TYPE 200 T. BEAM

DESIGN OF PRESTRESS CONCRETE BASS BEAMS TYPE 2047

1. DESIGN CRITERIA

1.2 ULTIMATE LIMIT STATES

The design criteria for prestress beams will be based on serviceability limit states only. Ultimate loads can be used as a check.

1.3 SERVICEABILITY LIMIT STATES

The design of the beams are based on acceptable deflections and cracking as specified in CP110. The different classes of Tables 33,34 and 35 refer.

2. DESIGN PROCEDURE FOR SIMPLY SUPPORTED BEAMS

2.1 PROPERTIES

Type 2047 is a T-Beam with a 500mm wide flange 40 to 30 mm thick and a rib 160 mm deep and 80 to 90 mm wide.

fcu	60	N/sq mm
fci	35	N/sq mm
E	36	kN/sq mm

Table 33 0.2 Limiting crack width 0.1 or 0.2

Table 33 0 Allowed increase in stress

Table 36 0.5 Allow comp stress factor of 0.5 or 0.4 at transfer

	2047	TOPPING
Depth m	0.200	0.250
Area sq m	0.0338500	0.0518500
I m x 4	0.0001200	0.0002200
Yt m	0.0650300	0.0837700
Yb m	0.1349700	0.1662300
Zt m x 3	-0.0018453	-0.0026262
Zb m x 3	0.0008891	0.0013235
b mm	90	90
Table 14	1.20	1.1
Centroid of wires from bottom	0.037000	0.037000
e cf wires	0.097970	0.129230
d	0.163	0.213

WIRES	Dia	dx is depth from top
First (Bottom)	7 mm	dx = 176.3
Second (Middle)	7 mm	dx = 149.5
Third (Top) two	0 mm	dx = 126.0

Aps	153.94 sq mm
Fpu	-238.60 kN
fpi	-167.02 kN
fpf	-116.92 kN

2.2 TRANSFER

The Bass Beams are limited initially by transfer conditions. Modifications can be made to the reinforcing if transfer conditions are not met.

2.2.1 ASSUMPTIONS

JACK LOSS ASSUMED TO BE BETWEEN 70 AND 80 %

LOSSES DUE TO CREEP ETC ARE ASSUMED TO BE 10 %

(High initial stressing forces and low final losses give the most restriction on the design at transfer)

2.2.2 LIMITS

Allowable comp stress % fci -17.5 N/sq mm

Allowable tensile stress fti 1 N/sq mm

2.2.3 EXAMPLES (SEE APPENDIX 10)

APPENDIX 10 7m Beam 70% JACK FORCE

It can be seen that the profile of the 2047 Beam is designed for a jack loss of approx 30 %. In practice this can be seen apparent and camber observations are to be carried out with the new stressing equipment.

2.3 DESIGN OF BASS BEAMS IN POSITION PRIOR TO SCREEDING

The beams in position need only be designed to carry light working loads. Load of screed is dealt with later.

2.3.1 ASSUMPTIONS

JACK LOSS ASSUMED TO BE 70 %

LOSSES DUE TO CREEP ETC ARE ASSUMED TO BE 30 %

CRACK WIDTH 0.1

DESIGN CLASS 3

LIVE LOADS TO BE CARRIED PRIOR TO SCREEDING 1 kN/sq m

2.3.2 LIMITS

Allowable comp stress - 19.8 N/sq mm

Allowable tensile stress 0.0 N/sq mm Allow max 15

Not applicable

2.3.3 EXAMPLES (SEE APPENDIX 11)

APPENDIX 11 9.4 m Beam

The 2047 should not in general cases be longer than 9.4m as propping may be required.

2.4 DESIGN OF BASS BEAMS DURING SCREEDING

The beams are designed unpropped to carry the weight of the screeding.

