



**SHAY
MURTAGH**



Technical Manual

Prestressed Concrete Beams

Third Edition

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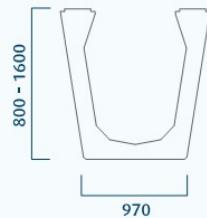
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Contents

U-Beam

Typical applications:
Medium and long span bridges.

Advantages:
Provides a ready made edge detail.
Provides easy provision for services.
Suitable for skewed deck which experience high torsion.



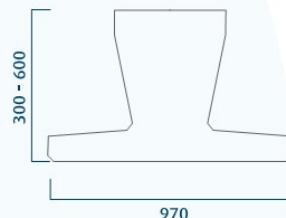
pg 1-5

Span Range (in metres)	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
------------------------	--

MY-Beam

Typical applications:
Short and Medium span bridges and commercial developments
eg. railway under bridge.

Advantages:
Provides a closely assembled soffit.
No need for formwork.
Ideal for short to medium spans that require rapid construction.



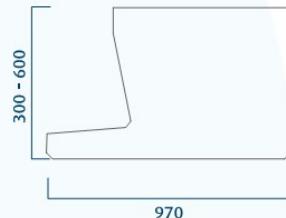
pg 6-8

Span Range (in metres)	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
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MYE-Beam

Typical applications:
Complimentary edge beam to the MY Beam.

Advantages:
The increased section properties can be used for a solid infill deck to support parpet loading.
Accomodate the installation of precast parapets to solid infill decks.



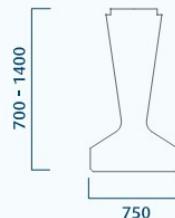
pg 9-11

Span Range (in metres)	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
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Y-Beam

Typical applications:
Medium and long span bridges and commercial development.

Advantages:
There is easy access to the underside of the structure, as the beams are spaced apart.



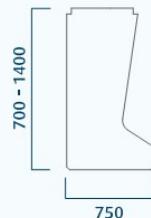
pg 12-14

Span Range (in metres)	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
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YE-Beam

Typical applications:
This is a complimentary edge beam to the 'Y' beam.

Advantages:
The YE beam offers increased section properties to support parpet loading.
Can be used for either a solid infill deck or beam and slab construction.



pg 15-17

Span Range (in metres)	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
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Contents

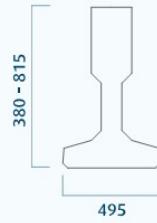
T-Beam

Typical applications:

Short and medium span bridges and commercial developments.

Advantages:

Design provides for a closely assembled soffit. There is no need for formwork.



pg 18-20

Span Range (in metres)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
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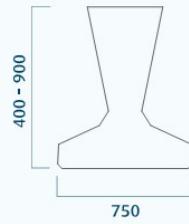
TY-Beam (available with rebate)

Typical applications:

Short and medium span bridges, commercial developments, jetties and marine decks.

Advantages:

Provides a closely assembled soffit and there is less insitu concrete. No need for formwork.



pg 21-23

Span Range (in metres)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
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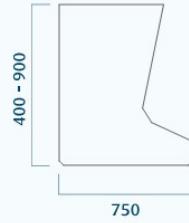
TYE-Beam (available with rebate)

Typical applications:

This beam is a complimentary edge beam to the 'TY' beam.

Advantages:

Can be used for a solid infill deck. The TYE beam offers increased section properties to support parpet loading.



pg 24-26

Span Range (in metres)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
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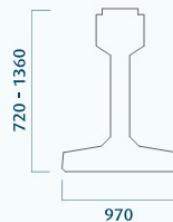
M-Beam

Typical applications:

Provides voided bridge deck for medium and long span road bridge construction.

Advantages:

Closed soffit to underside ideal for pseudo-box type construction.



pg 27-29

Span Range (in metres)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
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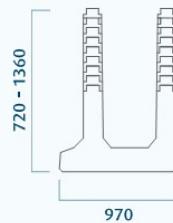
UM-Beam

Typical applications:

Complimentary edge beam to the 'M' beam.

Advantages:

Provides a clean vertical face with a variety of finishes along with a channel void for incorporation of services.



pg 30-32

Span Range (in metres)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
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Contents

Box-Beam

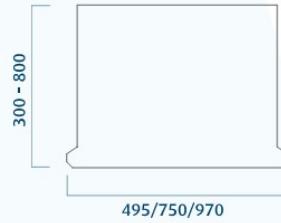
Typical applications:

Short to medium span bridges.

Ideal for use over busy railway lines.

Advantages:

Provides a quick, safe working platform.



pg 33-35

Span Range (in metres)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
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W-Beam

Typical applications:

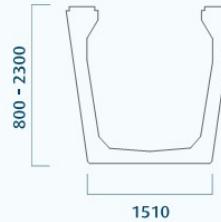
Medium and long span bridges.

Advantages:

Provides a ready made edge detail.

Provides easy provision for services.

Suitable for skewed deck which experience high torsion.



pg 36-39

Span Range (in metres)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
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Bridge Designers Checklist/Design Notes

pg 41-43

Introduction

For over forty years Shay Murtagh Precast has been to the forefront of the civil engineering industry. We are industry specialists in the design and manufacture of precast pre-stressed concrete products and our product inclusions are to Utility, Rail, Infrastructure and Commercial markets.

We believe our business is bespoke. We value each project individually. Our working partners demand the highest quality in product, reliability in service and confidence in team. All of which we deliver categorically. That successful basis has led us to work on a wide range of projects throughout the UK and Ireland with leading Main Contractors and Clients.

This is Edition Three of our Technical Manual for Pre-Stressed Concrete Beams. The first edition gave you a basis to some of our product solutions. The second edition incorporated more detail in response to suggestions from you the users, namely greater detail of the cross sectional dimensions and available strand locations for most beam types and the addition of span tables for Box Beams. The popular Bridge Designers checklist was also expanded to include more information on bridge bearings, concrete grade, the design assumptions used as the basis for the span tables and a new section on rail applications. This third edition incorporates span tables for W-Beams and refines the span tables for Y, YE, TY and TYE beams based upon more rigorous estimate calculations. The cross section details for several beams have also been improved. This is a working tool which in conjunction with our technical team can bring value engineering solutions to your project.

Contact us on: Technical@shaymurtagh.co.uk or Tel: 0844 2020263

Full listing of Bridge Beams:

T-Beams	MY-Beams	UM-Beams	TYE-Beams
TY-Beams	Y-Beams	U-Beams	W Beams
MYE-Beams	M-Beams	YE-Beams	Box Beams

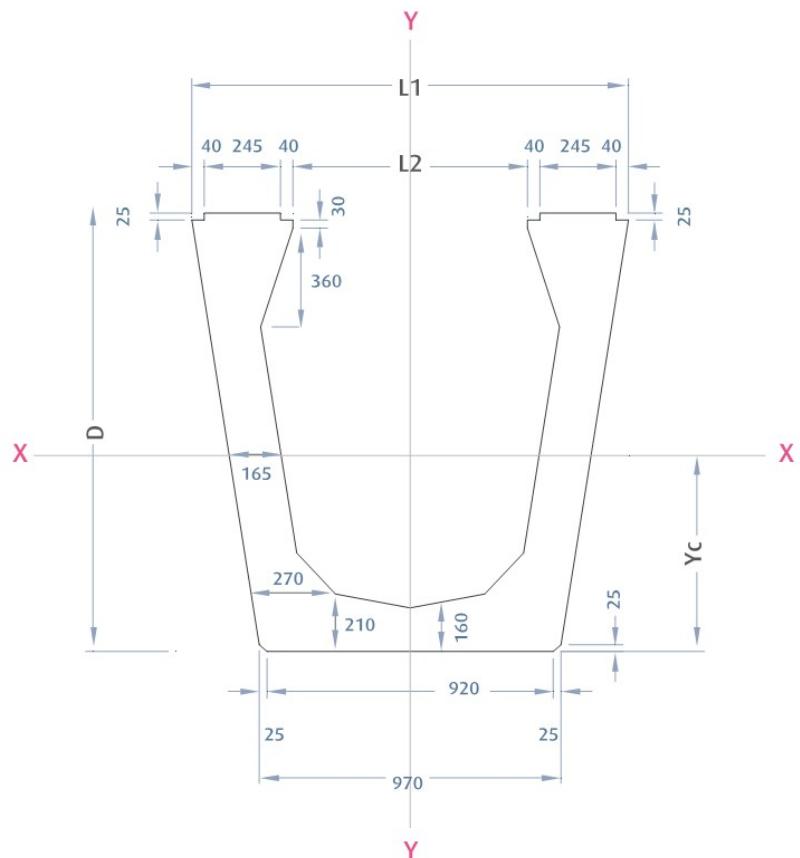


TECHNICAL MANUAL

U-Beam properties

Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Section modulus		Second moment of area	Self weight/m	Top of beam dimensions	
	D	A	Y_c	Z_t	Z_b	I_{xx}		L1	L2
	(mm)	mm^2	(mm)	($\text{mm}^3 \times 10^6$)	($\text{mm}^3 \times 10^6$)	($\text{mm}^4 \times 10^9$)	(kN/m)	(mm)	(mm)
U1	800	479470	353.4	68.2	86.19	30.459	11.99	1195	520
U3	900	510460	398.4	84.39	106.27	42.335	12.76	1208	558
U5	1000	543840	444.8	102.49	127.91	56.898	13.60	1236	586
U7	1100	577220	491.7	121.93	150.83	74.168	14.43	1264	614
U8	1200	610600	539	142.68	174.99	94.315	15.27	1292	642
U9	1300	643980	586.5	164.69	200.36	117.51	16.10	1320	670
U10	1400	677360	634.3	187.93	226.9	143.91	16.93	1348	698
U11	1500	710740	682.2	212.4	254.6	173.69	17.77	1376	726
U12	1600	744120	730.4	238.07	283.45	207.03	18.60	1404	754



U3 to U12 Beam Section Properties

TECHNICAL MANUAL

U-Beam Span Table

Shay Murtagh Precast

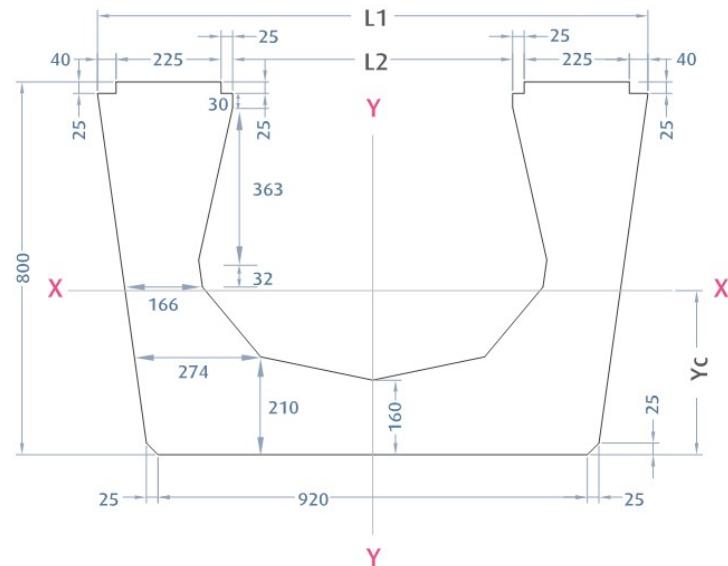
Metres	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
U1																									
U3																									
U5																									
U7																									
U8																									
U9																									
U10																									
U11																									
U12																									

Blue = 2.0mc/c

Red = 2.5mc/c

Yellow = 3.0mc/c

*See design notes for loading assumptions pg 41-43

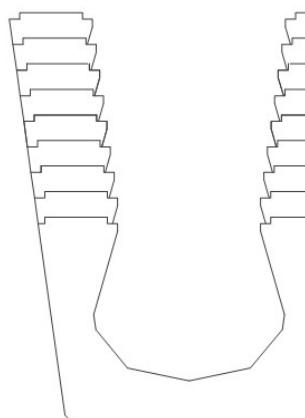


U1 Beam Section Properties

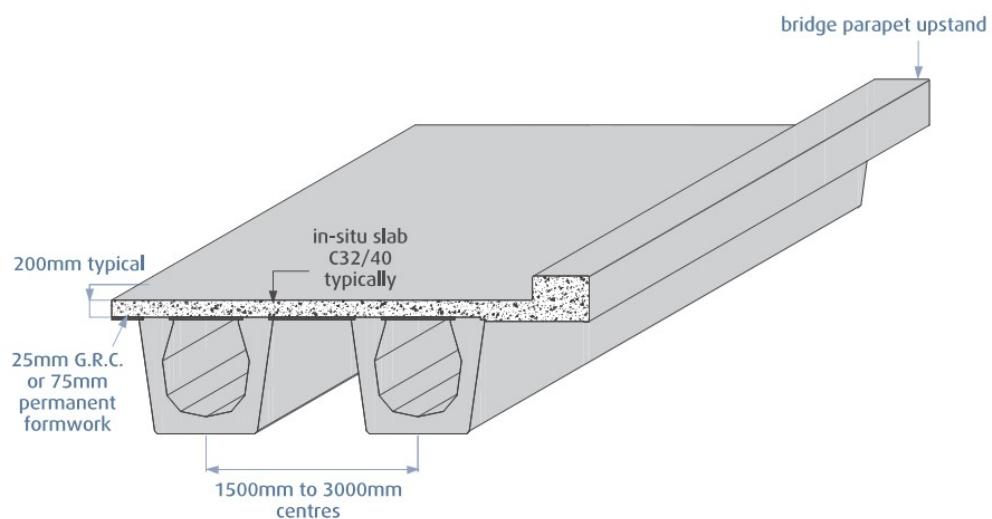
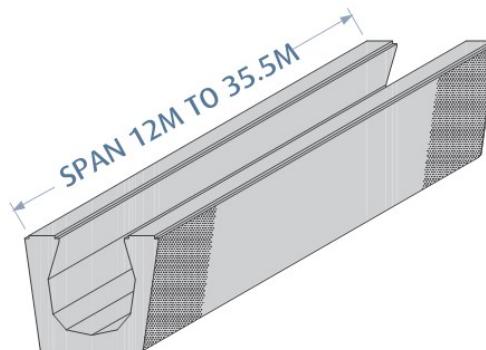
TECHNICAL MANUAL

U-Beam Typical Details

Shay Murtagh Precast



- U12@1600mm
- U11@1500mm
- U10@1400mm
- U9@1300mm
- U8@1200mm
- U7@1100mm
- U5@1000mm
- U3@900mm
- U1@800mm

