

**PRELIM. DESIGN OF BOTTOM CABLES
OF BOX GIRDER SUPERSTRUCTURE**

THE NATIONAL ARCHIVES
COLLECTION OF
UNITED STATES GOVERNMENT

**THE STUDY ON THE CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA- PHASE 2**

Job No. : Date : 36,499.00 Designed by : Checked by :

PRELIMINARY DESIGN FOR POSITIVE MOMENT (BOTTOM SPAN)

A. Computed Load Due to Construction Loading (See STAAD Output)

Note : Assume 20% for other loads such as shrinkage, creep, etc

NODE	M _{DL}	M _{LL-1}	M _{MOTHERS}	M _{TOTAL}	M _{DES}
2	-15,927.00	-2,955.52	-3,185.40	-22,068	22,067.92
3	-43,223.73	-8,292.53	-8,644.75	-60,161	60,161.01
4	-64,438.77	-12,646.55	-12,887.75	-89,973	89,973.07
5	-79,573.03	-16,069.51	-15,914.61	-111,557	111,557.15
6	-88,627.91	-18,573.89	-17,725.58	-124,927	124,927.38
7	-91,600.74	-20,175.31	-18,320.15	-130,096	130,096.20
8	-89,215.05	-20,835.33	-17,843.01	-127,893	127,893.39
9	-82,173.38	-20,867.28	-16,434.68	-119,475	119,475.34
10	-70,475.48	-20,222.38	-14,095.10	-104,793	104,792.96
11	-54,123.72	-18,993.25	-10,824.74	-83,942	83,941.71
12	-33,116.66	-16,813.72	-6,623.33	-56,554	56,553.71
13	-7,453.41	-14,431.25	-1,490.68	-23,375	23,375.34
31	-713.22	-6,826.44	-142.64	-7,682	7,682.30
32	-28,165.00	-10,542.17	-5,633.00	-44,340	44,340.17
33	-50,977.16	-13,776.27	-10,195.43	-74,949	74,948.86
34	-69,119.16	-16,401.73	-13,823.83	-99,345	99,344.72
35	-82,612.19	-18,484.12	-16,522.44	-117,619	117,618.75
36	-91,453.18	-19,951.02	-18,290.64	-129,695	129,694.84
37	-95,634.06	-20,861.14	-19,126.81	-135,622	135,622.01
38	-95,926.02	-21,103.68	-19,185.20	-136,215	136,214.90
39	-94,715.42	-21,149.54	-18,943.08	-134,808	134,808.04
40	-88,921.84	-20,776.45	-17,784.37	-127,483	127,482.66
41	-78,476.26	-19,799.28	-15,695.25	-113,971	113,970.79
42	-63,372.69	-18,165.87	-12,674.54	-94,213	94,213.10
43	-43,610.11	-16,112.80	-8,722.02	-68,445	68,444.93
95	7,769.38	-9,638.13	1,553.88	-315	314.87
96	-20,490.91	-13,100.91	-4,098.18	-37,690	37,690.00
97	-44,090.82	-16,081.33	-8,818.16	-68,990	68,990.31
98	-63,057.55	-18,449.88	-12,611.51	-94,119	94,118.94
99	-77,356.46	-20,274.37	-15,471.29	-113,102	113,102.12
100	-87,000.15	-21,484.50	-17,400.03	-125,885	125,884.68
101	-91,983.07	-22,135.25	-18,396.61	-132,515	132,514.93
102	-92,756.40	-22,230.05	-18,551.28	-133,538	133,537.73

**THE STUDY ON THE CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA- PHASE 2**

Job No. : Date : 36,499.00 Designed by : Checked by :

C. Preliminary No. of Strands/Cables

Compressive Strength @ Transfer. f_{ci} = 40,000.00 KPa
 Allowable Compression. $f_c = 0.40f_c$ = -16,000.00 KPa
 Allowable Tension. $f_t = 249 f_{ci}^{1/2}$ = 1,574.81 KPa

Distance of cable center to top of slab = 0.18

NODE	Preliminary Design Parameters						
	A	I	c_1	c_2	e	f_c	f_t
2	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
3	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
4	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
5	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
6	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
7	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
8	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
9	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
10	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
11	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
12	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
13	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
31	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
32	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
33	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
34	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
35	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
36	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
37	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
38	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
39	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
40	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
41	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
42	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
43	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
95	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
96	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
97	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
98	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
99	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
100	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
101	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81
102	11.66	15.69	1.11	2.01	1.83	-16,000.00	1,574.81

**THE STUDY ON THE CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA- PHASE 2**

Job No. : Date : 36,499.00 Designed by : Checked by :

Basic Equation :

@ top: $f_c = -P_i/A + P_i e_c/l - M_c/l = -16.000.00$
 @ bottom: $f_t = -P_i/A - P_i e_b/l + M_c/l = 1.574.81$

For Tension : $P_i = \frac{(M_c/l - f_t)}{(1/A + e_b/l)}$

For Comp.: $P_i = \frac{(M_c/l + f_c)}{(-1/A + e_c/l)}$

NODE	Location	M	c/l	f	1/A	e_c/l	P _i	Use P _i
2	top	22,067.92	0.0710	-16,000	0.0858	0.1298	-327,367.10	3,897.57
	bottom	22,067.92	0.1278	1,575	0.0858	0.2339	3,897.57	
3	top	60,161.01	0.0710	-16,000	0.0858	0.1298	-266,065.43	19,129.28
	bottom	60,161.01	0.1278	1,575	0.0858	0.2339	19,129.28	
4	top	89,973.05	0.0710	-16,000	0.0858	0.1298	-218,090.11	31,049.77
	bottom	89,973.05	0.1278	1,575	0.0858	0.2339	31,049.77	
5	top	111,557.15	0.0710	-16,000	0.0858	0.1298	-183,355.69	39,680.28
	bottom	111,557.15	0.1278	1,575	0.0858	0.2339	39,680.28	
6	top	124,927.38	0.0710	-16,000	0.0858	0.1298	-161,839.52	45,026.44
	bottom	124,927.38	0.1278	1,575	0.0858	0.2339	45,026.44	
7	top	130,096.20	0.0710	-16,000	0.0858	0.1298	-153,521.54	47,093.22
	bottom	130,096.20	0.1278	1,575	0.0858	0.2339	47,093.22	
8	top	127,893.39	0.0710	-16,000	0.0858	0.1298	-157,066.44	46,212.41
	bottom	127,893.39	0.1278	1,575	0.0858	0.2339	46,212.41	
9	top	119,475.34	0.0710	-16,000	0.0858	0.1298	-170,613.26	42,846.41
	bottom	119,475.34	0.1278	1,575	0.0858	0.2339	42,846.41	
10	top	104,792.96	0.0710	-16,000	0.0858	0.1298	-194,241.03	36,975.59
	bottom	104,792.96	0.1278	1,575	0.0858	0.2339	36,975.59	
11	top	83,941.71	0.0710	-16,000	0.0858	0.1298	-227,796.10	28,638.11
	bottom	83,941.71	0.1278	1,575	0.0858	0.2339	28,638.11	
12	top	56,553.71	0.0710	-16,000	0.0858	0.1298	-271,870.51	17,686.88
	bottom	56,553.71	0.1278	1,575	0.0858	0.2339	17,686.88	
13	top	23,375.34	0.0710	-16,000	0.0858	0.1298	-325,263.13	4,420.35
	bottom	23,375.34	0.1278	1,575	0.0858	0.2339	4,420.35	
31	top	7,682.30	0.0710	-16,000	0.0858	0.1298	-350,517.30	0.00
	bottom	7,682.30	0.1278	1,575	0.0858	0.2339	-1,854.59	
32	top	44,340.17	0.0710	-16,000	0.0858	0.1298	-291,525.27	12,803.24
	bottom	44,340.17	0.1278	1,575	0.0858	0.2339	12,803.24	

**THE STUDY ON THE CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA- PHASE 2**

Job No. : Date : 36,499.00 Designed by : Checked by :

