

TYPE 1055 FLAT BEAM

DESIGN OF PRESTRESS CONCRETE BASS BEAMS TYPE 1055 (FOR USE AS 200 TO 250 mm COMPOSITE SLAB)

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.

1.2 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 1055 is a flat soffit trapezium shaped Beam. The base width is 380 mm wide and the two sides are 100 mm and 25 mm high tapered 10 mm and 5mm outwards to give an effective width of 395 mm when laid side by side. The beam is used as a permanent shutter and topped with concrete to form a composite slab 200 to 250 mm deep.

fcu	60	N/sq mm
fci	35	N/sq mm
E	36	kN/sq mm
Pu	1550	N/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

	1055	200 mm	250 mm
Depth m	0.100	0.200	0.250
Area sq m	0.0241250	0.0760000	0.0950000
l m x 4	0.0000131	0.0002533	0.0004948
Yt m	0.065	0.100	0.125
Yb m	0.035	0.100	0.125
Zt m x 3	-0.0002026	-0.0025333	0.0039583
Zb m x 3	0.0003746	0.0025333	0.0039583
b mm	380	380	380
Table 14	1.0	1.0	1.0
Centroid of wires from bottom	0.023	0.023	0.023
e of wires	0.012	0.077	0.102
d	0.077	0.177	0.227

WIRES INFORMATION (Wires are numbered from the 100 mm edge of the beam.)

	% Stressed	Dia	Area
Wire No 1	100	5	19,63
Wire No 2	100	5	19,63
Wire No 3	100	5	19,63
Wire No 4	100	5	19,63
Wire No 5	100	5	19,63
Aps	98.17sq mm		
Fpu	-152.17 kN		
fpi	-106.52 kN		
fpf	- 95.87 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 3.5 N/sq mm

2.2.3 EXAMPLES (SEE APPENDIX 34)

APPENDIX 34 4m Beam 70 % JACK FORCE

It can be seen that the flat soffit shape of the 1055 with a large area under compression and a low eccentricity does not give the same high compression stresses achieved with the T-Beams. Stresses at transfer are therefore not critical.

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

2.4 EXAMPLES (SEE APPENDIX 35)

APPENDIX 35 4.0 m Beam

The maximum unpropped length is greater than 4 m. Closer prop centres are provided in practice to enable the beams to settle evenly for a better soffit finish.

2.5 DESIGN OF BASS BEAMS DURING SCREEDING

The beams are designed to carry the weight of screeding. Additional propping used in practice to enable the beams to settle evenly for a better finish.

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 36)

APPENDIX 36 3m 1055 Beam 250 mm Final depth

A live load of 1 kN/sq m was used as well as the weight of the wet concrete. Appendix 36 considers only the 250 mm case to determine the max propping length of 3 m.

2.6 DESIGN OF COMPOSITE SLABS 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.

2.6.1 ASSUMPTIONS

JACK LOSS ASSUMED TO BE 70 %
 LOSSES DUE TO CREEP ETC ARE ASSUMED TO BE 30 %
 CRACK WIDTH 0.2
 DESIGN CLASS 3

***** FINISHES OF 1 kN/sq m ALLOWED FOR *****

2.6.2 LIMITS

Allowable comp stress -19.8 N/sq mm
 Allowable tensile stress 6.9 N/sq mm Allow max 15
 Not applicable

2.6.3 EXAMPLES (SEE APPENDIX 37 AND 38)

APPENDIX 37 5 m 1055 - 200 mm SLAB 5 kN/sq m LIVE LOAD

APPENDIX 38 6 m 1055 - 250 mm SLAB 4 kN/sq m LIVE LOAD

The limitation with the 1055 composite slab is the high deflections and it can be seen that the tension in the bottom fibres are below the allowable.