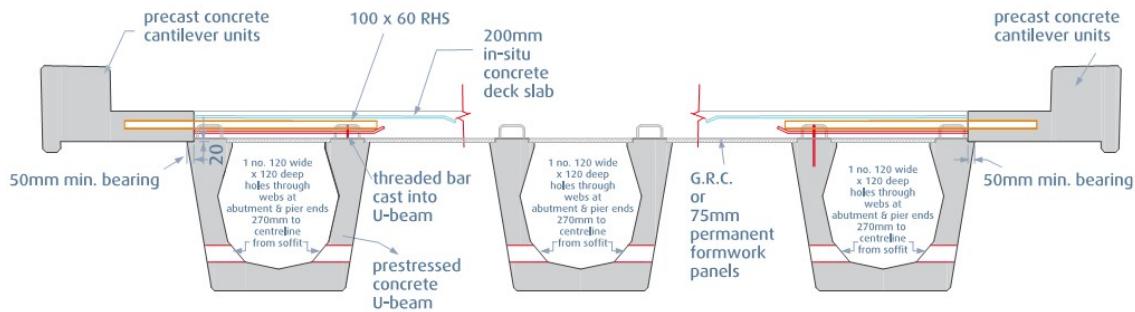


Typical Arrangement of Deck
Section with Cantilever

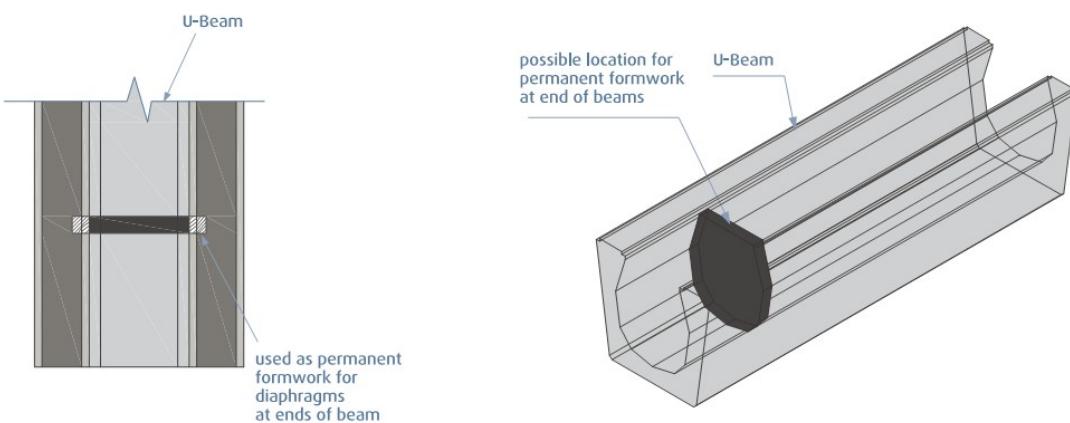
TECHNICAL MANUAL

U-Beam Typical Details

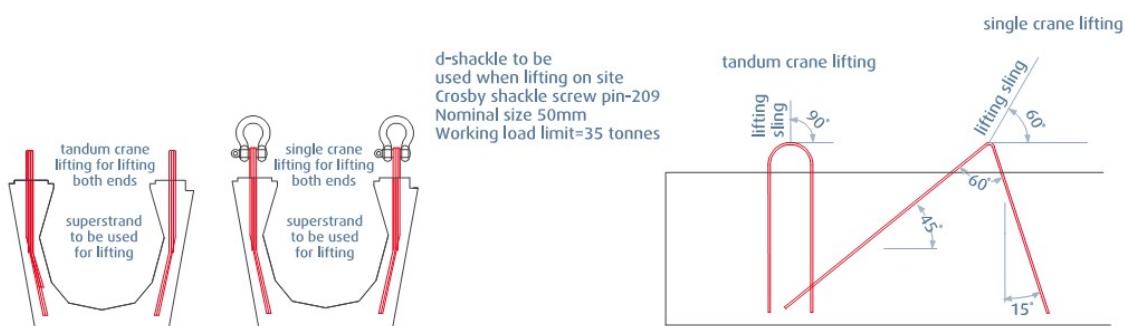
Shay Murtagh Precast



Typical Section Through Bridge



Typical Dwarf Wall Plan

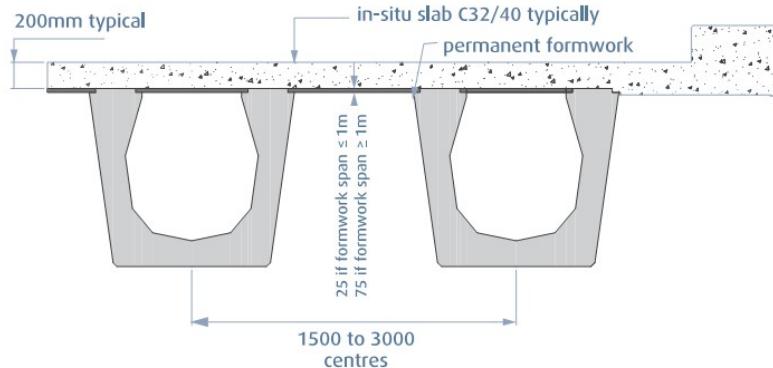


Typical Lifting Details

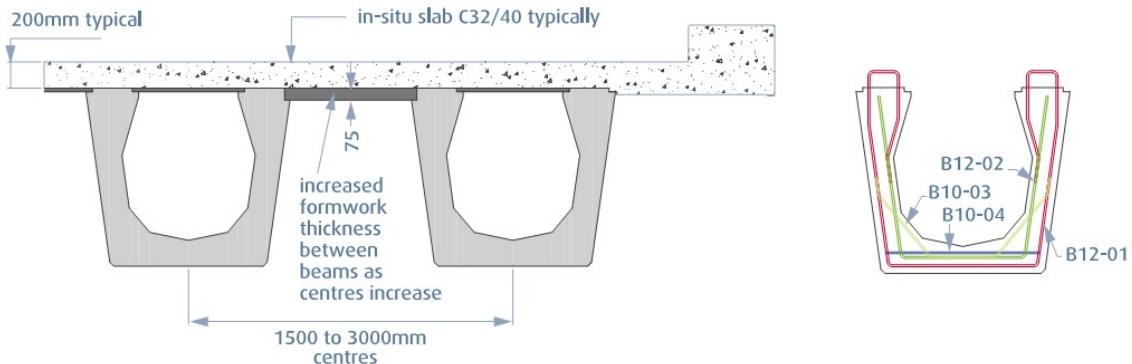
TECHNICAL MANUAL

U-Beam Typical Details

Shay Murtagh Precast

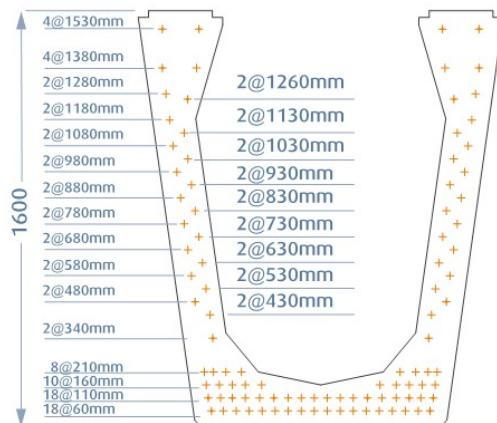


Typical Arrangement of Deck Section with Cantilever



Typical Arrangement of Deck Section with Cantilever
(Increase in Formwork Depth)

Standard Section of Typical Shear Reinforcement for U Beams



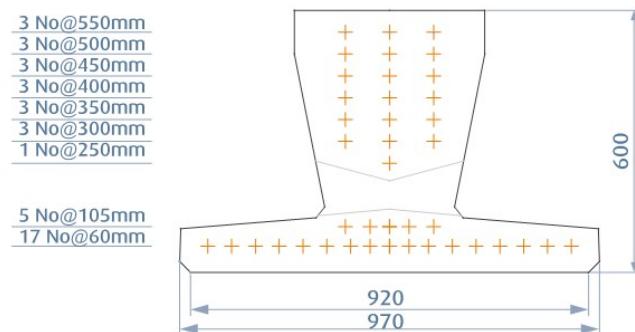
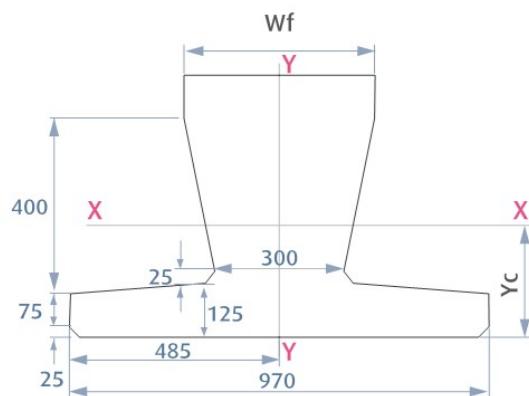
U Beam Possible Strand Positions

TECHNICAL MANUAL

MY-Beam properties

Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Section modulus		Second moment of Area	Self weight/m	Top of beam dimensions
	D	A	Y_c	Z_1	Z_b	I_{xx}		Wf
	(mm)	mm^2	(mm)	($\text{mm}^3 \times 10^6$)	($\text{mm}^3 \times 10^6$)	($\text{mm}^4 \times 10^9$)	(kN/m)	(mm)
MY1	300	170000	111.7	6.39	10.78	1.2033	4.25	360
MY2	350	188500	132.6	9.05	14.84	1.9681	4.71	380
MY3	400	208000	155.4	12.31	19.39	3.0123	5.20	400
MY4	450	228500	179.6	16.18	24.37	4.3753	5.71	420
MY5	500	250000	205	20.67	29.74	6.0972	6.25	440
MY6	550	272000	230.9	25.61	35.4	8.1425	6.80	440
MY7	600	294000	256.6	30.83	41.26	10.587	7.35	440



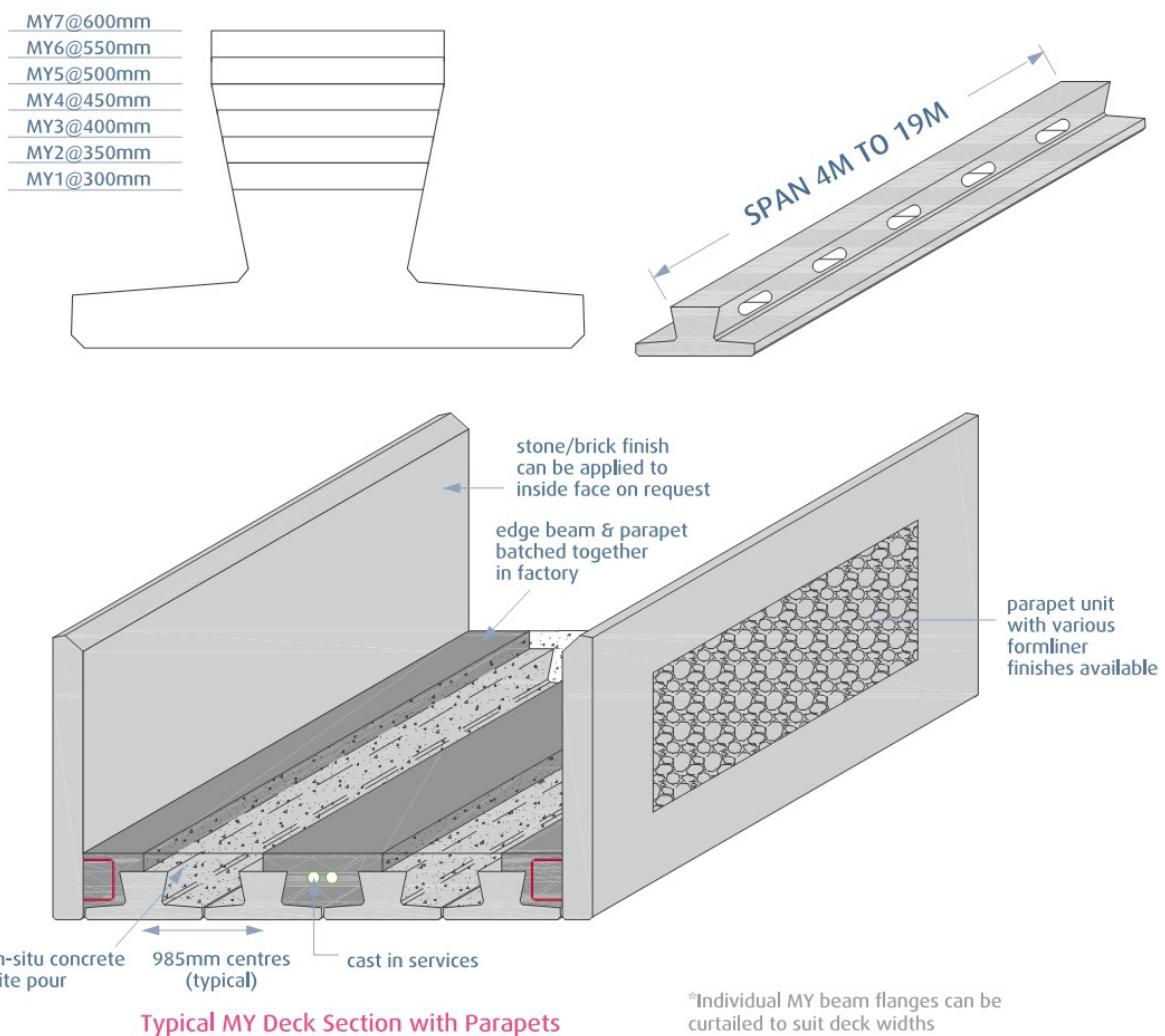
Typical Link Arrangement and Possible Strand Positions

TECHNICAL MANUAL

MY-Beam Span Table															Shay Murtagh Precast		
Metres	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
MY1																	
MY2																	
MY3																	
MY4																	
MY5																	
MY6																	
MY7																	

Beams placed individually Beams batched and placed in pairs/triples

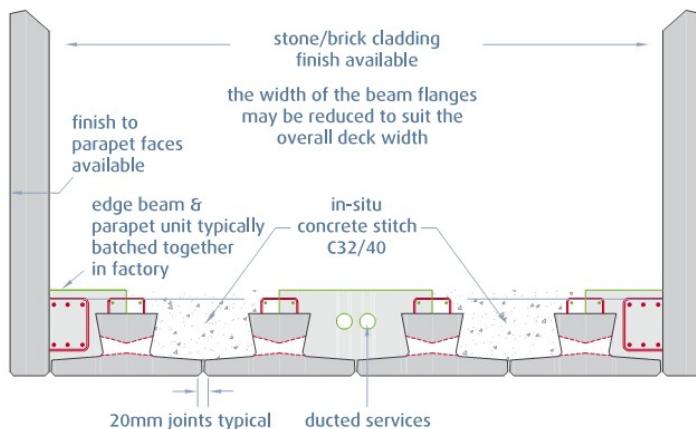
*See design notes for loading assumptions pg 41-43



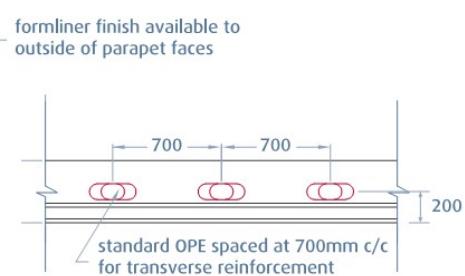
TECHNICAL MANUAL

MY-Beam Typical Details

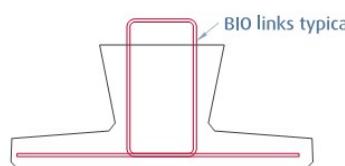
Shay Murtagh Precast



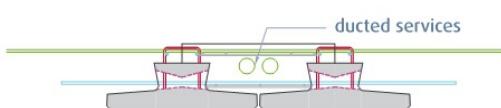
Typical Deck Section with Parapets



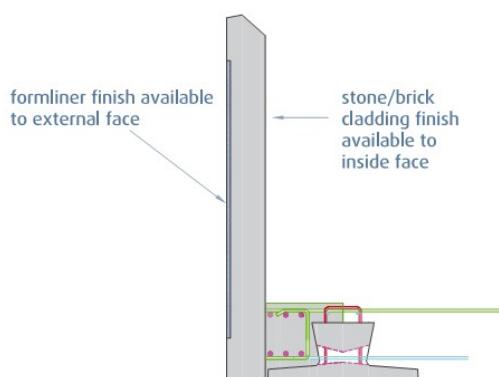
Part Elevation



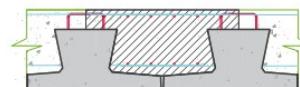
Standard Section of Possible Reinforcement for MY Beam



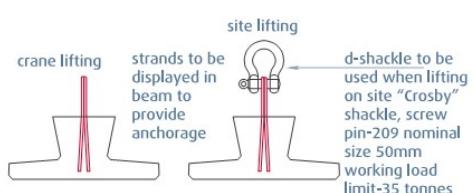
Standard Batched MY Beam to MY Beam Detail



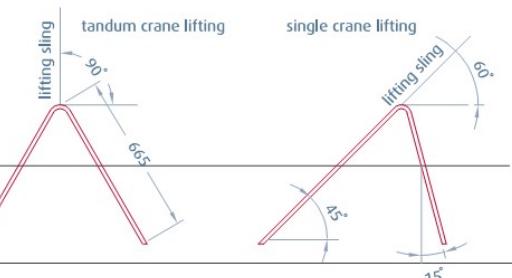
Standard Parapet to MY Beam Detail



MY Beam Batched in Pairs



Typical Lifting Details

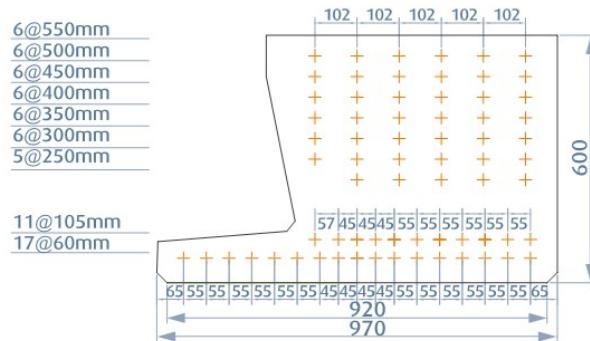
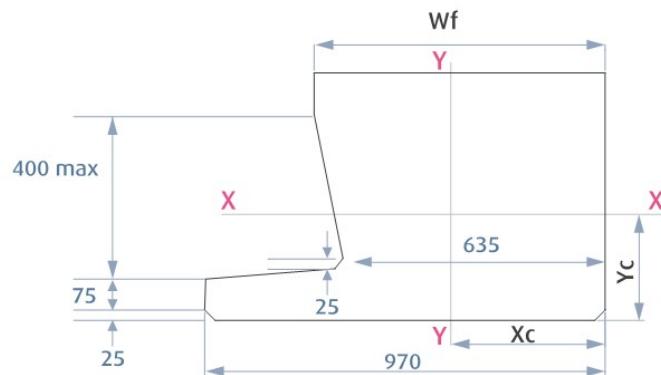