2.4.1 ASSUMPTIONS

JACK LOSS ASSUMED TO BE 70 %

LOSSES DUE TO CREEP ETC ARE ASSUMED TO BE 30 %

CRACK WIDTH 0.2

DESIGN CLASS 3

2.4.2 LIMITS

Allowable comp stress -19.8 N/sq mm

Allowable tensile stress 6.9 N/sq mm Allow max 15

Not applicable

2.4.3 EXAMPLES (SEE APPENDIX 12)

APPENDIX 12 9 m Beam

A live load of 1kN/sq m was used as well as the weight of the wet concrete. Any spans beyond 9 m will need an individual design check.

2.5 DESIGN OF BASS BEAMS WITH LIVE LOADS

The beams are designed with UDL only to give an indication of its Load-span capabilities. Each case needs to be separately checked for specific loadings.

2.5.1 ASSUMPTIONS

JACK LOSS ASSUMED TO BE 70 %

LOSSES DUE TO CREEP ETC ARE ASSUMED TO BE 30 %

CRACK WIDTH 0.2

DESIGN CLASS 3

2.5.2 LIMITS

Allowable comp stress -19.8 N/sq mm

Allowable tensile stress 6.9 N/sq mm Allow max 15

Not applicable

2.5.3 EXAMPLES (SEE APPENDIX 13 AND 14)

APPENDIX 13 6m Beam 7 kN/sq m LIVE LOAD

APPENDIX 14 9m Beam 1.5 kN/sq m LIVE LOAD

The limitation with Bass Beams is tension developing in the bottom fibres. The tension is well below the allowable for Class 23 with a practical limit of about 2 chosen for the load span tables.

2.6 DEFLECTIONS (SEE APPENDIX 15)

Only an approximation of deflections are possible as the true values of deflections due to losses are to date not available.

2.7 SHEAR

Extensive shear calculations indicate that shear is not a factor if the above serviceability limits for stressing and deflections are met. Individual cases can be checked conservatively using Table 5 and ignoring the additional shear resistance obtained from the prestressing.

APPENDIX 10

JOB INPUT INFORMATION		VARIABLES	
SPAN	7.0 m	BEAM DEPTH	200 mm
		SCREED	50 mm
		BOTTOM DIA	7 mm
JACK LOSS	70 % (70 TO 80%)	MIDDLE DIA	7 mm
CREEP ETC LOSS	10 % (10 TO 30 %)	TOP DIA	0 mm
CRACK WIDTH	0.2 (0.1 OR 0.2)	DESIGN CLAS	3 (1,2,3)

UDL kN/sq m			:	UDL kN/m i.e. per beam	
:	BEAM SW	0.81 kN/m			
			:	TOPPING	0.60 kN/m
FINISHES	0.0 kN/sq m		:	FINISHES	0.00 kN/m
			:		
LIVE	0.0 kN/sq m		:	LIVE	0.00 kN/m
			:	TOTAL	1.41 kN/m

POINT LOADS PER BEAM		POSITION FROM LEFT	EQUIVALENT UDL
LOAD 1	0 kN	0 m	0.00

DESIGN OF BASS BEAMS AT TRANSFER

BEAM LENGTH 7 m

SUMMARY OF LOADS AND FORCES

TOTAL SW	5.7 kN
LEFT SUPPORT	2.8 kN
RIGHT SUPPORT	2.8 kN

SPAN	Pi/A	PiE/Zit	Pie/Zib	SF*X	M SW	MOMENT
0.0	-4.9	8.9	-18.4	0.0	0.0	0.0
0.4	-4.9	8.9	-18.4	1.0	-0.0	0.9
0.7	-4.9	8.9	-18.4	2.0	-0.2	1.8
1.1	-4.9	8.9	-18.4	3.0	-0.4	2.5
1.4	-4.9	8.9	-18.4	4.0	-0.8	3.2
1.8	-4.9	8.9	-18.4	5.0	-1.2	3.7
2.1	-4.9	8.9	-18.4	6.0	-1.8	4.2
2.5	-4.9	8.9	-18.4	7.0	-2.4	4.5
2.8	-4.9	8.9	-18.4	8.0	-3.2	4.8
3.2	-4.9	8.9	-18.4	9.0	-4.0	4.9
3.5	-4.9	8.9	-18.4	10.0	-5.0	5.0
3.9	-4.9	8.9	-18.4	10.9	-6.0	4.9
4.2	-4.9	8.9	-18.4	11.9	-7.2	4.8
4.6	-4.9	8.9	-18.4	12.9	- 8.4	4.5
4.9	-4.9	8.9	-18.4	13.9	- 9.8	4.2
5.2	-4.9	8.9	-18.4	14.9.	-11.2	3.7
5.6	-4.9	8.9	-18.4	15.9	-12.7	3.2
5.9	-4.9	8.9	-18.4	16.9	-14.4	2.5
6.3	-4.9	8.9	-18.4	17.9	-16.1	1.8
6.6	-4.9	8.9	-18.4	18.9	-18.0	0.9
7.0	-4.9	8.9	-18.4	19.9	-19.9	0.0

