1000E+02		3.7249E+00		-8.0247E+00		4.2602E+00		1.4621E+06

 . | CRACKING VERIFICATION Exposure Class XD3

 . Decompression: COMPRESSED SECTION LEVEL (Respect bottom)

.		DISTANCE		TRANSPORT		MOMENT FINAL				
.		LEVEL SUP.		LEVEL INF.		LEVEL SUP.		LEVEL INF.		
.		1075.00		115.00		0.00		115.00		7.60
.		965.00		115.00		0.00		115.00		5.94
.		855.00		115.00		0.00		115.00		0.38
.		745.00		115.00		0.00		115.00		0.00
.		635.00		115.00		0.00		115.00		0.00

.	525.00	115.00	0.00	115.00	0.00
.	415.00	115.00	0.00	115.00	0.00
.	410.00	115.00	0.00	115.00	0.00
.	300.00	114.63	0.00	115.00	0.00
.	260.00	112.22	0.00	115.00	0.00
.	150.00	107.15	0.00	115.00	0.00
.	110.00	107.49	0.00	115.00	0.00

.
 . PRESTRESSING STEEL MUST REMAIN FOR 2.5 cm
 . INSIDE COMPRESSED ZONE
 . SATISFIED VERIFICATION

VERIFICATION		STRESS		BARS		FOR		CRACKING	
		TRANSPORT						MOMENT FINAL	
DISTANCE	BORDER	AREA	AREA	STRESS	LEMBO	AREA	AREA	STRESS	
DISTANCE		MIN.	EFFECT.			MIN.	EFFECT.		
.	1075.00	SEC.COMPRESSED				SEC.COMPRESSED			
.	965.00	SEC.COMPRESSED				SEC.COMPRESSED			
.	855.00	SEC.COMPRESSED				SEC.COMPRESSED			
.	745.00	SEC.COMPRESSED				SEC.COMPRESSED			
.	635.00	SEC.COMPRESSED				SEC.COMPRESSED			
.	525.00	SEC.COMPRESSED				SEC.COMPRESSED			
.	415.00	SEC.COMPRESSED				SEC.COMPRESSED			
.	410.00	SEC.COMPRESSED				SEC.COMPRESSED			
.	300.00	SUP.	0.18	0.45	1994.60	SEC.COMPRESSED			
.	260.00	SUP.	0.72	1.79	1945.82	SEC.COMPRESSED			
.	150.00	SUP.	2.25	5.75	1893.93	SEC.COMPRESSED			
.	110.00	SUP.	2.12	5.40	1901.54	SEC.COMPRESSED			

see Table 4.11 and 4.12 point 4.4.2.3 EC2

PRESTRESSING		STEEL					
DISTANCE	MOMENT	INITIAL	RARE	LOAD	CONDITION		
	STRESS var.	bar.Strands	STRESS var.	bar.Str.	Dbi Str.	N.Str.	
.	1075.00	13397.00	93.51	11282.99	30.83	23.06	18
.	965.00	13395.21	93.76	11271.82	31.78	23.06	18
.	855.00	13388.51	94.69	11237.35	34.62	23.06	18
.	745.00	13376.88	96.31	11179.59	39.35	23.06	18
.	635.00	13360.34	98.61	11098.53	45.97	23.06	18
.	525.00	13338.88	101.60	10994.19	54.47	23.06	18
.	415.00	13312.50	105.27	10866.54	64.87	23.06	18
.	410.00	13311.18	105.45	10860.19	65.38	23.06	18
.	300.00	13371.22	95.13	11025.94	64.28	24.06	16
.	260.00	13358.17	96.90	10963.57	69.29	24.06	16
.	150.00	13409.74	87.84	11088.56	71.09	25.00	14
.	110.00	13393.86	89.97	11013.08	77.09	25.00	14

PRESTRESSING LOSSES						
DISTANCE	Immediate	shrinkage	creep	relaxation	Comb.tot.	Loads
1075.00	300.09	817.00	1218.81	163.94	2180.99	345.92
965.00	300.09	817.00	1227.61	163.94	2189.71	341.63
855.00	300.09	817.00	1253.82	163.94	2215.69	329.90
745.00	300.09	817.00	1297.45	163.94	2258.95	310.72
635.00	300.09	817.00	1358.50	163.94	2319.48	284.08
525.00	300.09	817.00	1436.96	163.94	2397.28	250.00
415.00	300.09	817.00	1532.85	163.94	2492.34	208.47
410.00	300.09	817.00	1537.62	163.94	2497.08	206.40
300.00	300.09	817.00	1423.13	163.94	2385.82	158.01
260.00	300.09	817.00	1469.41	163.94	2431.75	138.12
150.00	300.09	817.00	1382.71	163.94	2347.94	78.76
110.00	300.09	817.00	1438.24	163.94	2403.10	55.00