TECHNICAL MANUAL

MYE-Beam properties

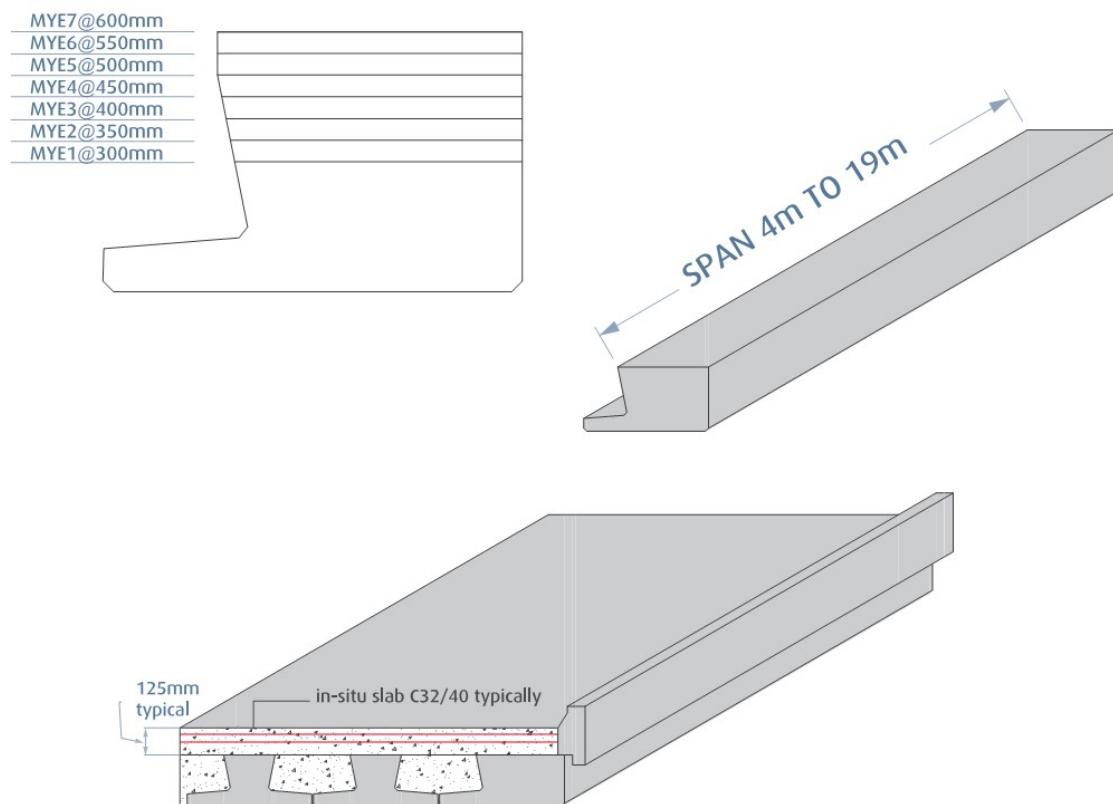
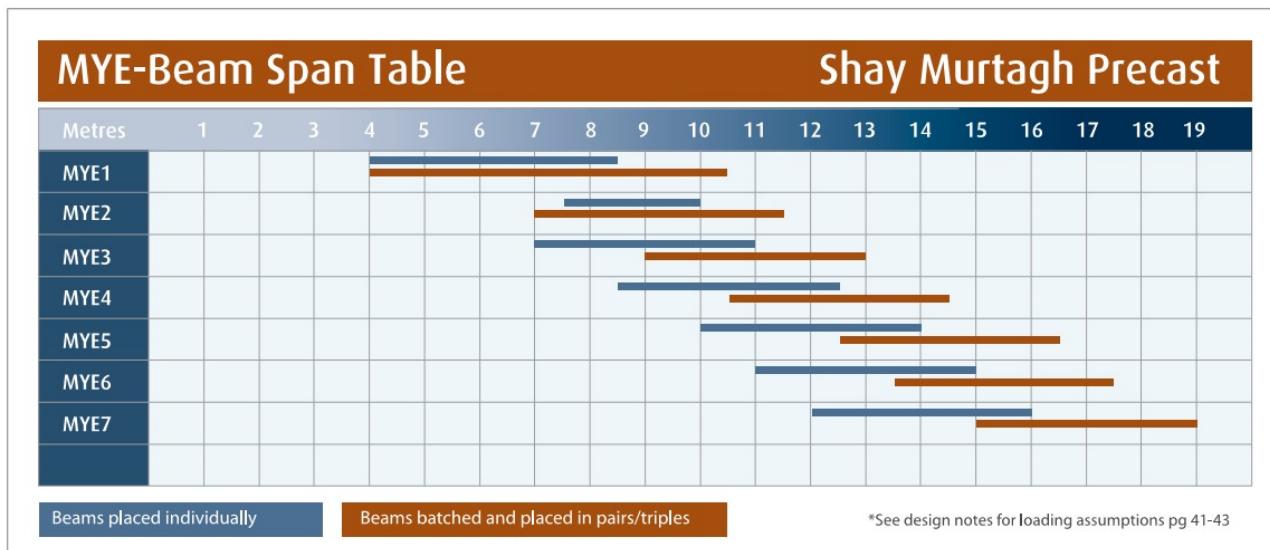
Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Distance to centroid from vertical face	Section modulus		Second moment of area	Self weight/m	Top of beam dimensions
	D	A	Y_c	X_c	Z_1	Z_b	I_{xx}		W_f
	(mm)	mm^2	(mm)	(mm)	$(\text{mm}^3 \times 10^6)$	$(\text{mm}^3 \times 10^6)$	$(\text{mm}^4 \times 10^9)$	(kN/m)	(mm)
MYE1	300	230200	136.0	399.1	10.77	12.99	1.7667	5.76	665
MYE2	350	263700	160.0	391.0	14.84	17.61	2.8186	6.59	675
MYE3	400	297700	184.6	385.2	19.58	22.85	4.2180	7.44	685
MYE4	450	332200	209.6	381.0	25.01	28.69	6.0128	8.31	695
MYE5	500	367200	234.9	378.0	31.12	35.13	8.2517	9.18	705
MYE6	550	402400	260.3	375.8	37.85	42.13	10.9660	10.06	705
MYE7	600	437700	285.6	373.9	42.12	49.65	14.1830	10.94	705



Typical Link Arrangement and Possible Strand Positions

TECHNICAL MANUAL



Typical MY & MYE Deck Section

TECHNICAL MANUAL

MYE-Beam Typical Details

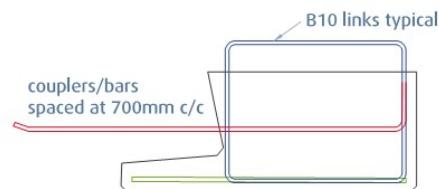
Shay Murtagh Precast



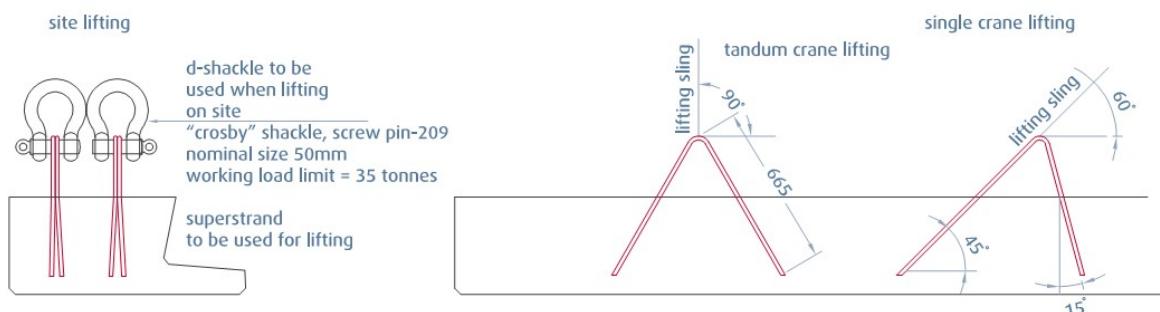
Typical MY & MYE Deck Section (Deck Slab & In-Fill Concrete)



Part Elevation (MYE Beam)



Typical Shear Links & Transverse Couplers/Bars for MYE Beam



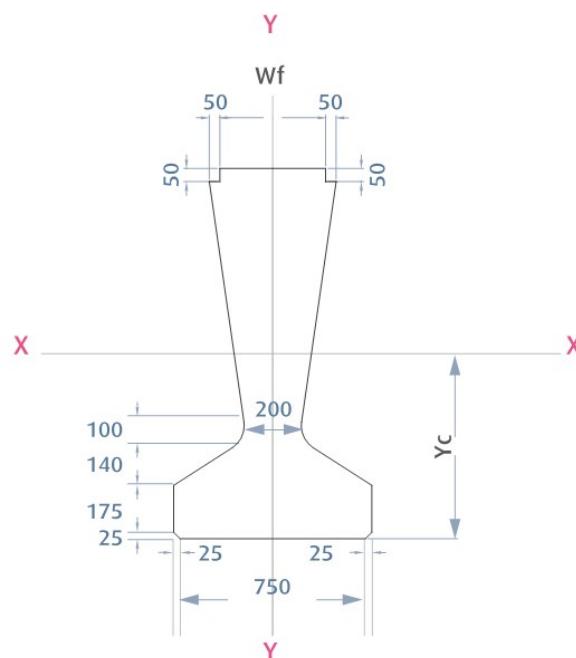
Typical Lifting Details

TECHNICAL MANUAL

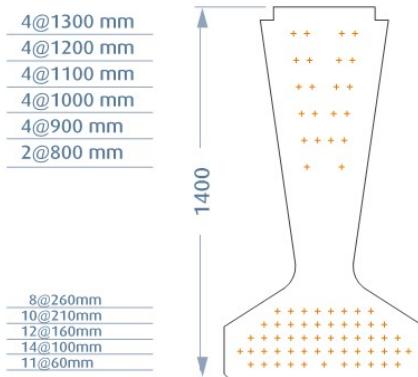
Y-Beam properties

Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Section modulus		Second moment of area	Self weight/m	Top of beam dimensions
	D	A	Y _c	Z _t	Z _b	I _{xx}		Wf
	(mm)	mm ²	(mm)	(mm ³ x 10 ⁶)	(mm ³ x 10 ⁶)	(mm ⁴ x 10 ⁹)	(kN/m)	(mm)
Y1	700	310140	255	24.88	43.42	11.073	7.75	180
Y2	800	340830	298.4	35.07	58.96	17.593	8.52	205
Y3	900	374420	346.8	47.95	76.51	26.53	9.36	235
Y4	1000	410880	399.3	63.63	95.72	38.22	10.27	255
Y5	1100	450230	455.2	82.19	116.4	52.99	11.26	295
Y6	1200	492460	514	103.73	138.45	71.16	12.31	320
Y7	1300	537580	575	128.35	161.83	93.052	13.44	350
Y8	1400	585580	637.8	156.12	186.56	118.99	14.64	380

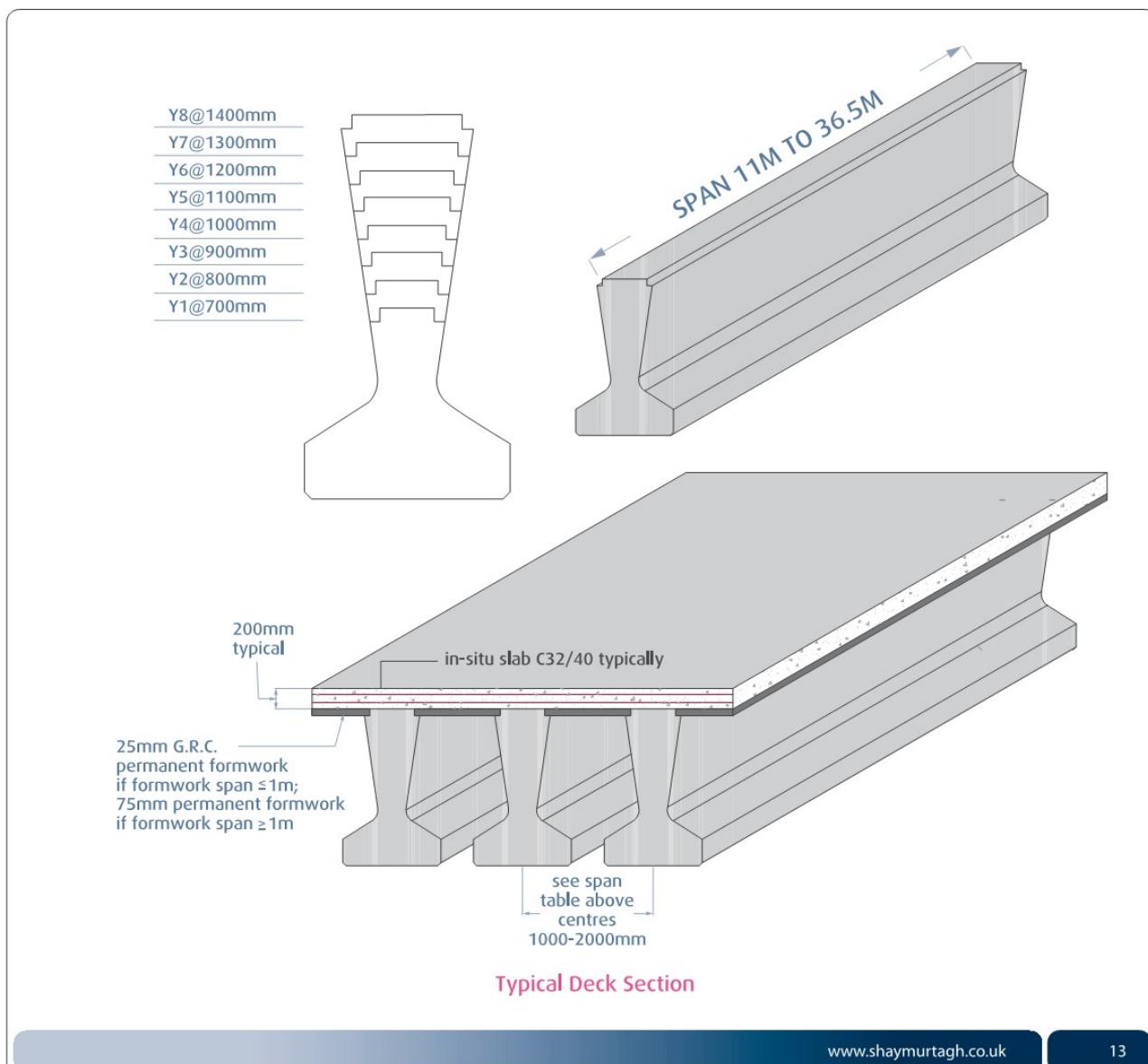


Y-Beam Section Properties



Possible Strand Position

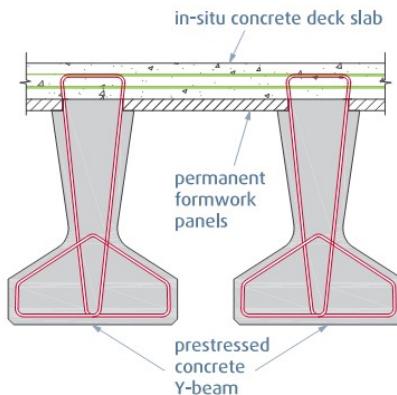
TECHNICAL MANUAL



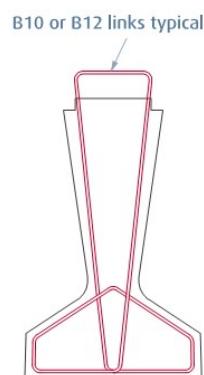
TECHNICAL MANUAL

Y-Beam Typical Details

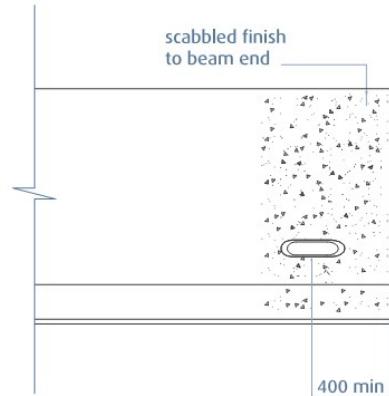
Shay Murtagh Precast



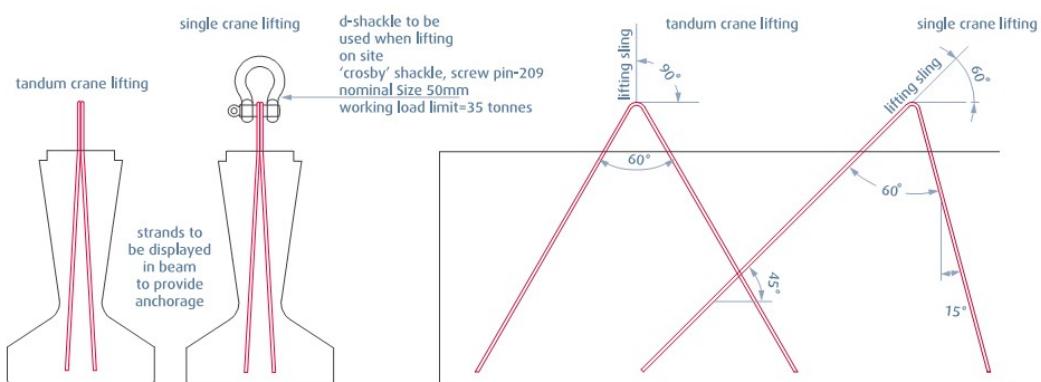
Typical Section Through Deck



Standard Section of Typical Shear Reinforcement for Y Beams



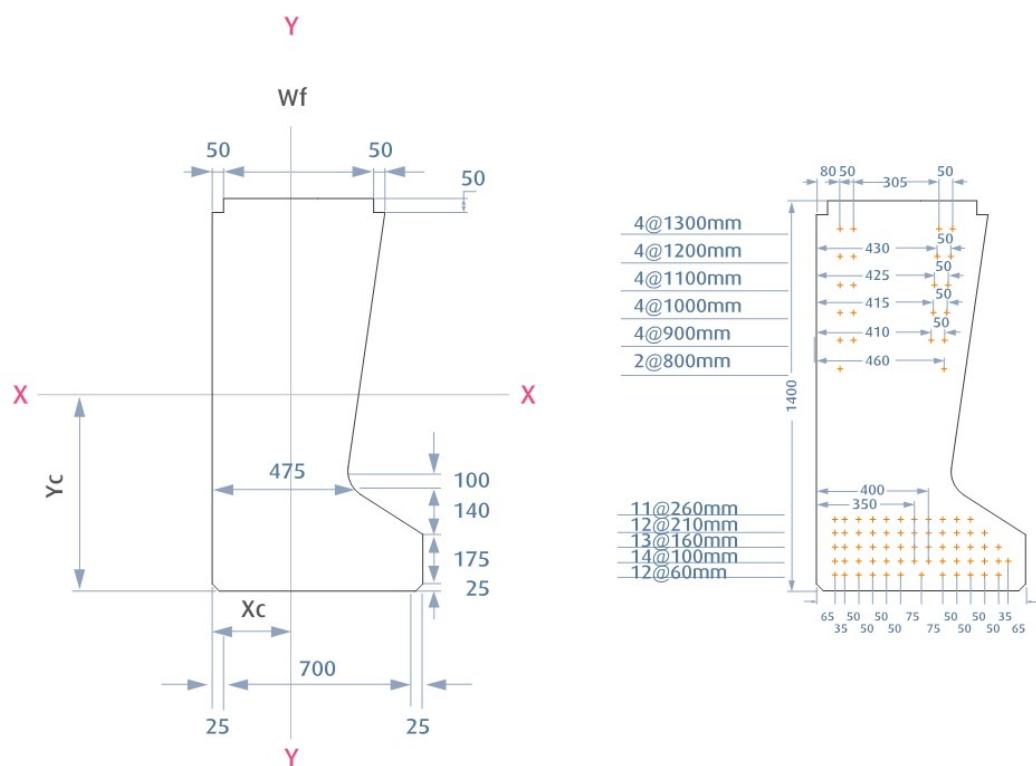
Part Elevation (Beam End)