	AFTER LOSSES					
	M/zit	M/zib	Top	Bott	Top	Bott
	0.0	0.0	3.9	-23.3	3.5	-21.0
	-0.5	1.1	3.4	-22.3	3.0	-19.9
	-1.0	2.0	3.0	-21.3	2.6	-19.0
	-1.4	2.9	2.6	-20.5	2.2	-18.2
	-1.7	3.6	2.2	-19.8	1.8	-17.4
	-2.0	4.2	1.9	-19.1	1.5	-16.8
	-2.3	4.7	1.7	-18.6	1.3	-16.3

-2.5	5.1	1.5	-18.2	1.1	-15.9
-2.6	5.4	1.3	-18.0	1.0	-15.6
-2.7	5.5	1.3	-17.8	0.9	-15.5
-2.7	5.6	1.2	-17.7	0.8	-15.4
-2.7	5.5	1.3	-17.8	0.9	-15.5
-2.6	5.4	1.3	-18.0	1.0	-15.6
-2.5	5.1	1.5	-18.2	1.1	-15.9
-2.3	4.7	1.7	-18.6	1.3	-16.3
-2.0	4.2	1.9	-19.1	1.5	-16.8
-1.7	3.6	2.2	-19.8	1.8	-17.4
-1.4	2.9	2.6	-20.5	2.2	-18.2
-1.0	2.0	3.0	-21.3	2.6	-19.0
-0.5	1.1	3.4	-22.3	3.0	-19.9
-0.0	0.0	3.9	-23.3	3.5	-21.0

Allowable comp stress % fci -17.5 N/sq mm
Allowable tensile stress ft 3.5 N/sq mm

AFTER LOSSES

TOP	3.9	N/sq mm	3.5
BOTTOM	-23.3	N/sq mm	-21.0

APPENDIX 11 **REV 1**

JOB INPUT INFORMATION — VARIABLES

SPAN	9.4 m	BEAM DEPTH	200 mm
		SCREED	0 mm
		BOTTOM DIA	7 mm
JACK LOSS	70 % (70 TO 80%)	MIDDLE DIA	7 mm
CREEP ETC LOSS	30 % (10 TO 30 %)	TOP DIA	0 mm
CRACK WIDTH	0.1 (0.1 OR 0.2)	DESIGN CLAS	1 (1,2,3)

UDL kN/sq m		:	UDL kN/m i.e. per beam		
	:	BEAM SW	0.81 kN/m		
		:	TOPPING	0.00 kN/m	
FINISHES	0.0 kN/sq m	:	FINISHES	0.00 kN/m	
		:			
LIVE	1.0 kN/sq m	:	LIVE	0.50 kN/m	
		:	TOTAL	1.31 kN/m	

DESIGN OF BASS BEAMS IN POSITION PRIOR TO SCREEDING

SPAN 9.4 m	BEAM LENGTH 9.4 m		
CENTROID OF BEAM FROM LE	4.70	RATIO L	0.50
CENTROID OF BEAM FROM RI	4.70	RATIO R	0.50

TOTAL W	12.3 kN		
LEFT SUPPORT	6.2 kN		
RIGHT SUPPORT	6.2 kN		
ALLOWABLE COMP STRESS	-19.8 N/sq mm		
ALLOWABLE TENSILE STRESS	0.0 N/sq mm	ALLOW MAX	15
MAIN TOP	2.8 N/sq mm		-5.1
SPAN BOTTOM	-16.3 N/sq mm		-0.0