2.7 DEFLECTIONS (SEE APPENDIX 39)

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

2.8 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 34

JOB INPUT INFORMATION

VARIABLES

SPAN	4.0 m	BEAM DEPTH	100 mm
		FINAL DEPTH	250 mm
	Dia % Stressed		
WIRE pt 1	5 100		
WIRE pt 2	5 100	BEAM SW	0.579 kN/m
WIRE pt 3	5 100		
WIRE pt 4	5 100		
WIRE pt 5	5 100		
JACK LOSS	70 % (70 TO 80%)		
CREEP ETC LOSS	10 % (10 TO 30 %)		
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	2.28 kN/m	
FINISHES	1.0 kN/sq m	FINISHES	0.38 kN/m
LIVE	2.0 kN/sq m	LIVE	0.76 kN/m
		TOTAL	3.42 kN/m

DESIGN OF BASS BEAMS AT TRANSFER

BEAM LENGTH 4 m

SUMMARY OF LOADS AND FORCES

TOTAL SW 9.1 kN
 LEFT SUPPORT 4.6 kN
 RIGHT SUPPORT 4.6 kN
 Allowable comp stress -17.5 N/sq mm
 Allowable tensile stress 3.5 N/sq mm

After losses

MAIN TOP 1.9 N/sq mm 1.8
 SPAN BOTTOM -7.9 N/sq mm -7.1

SPAN	Pi/A	PIE/Zit	Pie/Zib	SF*X	M SW	MOMENT
0.0	-4.4	6.4	-3.4	0.0	0.0	0.0
0.2	-4.4	6.4	-3.4	0.9	-0.0	0.9
0.4	-4.4	6.4	-3.4	1.8	-0.2	1.6
0.6	-4.4	6.4	-3.4	2.7	-0.4	2.3
0.8	-4.4	6.4	-3.4	3.6	-0.7	2.9
1.0	-4.4	6.4	-3.4	4.6	-1.1	3.4
1.2	-4.4	6.4	-3.4	5.5	-1.6	3.8
1.4	-4.4	6.4	-3.4	6.4	-2.2	4.1
1.6	-4.4	6.4	-3.4	7.3	-2.9	4.4
1.8	-4.4	6.4	-3.4	8.2	-3.7	4.5
2.0	-4.4	6.4	-3.4	9.1	-4.6	4.6
2.2	-4.4	6.4	-3.4	10.0	-5.5	4.5

2.4	-4.4	6.4	-3.4	10.9	-6.6	4.4
2.6	-4.4	6.4	-3.4	11.9	-7.7	4.1
2.8	-4.4	6.4	-3.4	12.8	-8.9	3.8
3.0	-4.4	6.4	-3.4	13.7	-10.3	3.4
3.2	-4.4	6.4	-3.4	14.6	-11.7	2.9
3.4	-4.4	6.4	-3.4	15.5	-13.2	2.3
3.6	-4.4	6.4	-3.4	16.4	-14.8	1.6
3.8	-4.4	6.4	-3.4	17.3	-16.5	0.9
4.0	-4.4	6.4	-3.4	18.2	-18.2	-0.0

AFTER LOSSES

	M/zit	M/zib	Top	Bott	Top	Bott
	0.0	0.0	1.9	-7.9	1.8	-7.1
	-4.3	2.3	-2.3	-5.5	-2.5	-4.8
	-8.1	4.4	-6.2	-3.5	-6.3	-2.7
	-11.5	6.2	-9.5	-1.6	-9.7	-0.9
	-14.4	7.8	-12.5	-0.1	-12.7	0.7
	-16.9	9.1	-14.9	1.3	-15.1	2.1
	-18.9	10.2	-17.0	2.4	-17.2	3.2
	-20.5	11.1	-18.5	3.2	-18.7	4.0
	-21.6	11.7	-19.7	3.8	-19.9	4.6
	-22.3	12.1	-20.3	4.2	-20.5	5.0
	-22.5	12.2	-20.6	4.3	-20.8	5.1
	-22.3	12.1	-20.3	4.2	-20.5	5.0
	-21.6	11.7	-19.7	3.8	-19.9	4.6
	-20.5	11.1	-18.5	3.2	-18.7	4.0
	-18.9	10.2	-17.0	2.4	-17.2	3.2
	-16.9	9.1	-14.9	1.3	-15.1	2.1
	-14.4	7.8	-12.5	-0.1	-12.7	0.7
	-11.5	6.2	-9.5	-1.6	-9.7	-0.9
	-8.1	4.4	-6.2	-3.5	-6.3	-2.7
	-4.3	2.3	-2.3	-5.5	-2.5	-4.8
	0.0	-0.0	1.9	-7.9	1.8	-7.1