Typical Lifting Details

TECHNICAL MANUAL

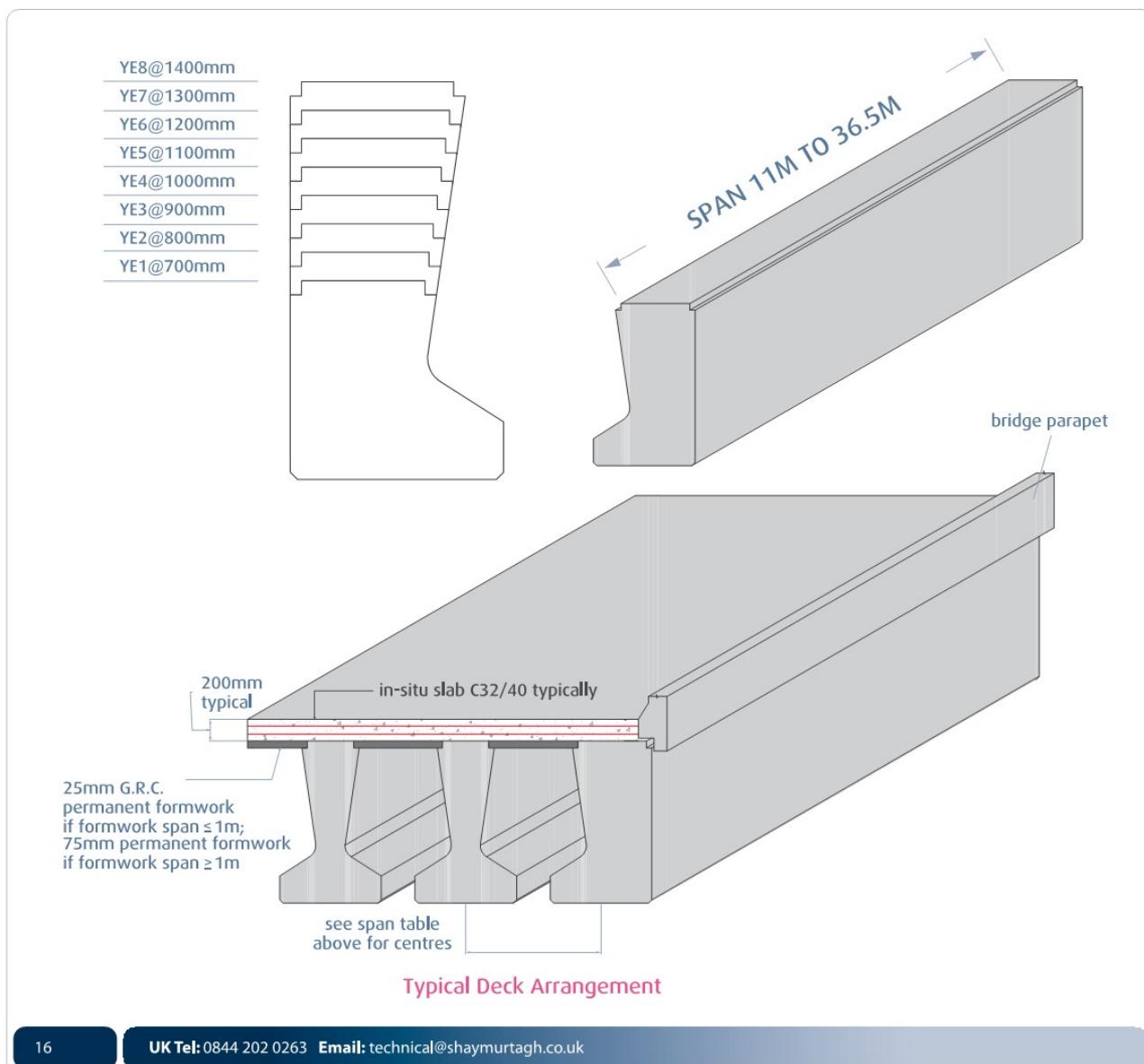
YE-Beam properties							Shay Murtagh Precast		
Type	Depth	Area	Height of centroid above soffit	Distance to centroid from vertical face	Section modulus		Second moment of Area	Self weight/m	Top of flange
	D	A	Y _c	X _c	Z _t	Z _b			Wf
	(mm)	mm ²	(mm)	(mm)	(mm ³ x 10 ⁶)	(mm ³ x 10 ⁶)	(mm ⁴ x 10 ⁹)	(kN/m)	(mm)
YE1	700	417260	315.0	309.5	44.43	54.31	17.106	10.43	415
YE2	800	470100	383.4	304.4	59.28	71.21	25.879	11.75	430
YE3	900	524400	413.4	300.9	76.61	90.18	37.278	13.11	445
YE4	1000	580130	464.6	298.7	96.45	111.15	51.641	14.50	455
YE5	1100	637300	518.8	297.5	118.85	134.13	69.318	15.93	470
YE6	1200	695920	569.8	297.1	143.36	159.1	90.659	17.40	485
YE7	1300	755880	623.6	297.3	171.55	186.08	116.04	18.90	500
YE8	1400	817480	678.0	298.0	201.98	215.1	145.83	20.44	515



YE Beam Section Properties

Possible Strand Position

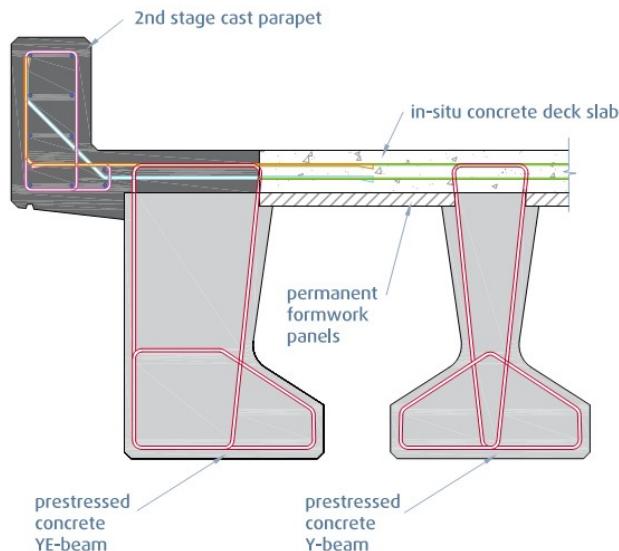
TECHNICAL MANUAL



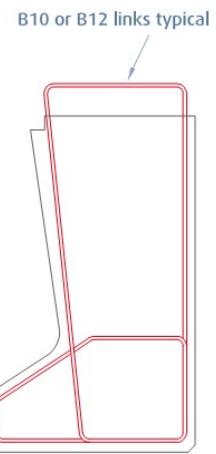
TECHNICAL MANUAL

YE Beam Typical Details

Shay Murtagh Precast

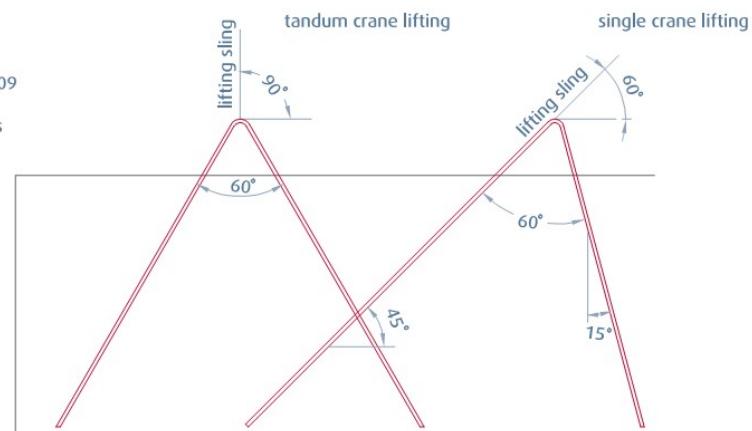
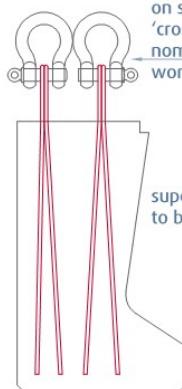


Typical Section Through Bridge



Standard Section of
Typical Shear Reinforcement
for YE Beam

d-shackle to be used when lifting on site
'crosby' shackle, screw Pin-209 nominal Size 50mm working load limit=35 tonnes



Typical Lifting Details

TECHNICAL MANUAL

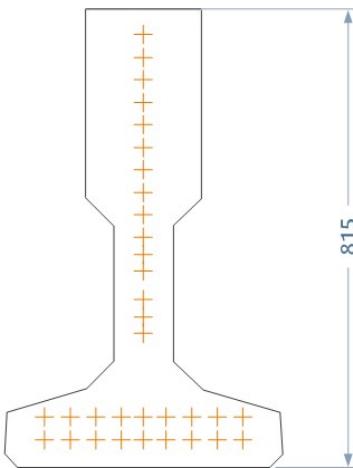
T-Beam properties

Shay Murtagh Precast

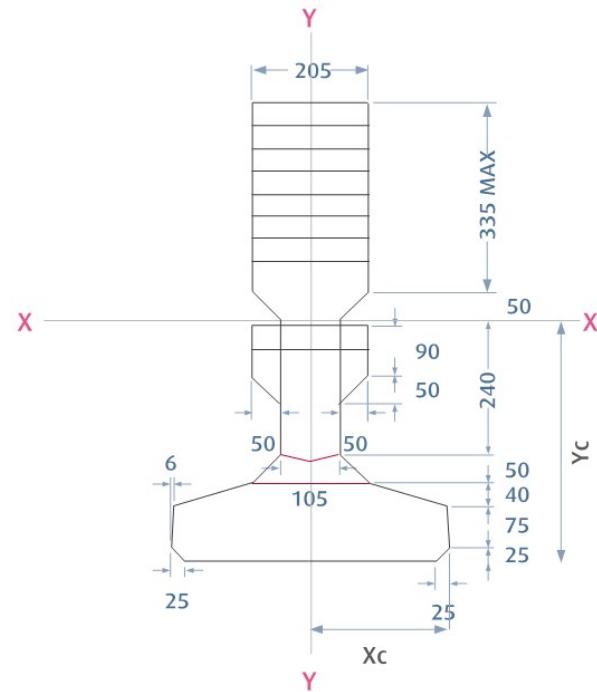
Type	Depth	Area	Height of centroid above soffit	Section modulus		Second moment of area	Self weight per m
				D	A	Y_c	Z_1
	(mm)	mm^2	(mm)	($\text{mm}^3 \times 10^6$)	($\text{mm}^3 \times 10^6$)	($\text{mm}^4 \times 10^9$)	(kN / m)
T1	380	97385	139.2	5.11	8.84	1.2306	2.43
T2	420	105580	159.4	6.70	10.95	1.7462	2.64
T3	535	114160	196.1	9.57	16.35	3.2426	2.85
T4	575	122360	220.2	11.92	19.21	4.2290	3.06
T5	615	130560	243.7	14.30	21.79	5.3098	3.26
T6	655	138760	266.8	16.73	24.33	6.4921	3.47
T7	695	146960	289.6	19.20	26.87	7.7831	3.67
T8	735	155160	312.1	21.73	29.45	9.1896	3.88
T9	775	163360	334.3	24.32	32.06	10.7190	4.08
T10	815	171560	356.3	26.99	34.73	12.3770	4.29

1@770mm
 1@730mm
 1@690mm
 1@650mm
 1@570mm
 1@530mm
 1@490mm
 1@450mm
 1@410mm
 1@380mm
 1@350mm
 1@300mm
 1@270mm
 1@240mm

9@90mm
 9@50mm



Possible Strand Position
for T Beam



T Beam Section

TECHNICAL MANUAL

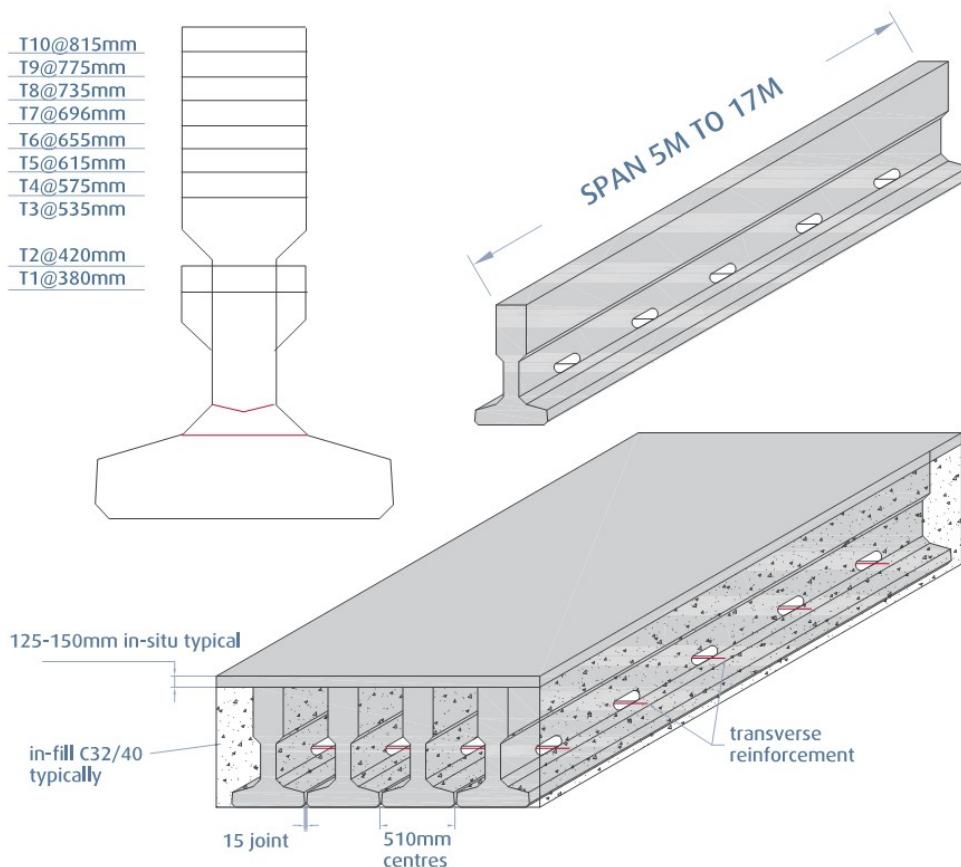
T-Beam Span Table

Shay Murtagh Precast

Metres	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T1																		
T2																		
T3																		
T4																		
T5																		
T6																		
T7																		
T8																		
T9																		
T10																		

Beam centres: 508mm

*See design notes for loading assumptions pg 41-43

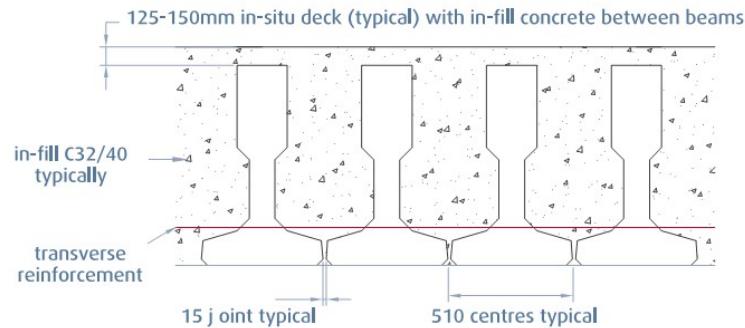


Typical Deck Section

TECHNICAL MANUAL

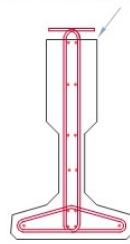
T Beam Typical Details

Shay Murtagh Precast

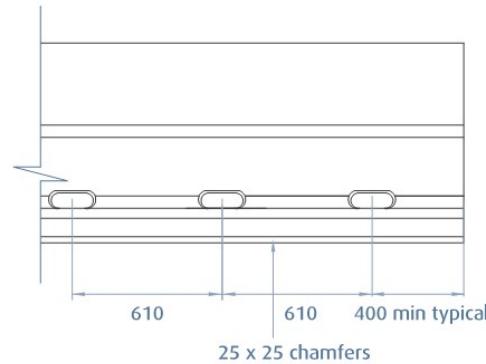


Typical Deck Section

B10 links typical

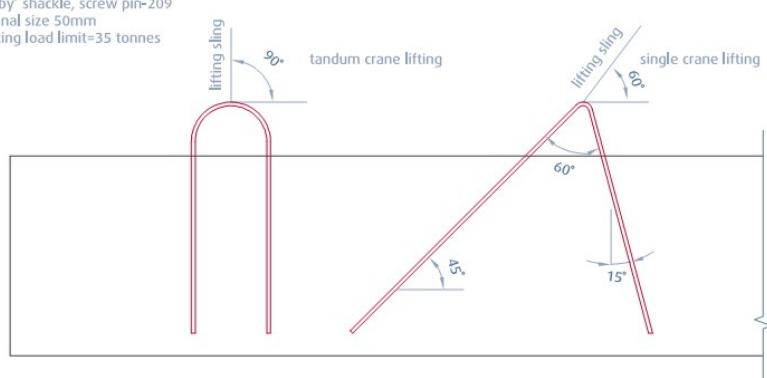
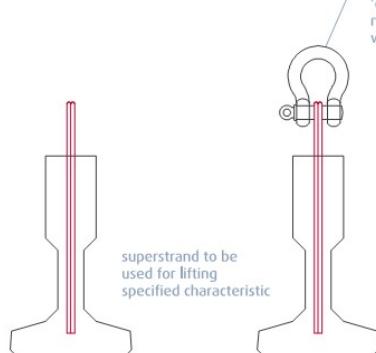