SPAN	Pf/A	PfE/Zit	Pfe/Zib	SF*X	M MOMENT		
0.0	-3.5	6.2	-12.9	0.0	0.0	0.0	
0.5	-3.5	6.2	-12.9	2.9	-0.1	2.8	
0.9	-3.5	6.2	-12.9	5.8	- 0.6	5.2	
1.4	-3.5	6.2	-12.9	8.7	- 1.3	7.4	
1.9	-3.5	6.2	-12.9	11.6	- 2.3	9.3	
2.4	-3.5	6.2	-12.9	14.5	- 3.6	10.9	
2.8	-3.5	6.2	-12.9	17.4	- 5.2	12.2	
3.3	-3.5	6.2	-12.9	20.3	- 7.1	13.2	
3.8	-3.5	6.2	-12.9	23.2	- 9.3	13.9	
4.2	-3.5	6.2	-12.9	26.1	-11.7	14.4	
4.7	-3.5	6.2	-12.9	29.0	-14.5	14.5	
5.2	-3.5	6.2	-12.9	31.9	-17.5	14.4	
5.6	-3.5	6.2	-12.9	34.8	-20.9	13.9	
6.1	-3.5	6.2	-12.9	37.7	- 24.5	13.2	
6.6	-3.5	6.2	-12.9	40.6	- 28.4	12.2	
7.0	-3.5	6.2	-12.9	43.5.	-32.6	10.9	
7.5	-3.5	6.2	-12.9	46.4	-37.1	9.3	
8.0	-3.5	6.2	-12.9	49.3	-41.9	7.4	
8.5	-3.5	6.2	-12.9	52.2	-47.0	5.2	
8.9	-3.5	6.2	-12.9	55.1	-52.3	2.8	
9.4	-3.5	6.2	-12.9	58.0	-58.0	0.0	

AFTER LOSSES

M/zit	M/zib	Top	Bott
0.0	0.0	2.8	-16.3
-1.5	3.1	1.3	-13.2
-2.8	5.9	-0.1	-10.5
-4.0	8.3	-1.3	-8.0
-5.0	10.4	-2.3	-5.9
-5.9	12.2	-3.1	-4.1
-6.6	13.7	-3.8	-2.6
-7.1	14.8	-4.4	-1.5
-7.5	15.7	-4.8	-0.7
7.8	16.1	-5.0	-0.2
-7.9	16.3	-5.1	-0.0
-7.8	16.1	-5.0	-0.2
-7.5	15.7	-4.8	-0.7
-7.1	14.8	-4.4	-1.5
-6.6	13.7	-3.8	-2.6
-5.9	12.2	-3.1	-4.1
-5.0	10.4	-2.3	-5.9

-4.0	8.3	-1.3	-8.0
-2.8	5.9	-0.1	-10.5
-1.5	3.1	1.3	-13.2
-0.0	0.0	2.8	-16.3

APPENDIX 12 **REV 1**

JOB INPUT INFORMATION		VARIABLES	
SPAN	9.0 m	BEAM DEPTH	200 mm
		SCREED	50 mm
		BOTTOM DIA	7 mm
JACK LOSS	70 % (70 TO 80%)	MIDDLE DIA	7 mm
CREEP ETC LOSS	30 % (10 TO 30 %)	TOP DIA	0 mm
CRACK WIDTH	0.2 (0.1 OR 0.2)	DESIGN CLAS	3 (1,2,3)

UDL kN/sq m			:	UDL kN/m i.e. per beam	
	:	BEAM SW	0.81 kN/m		
			:	TOPPING	0.60 kN/m
FINISHES	0.0 kN/sq m		:	FINISHES	0.00 kN/m
			:		
LIVE	1.0 kN/sq m		:	LIVE	0.50 kN/m
			:	TOTAL	1.91 kN/m