APPENDIX 35

JOB INPUT INFORMATION

VARIABLES

SPAN	4.0 m	BEAM DEPTH	100 mm
		FINAL DEPTH	N/A
	Dia % Stressed		
Wire Pt 1	5	100	
Wire Pt 2	5	100	BEAM SW 0.579 kN/m
Wire Pt 3	5	100	
Wire Pt 4	5	100	
Wire Pt 5	0	0	
JACK LOSS	70 % (70 TO 80%)		
CREEP ETC LOSS	30 % (10 TO 30 %)		
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	0.58 kN/m	:
FINISHES	0.0 kN/sq m	FINISHES	0.00 kN/m
LIVE	1.0 kN/sq m	LIVE	0.38 kN/m
	:	TOTAL	0.96 kN/m

DESIGN OF BASS BEAMS IN POSITION PRIOR TO SCREEDING

SPAN	4.0 m	BEAM LENGTH	4.0 m
CENTROID OF BEAM FROM 2.00 RATIO L		0.50	
CENTROID OF BEAM FROM 2.00 RATIO R	0.50		
TOTAL W	3.8 kN		
LEFT SUPPORT	1.9 kN		
RIGHT SUPPORT	1.9 kN		
Allowable comp stress	% -19.8 N/sq mm		
Allowable tensile stress	6.8 N/sq mm Allow max 15		

MAIN	TOP	1.4 N/sq mm	-8.1
SPAN	BOTTOM	-5.5 N/sq mm	-0.4
	deflect		-1.7

SPAN	Pf/A	PfE/Zit	Pfe/Zib	SF*X	M SW	MOMENT
0.0	-3.1	4.5	-2.4	0.0	0.0	0.0
0.2	-3.1	4.5	-2.4	0.4	-0.0	0.4
0.4	-3.1	4.5	-2.4	0.8	-0.1	0.7
0.6	-3.1	4.5	-2.4	1.2	-0.2	1.0
0.8	-3.1	4.5	-2.4	1.5	-0.3	1.2
1.0	-3.1	4.5	-2.4	1.9	-0.5	1.4
1.2	-3.1	4.5	-2.4	2.3	-0.7	1.6
1.4	-3.1	4.5	-2.4	2.7	-0.9	1.7
1.6	-3.1	4.5	-2.4	3.1	-1.2	1.8
1.8	-3.1	4.5	-2.4	3.5	-1.6	1.9
2.0	-3.1	4.5	-2.4	3.8	-1.9	1.9
2.2	-3.1	4.5	-2.4	4.2	-2.3	1.9
2.4	-3.1	4.5	-2.4	4.6	-2.8	1.8
2.6	-3.1	4.5	-2.4	5.0	-3.2	1.7
2.8	-3.1	4.5	-2.4	5.4	-3.8	1.6
3.0	-3.1	4.5	-2.4	5.8	-4.3	1.4
3.2	-3.1	4.5	-2.4	6.1	-4.9	1.2
3.4	-3.1	4.5	-2.4	6.5	-5.5	1.0
3.6	-3.1	4.5	-2.4	6.9	-6.2	0.7
3.8	-3.1	4.5	-2.4	7.3	-6.9	0.4
4.0	-3.1	4.5	-2.4	7.7	-7.7	-0.0