Standard Section of
Typical Reinforcement
for T Beams



Part Elevation (Beam End)

d-shackle to be used when lifting on-site
'crosby' shackle, screw pin=209
nominal size 50mm
working load limit=35 tonnes



Typical Lifting Details

TECHNICAL MANUAL

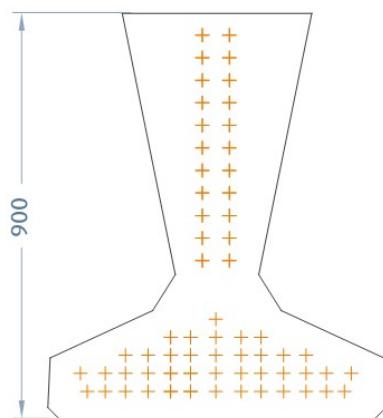
TY-Beam properties

Shay Murtagh Precast

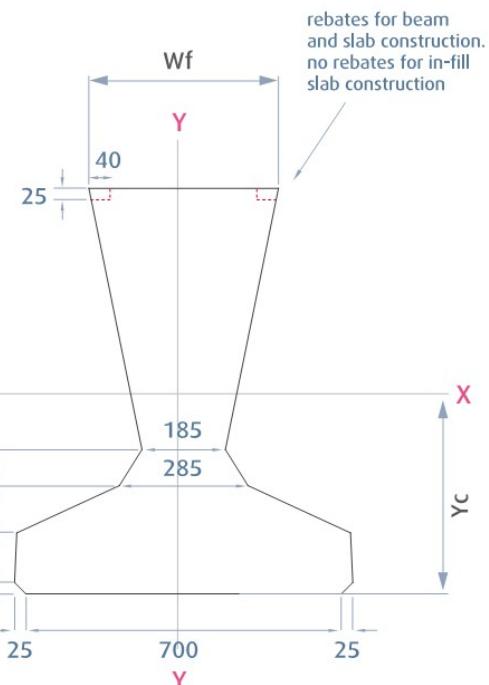
Type	Depth	Area	Height of centroid above soffit	Section modulus		Second moment of area	Self-weight	Top of flange
	D	A	Y _c	Z _t	Z _b	I _{xx}		Wf
	(mm)	mm ²	(mm)	(mm ³ x 10 ⁶)	(mm ³ x 10 ⁶)	(mmx ⁴ 10 ⁹)	(kN/m)	(mm)
TY1	400	188790	145.5	7.69	13.46	1.9581	4.72	217.5
TY2	450	200170	161.4	9.71	17.35	2.8011	5.00	237.7
TY3	500	212560	179.7	12.35	22.00	3.9538	5.31	258.0
TY4	550	225970	200.2	15.62	27.28	5.463	5.65	278.3
TY5	600	240390	222.7	19.54	33.1	7.373	6.01	298.6
TY6	650	255830	247.0	24.14	39.38	9.7266	6.40	318.9
TY7	700	272280	272.9	29.42	46.04	12.565	6.81	339.2
TY8	750	289740	300.2	35.41	53.06	15.926	7.24	359.4
TY9	800	308220	328.6	42.11	60.4	19.851	7.71	379.7
TY10	850	327710	358.2	49.56	68.05	24.375	8.19	400.1
TY11	900	348220	388.6	57.76	76.01	29.539	8.71	420.0

- 2@850 mm
- 2@800 mm
- 2@750 mm
- 2@700 mm
- 2@650 mm
- 2@600 mm
- 2@550 mm
- 2@500 mm
- 2@450 mm
- 2@400 mm
- 2@350 mm

- 1@220 mm
- 5@180 mm
- 9@140 mm
- 13@100 mm
- 13@ 60 mm



TY-Beam Section Properties



TY-Beam Section Properties

TECHNICAL MANUAL

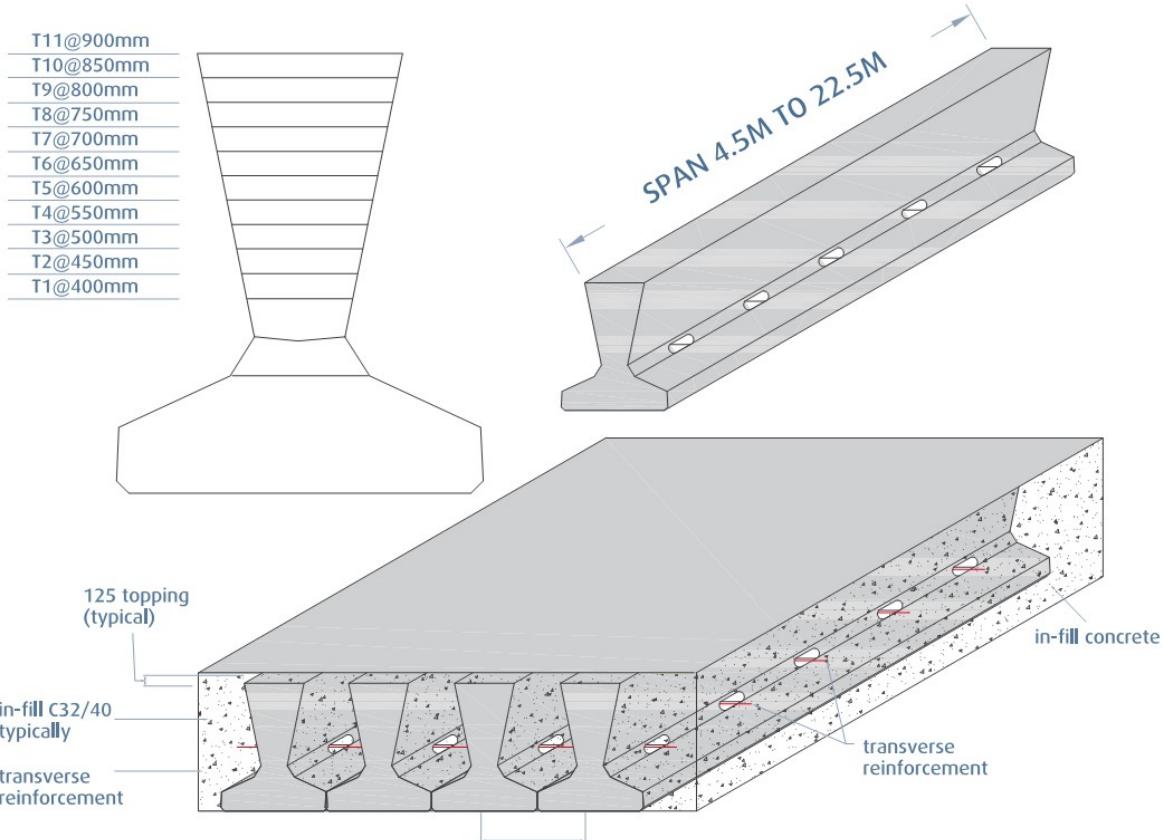
TY-Beam Span Table

Shay Murtagh Precast

Metres	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TY1																				
TY2																				
TY3																				
TY4																				
TY5																				
TY6																				
TY7																				
TY8																				
TY9																				
TY10																				
TY11																				

Beam centres: 765mm

*See design notes for loading assumptions pg 41-43

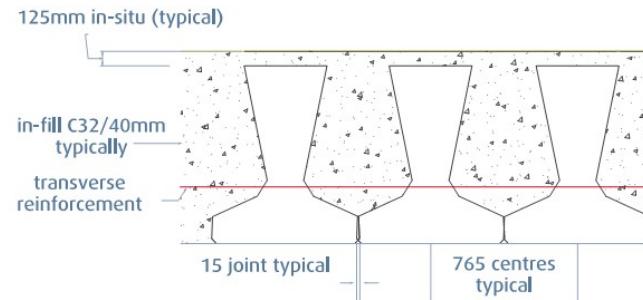


Typical Deck Arrangement

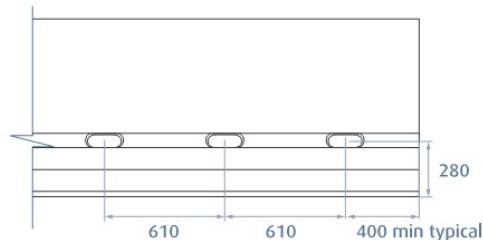
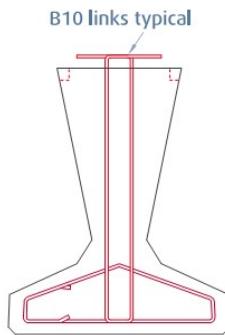
TECHNICAL MANUAL

TY-Beam Typical Details

Shay Murtagh Precast



Typical Deck Section



Standard Section of
Typical Shear Reinforcement
for TY Beams

Part Elevation (Beam End)



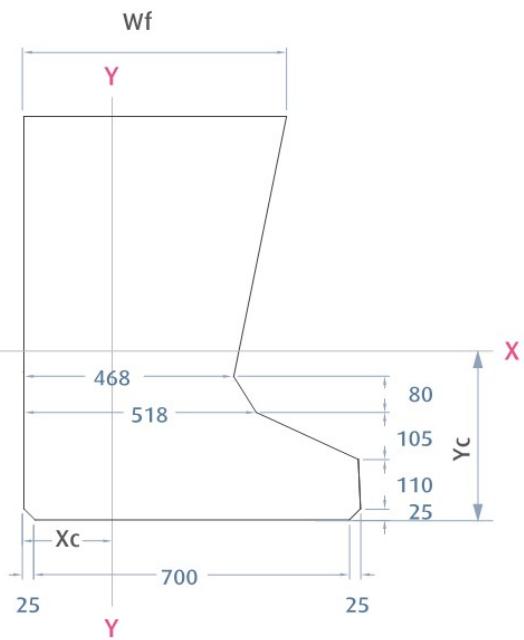
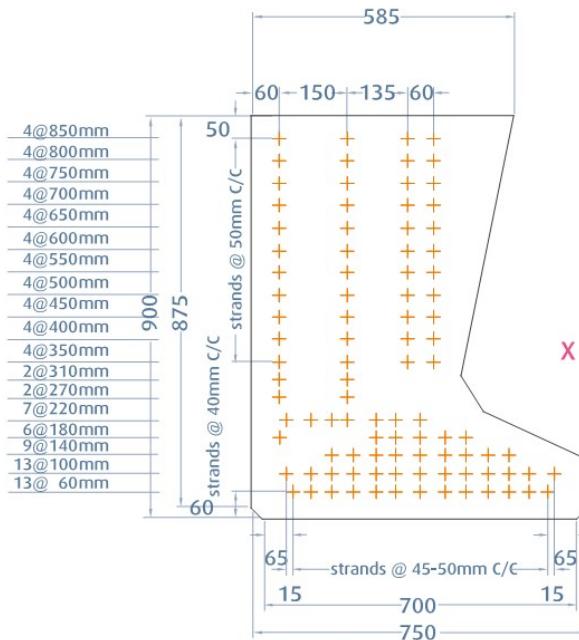
Typical Lifting Details

TECHNICAL MANUAL

TYE-Beam properties

Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Distance to centroid from vertical face	Section modulus		Second moment of area	Self-weight	Top of flange
	D	A	Y _c	X _c	Z _t	Z _b	I _{xx}		W _f
	(mm)	mm ²	(mm)	(mm)	(mm ³ x 10 ⁶)		(mm ⁴ x 10 ⁹)	(kN/m)	(mm)
TYE1	400	244080	179.2	317.3	14.23	17.54	3.142	6.10	483.7
TYE2	450	268520	201.6	310.6	18.07	22.28	4.4905	6.71	493.9
TYE3	500	293470	224.8	305.4	22.54	27.6	6.2035	7.34	504.0
TYE4	550	318920	248.8	301.4	27.62	33.45	8.3207	7.97	514.2
TYE5	600	344880	273.3	298.2	33.31	39.81	10.882	8.62	524.3
TYE6	650	371350	298.4	295.8	39.62	46.68	13.929	9.28	534.4
TYE7	700	398330	323.9	294.1	46.54	54.04	17.503	9.96	544.6
TYE8	750	425810	349.8	292.8	54.09	61.88	21.646	10.65	554.7
TYE9	800	453800	376.0	292.0	62.27	70.21	20.401	11.35	564.9
TYE10	850	482290	402.6	291.6	71.1	79.03	31.814	12.06	575.0
TYE11	900	511300	429.4	291.5	80.59	88.33	37.928	12.78	585.0



TECHNICAL MANUAL

TYE-Beam Span Table

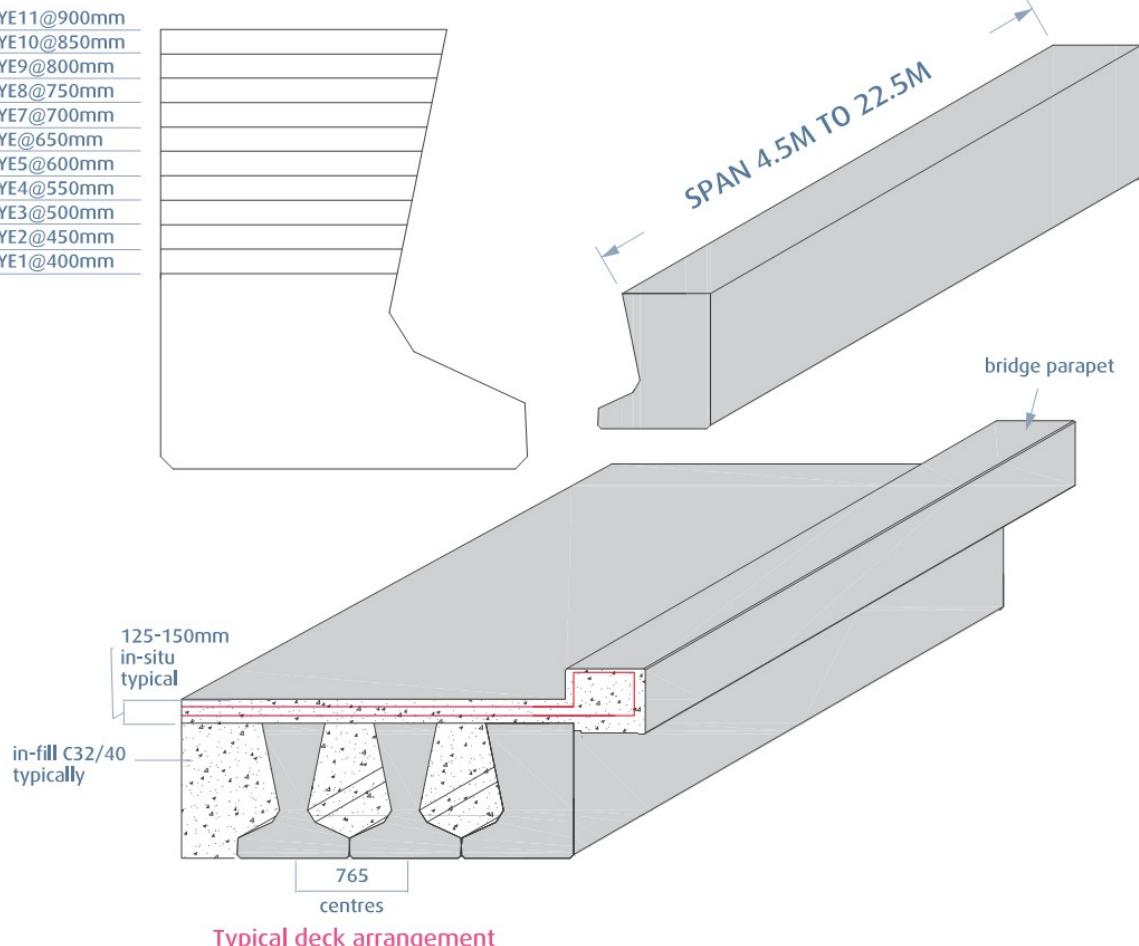
Shay Murtagh Precast

Metres	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TYE1																				
TYE2																				
TYE3																				
TYE4																				
TYE5																				
TYE6																				
TYE7																				
TYE8																				
TYE9																				
TYE10																				
TYE11																				