DESIGN OF BASS BEAMS DURING SCREEDING

SPAN 9.0 m	BEAM LENGTH 9.0 m		
CENTROID OF BEAM FROM LE	4.50	RATIO L	0.50
CENTROID OF BEAM FROM RI	4.50	RATIO R	0.50
TOTAL SW	7.3 kN	TOTAL W 17.2 kN	
TOTAL SCREED	5.4 kN		
LEFT SUPPORT	8.6 kN		
RIGHT SUPPORT	8.6 kN		
ALLOWABLE COMP STRESS	-19.8 N/sq mm		
ALLOWABLE TENSILE STRESS	6.8 N/sq mm ALLOW MAX 15		
MAIN TOP	2.8 N/sq mm	-7.7	
SPAN BOTTOM	-16.3 N/sq mm	5.4	

SPAN	Pf/A	PfE/Zit	Pfe/Zib	SF*X	M MOMENT		
0.0	-3.5	6.2	-12.9	0.0	0.0	0.0	
0.5	-3.5	6.2	-12.9	3.9	-0.2	3.7	
0.9	-3.5	6.2	-12.9	7.7	- 0.8	7.0	
1.4	-3.5	6.2	-12.9	11.6	- 1.7	9.9	
1.8	-3.5	6.2	-12.9	15.5	- 3.1	12.4	
2.3	-3.5	6.2	-12.9	19.4	- 4.8	14.5	
2.7	-3.5	6.2	-12.9	23.2	- 7.0	16.3	
3.2	-3.5	6.2	-12.9	27.1	- 9.5	17.6	
3.6	-3.5	6.2	-12.9	31.0	- 12.4	18.6	
4.1	-3.5	6.2	-12.9	34.9	-15.7	19.2	
4.5	-3.5	6.2	-12.9	38.7	-19.4	19.4	
5.0	-3.5	6.2	-12.9	42.6	-23.4	19.2	
5.4	-3.5	6.2	-12.9	46.5	-27.9	18.6	
5.9	-3.5	6.2	-12.9	50.3	-32.7	17.6	
6.3	-3.5	6.2	-12.9	54.2	-38.0	16.3	
6.8	-3.5	6.2	-12.9	58.1	-43.6	14.5	
7.2	-3.5	6.2	-12.9	62.0	-49.6	12.4	
7.7	-3.5	6.2	-12.9	65.8	-56.0	9.9	
8.1	-3.5	6.2	-12.9	69.7	-62.7	7.0	
8.6	-3.5	6.2	-12.9	73.6	-69.9	3.7	
9.0	-3.5	6.2	-12.9	77.5	-77.5	0.0	

AFTER LOSSES

M/zit	M/zib	Top	Bott
0.0	0.0	2.8	-16.3
-2.0	4.1	0.8	-12.2
-3.8	7.8	-1.0	-8.5
-5.4	11.1	-2.6	-5.2
-6.7	13.9	-4.0	-2.4
-7.9	16.3	-5.1	-0.0
-8.8	18.3	-6.1	2.0
-9.5	19.8	-6.8	3.5
-10.1	20.9	-7.3	4.6
-10.4	21.6	-7.6	5.2
-10.5	21.8	-7.7	5.4
-10.4	21.6	-7.6	5.2
-10.1	20.9	-7.3	4.6
-9.5	19.8	-6.8	3.5
-8.8	18.3	-6.1	2.0
-7.9	16.3	-5.1	-0.0
-6.7	13.9	-4.0	-2.4
-5.4	11.1	-2.6	-5.2
-3.8	7.8	-1.0	-8.5
-2.0	4.1	0.8	-12.2
0.0	0.0	2.8	-16.3

