National Highways of Infrastructure Development Corporation Ltd

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE

COST ESTIMATE

FEB-2017

CM ENGINEERING & SOLUTION

Engineering, Planning And Project Management

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MINISTRY OF ROAD, TRANSPORT & HIGHWAYS
GOVERNMENT OF INDIA
NHIDCL
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CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

Name of Road :NH- 10 (Sevoka -Gangtok Section)

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Detailed Cost Estimate

General

The cost estimate presented in this Section is based on the detailed proposals given in Section 5 in Vol-I. It is envisaged that the project would involve site clearance, construction of formation in cutting, slope protection works, pavement work ,bridge work and road furniture etc. The detailed cost estimate presented in this report has been worked out using quantities of different items of works derived from the detailed design, drawing and unit rates.

Estimation of Quantities

In arriving at the quantities, the following items of civil works have been computed for the total length of the road :

* Earthwork
* Slope Protection Works
* Bridge Work
* Pavement Work
* Road appurtenances

Detailed estimate of quantities and costs are presented in "Volume – III: Cost Estimate" of the report. Methodology followed for various items are based on Technical Specifications of Ministry of Road Transport and Highways (MoRTH) for material laying, its quality, measurements, etc. and it has been illustrated in brief in the subsequent paragraphs.

a) Earthwork :

Earthwork qualities in cutting and small quantities of filling are calculated by highway design software Mx-Road for the entire length of the project road. The formation cutting consists of earth cutting to get a formation width of double lane standard. Through cutting has also been proposed in some locations especially in curves where the existing alignment has been followed to ease the curves while going round spurs. Embankment s has also been proposed at some stretches.

The classification of soil in cutting has been made in three categories :

Soil : includes ordinary soil, hard, soil mixed with boulder
Ordinary Rock not requiring blasting
Hard Rock requiring blasting.

Locations along the road alignment passing along the above given three were noted down during field surveys and total quantities of earthwork in cutting has been worked out accordingly.

b) Slope Protection Works :

Quantities for retaining walls, breast walls, parapet walls, toe walls, etc. have been worked out based on the design proposals. Gabion walls have also been proposed at specified locations and quantities have been worked out.

c) Bridge :

Quantities of bridges have been worked out for all the stretches of the road based on the structure proposed at each location of cross-stream or river.

d) Pavement :

The provision for pavement includes different layers of sub-base, base, and surfacing course as appropriate throughout the whole stretch of the road.

Granular Sub-base (GSB): 250mm thick sub-base layer of crushed stone aggregate has been proposed. The sub-base course has been extended up to full width of the formation.

Extra quantities for widening at curves, major and minor junction locations are calculated separately and final quantities are worked out.

#Wet Mix Macadam Base (WMM): 250mm thick base layer of Wet Mix Macadam is proposed for 10.0m width.

#Dense Bituminous Macadam of 60 mm thick and 40mm thick of Bituminous Concrete as surfacing course has been proposed.

e) **Road Appurtenances**

Road appurtenances include provision for road signs and markings, etc.

Unit Rates

The unit rates for arriving at cost of different components of works are based on SIKKIM PWD Schedule of Rates 2012 (for National Highways). For those items of works which are not available in the SOR, separate Analysis of Rates have been carried out and incorporated in this DPR.

- Bitumen (60-70 grade) (Ex-Singtam) (Basic rate = Rs 23976/ MT + 2% CST, Rs 479.5+4% SKVAT, Rs 959.0 + 1% Env Cess (Cost +VAT) Rs. 249.4 +transportation from Barauni to Singtam (462Km xRs.11) Rs.5082.0= Rs 30745.9)

- Emulsion (Ex-Singtam) (Basic rate = Rs 19636.0/ MT + 2% CST, Rs 392.7+4% SKVAT, Rs 785.40 + 1% Env Cess (Cost +VAT) Rs. 204.2 +transportation from Haldia to Singtam (740Km xRs.11) Rs.8140.0= Rs 29158.3)