Beam centres: 765mm

*See design notes for loading assumptions pg 41-43

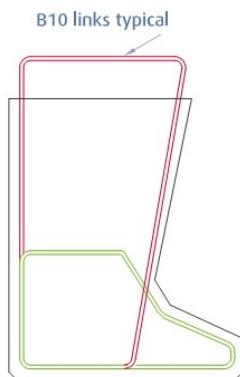
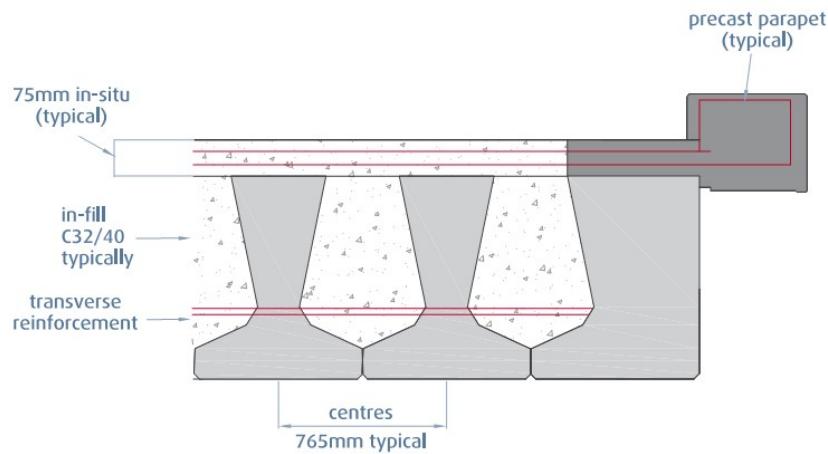
TYE11@900mm
 TYE10@850mm
 TYE9@800mm
 TYE8@750mm
 TYE7@700mm
 TYE@650mm
 TYE5@600mm
 TYE4@550mm
 TYE3@500mm
 TYE2@450mm
 TYE1@400mm



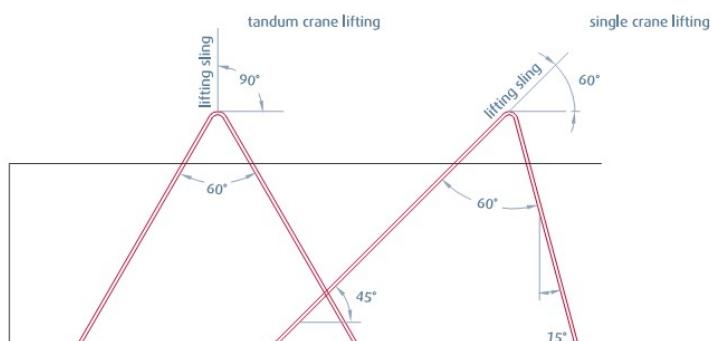
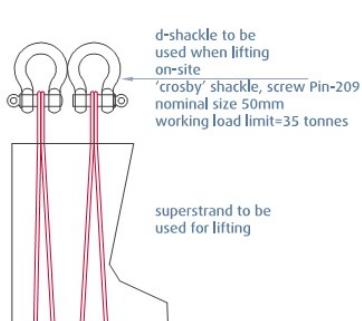
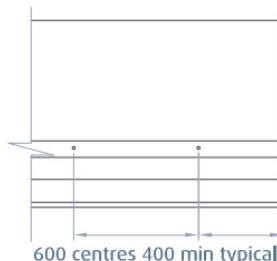
TECHNICAL MANUAL

TYE-Beam Typical Details

Shay Murtagh Precast



Standard Section of
Typical Shear Reinforcement
for TYE Beams



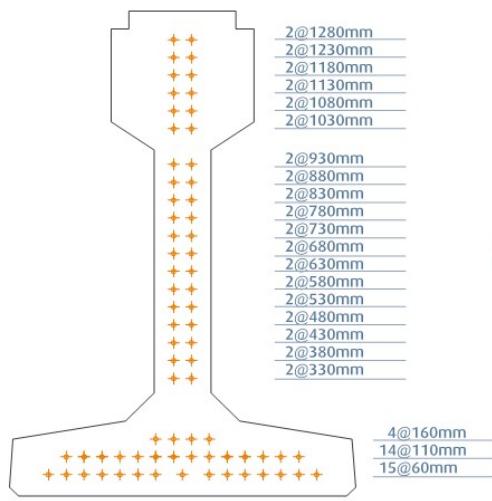
Typical Lifting Details

TECHNICAL MANUAL

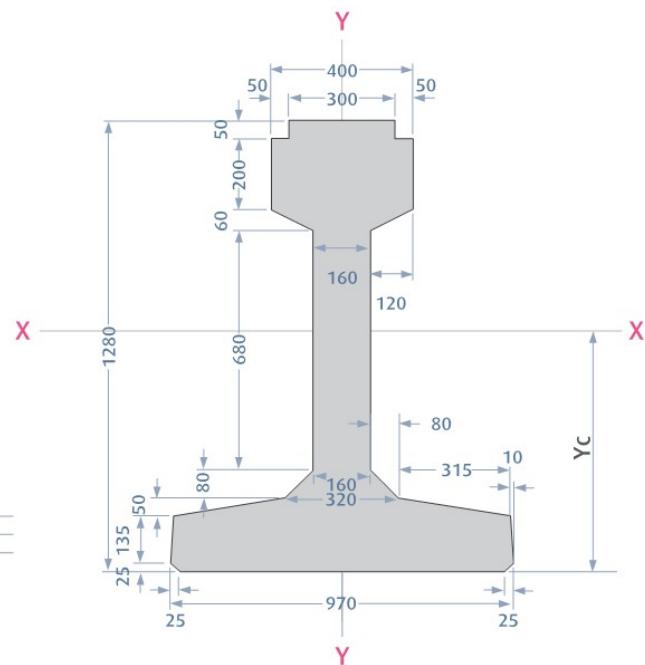
M-Beam properties

Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Section modulus		Self weight/m
				D	A	Y_c
	(mm)	mm^2	(mm)	($\text{mm}^3 \times 10^6$)	($\text{mm}^3 \times 10^6$)	(kN/m)
M2	720	314600	266	35.37	60.36	7.87
M3	800	346600	310	46.60	73.65	8.67
M4	880	378600	354	58.37	86.73	9.47
M5	960	353000	357	58.92	99.52	8.83
M6	1040	384999	410	74.94	115.15	9.63
M7	1120	417000	460	90.95	130.49	10.43
M8	1200	391399	455	86.87	142.23	9.79
M9	1280	423399	513	107.45	160.66	10.59
M10	1360	455399	569	127.97	177.90	11.39



Possible Strand Positions
for M Beams



Standard M Beam
Section Properties

TECHNICAL MANUAL

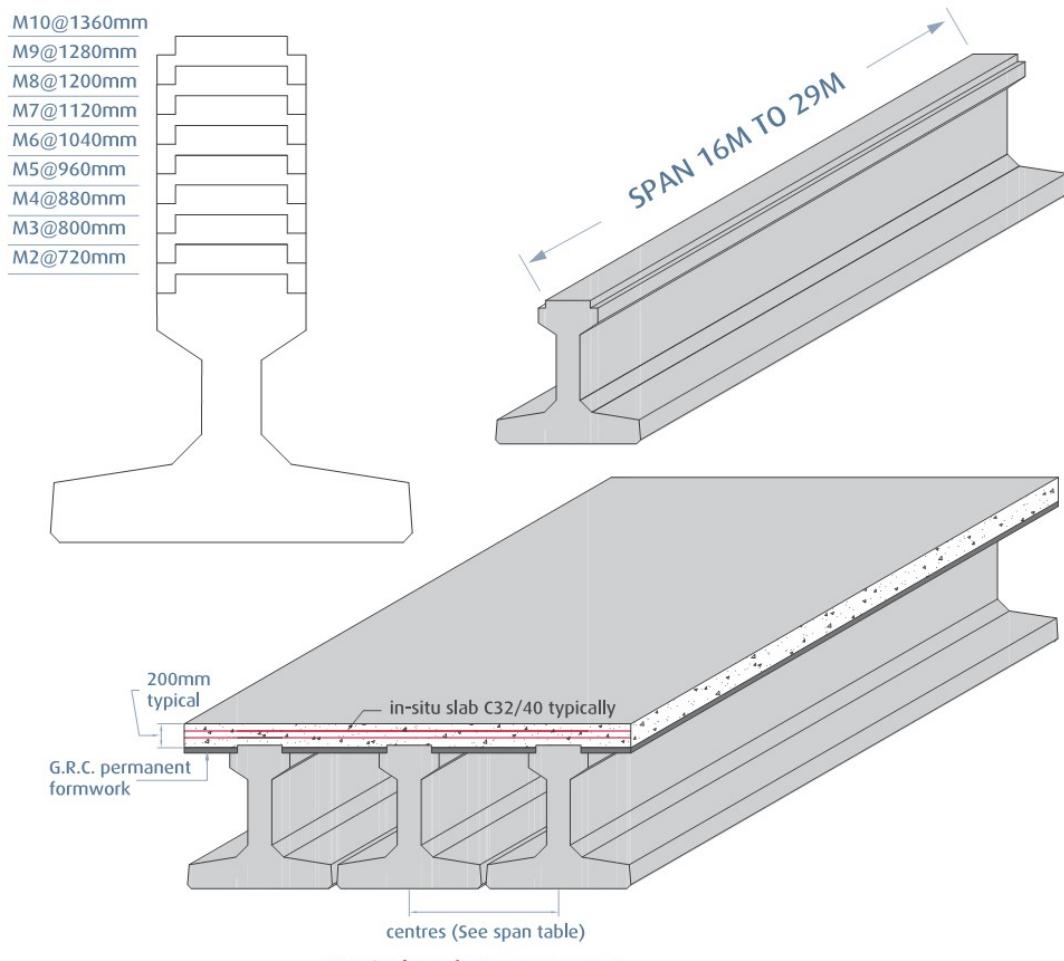
M-Beam Span Table

Shay Murtagh Precast

Metres	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
M2									16	18									
M3									17	19	20								
M4										19	21								
M5											21	23							
M6											23	24							
M7												24	26						
M8													26	27					
M9													27	28					
M10														28	29				

Beam centres: 1000mm

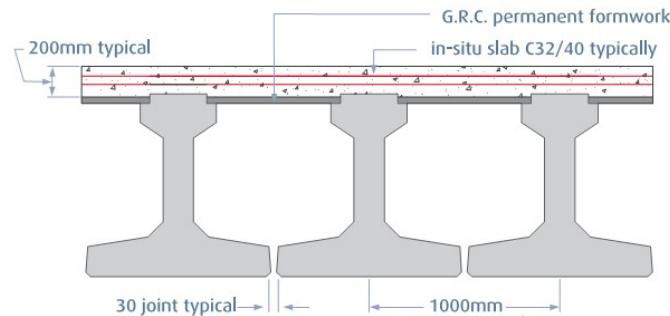
*See design notes for loading assumptions pg 41-43



TECHNICAL MANUAL

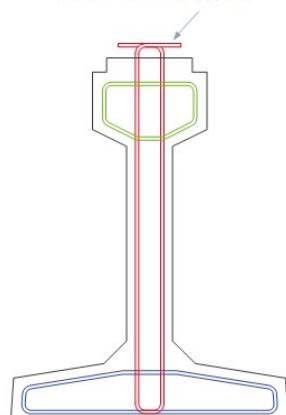
M-Beam Typical Details

Shay Murtagh Precast



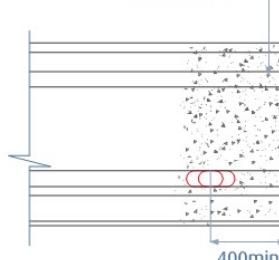
Typical Deck Section

B10 or B12 links typical



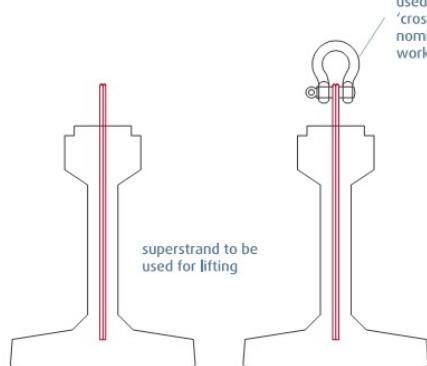
Standard Section of
Typical Reinforcement for M Beam

scabbled finish
to beam end

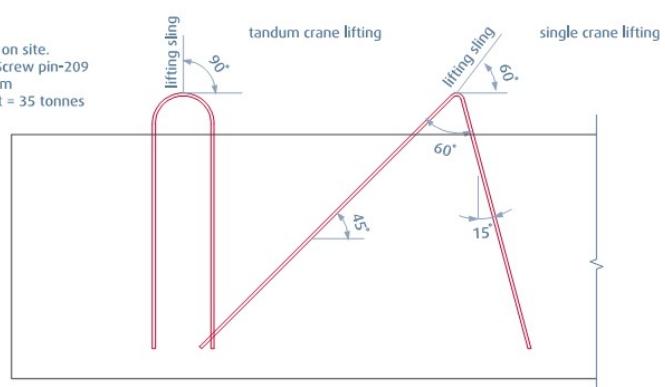


Part Elevation (Beam End)

d-shackle to be used when lifting on site.
'crosby' shackle. Screw pin-209 nominal size 50mm working load limit = 35 tonnes



Typical Lifting Details

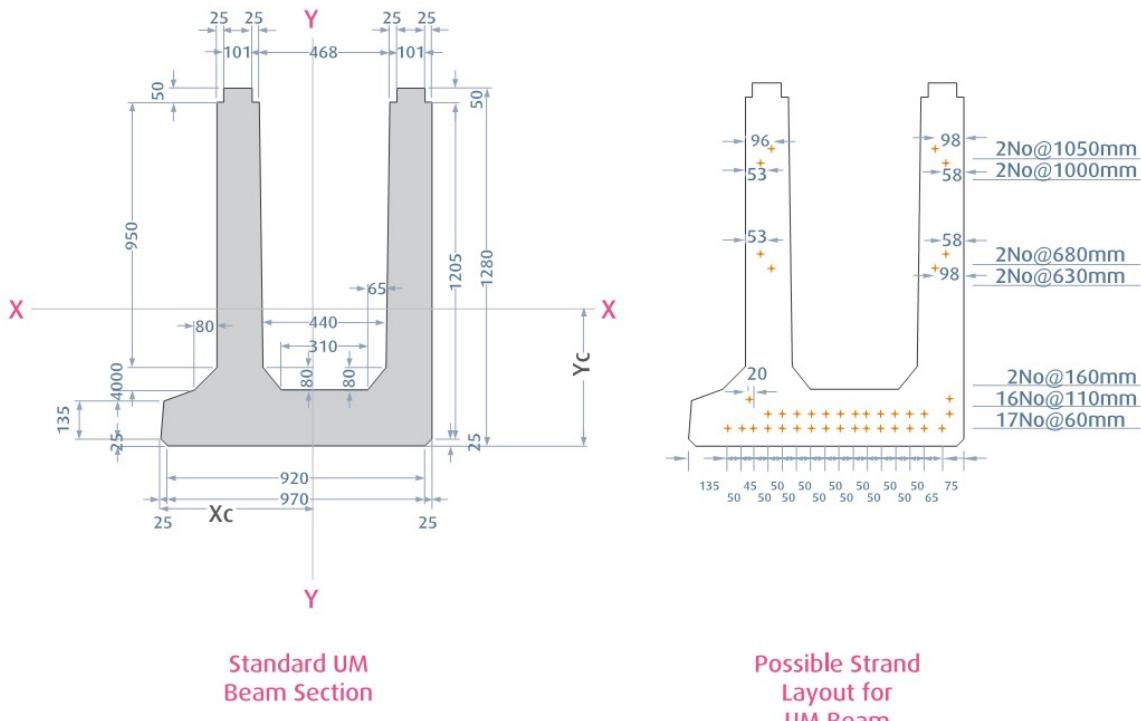


TECHNICAL MANUAL

UM-Beam properties

Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Section modulus		Self weight/m	Distance of centroid from vertical face
	D	A	Y _c	Z _t	Z _b		X _c
	(mm)	mm ²	(mm)	(mm ³ x 10 ⁶)	(mm ³ x 10 ⁶)	(kN/m)	(mm)
UM2	720	361767	261.5	32.73	57.38	9.05	437
UM3	800	387049	293.0	40.51	70.10	9.68	434
UM4	880	412144	325.0	49.03	83.73	10.31	431
UM5	960	437053	358.0	58.31	98.06	10.93	428
UM6	1040	461775	392.0	68.34	112.98	11.3	426
UM7	1120	486311	426.0	79.01	128.71	12.14	424
UM8	1200	510660	460.0	90.28	145.24	12.77	422
UM9	1280	534823	494.5	102.21	162.24	13.77	420
UM10	1360	558800	529.0	114.71	180.21	13.97	419