NODE	Location	M	c/l	f	I/A	ec/l	P _i	Use P _i
33	top	74,948.86	0.0710	-16.000	0.0858	0.1298	-242,267.94	25,042.28
	bottom	74,948.86	0.1278	1.575	0.0858	0.2339	25,042.28	
34	top	99,344.72	0.0710	-16.000	0.0858	0.1298	-203,008.66	34,797.08
	bottom	99,344.72	0.1278	1.575	0.0858	0.2339	34,797.08	
35	top	117,618.75	0.0710	-16.000	0.0858	0.1298	-173,601.00	42,104.05
	bottom	117,618.75	0.1278	1.575	0.0858	0.2339	42,104.05	
36	top	129,694.84	0.0710	-16.000	0.0858	0.1298	-154,167.43	46,932.73
	bottom	129,694.84	0.1278	1.575	0.0858	0.2339	46,932.73	
37	top	135,622.01	0.0710	-16.000	0.0858	0.1298	-144,629.08	49,302.74
	bottom	135,622.01	0.1278	1.575	0.0858	0.2339	49,302.74	
38	top	136,214.90	0.0710	-16.000	0.0858	0.1298	-143,674.96	49,539.81
	bottom	136,214.90	0.1278	1.575	0.0858	0.2339	49,539.81	
39	top	134,808.04	0.0710	-16.000	0.0858	0.1298	-145,938.97	48,977.27
	bottom	134,808.04	0.1278	1.575	0.0858	0.2339	48,977.27	
40	top	127,482.66	0.0710	-16.000	0.0858	0.1298	-157,727.41	46,048.18
	bottom	127,482.66	0.1278	1.575	0.0858	0.2339	46,048.18	
41	top	113,970.79	0.0710	-16.000	0.0858	0.1298	-179,471.52	40,645.39
	bottom	113,970.79	0.1278	1.575	0.0858	0.2339	40,645.39	
42	top	94,213.10	0.0710	-16.000	0.0858	0.1298	-211,266.77	32,745.18
	bottom	94,213.10	0.1278	1.575	0.0858	0.2339	32,745.18	
43	top	68,444.93	0.0710	-16.000	0.0858	0.1298	-252,734.45	22,441.65
	bottom	68,444.93	0.1278	1.575	0.0858	0.2339	22,441.65	
95	top	314.87	0.0710	-16.000	0.0858	0.1298	-362,373.41	0.00
	bottom	314.87	0.1278	1.575	0.0858	0.2339	-4,800.50	
96	top	37,690.00	0.0710	-16.000	0.0858	0.1298	-302,227.12	10,144.13
	bottom	37,690.00	0.1278	1.575	0.0858	0.2339	10,144.13	
97	top	68,990.31	0.0710	-16.000	0.0858	0.1298	-251,856.79	22,659.72
	bottom	68,990.31	0.1278	1.575	0.0858	0.2339	22,659.72	
98	top	94,118.94	0.0710	-16.000	0.0858	0.1298	-211,418.30	32,707.53
	bottom	94,118.94	0.1278	1.575	0.0858	0.2339	32,707.53	
99	top	113,102.12	0.0710	-16.000	0.0858	0.1298	-180,869.43	40,298.05
	bottom	113,102.12	0.1278	1.575	0.0858	0.2339	40,298.05	
100	top	125,884.68	0.0710	-16.000	0.0858	0.1298	-160,298.97	45,409.22
	bottom	125,884.68	0.1278	1.575	0.0858	0.2339	45,409.22	

**THE STUDY ON THE CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA- PHASE 2**

Job No. : _____ Date : 36,499.00 Designed by : _____ Checked by : _____

NODE	Location	M	c/l	f	l/A	ec/l	P _i	Use P _i
101	top	132.514.93	0.0710	-16.000	0.0858	0.1298	-149.629.18	48.060.36
	bottom	132.514.93	0.1278	1.575	0.0858	0.2339	48.060.36	
102	top	133.537.73	0.0710	-16.000	0.0858	0.1298	-147.983.23	48.469.33
	bottom	133.537.73	0.1278	1.575	0.0858	0.2339	48.469.33	

NODE	Total P _i	15				No. of Strands	19.00
		P _u	P _j = .75P _u	Estimated Init. Loss	P _i		

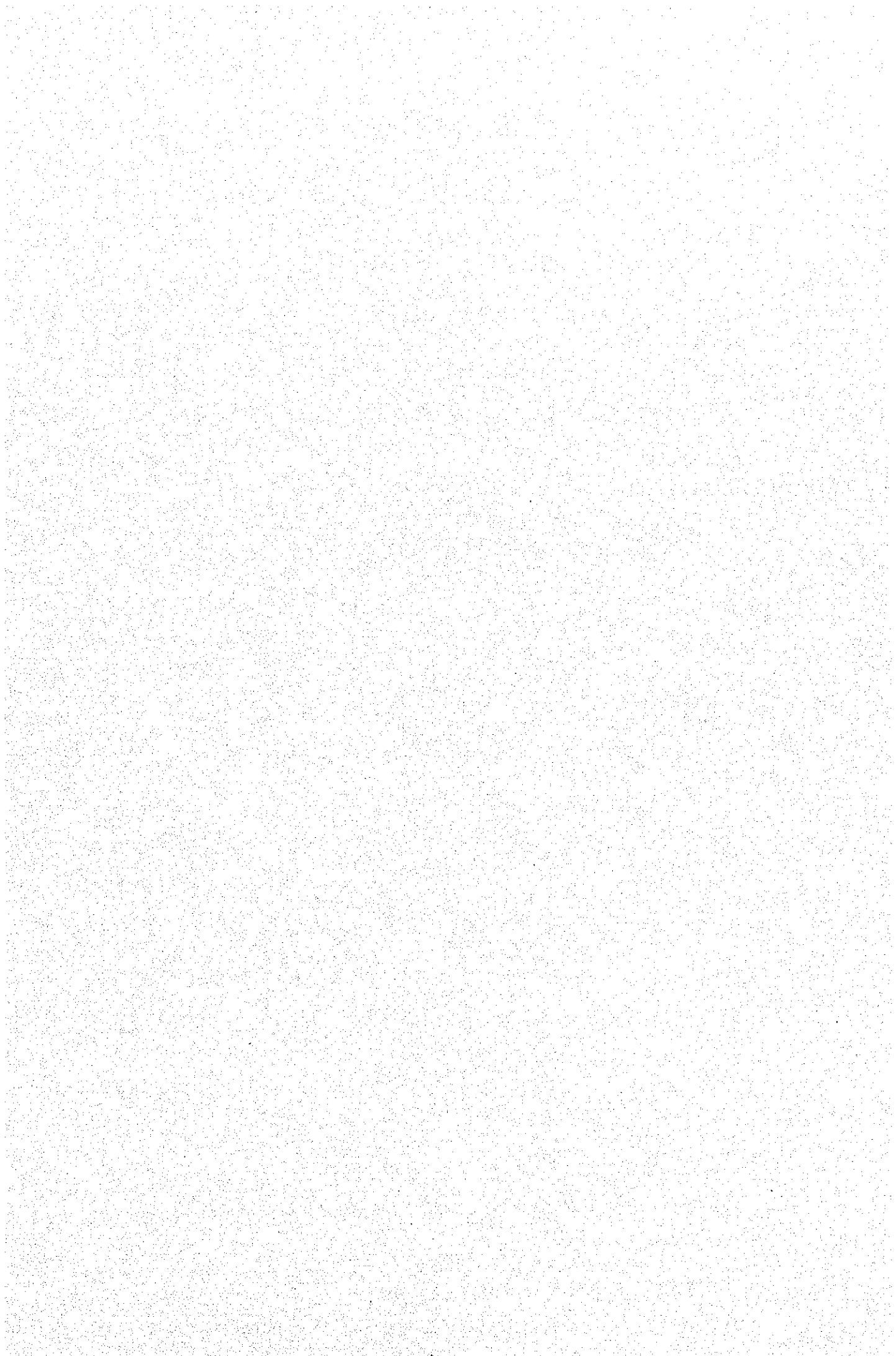
Ultimate Stress of P/S Cables (Grade270) = 1.860
 Number of prestressing strands per cable = 19
 Diameter of Prestressing Strands = 15 Area = 140.00 mm.²

2	3.897.57	260.40	195.30	0.20	156.24	24.95	1.31	19T15.24
3	19.129.28	260.40	195.30	0.20	156.24	122.44	6.44	19T15.24
4	31.049.77	260.40	195.30	0.20	156.24	198.73	10.46	19T15.24
5	39.680.28	260.40	195.30	0.20	156.24	253.97	13.37	19T15.24
6	45.026.44	260.40	195.30	0.20	156.24	288.19	15.17	19T15.24
7	47.093.22	260.40	195.30	0.20	156.24	301.42	15.86	19T15.24
8	46.212.41	260.40	195.30	0.20	156.24	295.78	15.57	19T15.24
9	42.846.41	260.40	195.30	0.20	156.24	274.23	14.43	19T15.24
10	36.975.59	260.40	195.30	0.20	156.24	236.66	12.46	19T15.24
11	28.638.11	260.40	195.30	0.20	156.24	183.30	9.65	19T15.24
12	17.686.88	260.40	195.30	0.20	156.24	113.20	5.96	19T15.24
13	4.420.35	260.40	195.30	0.20	156.24	28.29	1.49	19T15.24
31	0.00	260.40	195.30	0.20	156.24	0.00	0.00	19T15.24
32	12,803.24	260.40	195.30	0.20	156.24	81.95	4.31	19T15.24
33	25,042.28	260.40	195.30	0.20	156.24	160.28	8.44	19T15.24
34	34,797.08	260.40	195.30	0.20	156.24	222.72	11.72	19T15.24
35	42,104.05	260.40	195.30	0.20	156.24	269.48	14.18	19T15.24
36	46,932.73	260.40	195.30	0.20	156.24	300.39	15.81	19T15.24
37	49,302.74	260.40	195.30	0.20	156.24	315.56	16.61	19T15.24
38	49,539.81	260.40	195.30	0.20	156.24	317.08	16.69	19T15.24
39	48,977.27	260.40	195.30	0.20	156.24	313.47	16.50	19T15.24
40	46,048.18	260.40	195.30	0.20	156.24	294.73	15.51	19T15.24
41	40,645.39	260.40	195.30	0.20	156.24	260.15	13.69	19T15.24
42	32,745.18	260.40	195.30	0.20	156.24	209.58	11.03	19T15.24
43	22,441.65	260.40	195.30	0.20	156.24	143.64	7.56	19T15.24
95	0.00	260.40	195.30	0.20	156.24	0.00	0.00	19T15.24
96	10,144.13	260.40	195.30	0.20	156.24	64.93	3.42	19T15.24
97	22,659.72	260.40	195.30	0.20	156.24	145.03	7.63	19T15.24
98	32,707.53	260.40	195.30	0.20	156.24	209.34	11.02	19T15.24
99	40,298.05	260.40	195.30	0.20	156.24	257.92	13.57	19T15.24
100	45,409.22	260.40	195.30	0.20	156.24	290.64	15.30	19T15.24
101	48,060.36	260.40	195.30	0.20	156.24	307.61	16.19	19T15.24
102	48,469.33	260.40	195.30	0.20	156.24	310.22	16.33	19T15.24