AFTER LOSSES

	M/zit	M/zib	Top	Bott
	0.0	0.0	1.4	-5.5
	-1.8	1.0	-0.4	-4.5
	-3.4	1.8	-2.0	-3.7
	-4.8	2.6	-3.5	-2.9
	-6.1	3.3	-4.7	-2.2
	-7.1	3.8	-5.7	-1.7
	-8.0	4.3	-6.6	-1.2
	-8.6	4.7	-7.3	-0.8
	-9.1	4.9	-7.7	-0.6
	-9.4	5.1	-8.0	-0.4
	-9.5	5.1	-8.1	-0.4
	-9.4	5.1	-8.0	-0.4
	-9.1	4.9	-7.7	-0.6
	-8.6	4.7	-7.3	-0.8
	-8.0	4.3	-6.6	-1.2
	-7.1	3.8	-5.7	-1.7
	-6.1	3.3	-4.7	-2.2
	-4.8	2.6	-3.5	-2.9
	-3.4	1.8	-2.0	-3.7
	-1.8	1.0	-0.4	-4.5
	0.0	-0.0	1.4	-5.5

APPENDIX 36

JOB INPUT INFORMATION

VARIABLES

SPAN	3.0 m	BEAM DEPTH	100 mm
		FINAL DEPTH	0 mm
	Dia % Stressed		
WIRE pt 1	5 100		
WIRE pt 2	5 100	BEAM SW	0.579 kN/m
WIRE pt 3	5 100		
WIRE pt 4	5 100		
WIRE pt 5	5 100		
JACK LOSS	70 % (70 TO 80%)		
CREEP ETC LOSS	30 % (10 TO 30 %)		
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 0.58 kN/m
WET CONC 4.5 kN/sq m	:	WET CONC 1.71 kN/m
187.5 mm	:	
LIVE 1.0 kN/sq m	:	LIVE 0.38 kN/m
	:	TOTAL 2.67 kN/m

DESIGN OF BASS BEAMS DURING SCREEDING

SPAN	3.0 m	BEAM LENGTH	3.0 m
CENTROID OF BEAM FROM	1.50	RATIO L	0.50
CENTROID OF BEAM FROM	1.50	RATIO R	0.50
TOTAL SW	1.7 kN	TOTAL W	8.0 kN
TOTAL SCREED	0.0 kN		
LEFT SUPPORT	4.0 kN		
RIGHT SUPPORT	4.0 kN		
Allowable comp stress	-19.8 N/sq mm		
Allowable tensile stress	6.8 N/sq mm	Allow max	15
MAIN TOP	1.4 N/sq mm		-13.5
SPAN BOTTOM	-5.5 N/sq mm		2.5
			-2.7 Final deflection

SPAN	Pf/A	Pfe/Zit	Pfe/Zib	SF*X	M	MOMENT
0.0	-3.1	4.5	-2.4		0.0	0.0
0.2	-3.1	4.5	-2.4		0.6	-0.0
0.3	-3.1	4.5	-2.4		1.2	-0.1
0.5	-3.1	4.5	-2.4		1.8	-0.3
0.6	-3.1	4.5	-2.4		2.4	-0.5
0.8	-3.1	4.5	-2.4		3.0	-0.8
0.9	-3.1	4.5	-2.4		3.6	-1.1
1.1	-3.1	4.5	-2.4		4.2	-1.5
1.2	-3.1	4.5	-2.4		4.8	-1.9
1.3	-3.1	4.5	-2.4		5.4	-2.4
1.5	-3.1	4.5	-2.4		6.0	-3.0
1.6	-3.1	4.5	-2.4		6.6	-3.6
1.8	-3.1	4.5	-2.4		7.2	-4.3
1.9	-3.1	4.5	-2.4		7.8	-5.1
2.1	-3.1	4.5	-2.4		8.4	-5.9
2.2	-3.1	4.5	-2.4		9.0	-6.8
2.4	-3.1	4.5	-2.4		9.6	-7.7
2.5	-3.1	4.5	-2.4		10.2	-8.7
2.7	-3.1	4.5	-2.4		10.8	-9.7
2.8	-3.1	4.5	-2.4		11.4	-10.8
3.0	-3.1	4.5	-2.4		12.0	-12.0