UM Beam Section Properties

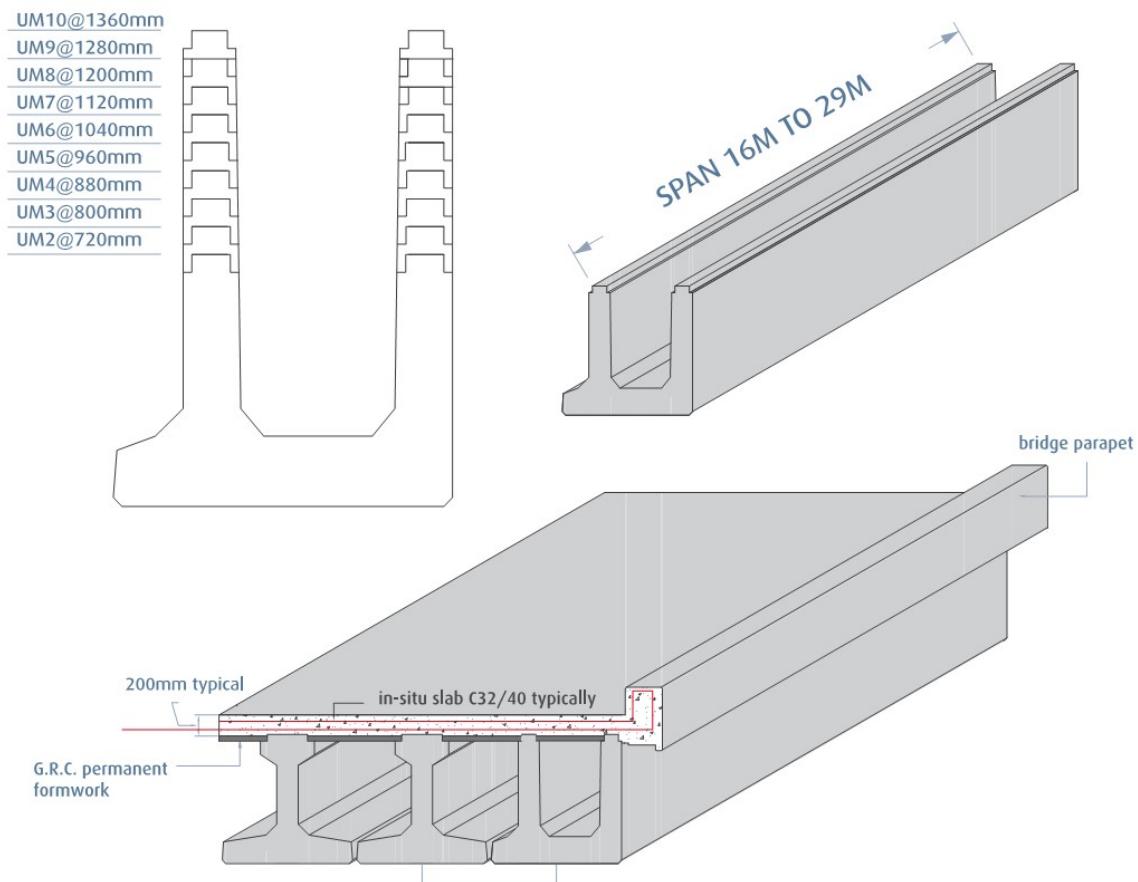
TECHNICAL MANUAL

UM-Beam Span Table

Shay Murtagh Precast

Metres	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
UM2																			
UM3																			
UM4																			
UM5																			
UM6																			
UM7																			
UM8																			
UM9																			
UM10																			

*See design notes for loading assumptions pg 41-43

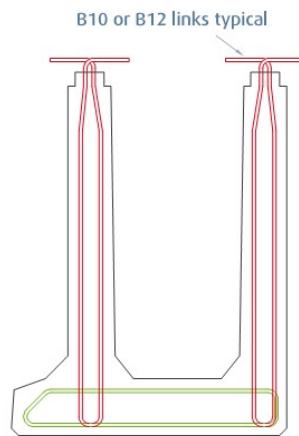
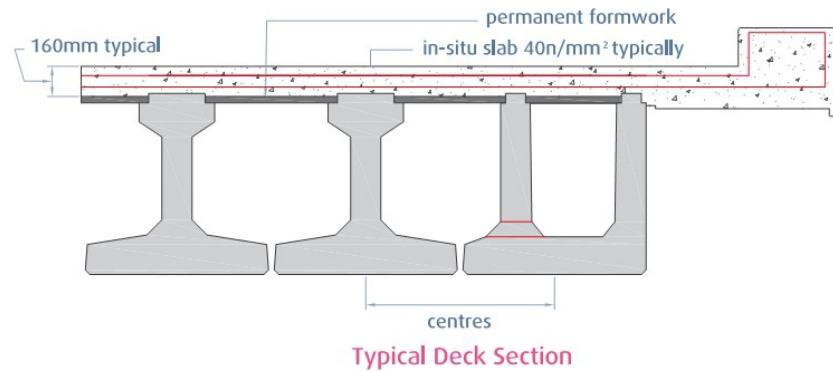


Typical Deck Arrangement

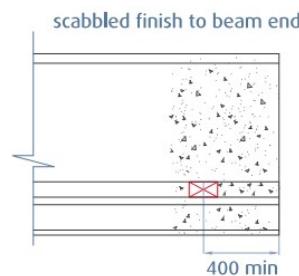
TECHNICAL MANUAL

UM-Beam Typical Details

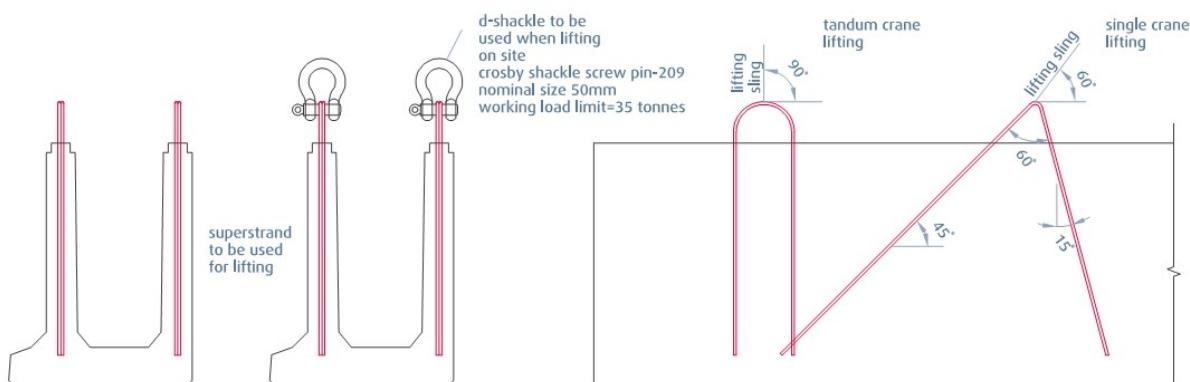
Shay Murtagh Precast



**Standard Section of
Typical Shear Reinforcement
for UM Beam**



Part Elevation (Beam End)



Typical Lifting Details

TECHNICAL MANUAL

Box-Beam properties 495mm Wide

Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Section modulus		Self weight / m
	D	A	Y_c	Z_t	Z_b	
	(mm)	(mm ²)	(mm)	(mm ³ x 10 ⁶)	(mm ³ x 10 ⁶)	(kN/m)
SD1(1)	300	118625	142	5.85	6.55	2.97
SD2(1)	400	155125	191	10.37	11.39	3.88
SD3(1)	500	191625	240	16.11	17.46	4.79
SD4(1)	600	228125	290	23.09	24.75	5.70
SD5(1)	700	264625	339	31.28	33.26	6.62
SD6(1)	800	301125	389	40.70	42.98	7.53

Box-Beam properties 750mm Wide

Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Section modulus		Self weight / m
	D	A	Y_c	Z_t	Z_b	
	(mm)	(mm ²)	(mm)	(mm ³ x 10 ⁶)	(mm ³ x 10 ⁶)	(kN/m)
SD1(2)	300	195125	145	9.70	10.38	4.88
SD2(2)	400	257125	194	17.19	18.20	6.43
SD3(2)	500	319125	244	26.77	28.09	7.98
SD4(2)	600	381125	294	38.43	40.05	9.53
SD5(2)	700	443125	344	52.15	54.09	11.08
SD6(2)	800	505125	394	67.94	70.19	12.63

Box-Beam properties 970mm Wide

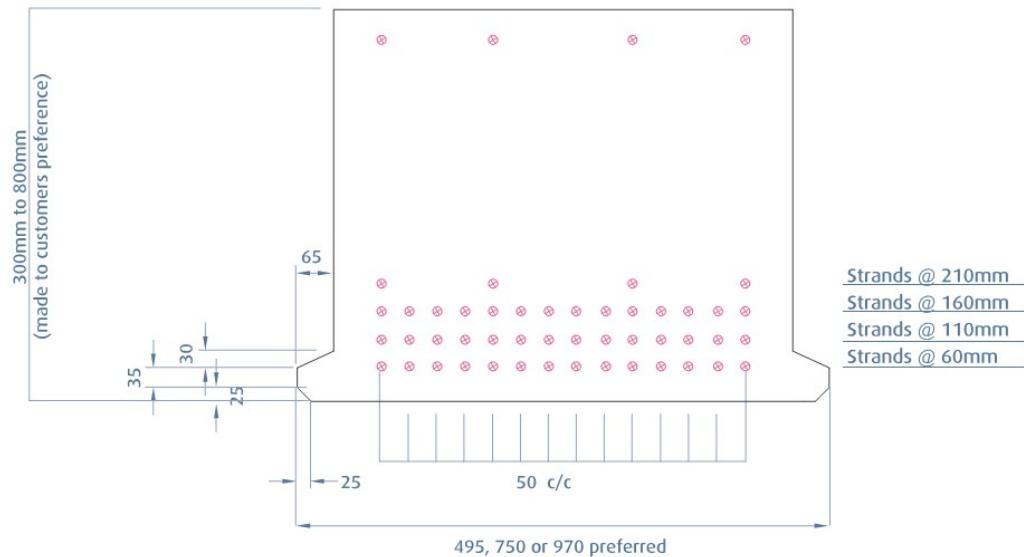
Shay Murtagh Precast

Type	Depth	Area	Height of centroid above soffit	Section modulus		Self weight / m
	D	A	Y_c	Z_t	Z_b	
	(mm)	(mm ²)	(mm)	(mm ³ x 10 ⁶)	(mm ³ x 10 ⁶)	(kN/m)
SD1(3)	300	261125	146	13.01	13.69	6.53
SD2(3)	400	345125	196	23.07	24.06	8.63
SD3(3)	500	429125	246	35.95	37.26	10.73
SD4(3)	600	513125	295	51.46	53.25	12.83
SD5(3)	700	597125	345	70.14	72.05	14.93
SD6(3)	800	681125	395	91.43	93.65	17.03

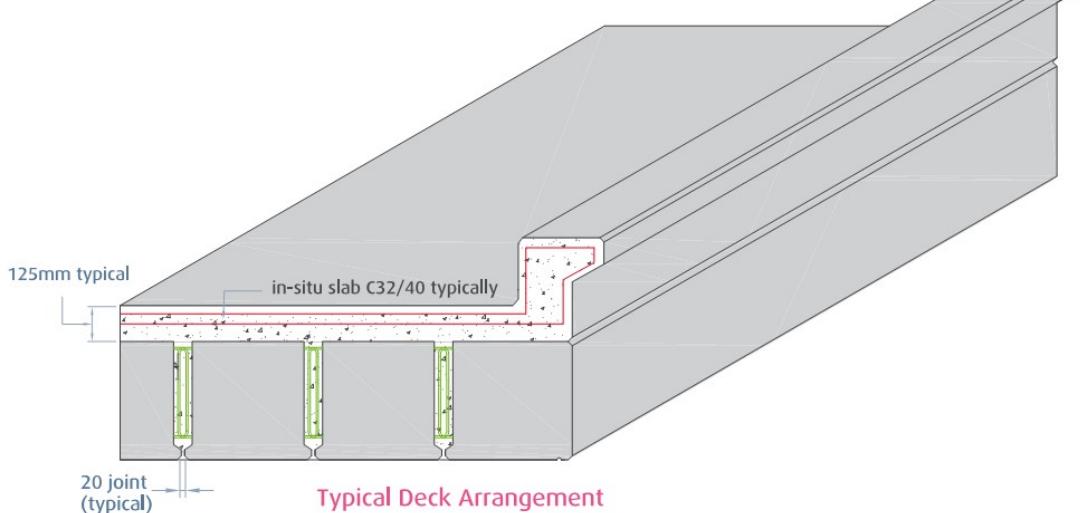
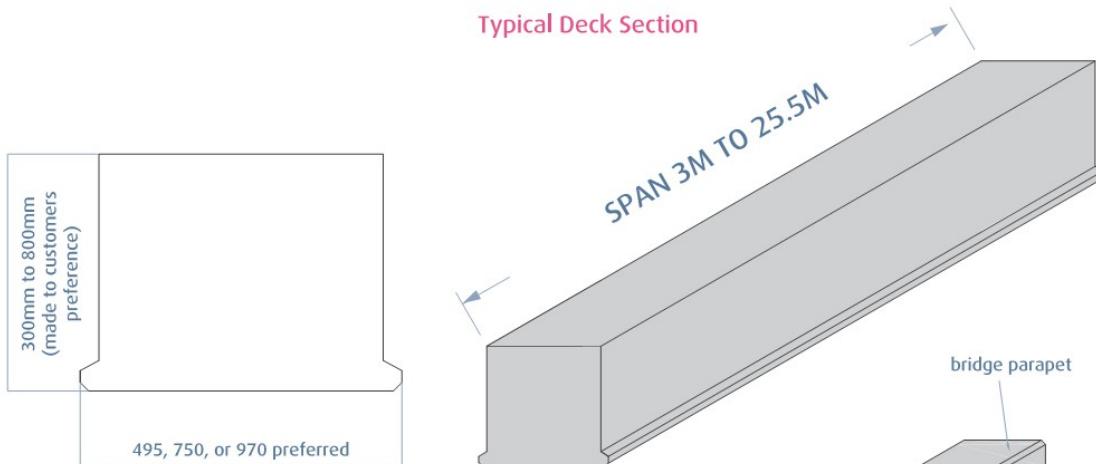
TECHNICAL MANUAL

Box-Beam Typical Details

Shay Murtagh Precast



Typical Deck Section



Typical Deck Arrangement

TECHNICAL MANUAL

Box Beam Span Table

Shay Murtagh Precast

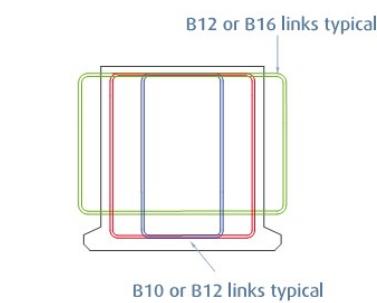
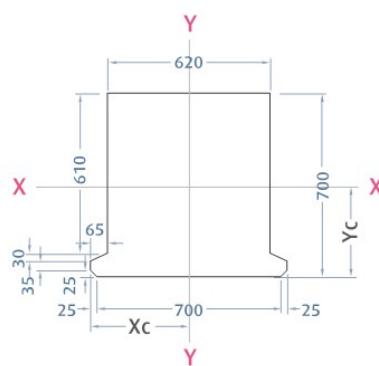
Depth	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
300																									
400																									
500																									
600																									
700																									
800																									

Blue = 495mm wide

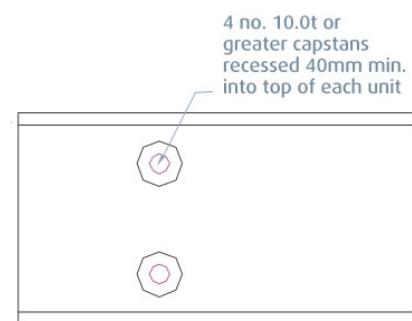
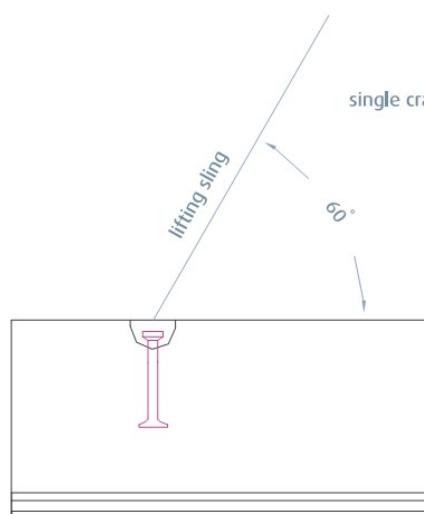
Red = 750mm wide