**CANTILEVER CONSTRUCTION
OF BOX GIRDER SUPERSTRUCTURE**

INPUT PARAMETERS
FOR THE STRUCTURE STICK MODEL USING STAAD III

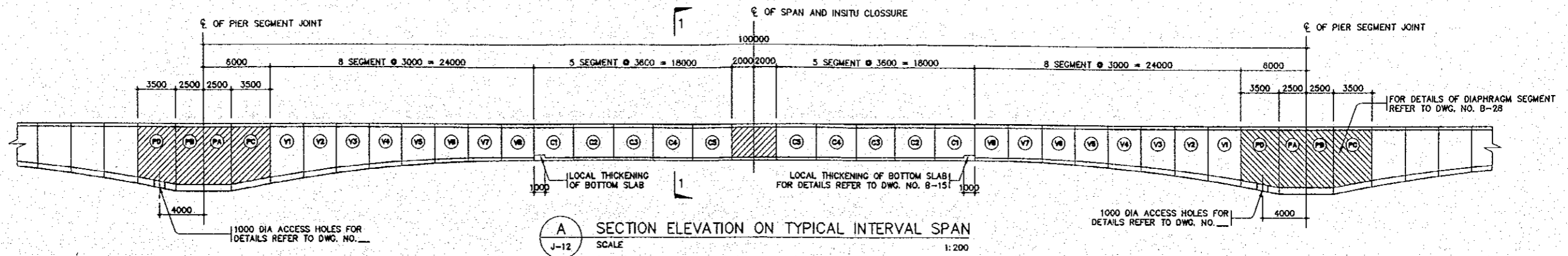
**SECTIONAL PROPERTIES
OF BOX GIRDER SUPERSTRUCTURE**



THE STUDY ON CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA (PHASE 2)

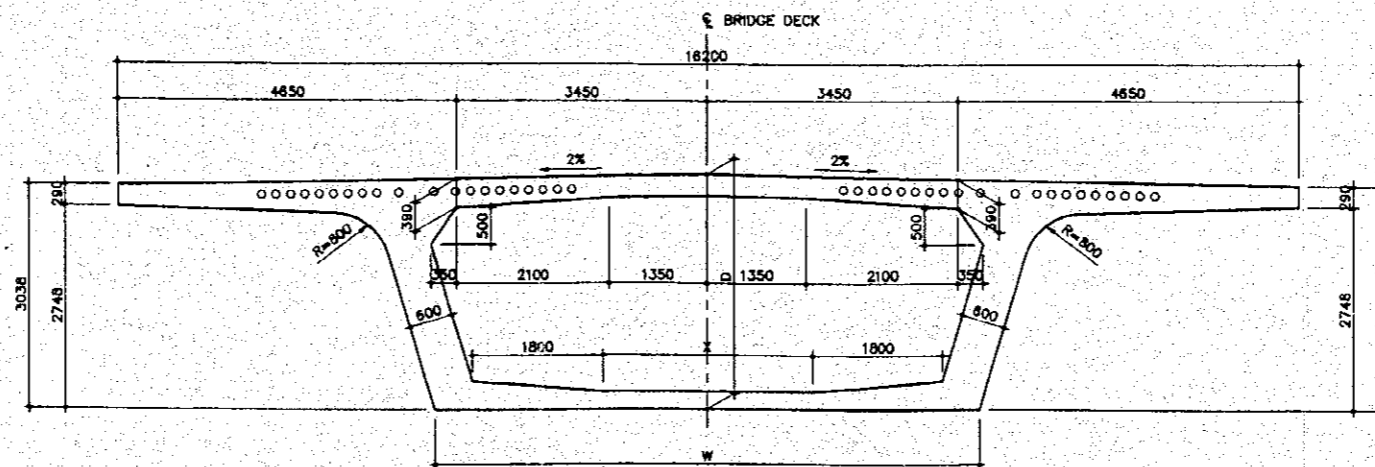
GENERAL ARRANGEMENT OF
DECK SEGMENT (SHEET 1 OF 3)

SCALE AS SHOWN SHEET NO. J-12



SCHEDULE OF VARYING SEGMENT DIMENSIONS

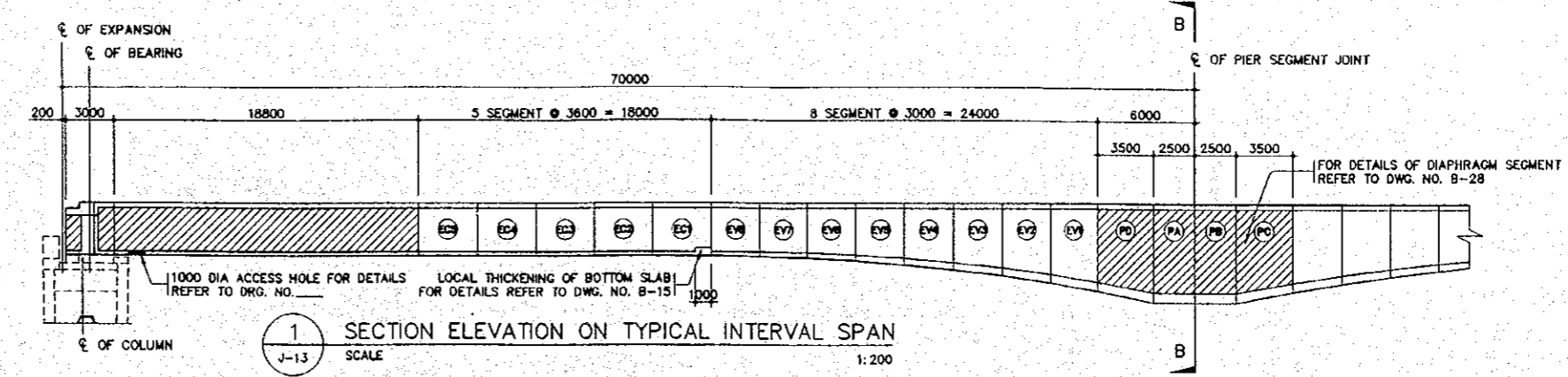
SEGMENT TYPE	DISTANCE FROM ϕ SPAN	OVERALL BOX DEPTH 'D'	BOTTOM SLAB WIDE 'W'	DIMENSION 'X'	BOTTOM SLAB THICKNESS 'T'	LONGITUDINAL PRESTRESSING ANCHORAGE BUSTER TYPES
PA	50000	6000	5800	1400	600	
PC	48000	6000	6204	1400	600	
V1	44000	5333	6507	1776	554	
	41000	4833	6769	2055	515	
V2	38000	4400	6991	2294	476	
V3	35000	4033	7173	2492	436	
V4	32000	3733	7314	2650	397	
V5	29000	3500	7415	2867	358	
V6	26000	3333	7475	2845	319	
V7	23000	3233	7495	2881	279	
V8	19500	3200	7495	2878	240	
C1	18000	3200	7485	2878	240	
C2	12500	3200	7485	2878	240	
C3	9000	3200	7485	2878	240	
C4	5500	3200	7485	2878	240	
C5	2000	3200	7485	2878	240	
C6	2000	3200	7485	2878	240	
C4	5500	3200	7485	2878	240	
C3	9000	3200	7485	2878	240	
C2	12500	3200	7485	2878	240	
C1	18000	3200	7485	2878	240	
V8	19500	3200	7485	2878	240	
V7	23000	3233	7475	2881	279	
V6	26000	3333	7415	2845	319	
V5	29000	3500	7314	2867	358	
V4	32000	3733	7173	2650	397	
V3	35000	4033	6991	2492	436	
V2	38000	4400	6769	2294	476	
V1	41000	4833	6507	2055	515	
	44000	5333	6204	1776	554	
PD	48000	6000	5800	1400	600	
PA	50000	6000	5800	1400	600	



THE STUDY ON CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA (PHASE 2)