APPENDIX 13

JOB INPUT INFORMATION		VARIABLES	
SPAN	6.0 m	BEAM DEPTH	200 mm
		SCREED	50 mm
		BOTTOM DIA	7 mm
JACK LOSS	70 % (70 TO 80%)	MIDDLE DIA	7 mm
CREEP ETC LOSS	30 % (10 TO 30 %)	TOP DIA	0 mm
CRACK WIDTH	0.2 (0.1 OR 0.2)	DESIGN CLAS	3 (1,2,3)

UDL kN/sq m		:	UDL kN/m i.e. per beam
	: BEAM SW 0.81 kN/m		
		:	TOPPING 0.60 kN/m
FINISHES	0.0 kN/sq m	:	FINISHES 0.00 kN/m
		:	
LIVE	7.0 kN/sq m	:	LIVE 3.50 kN/m
		:	TOTAL 4.91 kN/m

POINT LOADS PER BEAM		POSITION FROM LEFT	EQUIVALENT UDL
LOAD 1	0 kN	0 m	0.00

DESIGN OF BASS BEAMS WITH LIVE LOADS

SPAN 6.0 m BEAM LENGTH 6.0 m
UDL
CENTROID OF BEAM FROM LE 3.00 RATIO L 0.50
CENTROID OF BEAM FROM RI 3.00 RATIO R 0.50
POINT LOAD 1 RATIO L 1.00
RATIO R 0.00

TOTAL SW 4.9 kN TOTAL DL 8.5 kN
TOTAL SCREED 3.6 kN TOTAL LL 21.0 kN
TOTAL FINISHES 0.0 kN TOTAL 29.5 kN
TOTAL LIVE LOAD 21.0 kN
LEFT SUPPORT 4.2 10.5 0.0 14.7 kN
RIGHT SUPPORT 4.2 10.5 0.0 14.7 kN

SPAN	Pf/A	PfE/Zit	Pfe/Zib	SF*X	M SW	POINT		
0.0	-2.3	5.8	-11.4		0.0	0.0	0.0	
0.3	-2.3	5.8	-11.4		4.4	-0.2	0.0	
0.6	-2.3	5.8	-11.4		8.8	-0.9	0.0	
0.9	-2.3	5.8	-11.4		13.3	-2.0	0.0	
1.2	-2.3	5.8	-11.4		17.7	-3.5	0.0	
1.5	-2.3	5.8	-11.4		22.1	-5.5	0.0	
1.8	-2.3	5.8	-11.4		26.5	-8.0	0.0	
2.1	-2.3	5.8	-11.4		30.9	-10.8	0.0	
2.4	-2.3	5.8	-11.4		35.4	-14.1	0.0	
2.7	-2.3	5.8	-11.4		39.8	-17.9	0.0	
3.0	-2.3	5.8	-11.4		44.2	-22.1	0.0	
3.3	-2.3	5.8	-11.4		48.6	-26.7	0.0	
3.6	-2.3	5.8	-11.4		53.1	-31.8	0.0	
3.9	-2.3	5.8	-11.4		57.5	-37.4	0.0	
4.2	-2.3	5.8	-11.4		61.9	-43.3	0.0	
4.5	-2.3	5.8	-11.4		66.3.	-49.7	0.0	
4.8	-2.3	5.8	-11.4		70.7	-56.6	0.0	
5.1	-2.3	5.8	-11.4		75.2	-63.9	0.0	
5.4	-2.3	5.8	-11.4		79.6	-71.6	0.0	
5.7	-2.3	5.8	-11.4		84.0	-79.8	0.0	
6.0	-2.3	5.8	-11.4		88.4	-88.4	0.0	