- Cement (43 grade) (Ex-Singtam) (Basic rate = Rs 4200.00/ MT + 2% CST, Rs 84.0+14.5% SKVAT, Rs 609.0 + 12.5 Rs. ED 525.00 + 1% Env Cess (Cost +VAT) Rs. 48.1 +transportation from Murshidbad to Singtam (467Km xRs.5.6) Rs.2615.2= Rs 8081.3)

- Cold twisted bars (HYSD Fe 500 Bars)(Basic rate = Rs 32000.00/ MT + 2% CST, Rs 640.0+4% SKVAT, Rs 1280.0 + 1% Env Cess (Cost +VAT) Rs. 332.8 +transportation from Siliguri to Singtam (90Km xRs.5.6) Rs.504.0= Rs 34756.8)

- Sand & Aggregate from Teesta River.

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

Name of Road :NH- 10 (Sevoka -Gangtok Section)
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ABSTRACT OF COST ESTIMATE

Sr.No.	Items of work	Total quantity	Unit	Amount (Rs)
A.	**CONSTRUCTION COST**			
1	Formation Cutting			
2	Dismantling			35,010.00
3	Jungle Clearance etc			3,716.10
4	Formation Works	2147.02	Cum	1,016,649.53
	Road Side drain	200.00	Rm	252,762.00
5	Protection Works	200.00	Rm	18,087,900.00
6	Pavement Works			4,105,861.40
7	Road Signs , Road Safety & Light			3,071,076.00
8	Bridge Work		LS	81,822,007.47
		TOTAL OF (1 to 8)	**Rs**	**108,394,982.50**
B	Escalation for 4 years @ 5%		Rs.	21,678,996.50
C	**Civil Cost**		**Rs.**	**130,073,979.00**
D	Contingency (2.8% of C)		Rs.	3,642,071.41
E	**TOTAL (C+D)**		**Rs.**	**133,716,050.41**
F	Construction Supervision Charge (6 % of C)		Rs.	7,804,438.74
G	Quality Control Charge (1.0% of C)		Rs.	1,300,739.79
H	Road Safety Audit Charge (1.0% of C)		Rs.	1,300,739.79
I	Maintenance for 4Years (0.25%+0.5%x3=1.75% of C)		Rs.	2,276,294.63
J	Escalation (10 % of C)		Rs.	13,007,397.90
K	Agency (NHIDCL) Charge (3 % of C)		Rs.	3,902,219.37
	TOTAL PROJECT COST		**Rs.**	**163,307,880.63**
	Say		**Rs.**	**#NAME?**

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

ABSTRACT OF COST ESTIMATE FOR CIVIL WORK

Name of Road :NH- 10 (Sevoka -Gangtok Section)

Sr.No.	Items of work	Total quantity	Unit	Amount
A.	**FORMATION CUTTING :**	**TOTAL 'A'**	=	**1,055,375.63**
a	Dismantling			35,010.00
b	Clearing, setting, etc.			3,716.10
c	Earthwork			
	Ordinary soil	858.81	m^3	43,370.41
	Hard rock	1288.21	m^3	133,974.88
	Preparation of Embankment	4411.44	m^3	533,784.24
d	Preparation of Sub-Grade	1140.00	m^3	305,520.00
B.	**PROTECTION WORKS :**	**TOTAL 'B'**	=	**18,087,900.00**
a	RCC Retaining Wall 10.00 m height	75.00	Rm	16,124,475.00
b	Breast Wall 3 m height	100.00	Rm	1,609,100.00
c	Toe Wall 3 m height	25.00	Rm	354,325.00
C.	**DRAINAGE WORKS :**	**TOTAL 'C'**	=	**252,762.00**
a	Concrete lined side drain	**200.00**	Rm	**252,762.00**
D.	**PAVEMENT WORKS**	**TOTAL 'D'**	=	**4,105,861.40**
a	Granular Sub-base	628.00	m^3	1,043,108.00
b	Wet Mix Macadam	547.50	m^3	931,845.00
c	Prime Coat	2190.00	m^3	50,370.00
d	Tack Coat	4380.00	m^3	56,940.00
e	Dense Grade Bituminous Macadam	131.40	m^3	1,004,553.00
f	Bituminous Concrete	87.60	m^3	745,563.60
g	Carriage of materials			273,481.80
E.	**ROAD SIGN & ROAD SAFETY**	**TOTAL 'E'**	=	**3,071,076.00**
a	Informatory , Cautionary signs & Marking			101,012.00
b	Steel Crash Barrier			1,666,832.00
c	Electric Pole With LED Light with Solar System			1,303,232.00
F.	**BRIDGE WORK**			
a	Rangpo Bridge (72.0 m)		L.S.	81,820,000.00
		TOTAL 'F'	**L.S.**	**81,822,007.47**
		Total =	**Rs.**	**108,394,982.5**
			Say = Rs.	**108,395,000.0**