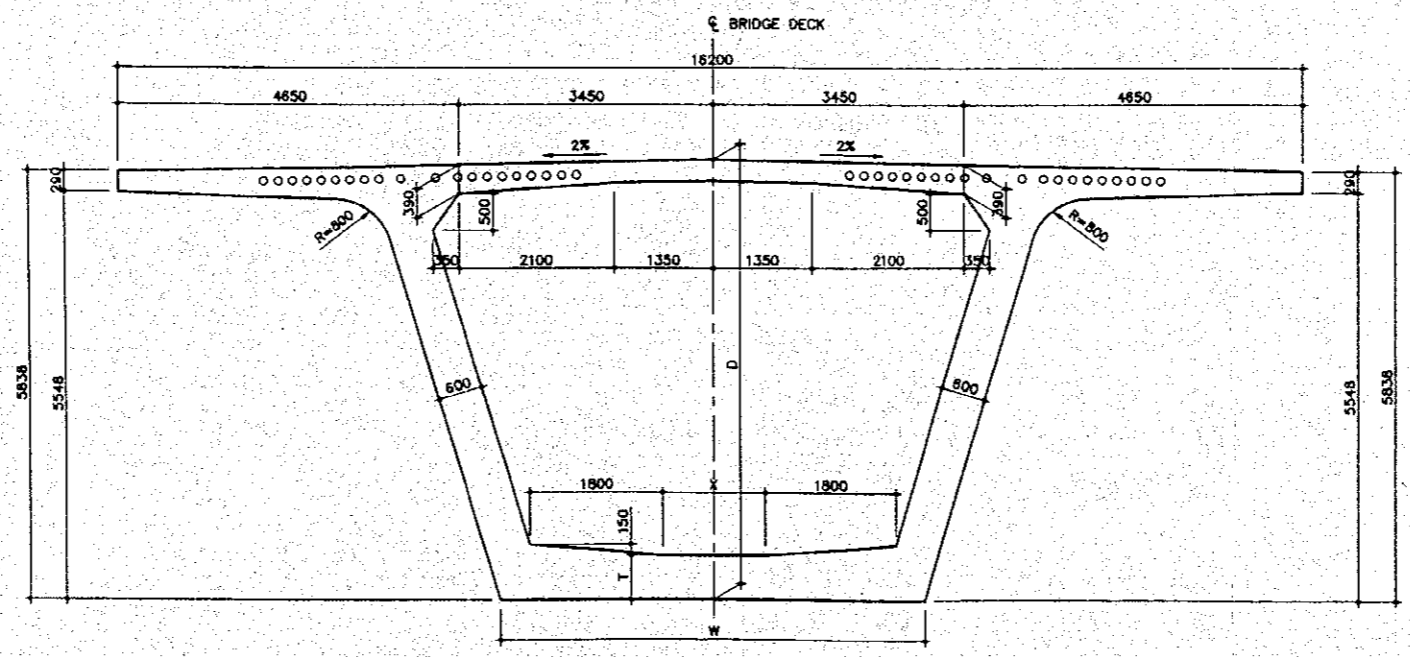
GENERAL ARRANGEMENT OF
DECK SEGMENT (SHEET 2 OF 3)

SCALE	SHEET NO.
AS SHOWN	J-13



SCHEDULE OF VARYING SEGMENT DIMENSIONS

SEGMENT TYPE	DISTANCE FROM ϕ SPAN	OVERALL BOX DEPTH 'D'	BOTTOM BOX WIDE 'W'	BOTTOM DIMENSION 'X'	BOTTOM SLAB THICKNESS 'T'	LONGITUDINAL PRESTRESSING ANCHORAGE BULSTER TYPES
AD	18655	3200	7495	2878	240	
EC5	2000	3200	7495	2878	240	
EC4	5500	3200	7495	2878	240	
EC3	9000	3200	7495	2878	240	
EC2	12500	3200	7495	2878	240	
EC1	16000	3200	7495	2878	240	
E18	19500	3200	7495	2878	240	
E17	23000	3233	7475	2881	279	
E16	26000	3333	7415	2845	319	
E15	29000	3500	7314	2867	358	
E14	32000	3733	7173	2850	387	
E13	35000	4033	6991	2492	436	
E12	38000	4400	6769	2294	476	
E11	41000	4833	6507	2055	515	
E10	44000	5333	6204	1776	554	
FD	48000	6000	5800	1400	600	
PA	50000	6000	5800	1400	600	



THE STUDY ON THE CONSTRUCTION OF THE BRIDGE

OVER THE RIVER RUPSA IN KHULNA - PHASE 2

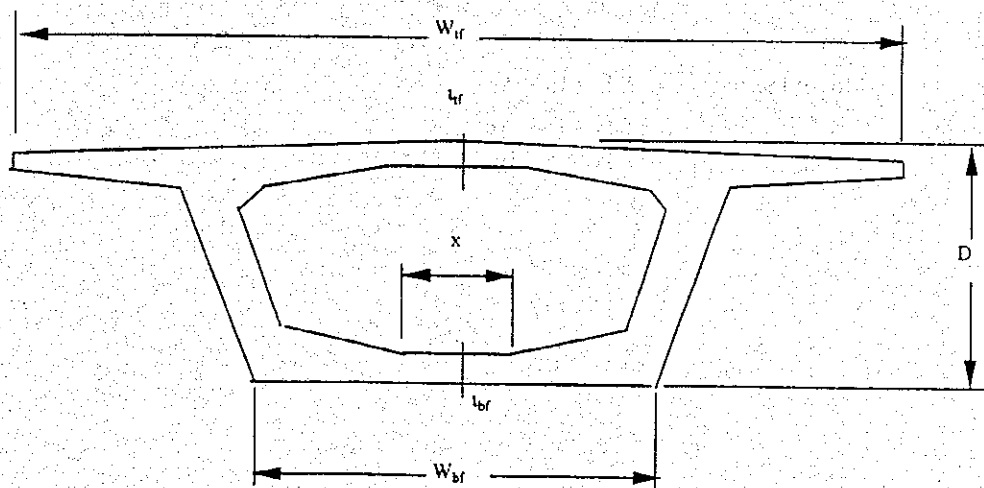
Job No.	Date : 10-Nov-99	Designed by :	Checked by :
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A. Dimensions

SECTION	ΔL	L	W_{tf}	W_{bf}	t_{tf}	t_{bf}	D	x
IS-0	0.00	0.00	16.35	6.000	0.280	0.650	5.918*	0.522
IS-1	4.00	4.00	16.35	6.334	0.280	0.586	5.470	0.809
IS-2	3.00	7.00	16.35	6.585	0.280	0.538	5.134	1.023
IS-3	3.00	10.00	16.35	6.836	0.280	0.490	4.798	1.238
IS-4	3.00	13.00	16.35	7.087	0.280	0.442	4.462	1.453
IS-5	3.00	16.00	16.35	7.338	0.280	0.394	4.126	1.668
IS-6	3.00	19.00	16.35	7.588	0.280	0.346	3.790	1.883
IS-7	3.00	22.00	16.35	7.839	0.280	0.298	3.454	2.098
IS-8 to 14	3.00	25.00	16.35	8.090	0.280	0.250	3.118*	2.313

* Ave. Dimension

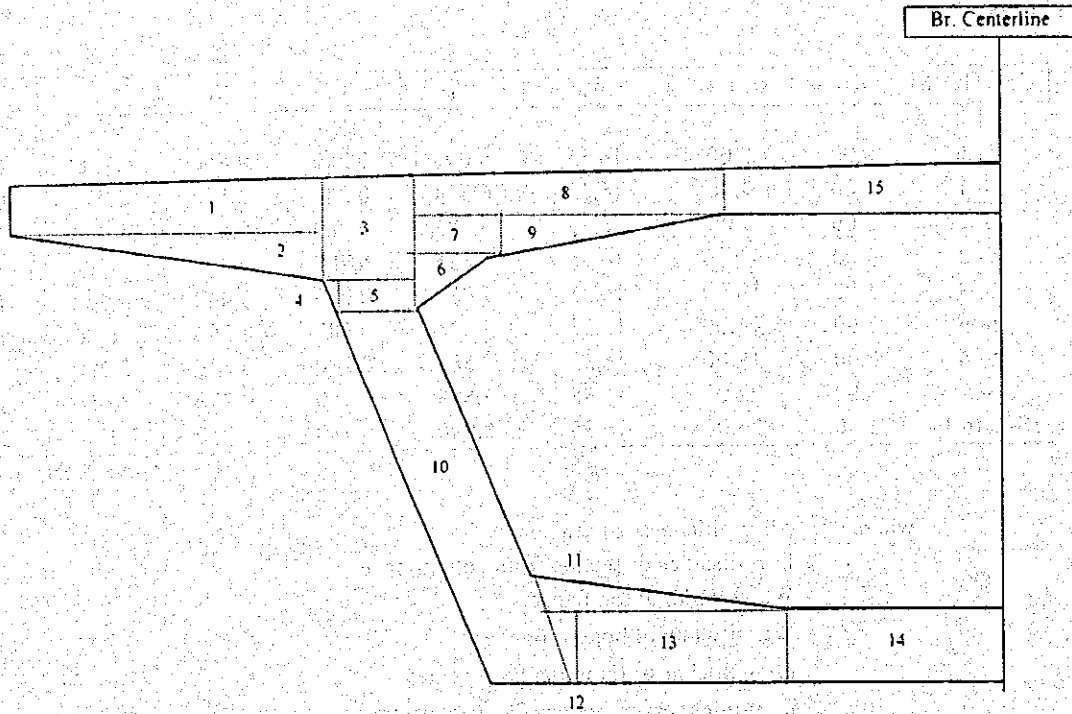
- where :
- ΔL = thickness of segment
 - L = distance of section from column face
 - W_{tf} = width of top flange
 - W_{bf} = width of bottom flange
 - t_{tf} = thickness of top flange at center
 - t_{bf} = thickness of bottom flange at center
 - D = depth of section
 - x = width of bottom flange as shown