AFTER LOSSES

MPT	MOMENT	M/ZFT	M/ZFB	TOP	BOTT
0.0	0.0	0.0	0.0	3.5	-13.7
0.0	4.2	-1.6	3.2	1.9	-10.5
0.0	8.0	-3.0	6.0	0.5	-7.7
0.0	11.3	-4.3	8.5	-0.8	-5.2
0.0	14.1	-5.4	10.7	-1.9	-3.0
0.0	16.6	-6.3	12.5	-2.8	-1.1
0.0	18.6	-7.1	14.0	-3.6	0.4
0.0	20.1	-7.7	15.2	-4.2	1.5
0.0	21.2	-8.1	16.0	-4.6	2.4
0.0	21.9	-8.3	16.5	-4.8	2.9
0.0	22.1	-8.4	16.7	-4.9	3.0
0.0	21.9	-8.3	16.5	-4.8	2.9
0.0	21.2	-8.1	16.0	-4.6	2.4
0.0	20.1	-7.7	15.2	-4.2	1.5
0.0	18.6	-7.1	14.0	-3.6	0.4
0.0	16.6	-6.3	12.5	-2.8	-1.1
0.0	14.1	-5.4	10.7	-1.9	-3.0
0.0	11.3	-4.3	8.5	-0.8	-5.2
0.0	8.0	-3.0	6.0	0.5	-7.7
0.0	4.2	-1.6	3.2	1.9	-10.5
0.0	0.0	-0.0	0.0	3.5	-13.7

Allowable comp stress -19.8 N/sq mm
Allowable tensile stress 6.8 N/sq mm Allow max 15
MAIN TOP 3.5 N/sq mm -4.9
SPAN BOTTOM 13.7 N/sq mm 3.0

APPENDIX 14

JOB INPUT INFORMATION		VARIABLES	
SPAN	9.0 m	BEAM DEPTH	200 mm
		SCREED	50 mm
		BOTTOM DIA	7 mm
JACK LOSS	70 % (70 TO 80%)	MIDDLE DIA	7 mm
CREEP ETC LOSS	30 % (10 TO 30 %)	TOP DIA	0 mm
CRACK WIDTH	0.2 (0.1 OR 0.2)	DESIGN CLAS	3 (1,2,3)

UDL kN/sq m		:	UDL kN/m i.e. per beam
	: BEAM SW 0.81 kN/m		

		:	TOPPING	0.60 kN/m
FINISHES	0.0 kN/sq m	:	FINISHES	0.00 kN/m
		:		
LIVE	1.5 kN/sq m	:	LIVE	0.75 kN/m
		:	TOTAL	2.16 kN/m

POINT LOADS PER BEAM		POSITION FROM LEFT	EQUIVALENT UDL
LOAD 1	0 kN	0 m	0.00

DESIGN OF BASS BEAMS WITH LIVE LOADS

SPAN 9.0 m	BEAM LENGTH 9.0 m		
CENTROID OF BEAM FROM LE	4.50	RATIO L	0.50
CENTROID OF BEAM FROM RI	4.50	RATIO R	0.50
POINT LOAD 1		RATIO L	1.00
		RATIO R	0.00

TOTAL SW	7.3 kN	TOTAL DL	12.7 kN	
TOTAL SCREED	5.4 kN	TOTAL LL	6.8 kN	
TOTAL FINISHES	0.0 kN	TOTAL	19.5 kN	
TOTAL LIVE LOAD	6.8 kN			
LEFT SUPPORT	6.4	3.4	0.0	9.7 kN
RIGHT SUPPORT	6.4	3.4	0.0	9.7 kN

SPAN	Pf/A	PfE/Zit	Pfe/Zib	SF*X	UDL	POINT	
0.0	-2.3	5.8	-11.4	0.0	0.0	0.0	
0.5	-2.3	5.8	-11.4	4.4	-0.2	0.0	
0.9	-2.3	5.8	-11.4	8.8	-0.9	0.0	
1.4	-2.3	5.8	-11.4	13.1	-2.0	0.0	
1.8	-2.3	5.8	-11.4	17.5	-3.5	0.0	
2.3	-2.3	5.8	-11.4	21.9	-5.5	0.0	
2.7	-2.3	5.8	-11.4	26.3	-7.9	0.0	
3.2	-2.3	5.8	-11.4	30.7	-10.7	0.0	
3.6	-2.3	5.8	-11.4	35.0	-14.0	0.0	
4.1	-2.3	5.8	-11.4	39.4	-17.7	0.0	
4.5	-2.3	5.8	-11.4	43.8	-21.9	0.0	
5.0	-2.3	5.8	-11.4	48.2	-26.5	0.0	
5.4	-2.3	5.8	-11.4	52.5	-31.5	0.0	
5.9	-2.3	5.8	-11.4	56.9	-37.0	0.0	
6.3	-2.3	5.8	-11.4	61.3	-42.9	0.0	
6.8	-2.3	5.8	-11.4	65.7.	-49.3	0.0	
7.2	-2.3	5.8	-11.4	70.7	-56.0	0.0	
7.7	-2.3	5.8	-11.4	74.4	-63.3	0.0	
8.1	-2.3	5.8	-11.4	78.8	-70.9	0.0	
8.6	-2.3	5.8	-11.4	83.2	-79.0	0.0	
9.0	-2.3	5.8	-11.4	87.6	-87.6	0.0	