AFTER LOSSES

	M/zit	M/zib	Top	Bott
	0.0	0.0	1.4	-5.5
	-2.8	1.5	-1.5	-4.0
	-5.3	2.9	-4.0	-2.6
	-7.6	4.1	-6.2	-1.4

-9.5	5.1	-8.1	-0.4
-11.1	6.0	-9.8	0.5
-12.4	6.7	-11.1	1.2
-13.5	7.3	-12.1	1.8
-14.2	7.7	-12.9	2.2
-14.7	7.9	-13.3	2.4
-14.8	8.0	-13.5	2.5
-14.7	7.9	-13.3	2.4
-14.2	7.7	-12.9	2.2
-13.5	7.3	-12.1	1.8
-12.4	6.7	-11.1	1.2
-11.1	6.0	-9.8	0.5
-9.5	5.1	-8.1	-0.4
-7.6	4.1	-6.2	-1.4
-5.3	2.9	-4.0	-2.6
-2.8	1.5	-1.5	-4.0
-0.0	0.0	1.4	-5.5

APPENDIX 37

JOB INPUT INFORMATION

VARIABLES

SPAN	5.0 m	BEAM DEPTH	100 mm
		FINAL DEPTH	200 mm
	Dia %	Stressed	
WIRE pt 1	5	100	
WIRE pt 2	5	100	BEAM SW 0.579 kN/m
WIRE pt 3	5	100	
WIRE pt 4	5	100	
WIRE pt 5	5	100	
JACK LOSS	70 % (70 TO 80%)		
CREEP ETC LOSS	30 % (10 TO 30 %)		
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
:	SLAB SW	1.82 kN/m
FINISHES	0.0 kN/sq m	FINISHES 0.0 kN/m
LIVE	5.0 kN/sq m	LIVE 1.90 kN/m
		TOTAL 3.72 kN/m

DESIGN OF BASS BEAMS WITH LIVE LOADS

SPAN	5.0 m	BEAM LENGTH	5.0 m
CENTROID OF BEAM FROM 2.50	RATIO L 0.50		
CENTROID OF BEAM FROM 2.50	RATIO R 0.50		
POINT LOAD 1	RATIO L 1.00		
	RATIO R 0.00		
TOTAL SW	9.1 kN	TOTAL DL	9.1 kN
TOTAL SCREED	0.0 kN	TOTAL LL	9.5 kN
TOTAL FINISH	0.0 kN	TOTAL	18.6 kN
TOTAL LIVE LOAD	9.5 kN		
LEFT SUPPORT	4.6	4.8	0.0 9.3 kN
RIGHT SUPPORT	4.6	4.8	0.0 9.3 kN
Allowable comp stress -19.8 N/sq mm			
Allowable tensile stress 6.9 N/sq mm Allow max 15			