(Rupees ten crore eighty three lakh ninety five thousand) only

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

COST ESTIMATE FOR FORMATION CUTTING

Name of Road :NH- 10 (Sevoka -Gangtok Section)

Sl/SOR	Description	Unit	No	L	B	H	Quantity	Rate	Amount
1/2.4	**Dismantling of Structures** (Dismantling of existing structures like culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts and lead of 1000 metres)								
(i)	**Lime /Cement Concrete**								
II	**By Mechanical Means for items No. 202(b) & (c)**								
A	Cement Concrete Grade M-15 & M-20 (slab culvert slab)	Cum	1	25	2	0.2	10.00	425.00	4,250.00
(iii)	**Dismantling Stone Masonry**		1						
B	Rubble stone masonry in cement mortar.	Cum	1	25	2	1.5	75.00	188.00	14,100.00
2/2.5	**Dismantling of Flexible Pavements** (Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately)								
II	**By Mechanical Means**								
A	**Bituminous course**	Cum	1	100.00	7.00	0.10	70.00	238.00	16,660.00
3/2.3	Clearing and grubbing of road land including uprooting wild vegetation, grass, brushes, shrubs, saplings and trees of girth upto 300mm, removal of stumps of such trees cut earlier and disposal of unserviceable materials and stacking of serviceable materials to be used or auctioned, upto a lead of 1000m including removal and disposal of top organic soil not exceeding 150mm in thickness as per technical specification clause 201								
(ii)	By Mechanical Means (A) In area of light jungle	Ha		100.00	12.00		0.12	21109.00	2,533.1
4/2.1	Cutting of trees including cutting of trunks,branches and removal of stumps and root, refilling, compaction of backfilling and stacking of serviceable materials by manual means with all lifts as per technical specification clause 201 (A) Lead upto 1000m.								
	(i) Girth above 300mm to 600mm.	Nos					5.00	147.00	735.00
	(ii) Girth above 600mm to 900mm.	Nos					2.00	224.00	448.00
	(iii) Girth above 900mm to 1800mm.	Nos					0.00	495.00	0.00
5/3.1	**Excavation in Hilly Areas in Soil By Mechanical Means** (Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead .)			Quantity taken and calculated from Earth Work			**858.81**		
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres.	Cum					429.41	101.00	43,370.41

Sl/SOR	Description	Unit	No	L	B	H	Quantity	Rate	Amount
6/3.6	**Excavation in Hilly Areas in Hard Rock Blasting Prohibited** (Excavation in hilly areas in hard rock not requiring blasting, by mechanical means including trimming of slopes and stacking of 60% of cut material with all lifts and lead upto 50 metres..)			Quantity taken and calculated from Earth Work			**1288.21**		
	Case-I : Disposal of cut material with all lifts and lead upto 50 metres.	Cum					644.11	208.00	133,974.88
7/3.13	Construction of Embankment with approved material deposite at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of Tables 300.1 and 300.2 as per Technical specification Clause 301.5	Cum		Quantity taken from Abstract of Earth Work Table			4411.44	121.00	533,784.24
8/3.14	Construction of Subgrade and Earthen Shoulders (Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2)	Cum		170.00	12.00	0.50	1020.00	268.00	273,360.00
	Shoulder Preparation	Cum		100.00	2.00	0.60	120.00	268.00	32,160.00
		Sub Total of Earth work							**1,055,375.63**
9/A1	Construction of M20 grade lined surface drains specified lines, grades, levels and dimensions as per drawing or technical specification section 309 and 1700	Rm		200			200.00	1263.81	252,762.00
		Sub Total of side drain							**252,762.00**
							Grand Total of Earth work & Side Drain		**1,308,137.63**