Yellow = 970mm wide

*See design notes for loading assumptions pg 41-43



Typical Section of Shear Reinforcement for Box Beam



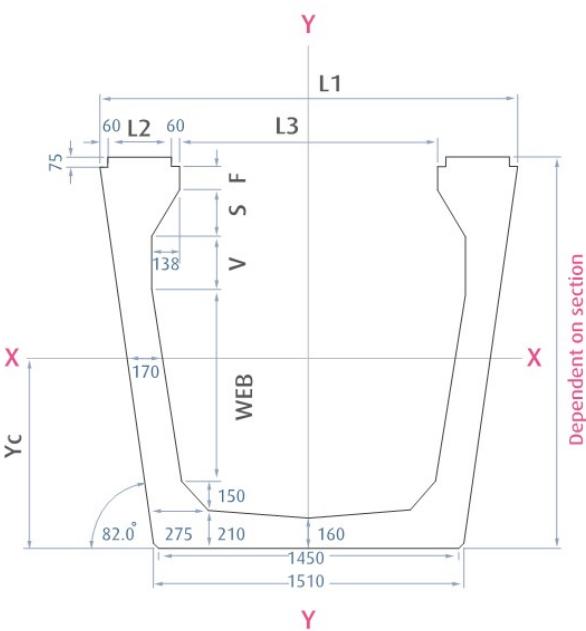
Typical Lifting Details

TECHNICAL MANUAL

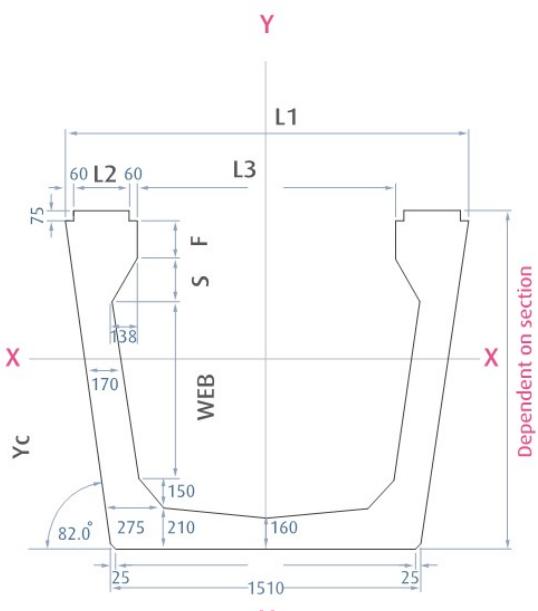
W-Beam properties

Shay Murtagh Precast

Type	Depth	Area	Y_c	Section modulus		I_{xx}	Approximate self weight	Beam top dimensions						
Section	(mm)	mm^2	(mm)	$(\text{mm}^3 \times 10^6)$		$(\text{mm}^4 \times 10^9)$	(kN/m)	L1	L2	L3	Web	S	F	V
W1	800	572360	305.3	71.88	116.46	35.556	14.31	1704.4	203.2	1058	100	220	70	-
W3	900	606880	345.9	89.54	143.43	49.614	15.17	1732.4	203.2	1086	200	220	70	-
W5	1000	641400	387.5	108.76	171.88	66.61	16.00	1760.4	203.2	1114	300	220	70	-
W7	1100	692030	440.2	136.21	204.15	89.871	17.30	1788.4	210.2	1128	350	220	120	-
W8	1200	726550	484.2	159.46	235.73	114.14	18.16	1816.4	210.2	1156	450	220	120	-
W9	1300	761070	528.7	184.11	268.56	142.00	19.03	1844.4	210.2	1184	550	220	120	-
W10	1400	812400	585.2	219.51	305.62	178.85	20.31	1872.4	217.2	1198	600	220	170	-
W11	1500	846920	631.3	248.01	341.33	215.46	21.17	1900.4	217.2	1226	700	220	170	-
W12	1600	881440	677.6	277.84	378.23	256.28	22.04	1928.4	217.2	1254	800	220	170	-
W13	1700	933470	736.7	321.13	419.90	309.34	23.34	1956.4	224.2	1268	850	220	220	-
W14	1800	975150	790.6	362.63	462.97	366.03	24.38	1984.4	238.2	1268	950	248	192	-
W15	1900	1016060	844.3	405.70	507.30	428.30	25.40	2012.4	252.2	1268	1050	276	164	-
W16	2000	1057970	898.6	451.09	552.89	496.83	26.45	2040.4	266.2	1268	1050	276	136	128
W17	2100	1102680	954.5	499.74	599.75	572.45	27.57	2068.4	280.2	1268	1050	276	108	256
W18	2200	1150190	1011.8	551.68	647.82	655.49	28.75	2096.4	294.2	1268	1050	276	80	384
W19	2300	1200500	1070.5	606.97	697.10	746.26	30.01	2124.4	308.2	1268	1050	276	52	512



Applies to Beams W16 to W19



Applies to Beams W1 to W15

TECHNICAL MANUAL

W-Beam Span Table W1 - W11

Shay Murtagh Precast

Metres	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
W1																					
W3																					
W5																					
W7																					
W8																					
W9																					
W10																					
W11																					

Blue = 3.0mc/c

Red = 3.5mc/c

Yellow = 4.0mc/c

*See design notes for loading assumptions pg 41-43

W-Beam Span Table W12 - W19

Shay Murtagh Precast

Metres	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
W12																					
W13																					
W14																					
W15																					
W16																					
W17																					
W18																					
W19																					

Blue = 3.0mc/c

Red = 3.5mc/c

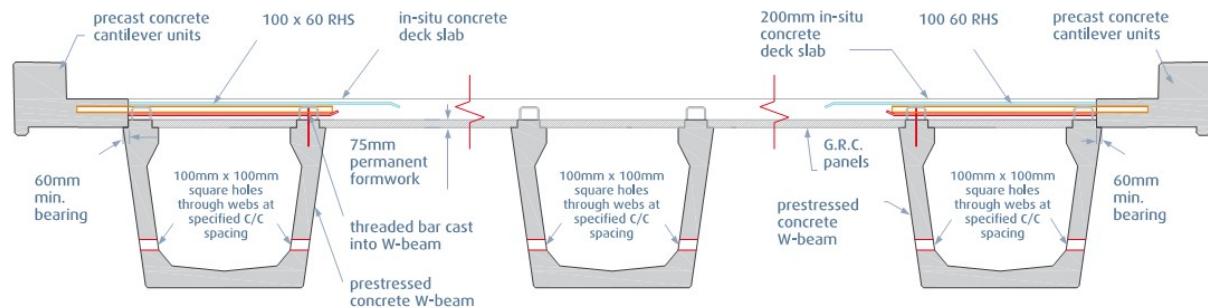
Yellow = 4.0mc/c

*See design notes for loading assumptions pg 41-42

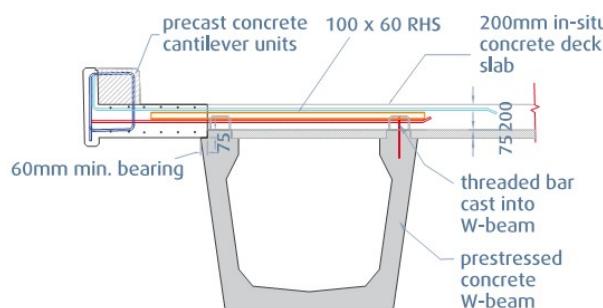
TECHNICAL MANUAL

W-Beam Typical Details

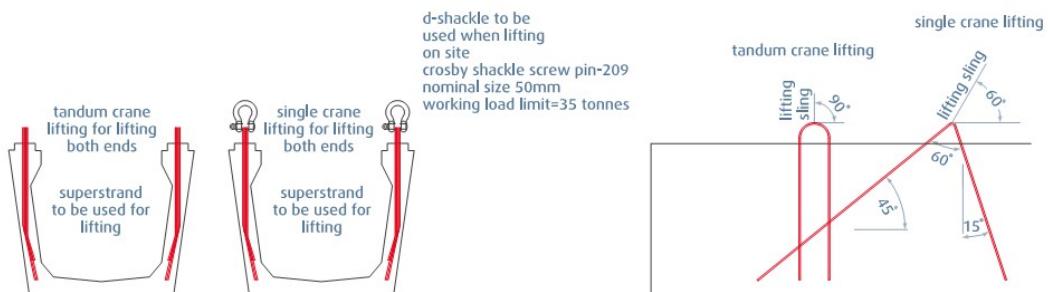
Shay Murtagh Precast



Typical Section Through Bridge



Precast Concrete
Cantilevers Detail
Typical Section

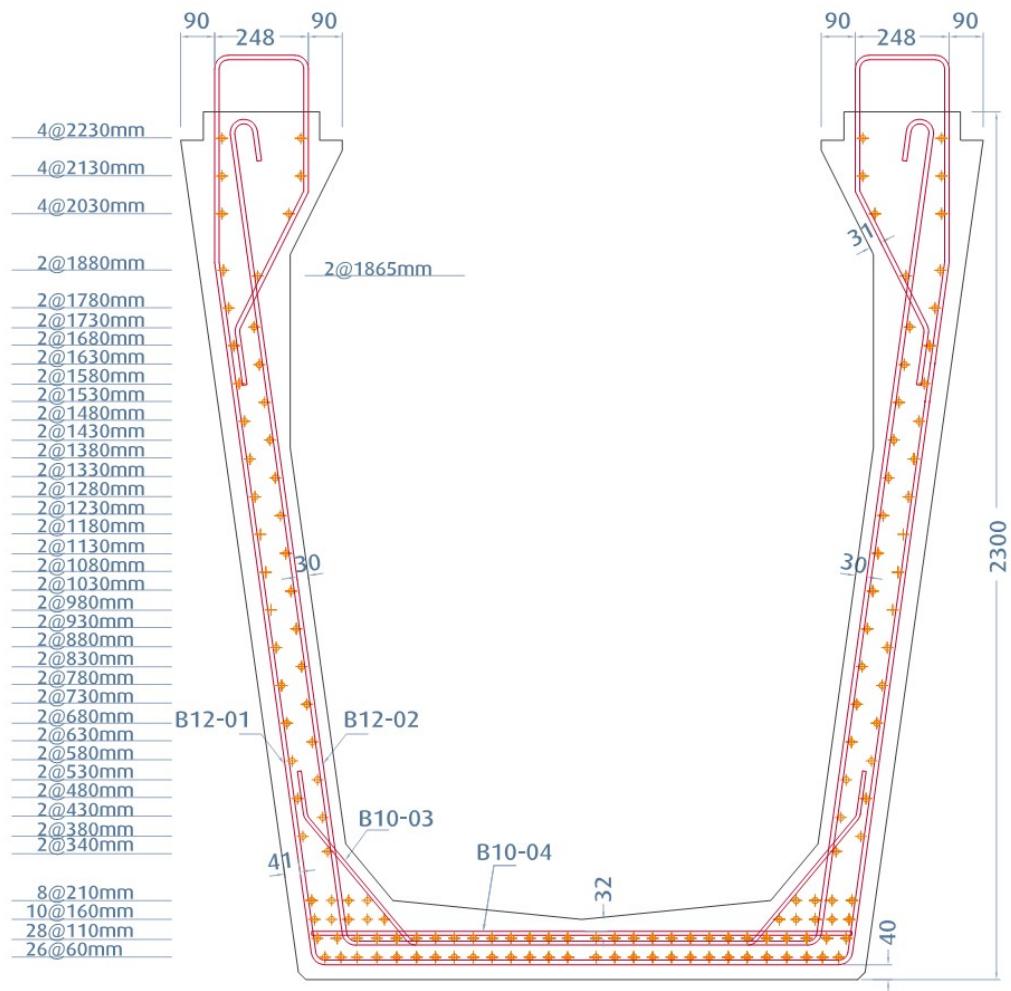


Typical Lifting Details

TECHNICAL MANUAL

W-Beam Typical Details

Shay Murtagh Precast



W Beam Typical Links and Possible Strand Positions

Precast Concrete

Precast Concrete

Precast Concrete = Strong + Durable + Versatile

These are the widely known characteristics and benefits of concrete. However precast concrete has much more to offer due to innovative, perfected and proven designs and efficient and perfected production methods.

These developments have led to time and money savings through

- Reduction of initial construction costs
- Lower level of maintenance requirements
- Quick and easy installation
- No on-site delays due to curing

Why choose precast concrete?

- Rapid and efficient build
- Lowest whole life costs
- Increased accuracy and quality of finish
- Low maintenance costs
- Large span capabilities
- Durability, strength and versatility
- High resistance to noise transmission
- Excellent thermal capacity
- Inherent fire resistance
- Buildability
- Environmentally friendly



BRIDGE DESIGNER'S CHECKLIST: DESIGN NOTES

BEARINGS

As a general rule the edge of the bearing closest to the abutment should be detailed a minimum of 150mm from the end of the beam.

- Prestressed concrete bridge beams can be used with any type of bridge bearings. However, elastomeric strip bearings and both plain and laminated elastomeric pad bearings are most commonly used for both temporary and permanent support requirements.
- The connection between the bearing and the beam is a function of the type of bearing employed and any required inserts into the beam soffit can be easily accommodated. An epoxy mortar bed or similar is frequently specified for elastomeric pad bearings.
- Due consideration must be given to the stability of the beams during construction for the type and width of bearing selected.

CAMBER

Due to the specified properties of prestressed concrete units upward camber will be present. As our standard beams are cast on flat bases, built in cambers cannot normally be accommodated.

CAST IN ITEMS

Cast in items can be included providing that they do not project through the sides or soffit of our standard mouldage. Care should be taken to ensure that any cast in items do not conflict with reinforcement or prestressing strand locations.

CONCRETE

The use of cementitious materials other than RHPC may require a longer curing period prior to detensioning and therefore are to be avoided. Our standard concrete mixes have been designed to attain a transfer strength of C40/50 and a 28 day strength of C50/60. Other concrete strengths can be considered.

Higher grade concrete is significantly beneficial for most bridge beam designs and can be used in beams manufactured by Shay Murtagh with negligible cost implications.

DEBONDING

It is common practice to debond varying lengths at the ends of a number of strands in order to pass the stress limit checks at the beam ends. Debonding is typically achieved by inserting the relevant length of strand into a duct. Debonding is inexpensive and a simple procedure from a manufacturing perspective. Debonding more than four strands at any single point should be avoided. If large numbers of strands require debonding, it is recommended to do so at multiple debonding points spaced at 500mm or 1000mm gaps.

ENDS

Skews up to 45° can normally be incorporated within our standard manufacturing procedures. The acute corner will be blocked out above 24° to minimise the risk of spalling. At the beam ends chamfers are provided across the soffit to prevent spalling on detensioning. Scarfed ends and solid end blocks should be avoided where possible. Where dowel slots are specified, account should be taken of the implications of reinforcement and cover detailing.

FINISHES

Top finish will be as cast with the side and soffit finishes to the DTp Highway Specification or Eurocodes. Colour variations occur between our units and any site in-situ works.

LIFTING

Our standard lifting methods are shown, however methods vary due to beam properties.

LENGTHS

The overall beam lengths should be specified. Small variations in length should be avoided.

REINFORCEMENT

Links are tied to the prestressing strand using stainless steel tying wire as standard. Links must be dimensioned to take account of strand positions and link diameters when considering cover requirements. Two piece links of different diameters and/or centres should be avoided. To avoid displacement of reinforcement in complex cages during casting it may be necessary to use tack welding. Reinforcement projecting through the sides and soffit should be avoided and reinforcement couplers should be considered as an alternative. Reinforcement projecting from the beam end should be straight where possible. Special stop ends/couplers may be provided to accommodate a bob on the projecting bar.

STACKING BEARERS

Stacking bearers are generally located at 500mm from the beam end.

STRAND

Our preferred strand size and type is 15.7mm diameter 7-wire super strands with nominal tensile strength of 1860 N/mm² and relaxation class 2. Strands are typically prestressed to 209kN per strand. Debonding techniques can be used.

BRIDGE DESIGNER'S CHECKLIST: DESIGN NOTES

TESTING

Our high standards of quality control make routine load testing unnecessary.

TOLERANCES

Tolerances should be to either DTp Highways Specification or the Eurocodes.

WEB OPENINGS

Web holes are provided at standard centres as indicated in the details for each beam type. The centres of the first web holes should be at least 400mm from the beam end to avoid the risk of horizontal splitting.

WEIGHT

The weight of the beams used for handling and erection purposes is carefully calculated on a case by case basis, so the client can be economical with crane hire.

ASSUMPTIONS AND DESIGN CRITERIA USED FOR THE SPAN TABLES

- The Eurocodes are used in conjunction with the relevant UK or Irish National Annexes
- Road vehicle live loading is applied using load models LM1, LM2 and the applicable range of LM3 vehicles (SV vehicles only).
- 150mm average surfacing thickness is assumed (unit weight = 23kN/m³)
- Grade C40/50 concrete used for the beams, grade C32/40 assumed for the in-situ concrete (Class N cement for both)
- Exposure Classes XC3/4 and XD1 assumed in conjunction with a 120 design life requirement.
- Total beam lengths are assumed to be at least 600mm greater than the span length.

The upper limits given in the span tables are necessarily based upon conservative bridge types and conditions. The maximum spans can likely be increased significantly if any of the following are relevant:

- Continuous multiple span bridges
- Integral bridges
- Wider bridges accomodating three or more notional lanes and/or wide footpaths
- Exposure classes XD and XS do not need to be considered

If any of the above conditions are applicable, contact the Shay Murtagh technical department at technical@shaymurtagh.ie to determine the likely increase in maximum span above what is listed in the span tables.

RAIL APPLICATIONS

- The span tables provided are not applicable for rail loading. Please contact the Shay Murtagh technical department for assistance with selecting the most suitable type and size of beam for a given span and structural characteristics. Please indicate the following details:
 - Number and length of individual spans.
 - Indicate the use of full flexural continuity between spans and/or the use of integral connections between the superstructure and the abutments if applicable.
 - Depth of ballast above the deck.
 - Type of rail loading to be considered (Typically LM71).
- Prestressed concrete beams are ideal for the rapid installation of bridge decks required for limited railway possessions. Shay Murtagh has developed a variety of details to eliminate the need for falsework and to minimize or eliminate formwork requirements for such structures. Please contact the Shay Murtagh technical department to determine how these details may be tailored to a specific rail bridge. Shay Murtagh has considerable experience in determining the optimal construction sequence for such structures and encourages the designer to contact the technical department for any desired assistance.

BRIDGE DESIGNER'S CHECKLIST: DESIGN NOTES

Shay Murtagh Precast Concrete is a BSI Registered Company. The Quality System fully complies with the requirements of BS EN ISO 9001:2000.

Additional Technical Information:

For additional information on Beam Section Properties, Strand Layout, Design Calculations, Drawings & Installation Advice, please contact:

UK Enquiries:

UK Tel: 0844 202 0263
Email: technical@shaymurtagh.co.uk

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**SHAY
MURTAGH**

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