TYPICAL CROSS SECTION

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No. : Date : 11/10/99 Designed by : Checked by :



Half Cross Section

Section Properties :

Nodal Properties

Area : $A_x = A_1 + A_2 + \dots + A_n$ or $A_x = \sum A_i$
 Mo. of Inertia : $\sum I_z = I_o + Ad^2$
 $\sum I_y = I_o + Ad^2$
 $\sum I_x = I_z + I_y$

**THE STUDY ON THE CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA - PHASE 2**

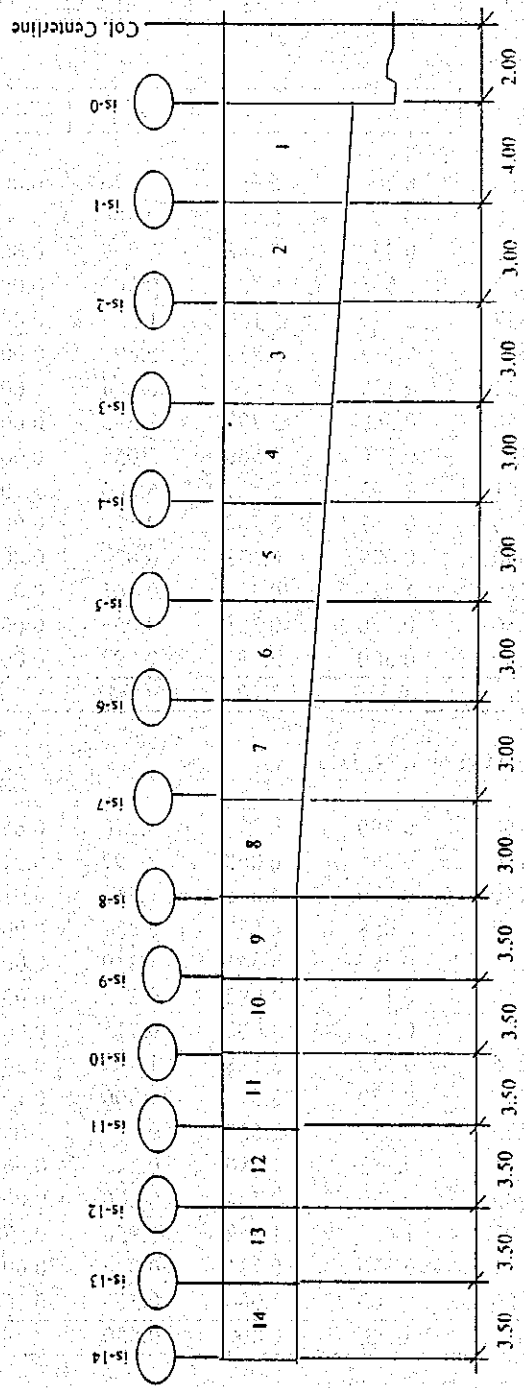
Job No.:

Date:

10-Nov-99

Designed by:

Checked by:



HALF PROFILE OF THE SUPERSTRUCTURE

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No. _____ Date: 10-Nov-99 Designed by: _____ Checked by: _____

A. Calculation of Section Properties : A, Iz

IS-0		W_{rf}	W_{br}	t_{rf}	t_{br}	D	x	ϕ	deg.
		16.350	6.000	0.280	0.650	5.918	0.522	0.356	20.40

Type	b	h	Area	y_b	Ay_b	I_o	d	Ad^2	I_z	
1	R	3.160	0.250	0.790	5.793	4.576	0.0041	-2.390	4.5110	4.5151
2	T	3.160	0.250	0.395	5.585	2.206	0.0014	-2.181	1.8794	1.8807
3	R	0.740	0.500	0.370	5.668	2.097	0.0077	-2.265	1.8975	1.9052
4	T	0.207	0.557	0.058	5.232	0.302	0.0010	-1.829	0.1930	0.1940
5	R	0.533	0.557	0.297	5.140	1.527	0.0077	-1.736	0.8956	0.9033
6	T	0.550	0.482	0.133	5.257	0.697	0.0017	-1.854	0.4556	0.4573
7	R	0.550	0.325	0.179	5.506	0.984	0.0016	-2.102	0.7899	0.7914
8	R	2.275	0.250	0.569	5.793	3.295	0.0030	-2.390	3.2476	3.2506
9	T	2.275	0.325	0.370	5.560	2.055	0.0022	-2.156	1.7188	1.7210
10	R	0.533	4.861	2.593	2.431	6.303	5.1062	0.973	2.4545	7.5607
11	T	2.444	0.150	0.183	0.700	0.128	0.0002	2.703	1.3398	1.3400
12	T	0.242	0.650	0.079	0.433	0.034	0.0018	2.970	0.6931	0.6949
13	R	2.202	0.650	1.432	0.325	0.465	0.0504	3.078	13.5668	13.6172
14	R	0.261	0.650	0.170	0.325	0.055	0.0060	3.078	1.6077	1.6137
15	R	2.000	0.250	0.500	5.793	2.897	0.0026	-2.390	2.8551	2.8577
S u m m a t i o n			16.232	3.403	55.243					86.6056

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.207	0.058	4.877	0.281	0.0001	-4.877	1.3722	1.3723
5	R	0.557	0.533	0.297	4.541	1.349	0.0070	-4.541	6.1275	6.1345
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	4.861	0.533	2.593	3.637	9.432	0.0615	-3.637	34.3052	34.3667
11	T	0.150	2.444	0.183	1.890	0.347	0.0608	-1.890	0.6552	0.7160
12	T	0.650	0.242	0.079	2.544	0.200	0.0003	-2.544	0.5085	0.5087
13	R	0.650	2.202	1.432	1.362	1.950	0.5787	-1.362	2.6566	3.2353
14	R	0.650	0.261	0.170	0.131	0.022	0.0010	-0.131	0.0029	0.0039
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			16.232	0.000	0.000					240.7895

Therefore :

$$\begin{aligned}
 A &= 16.232 \text{ m}^2 & I_y &= 240.789 \text{ m}^4 & y_b &= 3.403 \text{ m} \\
 I_z &= 86.606 \text{ m}^4 & I_x &= 327.395 \text{ m}^4 & y_t &= 2.515 \text{ m}
 \end{aligned}$$

Note : R = Rectangular Section T = Triangular Section

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No.	Date : 10-Nov-99	Designed by :	Checked by :
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A. Calculation of Section Properties : A, Iz

IS- 1	W _{tr}	W _{br}	t _{tr}	t _{br}	D	x	φ	deg.
	16.350	6.334	0.280	0.586	5.470	0.809	0.356	20.39

Type	b	h	Area	y _b	Ay _b	I _o	d	Ad ²	Iz	
1	R	3.160	0.250	0.790	5.345	4.223	0.0041	-2.169	3.7150	3.7191
2	T	3.160	0.250	0.395	5.137	2.029	0.0014	-1.960	1.5177	1.5191
3	R	0.740	0.500	0.370	5.220	1.931	0.0077	-2.044	1.5451	1.5528
4	T	0.207	0.557	0.058	4.784	0.276	0.0010	-1.608	0.1491	0.1501
5	R	0.533	0.557	0.297	4.692	1.394	0.0077	-1.515	0.6820	0.6897
6	T	0.550	0.482	0.133	4.809	0.637	0.0017	-1.633	0.3534	0.3551
7	R	0.550	0.325	0.179	5.058	0.904	0.0016	-1.881	0.6325	0.6340
8	R	2.275	0.250	0.569	5.345	3.040	0.0030	-2.169	2.6746	2.6775
9	T	2.275	0.325	0.370	5.112	1.890	0.0022	-1.935	1.3845	1.3866
10	R	0.533	4.413	2.354	2.207	5.194	3.8205	0.970	2.2149	6.0354
11	T	2.444	0.150	0.183	0.636	0.117	0.0002	2.541	1.1832	1.1834
12	T	0.218	0.586	0.064	0.391	0.025	0.0012	2.786	0.4954	0.4966
13	R	2.226	0.586	1.305	0.293	0.382	0.0373	2.884	10.8477	10.8850
14	R	0.404	0.586	0.237	0.293	0.069	0.0068	2.884	1.9698	1.9766
15	R	2.000	0.250	0.500	5.345	2.673	0.0026	-2.169	2.3513	2.3539
S u m m a t i o n			15.605	3.177	49.568					71.2300