MAIN TOP	1.3 N/sq mm	-3.3
SPAN BOTTOM	-3.2 N/sq mm	1.3

SPAN	Pf/A	PfE/Zit	Pfe/Zib	SF*X	M UDL
0.0	-1.0	2.3	-2.3	0.0	0.0
0.3	-1.0	2.3	-2.3	2.3	-0.1
0.5	-1.0	2.3	-2.3	4.7	-0.5
0.8	-1.0	2.3	-2.3	7.0	-1.0
1.0	-1.0	2.3	-2.3	9.3	-1.9
1.3	-1.0	2.3	-2.3	11.6	-2.9
1.5	-1.0	2.3	-2.3	14.0	-4.2
1.8	-1.0	2.3	-2.3	16.3	-5.7
2.0	-1.0	2.3	-2.3	18.6	-7.4
2.3	-1.0	2.3	-2.3	20.9	-9.4
2.5	-1.0	2.3	-2.3	23.3	-11.6
2.8	-1.0	2.3	-2.3	25.6	-14.1
3.0	-1.0	2.3	-2.3	27.9	-16.8
3.3	-1.0	2.3	-2.3	30.3	-19.7
3.5	-1.0	2.3	-2.3	32.6	-22.8
3.8	-1.0	2.3	-2.3	34.9	-26.2
4.0	-1.0	2.3	-2.3	37.2	-29.8
4.3	-1.0	2.3	-2.3	39.6	-33.6
4.5	-1.0	2.3	-2.3	41.9	-37.7
4.8	-1.0	2.3	-2.3	44.2	-42.0
5.0	-1.0	2.3	-2.3	46.6	-46.6

AFTER LOSSES

M PT	MOMENT	M/Zft	M/Zfb	Top	Bott
0.0	0.0	0.0	0.0	1.3	-3.2
0.0	2.2	-0.9	0.9	0.4	-2.4
0.0	4.2	-1.7	1.7	-0.4	-1.6
0.0	5.9	-2.3	2.3	-1.1	-0.9
0.0	7.4	-2.9	2.9	-1.7	-0.3
0.0	8.7	-3.4	3.4	-2.2	0.2

0.0	9.8	-3.9	3.9	-2.6	0.6
0.0	10.6	-4.2	4.2	-2.9	0.9
0.0	11.2	-4.4	4.4	-3.1	1.2
0.0	11.5	-4.5	4.5	-3.3	1.3
0.0	11.6	-4.6	4.6	-3.3	1.3
0.0	11.5	-4.5	4.5	-3.3	1.3
0.0	11.2	-4.4	4.4	-3.1	1.2
0.0	10.6	-4.2	4.2	-2.9	0.9
0.0	9.8	-3.9	3.9	-2.6	0.6
0.0	8.7	-3.4	3.4	-2.2	0.2
0.0	7.4	-2.9	2.9	-1.7	-0.3
0.0	5.9	-2.3	2.3	-1.1	-0.9
0.0	4.2	-1.7	1.7	-0.4	-1.6
0.0	2.2	-0.9	0.9	0.4	-2.4
0.0	0.0	0.0	0.0	1.3	-3.2

APPENDIX 38

JOB INPUT INFORMATION

VARIABLES

SPAN	6.0 m	BEAM DEPTH	100 mm
		FINAL DEPTH	250 mm
WIRE pt 1	Dia % Stressed		
WIRE pt 2	5 100		
WIRE pt 3	5 100		
WIRE pt 4	5 100		
WIRE pt 5	5 100		
JACK LOSS	70 % (70 TO 80%)		
CREEP ETC LOSS	30 % (10 TO 30 %)		
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
	:	SLAB SW 2.28 kN/m
FINISHES 0.0 kN/sq m	:	FINISHES 0.0 kN/m
LIVE 4.0 kN/sq m	:	LIVE 1.52 kN/m
	:	TOTAL 3.80 kN/m

DESIGN OF BASS BEAMS WITH LIVE LOADS

SPAN 6.0 m	BEAM LENGTH 6.0 m
UDL	
CENTROID OF BEAM FROM 3.00 RATIO L 0.50	
CENTROID OF BEAM FROM 3.00 RATIO R 0.50	
POINT LOAD 1	RATIO L 1.00
	RATIO R 0.00
TOTAL SW	13.7 kN TOTAL DL 13.7 kN
TOTAL SCREED	0.0 kN TOTAL LL 9.1 kN
TOTAL FINISH	0.0 kN TOTAL 22.8 kN
TOTAL LIVE LOAD	9.1 kN
LEFT SUPPORT	6.8 4.6 0.0 11.4 kN
RIGHT SUPPORT	6.8 4.6 0.0 11.4 kN
Allowable comp stress	-19.8 N/sq mm
Allowable tensile stress	6.8 N/sq mm Allow max 15