BOW HEIGHT					
MOMENT INITIAL			MOMENT FINAL		
self-weight	prestress	TOTAL	PERM.+s-weight	VARIABLE	TOTAL
-1.0412E+00	2.2992E+00	1.2580E+00	3.1646E-01	-5.2248E-01	6.8006E-01

Kvisc= 3.8
Length/Bow Ist.= 10435.73 >=1000 Length/Bow inf.= 2090.659 >=500

*** BENDING ULTIMATE LIMIT STATES

DISTANCE	ELONG%. PRECAST	ELONG%. STRANDS	ELONG%. p.concr.	ELONG%. BARS SUP.	ELONG%. BARS INF.	DIST n-n SUP.BORDER	Mr/Md >1
1075.000	0.785	19.138	3.500	0.071	14.782	5.497	1.190
965.000	0.783	19.138	3.500	0.068	14.788	5.479	1.201
855.000	0.799	18.993	3.500	0.091	14.650	5.639	1.263
745.000	0.787	18.991	3.500	0.078	14.678	5.548	1.329
635.000	0.770	18.988	3.500	0.060	14.718	5.420	1.435
525.000	0.772	18.840	3.500	0.067	14.613	5.472	1.639
415.000	0.770	18.689	3.500	0.069	14.518	5.490	1.967
410.000	0.769	18.689	3.500	0.067	14.521	5.480	1.984
300.000	0.767	18.696	3.500	0.069	14.439	5.495	2.598
260.000	0.754	18.693	3.500	0.055	14.468	5.397	2.936
150.000	0.743	18.699	3.500	0.048	14.406	5.348	5.036
110.000	0.728	18.696	3.500	0.032	14.442	5.231	6.948

Md = 1.4 * Mpp + 1.4 * Mper + 1.5 * Mvar

*** Geometric mechanical properties sections with steel

SEC. dist.	Area	Dist.Bar.	Mom.In.	Mod.Res.	Mod.Res.	Mod.Res.
support	A	Dbi	J n-n	Wi	Ws	Wsc
1075.00	7.146E+03	7.817E+01	1.439E+07	1.840E+05	3.906E+05	2.531E+05
965.00	7.146E+03	7.817E+01	1.439E+07	1.840E+05	3.906E+05	2.531E+05
855.00	7.146E+03	7.817E+01	1.439E+07	1.840E+05	3.906E+05	2.531E+05
745.00	7.146E+03	7.817E+01	1.439E+07	1.840E+05	3.906E+05	2.531E+05
635.00	7.146E+03	7.817E+01	1.439E+07	1.840E+05	3.906E+05	2.531E+05
525.00	7.146E+03	7.817E+01	1.439E+07	1.840E+05	3.906E+05	2.531E+05
415.00	7.146E+03	7.817E+01	1.439E+07	1.840E+05	3.906E+05	2.531E+05
410.00	7.146E+03	7.817E+01	1.439E+07	1.840E+05	3.906E+05	2.531E+05
300.00	7.131E+03	7.830E+01	1.434E+07	1.831E+05	3.907E+05	2.529E+05
260.00	7.138E+03	7.833E+01	1.434E+07	1.831E+05	3.912E+05	2.531E+05
150.00	7.141E+03	7.855E+01	1.431E+07	1.822E+05	3.926E+05	2.535E+05
110.00	7.139E+03	7.854E+01	1.431E+07	1.822E+05	3.925E+05	2.535E+05

*** SHEAR ULTIMATE LIMIT STATES

in SUPPORT (simple reinforced concrete)

.Vsd (shear design) = 59230.95 Vrd1 (concrete)= 15514.48

.Vrd2 (crushing) = 147229.7 SPREAD STIRRUPS = 12.96519

.STIRRUPS TOTAL/ML = 21.62061 loops place concr/ML = .6616765

.BARS SUPPORT (BENDS+LOOPS) 11.91754 shear from head cm 15

.STRESS BARS inferior Td/As 1245.599

.FIRST PRECOMPRESSED SECTION 100 from support

.Vsd (shear design) = 53643.13 Vrd1 (concrete)= 27264.33

.Vrd2 (crushing) = 158999 TOTAL STIRRUPS/ML = 6.628352

LOOPS place concr /ML = .8136793

.T_RCAEC2 E-MAIL studio@engisoft.org WEB www.engisoft.org

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