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.207	0.058	4.877	0.281	0.0001	-4.877	1.3717	1.3719
5	R	0.557	0.533	0.297	4.541	1.349	0.0070	-4.541	6.1275	6.1345
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	4.413	0.533	2.354	3.721	8.759	0.0558	-3.721	32.5914	32.6473
11	T	0.150	2.444	0.183	2.034	0.373	0.0608	-2.034	0.7582	0.8191
12	T	0.586	0.218	0.064	2.703	0.173	0.0002	-2.703	0.4665	0.4667
13	R	0.586	2.226	1.305	1.517	1.980	0.5389	-1.517	3.0042	3.5431
14	R	0.586	0.404	0.237	0.202	0.048	0.0032	-0.202	0.0097	0.0129
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			15.605	0.000	0.000					238.1054

Therefore:

$$\begin{aligned}
 A &= 15.605 \text{ m}^2 & I_y &= 238.105 \text{ m}^4 & y_b &= 3.177 \text{ m.} \\
 I_z &= 71.230 \text{ m}^4 & I_x &= 309.335 \text{ m}^4 & y_t &= 2.294 \text{ m.}
 \end{aligned}$$

Note : R = Rectangular Section T = Triangular Section

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No.	Date : 10-Nov-99	Designed by :	Checked by :
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A. Calculation of Section Properties : A, Iz

IS- 2	W _{tr}	W _{br}	t _{tr}	t _{br}	D	x	φ	deg.
	16.350	6.585	0.280	0.538	5.134	1.023	0.356	20.39

Type	b	h	Area	y _b	Ay _b	I _o	d	Ad ²	Iz	
1	R	3.160	0.250	0.790	5.009	3.957	0.0041	-2.001	3.1619	3.1660
2	T	3.160	0.250	0.395	4.801	1.896	0.0014	-1.792	1.2688	1.2702
3	R	0.740	0.500	0.370	4.884	1.807	0.0077	-1.876	1.3016	1.3093
4	T	0.207	0.557	0.058	4.448	0.256	0.0010	-1.440	0.1195	0.1205
5	R	0.533	0.557	0.297	4.356	1.294	0.0077	-1.347	0.5392	0.5469
6	T	0.550	0.482	0.133	4.473	0.593	0.0017	-1.465	0.2845	0.2862
7	R	0.550	0.325	0.179	4.722	0.844	0.0016	-1.713	0.5246	0.5262
8	R	2.275	0.250	0.569	5.009	2.849	0.0030	-2.001	2.2764	2.2793
9	T	2.275	0.325	0.370	4.776	1.766	0.0022	-1.767	1.1546	1.1568
10	R	0.533	4.077	2.175	2.039	4.433	3.0125	0.970	2.0460	5.0585
11	T	2.444	0.150	0.183	0.588	0.108	0.0002	2.420	1.0740	1.0742
12	T	0.200	0.538	0.054	0.359	0.019	0.0009	2.650	0.3777	0.3786
13	R	2.244	0.538	1.207	0.269	0.325	0.0291	2.739	9.0613	9.0904
14	R	0.512	0.538	0.275	0.269	0.074	0.0066	2.739	2.0662	2.0728
15	R	2.000	0.250	0.500	5.009	2.505	0.0026	-2.001	2.0012	2.0038
S u m m a t i o n			15.108	3.008	45.453					60.6795

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.207	0.058	4.877	0.281	0.0001	-4.877	1.3714	1.3715
5	R	0.557	0.533	0.297	4.541	1.349	0.0070	-4.541	6.1274	6.1345
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	4.077	0.533	2.175	3.784	8.228	0.0516	-3.784	31.1331	31.1847
11	T	0.150	2.444	0.183	2.141	0.393	0.0608	-2.141	0.8405	0.9013
12	T	0.538	0.200	0.054	2.823	0.152	0.0001	-2.823	0.4286	0.4287
13	R	0.538	2.244	1.207	1.634	1.973	0.5068	-1.634	3.2233	3.7301
14	R	0.538	0.512	0.275	0.256	0.070	0.0060	-0.256	0.0180	0.0240
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			15.108	0.000	0.000					235.6642

Therefore :

$$\begin{aligned}
 A &= 15.108 \text{ m}^2 & I_y &= 235.664 \text{ m}^4 & y_b &= 3.008 \text{ m} \\
 I_z &= 60.680 \text{ m}^4 & I_x &= 296.344 \text{ m}^4 & y_t &= 2.126 \text{ m}
 \end{aligned}$$

Note : R = Rectangular Section T = Triangular Section

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No. _____ Date : 10-Nov-99 Designed by : _____ Checked by : _____

A. Calculation of Section Properties : A, Iz

IS-3		W_{rf}	W_{br}	t_{rf}	t_{br}	D	x	ϕ	deg.
		16.350	6.836	0.280	0.490	4.798	1.238	0.356	20.38

Type	b	h	Area	y_b	Ay_b	I_0	d	Ad^2	Iz	
1	R	3.160	0.250	0.790	4.673	3.692	0.0041	-1.831	2.6497	2.6538
2	T	3.160	0.250	0.395	4.465	1.764	0.0014	-1.623	1.0406	1.0419
3	R	0.740	0.500	0.370	4.548	1.683	0.0077	-1.706	1.0774	1.0851
4	T	0.207	0.557	0.058	4.112	0.237	0.0010	-1.271	0.0931	0.0941
5	R	0.533	0.557	0.297	4.020	1.194	0.0077	-1.178	0.4122	0.4199
6	T	0.550	0.482	0.133	4.137	0.548	0.0017	-1.296	0.2225	0.2243
7	R	0.550	0.325	0.179	4.386	0.784	0.0016	-1.544	0.4261	0.4276
8	R	2.275	0.250	0.569	4.673	2.658	0.0030	-1.831	1.9076	1.9106
9	T	2.275	0.325	0.370	4.440	1.641	0.0022	-1.598	0.9441	0.9463
10	R	0.533	3.741	1.995	1.871	3.733	2.3274	0.971	1.8820	4.2094
11	T	2.444	0.150	0.183	0.540	0.099	0.0002	2.302	0.9712	0.9714
12	T	0.182	0.490	0.045	0.327	0.015	0.0006	2.515	0.2821	0.2827
13	R	2.262	0.490	1.108	0.245	0.272	0.0222	2.597	7.4743	7.4965
14	R	0.619	0.490	0.303	0.245	0.074	0.0061	2.597	2.0458	2.0519
15	R	2.000	0.250	0.500	4.673	2.337	0.0026	-1.831	1.6770	1.6796
S u m m a t i o n			14.590	2.842	41.459					50.9902

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.207	0.058	4.877	0.281	0.0001	-4.877	1.3709	1.3711
5	R	0.557	0.533	0.297	4.541	1.349	0.0070	-4.541	6.1274	6.1344
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	3.741	0.533	1.995	3.846	7.675	0.0473	-3.846	29.5218	29.5691
11	T	0.150	2.444	0.183	2.249	0.412	0.0608	-2.249	0.9270	0.9878
12	T	0.490	0.182	0.045	2.942	0.131	0.0001	-2.942	0.3861	0.3862
13	R	0.490	2.262	1.108	1.750	1.940	0.4727	-1.750	3.3959	3.8686
14	R	0.490	0.619	0.303	0.310	0.094	0.0097	-0.310	0.0291	0.0388
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			14.590	0.000	0.000					232.8266

Therefore :

$$A = 14.590 \text{ m}^2 \quad I_y = 232.827 \text{ m}^4 \quad y_b = 2.842 \text{ m}$$

$$I_z = 50.990 \text{ m}^4 \quad I_x = 283.817 \text{ m}^4 \quad y_t = 1.956 \text{ m}$$

Note : R = Rectangular Section T = Triangular Section

**THE STUDY ON THE CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA - PHASE 2**

Job No. _____ Date : 10-Nov-99 Designed by : _____ Checked by : _____

A. Calculation of Section Properties : A, Iz

IS- 4		W_{tr}	W_{br}	t_{tr}	t_{br}	D	x	ϕ	deg.
		16.350	7.087	0.280	0.442	4.462	1.453	0.356	20.38

Type	b	h	Area	y_b	Ay_b	I_o	d	Ad^2	Iz	
1	R	3.160	0.250	0.790	4.337	3.426	0.0041	-1.661	2.1807	2.1848
2	T	3.160	0.250	0.395	4.129	1.631	0.0014	-1.453	0.8341	0.8354
3	R	0.740	0.500	0.370	4.212	1.558	0.0077	-1.536	0.8735	0.8812
4	T	0.207	0.557	0.058	3.776	0.218	0.0010	-1.101	0.0698	0.0708
5	R	0.533	0.557	0.297	3.684	1.094	0.0077	-1.008	0.3018	0.3095
6	T	0.550	0.482	0.133	3.801	0.504	0.0017	-1.126	0.1680	0.1697
7	R	0.550	0.325	0.179	4.050	0.724	0.0016	-1.374	0.3374	0.3390
8	R	2.275	0.250	0.569	4.337	2.467	0.0030	-1.661	1.5700	1.5730
9	T	2.275	0.325	0.370	4.104	1.517	0.0022	-1.428	0.7540	0.7562
10	R	0.533	3.405	1.816	1.703	3.092	1.7549	-0.973	1.7199	3.4748
11	T	2.444	0.150	0.183	0.492	0.090	0.0002	2.184	0.8742	0.8744
12	T	0.164	0.442	0.036	0.295	0.011	0.0004	2.381	0.2057	0.2061
13	R	2.280	0.442	1.008	0.221	0.223	0.0164	2.455	6.0725	6.0889
14	R	0.727	0.442	0.321	0.221	0.071	0.0052	2.455	1.9353	1.9405
15	R	2.000	0.250	0.500	4.337	2.169	0.0026	-1.661	1.3802	1.3828
S u m m a t i o n			14.048	2.676	37.589					42.1741