AFTER LOSSES

Mpt	Moment	M/zft	M/zfb	Top	Bott
0.0	0.0	0.0	0.0	3.5	-13.7
0.0	4.2	-1.6	3.1	1.9	-10.5
0.0	7.9	-3.0	6.0	0.5	-7.7
0.0	11.2	-4.3	8.4	-0.8	-5.2
0.0	14.0	-5.3	10.6	8	-3.1
0.0	16.4	-6.3	12.4	-2.8	-1.3
0.0	18.4	-7.0	13.9	-3.5	0.2
0.0	19.9	-7.6	15.1	-4.1	1.4
0.0	21.0	-8.0	15.9	-4.5	2.2
0.0	21.7	-8.3	16.4	-4.8	2.7
0.0	21.9	-8.3	16.5	-4.8	2.9
0.0	21.7	-8.3	16.4	-4.8	2.7
0.0	21.0	-8.0	15.9	-4.5	2.2
0.0	19.9	-7.6	15.1	-4.1	1.4
0.0	18.4	-7.0	13.9	-3.5	0.2
0.0	16.4	-6.3	12.4	-2.8	-1.3
0.0	14.0	-5.3	10.6	-1.8	-3.1
0.0	11.2	-4.3	8.4	-0.8	-5.2
0.0	7.9	-3.0	6.0	0.5	-7.7
0.0	4.2	-1.6	3.1	1.9	-10.5
0.0	0.0	-0.0	0.0	3.5	-13.7

Allowable comp stress -19.8 N/sq mm
Allowable tensile stress 6.8 N/sq mm Allow max 15
MAIN TOP 3.5 N/sq mm -4.8
SPAN BOTTOM 13.7 N/sq mm 2.9

APPENDIX 15

4.3.7 DEFLECTIONS OF BEAMS

4.3.7.1 CLASS 1 AND CLASS 2 MEMBERS

Deflections may be calculated using elastic analysis

4.3.7.2 CLASS 3 MEMBERS

As per Class 1 and Class 2 if permanent load < 25 % of design imposed load

Where permanent load exceeds 25 % then Tables 7 and 8 only i.e. span/20 for effective depth

APPENDIX 15

SPAN 6.0 UDL 7

	INITIAL	FINAL
Elastic deflection due to Prestress P.e.l.l/8EI	-17	-12
Elastic deflection due to self wt 5wl^4/384EI	3	3
Elastic deflection due to topping 5wl^4/384EI		2

Elastic deflection due to UDL						14
5wl^4/384EI						
Elastic deflection due to P						0
Elastic deflect due to creep						-2
		-14 Hogging at transfer				
		-8 Prior to loading				
		5 Final deflection				
SPAN	9.0		UDL	1.5		
					INITIAL	FINAL
Elastic deflection due to Prestress					-38	-27
P.e.l.l/8EI						
Elastic deflection due to self wt					16	16
5wl^4/384EI						
Elastic deflection due to topping						12
5wl^4/384EI						
Elastic deflection due to UDL						15
5wl^4/384EI						
Elastic deflection due to P						0
Elastic deflect due to creep						-2
		-22 Hogging at transfer				
		-1 Prior to loading				
		14 Final deflection				