MAIN TOP	1.1 N/sq mm	-3.2
SPAN BOTTOM	-2.7 N/sq mm	1.6

SPAN	Pf/A	PfE/Zit	PfE/Zib	SF*X	M UDL
0.0	-0.8	1.9	-1.9		0.0
0.3	-0.8	1.9	-1.9		3.4
0.6	-0.8	1.9	-1.9		6.8
0.9	-0.8	1.9	-1.9		10.3
1.2	-0.8	1.9	-1.9		13.7
1.5	-0.8	1.9	-1.9		17.1
1.8	-0.8	1.9	-1.9		20.5
2.1	-0.8	1.9	-1.9		23.9
2.4	-0.8	1.9	-1.9		27.4
2.7	-0.8	1.9	-1.9		30.8
3.0	-0.8	1.9	-1.9		34.2
3.3	-0.8	1.9	-1.9		37.6
3.6	-0.8	1.9	-1.9		41.0
3.9	-0.8	1.9	-1.9		44.5
4.2	-0.8	1.9	-1.9		47.9
4.5	-0.8	1.9	-1.9		51.3
4.8	-0.8	1.9	-1.9		54.7
5.1	-0.8	1.9	-1.9		58.1
5.4	-0.8	1.9	-1.9		61.6
5.7	-0.8	1.9	-1.9		65.0
6.0	-0.8	1.9	-1.9		68.4

AFTER LOSSES

M PT MOMENT	M/Zft	M/Zfb	Top	Bott
0.0	0.0	0.0	1.1	-2.7
0.0	3.2	-0.8	0.3	-1.9
0.0	6.2	-1.6	-0.4	-1.2
0.0	8.7	-2.2	-1.1	-0.5
0.0	10.9	-2.8	-1.6	0.1
0.0	12.8	-3.2	-2.1	0.5
0.0	14.4	-3.6	-2.5	0.9

0.0	15.6	-3.9	3.9	-2.8	1.2
0.0	16.4	-4.1	4.1	-3.0	1.4
0.0	16.9	-4.3	4.3	-3.1	1.6
0.0	17.1	-4.3	4.3	-3.2	1.6
0.0	16.9	-4.3	4.3	-3.1	1.6
0.0	16.4	-4.1	4.1	-3.0	1.4
0.0	15.6	-3.9	3.9	-2.8	1.2
0.0	14.4	-3.6	3.6	-2.5	0.9
0.0	12.8	-3.2	3.2	-2.1	0.5
0.0	10.9	-2.8	2.8	-1.6	0.1
0.0	8.7	-2.2	2.2	-1.1	-0.5
0.0	6.2	-1.6	1.6	-0.4	-1.2
0.0	3.2	-0.8	0.8	0.3	-1.9
0.0	0.0	0.0	0.0	1.1	-2.7

APPENDIX 39

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

SPAN	UDL	UDL	UDL	UDL	UDL	INITIAL	FINAL	
5.0	5							
Elastic deflection due to Prestress							-9	-6
P.e.l./8EI								
Elastic deflection due to self wt							10	10
5wl ⁴ /384EI								
Elastic deflection due to topping								1
5wl ⁴ /384EI								
Elastic deflection due to UDL								2
5wl ⁴ /384EI								
Elastic deflection due to P								0
Elastic defect due to creep								-2
1.4 Hogging at transfer								
3.1 Prior to loading								
4.8 Final deflection								
6.0	4					INITIAL	FINAL	
Elastic deflection due to Prestress							-12	-9
P.e.l./8EI								
Elastic deflection due to self wt							21	21
5wl ⁴ /384EI								
Elastic deflection due to topping								2
5wl ⁴ /384EI								
Elastic deflection due to UDL								1
5wl ⁴ /384EI								
Elastic deflection due to P								0
Elastic defect due to creep								-2
8.4 Hogging at transfer								
11.7 Prior to loading								
13.1 Final deflection								