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.207	0.058	4.877	0.281	0.0001	-4.877	1.3704	1.3706
5	R	0.557	0.533	0.297	4.541	1.349	0.0070	-4.541	6.1274	6.1344
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	3.405	0.533	1.816	3.909	7.100	0.0431	-3.909	27.7532	27.7963
11	T	0.150	2.444	0.183	2.356	0.432	0.0608	2.356	1.0177	1.0786
12	T	0.442	0.164	0.036	3.062	0.111	0.0001	-3.062	0.3401	0.3401
13	R	0.442	2.280	1.008	1.867	1.881	0.4366	-1.867	3.5119	3.9485
14	R	0.442	0.727	0.321	0.363	0.117	0.0141	-0.363	0.0424	0.0565
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			14.048	0.000	0.000					229.5645

Therefore :

$A = 14.048 \text{ m}^2$ $I_y = 229.564 \text{ m}^4$ $y_b = 2.676 \text{ m}$
 $I_z = 42.174 \text{ m}^4$ $I_x = 271.739 \text{ m}^4$ $y_t = 1.786 \text{ m}$

Note : R = Rectangular Section T = Triangular Section

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No.	Date : 10-Nov-99	Designed by :	Checked by :
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A. Calculation of Section Properties : A, Iz

IS- 5		W _{tr}	W _{br}	t _{tr}	t _{br}	D	x	φ	deg.
		16.350	7.338	0.280	0.394	4.126	1.668	0.355	20.37

Type	b	h	Area	y _b	Ay _b	I _o	d	Ad ²	Iz	
1	R	3.160	0.250	0.790	4.001	3.161	0.0041	-1.491	1.7571	1.7612
2	T	3.160	0.250	0.395	3.793	1.498	0.0014	-1.283	0.6502	0.6516
3	R	0.740	0.500	0.370	3.876	1.434	0.0077	-1.366	0.6908	0.6985
4	T	0.207	0.557	0.058	3.440	0.198	0.0010	-0.931	0.0499	0.0509
5	R	0.533	0.557	0.297	3.348	0.994	0.0077	-0.838	0.2086	0.2162
6	T	0.550	0.482	0.133	3.465	0.459	0.0017	-0.956	0.1211	0.1228
7	R	0.550	0.325	0.179	3.714	0.664	0.0016	-1.204	0.2591	0.2606
8	R	2.275	0.250	0.569	4.001	2.276	0.0030	-1.491	1.2650	1.2680
9	T	2.275	0.325	0.370	3.768	1.393	0.0022	-1.258	0.5851	0.5873
10	R	0.533	3.069	1.637	1.535	2.512	1.2849	0.975	1.5567	2.8417
11	T	2.444	0.150	0.183	0.444	0.081	0.0002	2.066	0.7823	0.7826
12	T	0.146	0.394	0.029	0.263	0.008	0.0002	2.247	0.1455	0.1458
13	R	2.298	0.394	0.905	0.197	0.178	0.0117	2.313	4.8431	4.8548
14	R	0.834	0.394	0.329	0.197	0.065	0.0043	2.313	1.7579	1.7622
15	R	2.000	0.250	0.500	4.001	2.001	0.0026	-1.491	1.1121	1.1147
S u m m a t i o n			13.485	2.510	33.845					34.2376

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.207	0.058	4.877	0.281	0.0001	-4.877	1.3699	1.3700
5	R	0.557	0.533	0.297	4.542	1.349	0.0070	-4.542	6.1273	6.1344
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	3.069	0.533	1.637	3.972	6.502	0.0388	-3.972	25.8232	25.8620
11	T	0.150	2.444	0.183	2.464	0.452	0.0608	-2.464	1.1127	1.1736
12	T	0.394	0.146	0.029	3.181	0.092	0.0000	-3.181	0.2916	0.2916
13	R	0.394	2.298	0.905	1.983	1.796	0.3985	-1.983	3.5609	3.9594
14	R	0.394	0.834	0.329	0.417	0.137	0.0191	-0.417	0.0572	0.0762
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			13.485	0.000	0.000					225.8487

Therefore :

$$A = 13.485 \text{ m}^2$$

$$Iz = 34.238 \text{ m}^4$$

$$Iy = 225.849 \text{ m}^4$$

$$Ix = 260.086 \text{ m}^4$$

$$y_b = 2.510 \text{ m.}$$

$$y_t = 1.616 \text{ m.}$$

Note : R = Rectangular Section

T = Triangular Section

**THE STUDY ON THE CONSTRUCTION OF THE BRIDGE
OVER THE RIVER RUPSA IN KHULNA - PHASE 2**

Job No.	Date : 10-Nov-99	Designed by :	Checked by :
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A. Calculation of Section Properties : A, Iz

IS- 6		W_{ef}	W_{bf}	t_{ef}	t_{bf}	D	x	ϕ	deg.
		16.350	7.588	0.280	0.346	3.790	1.883	0.355	20.36

Type	b	h	Area	y_b	Ay_b	I_o	d	Ad^2	Iz	
1	R	3.160	0.250	0.790	3.665	2.896	0.0041	-1.322	1.3805	1.3846
2	T	3.160	0.250	0.395	3.457	1.365	0.0014	-1.114	0.4898	0.4912
3	R	0.740	0.500	0.370	3.540	1.310	0.0077	-1.197	0.5301	0.5378
4	T	0.207	0.557	0.058	3.105	0.179	0.0010	-0.761	0.0334	0.0343
5	R	0.533	0.557	0.297	3.012	0.895	0.0077	-0.668	0.1327	0.1404
6	T	0.550	0.482	0.133	3.130	0.415	0.0017	-0.786	0.0819	0.0836
7	R	0.550	0.325	0.179	3.378	0.604	0.0016	-1.034	0.1913	0.1928
8	R	2.275	0.250	0.569	3.665	2.085	0.0030	-1.322	0.9939	0.9968
9	T	2.275	0.325	0.370	3.432	1.269	0.0022	-1.089	0.4381	0.4402
10	R	0.533	2.733	1.458	1.367	1.992	0.9074	0.977	1.3905	2.2979
11	T	2.444	0.150	0.183	0.396	0.073	0.0002	1.947	0.6952	0.6954
12	T	0.128	0.346	0.022	0.231	0.005	0.0001	2.113	0.0991	0.0993
13	R	2.316	0.346	0.801	0.173	0.139	0.0080	2.170	3.7743	3.7823
14	R	0.942	0.346	0.326	0.173	0.056	0.0033	2.170	1.5345	1.5378
15	R	2.000	0.250	0.500	3.665	1.833	0.0026	-1.322	0.8737	0.8763
S u m m a t i o n			12.899	2.343	30.227					27.1815

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.207	0.058	4.877	0.281	0.0001	-4.877	1.3691	1.3693
5	R	0.557	0.533	0.297	4.542	1.349	0.0070	-4.542	6.1273	6.1343
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	2.733	0.533	1.458	4.035	5.881	0.0345	-4.035	23.7275	23.7620
11	T	0.150	2.444	0.183	2.571	0.471	0.0609	-2.571	1.2119	1.2728
12	T	0.346	0.128	0.022	3.300	0.073	0.0000	-3.300	0.2419	0.2419
13	R	0.346	2.316	0.801	2.100	1.682	0.3582	-2.100	3.5324	3.8905
14	R	0.346	0.942	0.326	0.471	0.153	0.0241	-0.471	0.0722	0.0963
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			12.899	0.000	0.000					221.6488

Therefore :

$$\begin{aligned}
 A &= 12.899 \text{ m}^2 & I_y &= 221.649 \text{ m}^4 & y_b &= 2.343 \text{ m} \\
 I_z &= 27.182 \text{ m}^4 & I_x &= 248.830 \text{ m}^4 & y_t &= 1.447 \text{ m}
 \end{aligned}$$

Note : R = Rectangular Section T = Triangular Section

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No.	Date: 10-Nov-99	Designed by :	Checked by :
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A. Calculation of Section Properties : A, Iz

IS- 7	W _d	W _{br}	t _r	t _{br}	D	x	φ	deg.
	16.350	7.839	0.280	0.298	3.454	2.098	0.355	20.34

Type	b	h	Area	y _b	Ay _b	I _o	d	Ad ²	Iz	
1	R	3.160	0.250	0.790	3.329	2.630	0.0041	-1.154	1.0519	1.0560
2	T	3.160	0.250	0.395	3.121	1.233	0.0014	-0.946	0.3532	0.3545
3	R	0.740	0.500	0.370	3.204	1.186	0.0077	-1.029	0.3917	0.3994
4	T	0.207	0.557	0.058	2.769	0.159	0.0010	-0.593	0.0202	0.0212
5	R	0.533	0.557	0.297	2.676	0.795	0.0077	-0.500	0.0744	0.0821
6	T	0.550	0.482	0.133	2.794	0.370	0.0017	-0.618	0.0507	0.0524
7	R	0.550	0.325	0.179	3.042	0.544	0.0016	-0.866	0.1342	0.1358
8	R	2.275	0.250	0.569	3.329	1.893	0.0030	-1.154	0.7573	0.7602
9	T	2.275	0.325	0.370	3.096	1.145	0.0022	-0.921	0.3133	0.3155
10	R	0.533	2.397	1.278	1.199	1.532	0.6122	0.977	1.2195	1.8317
11	T	2.444	0.150	0.183	0.348	0.064	0.0002	1.827	0.6122	0.6124
12	T	0.110	0.298	0.016	0.199	0.003	0.0001	1.977	0.0643	0.0644
13	R	2.334	0.298	0.695	0.149	0.104	0.0051	2.026	2.8557	2.8608
14	R	1.049	0.298	0.313	0.149	0.047	0.0023	2.026	1.2836	1.2859
15	R	2.000	0.250	0.500	3.329	1.665	0.0026	-1.154	0.6657	0.6683
S u m m a t i o n			12.291	2.175	26.737					21.0012

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.207	0.058	4.877	0.281	0.0001	-4.877	1.3683	1.3684
5	R	0.557	0.533	0.297	4.542	1.349	0.0070	-4.542	6.1272	6.1342
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	2.397	0.533	1.278	4.097	5.238	0.0303	-4.097	21.4619	21.4922
11	T	0.150	2.444	0.183	2.679	0.491	0.0609	-2.679	1.3154	1.3762
12	T	0.298	0.110	0.016	3.420	0.056	0.0000	-3.420	0.1925	0.1926
13	R	0.298	2.334	0.695	2.216	1.541	0.3157	-2.216	3.4153	3.7310
14	R	0.298	1.049	0.313	0.525	0.164	0.0287	-0.525	0.0860	0.1147
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			12.291	0.000	0.000					216.9332

Therefore :

$$\begin{aligned}
 A &= 12.291 \text{ m}^2 & I_y &= 216.933 \text{ m}^4 & y_b &= 2.175 \text{ m.} \\
 I_z &= 21.001 \text{ m}^4 & I_x &= 237.934 \text{ m}^4 & y_t &= 1.279 \text{ m.}
 \end{aligned}$$

Note : R = Rectangular Section T = Triangular Section

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No.	Date : 10-Nov-99	Designed by :	Checked by :
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A. Calculation of Section Properties : A, Iz

IS- 8 to 14	W _{rf}	W _{bf}	t _{rf}	t _{bf}	D	x	φ	deg.
	16.350	8.090	0.280	0.250	3.118	2.313	0.355	20.33

Type	b	h	Area	y _b	Ay _b	I _o	d	Ad ²	I _z	
1	R	3.160	0.250	0.790	2.993	2.365	0.0041	-0.988	0.7718	0.7759
2	T	3.160	0.250	0.395	2.785	1.100	0.0014	-0.780	0.2404	0.2417
3	R	0.740	0.500	0.370	2.868	1.061	0.0077	-0.863	0.2758	0.2835
4	T	0.206	0.557	0.057	2.433	0.140	0.0010	-0.428	0.0105	0.0115
5	R	0.533	0.557	0.297	2.340	-0.695	0.0077	-0.335	0.0333	0.0410
6	T	0.550	0.482	0.133	2.458	0.326	0.0017	-0.453	0.0272	0.0289
7	R	0.550	0.325	0.179	2.706	0.484	0.0016	-0.701	0.0878	0.0894
8	R	2.275	0.250	0.569	2.993	1.702	0.0030	-0.988	0.5557	0.5586
9	T	2.275	0.325	0.370	2.760	1.020	0.0022	-0.755	0.2108	0.2129
10	R	0.533	2.061	1.099	1.031	1.133	0.3891	0.974	1.0431	1.4323
11	T	2.444	0.150	0.183	0.300	0.055	0.0002	1.705	0.5328	0.5331
12	T	0.093	0.250	0.012	0.167	0.002	0.0000	1.838	0.0391	0.0392
13	R	2.352	0.250	0.588	0.125	-0.073	0.0031	1.880	2.0777	2.0807
14	R	1.157	0.250	0.289	0.125	0.036	0.0015	1.880	1.0217	1.0232
15	R	2.000	0.250	0.500	2.993	1.497	0.0026	-0.988	0.4885	0.4911
S u m m a t i o n			11.661	2.005	23.377					15.6861

B. Calculation of Section Properties : A, Iy, Ix

1	R	0.250	3.160	0.790	6.595	5.210	0.6574	-6.595	34.3603	35.0177
2	T	0.250	3.160	0.395	6.068	2.397	0.2191	-6.068	14.5457	14.7649
3	R	0.500	0.740	0.370	4.645	1.719	0.0169	-4.645	7.9831	8.0000
4	T	0.557	0.206	0.057	4.877	0.280	0.0001	-4.877	1.3672	1.3673
5	R	0.557	0.533	0.297	4.542	1.349	0.0070	-4.542	6.1271	6.1341
6	T	0.482	0.550	0.133	4.092	0.542	0.0022	-4.092	2.2191	2.2213
7	R	0.325	0.550	0.179	4.000	0.715	0.0045	-4.000	2.8600	2.8645
8	R	0.250	2.275	0.569	3.138	1.784	0.2453	-3.138	5.5987	5.8440
9	T	0.325	2.275	0.370	3.517	1.300	0.1063	-3.517	4.5719	4.6782
10	R	2.061	0.533	1.099	4.160	4.572	0.0260	-4.160	19.0222	19.0483
11	T	0.150	2.444	0.183	2.786	0.511	0.0609	-2.786	1.4231	1.4840
12	T	0.250	0.093	0.012	3.539	0.041	0.0000	-3.539	0.1450	0.1450
13	R	0.250	2.352	0.588	2.332	1.371	0.2710	-2.332	3.1985	3.4695
14	R	0.250	1.157	0.289	0.578	0.167	0.0322	-0.578	0.0967	0.1289
15	R	0.250	2.000	0.500	1.000	0.500	0.1667	-1.000	0.5000	0.6667
S u m m a t i o n			11.661	0.000	0.000					211.6688

Therefore :

$$\begin{aligned}
 A &= 11.661 \text{ m}^2 & I_y &= 211.669 \text{ m}^4 & y_b &= 2.005 \text{ m} \\
 I_z &= 15.686 \text{ m}^4 & I_x &= 227.355 \text{ m}^4 & y_t &= 1.113 \text{ m}
 \end{aligned}$$

Note : R = Rectangular Section T = Triangular Section

THE STUDY ON THE CONSTRUCTION OF THE BRIDGE OVER THE RIVER RUPSA IN KHULNA - PHASE 2

Job No. : _____ Date : 11/10/99 Designed by : _____ Checked by : _____

C. Element Properties : Ax, Ix, Iy, Iz

$$A_x = 1/2(A_{xi} + A_{xj})$$

$$I_x = 1/2(I_{xi} + I_{xj})$$

$$I_y = 1/2(I_{yi} + I_{yj})$$

$$I_z = 1/2(I_{zi} + I_{zj})$$

Note : Property of element N is taken as the average of property of Node i and Node j

Element	Node	Ax (m. ²)	Ix (m. ⁴)	Iy (m. ⁴)	Iz (m. ⁴)
1	IS-0	16.232	327.395	240.789	86.606
	IS-1	15.605	309.335	238.105	71.230
		15.919	318.365	239.447	78.918
2	IS-1	15.605	309.335	238.105	71.230
	IS-2	15.108	296.344	235.664	60.680
		15.357	302.840	236.885	65.955
3	IS-2	15.108	296.344	235.664	60.680
	IS-3	14.590	283.817	232.827	50.990
		14.849	290.081	234.246	55.835
4	IS-3	14.590	283.817	232.827	50.990
	IS-4	14.048	271.739	229.564	42.174
		14.319	277.778	231.196	46.582
5	IS-4	14.048	271.739	229.564	42.174
	IS-5	13.485	260.086	225.849	34.238
		13.767	265.913	227.707	38.206
6	IS-5	13.485	260.086	225.849	34.238
	IS-6	12.899	248.830	221.649	27.182
		13.192	254.458	223.749	30.710
7	IS-6	12.899	248.830	221.649	27.182
	IS-7	12.291	237.934	216.933	21.001
		12.595	243.382	219.291	24.092
8	IS-7	12.291	237.934	216.933	21.001
	IS-8	11.661	227.335	211.669	15.686
		11.976	232.635	214.301	18.344
9 to 13	IS-8	11.661	227.335	211.669	15.686
	IS-14	11.661	227.335	211.669	15.686
		11.661	227.335	211.669	15.686