(Rupees thirteen lakh eight thousand one hundred thirty seven and sixty three paise) only

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

EARTHWORK QUANTITY

Name of Road :NH- 10 (Sevoka -Gangtok Section)

Sr No.	Chainage in m	Area Cut (m2)	Area Fill (m2)	Volume Cut (m3)	Volume Fill (m3)
1.0	115.00	24.822	0.012	0.000	0.000
2.0	120.00	25.717	0.017	126.348	0.073
3.0	125.00	24.819	0.000	126.340	0.043
4.0	130.00	22.844	0.014	119.158	0.035
5.0	135.00	19.730	0.002	106.435	0.040
6.0	140.00	26.978	0.005	116.770	0.018
7.0	145.00	22.034	0.010	122.530	0.038
8.0	150.00	16.568	0.010	96.505	0.050
9.0	155.00	24.141	0.000	101.773	0.025
10.0	160.00	21.365	0.000	113.765	0.000
11.0	165.00	19.499	0.000	102.160	0.000
12.0	170.00	25.266	0.000	111.913	0.000
13.0	175.00	25.211	0.000	126.193	0.000
14.0	180.00	37.699	0.000	157.275	0.000
15.0	185.00	41.964	0.000	199.158	0.000
16.0	190.00	27.634	0.000	173.995	0.000
17.0	195.00	15.234	0.000	107.170	0.000
18.0	200.00	9.570	0.001	62.010	0.003
19.0	205.00	3.552	0.406	32.805	1.018
20.0	210.00	0.354	19.191	9.765	48.993
21.0	215.00	0.000	74.249	0.885	233.600
22.0	290.00	0.000	149.042	0.000	0.000
23.0	295.00	0.000	102.377	0.000	628.548
24.0	300.00	0.000	77.647	0.000	450.060
25.0	305.00	0.000	88.407	0.000	415.135
26.0	310.00	0.000	101.411	0.000	474.545
27.0	315.00	0.000	108.916	0.000	525.818
28.0	320.00	0.000	95.274	0.000	510.475
29.0	325.00	0.000	81.372	0.000	441.615
30.0	330.00	0.000	41.099	0.000	306.178
31.0	335.00	0.149	20.228	0.373	153.318
32.0	340.00	0.858	13.833	2.518	85.153
33.0	345.00	0.734	12.473	3.980	65.765
34.0	350.00	2.290	7.090	7.560	48.908
35.0	355.00	5.565	1.703	19.638	21.983
			Total	**2147.022**	**4411.437**

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

Name of Road :NH- 10 (Sevoka -Gangtok Section)

Sl/SOR	Description	Unit	L	B	H	No	Qnty	Rate	Amount
1/4.1	**Granular Sub-base with Close Graded Material (Table:- 400-1)**								
	Plant Mix Method (Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401)								
(i)	**For grading- II Material**								
	Carriageway	Cum	161.00	12.00	0.125	2.00	483.00		
	Junction Development	Cum	580.00		0.125	2.00	145.00		
	Total	Cum					**628.00**	**1661.00**	**1,043,108.00**
2/4.11	**Wet Mix Macadam** (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)								
	Carriageway	Cum	161.00	10.00	0.125	2.00	402.50		
	Junction Development	Cum	580.00		0.125	2.00	145.00		
	Total	Cum					**547.50**	**1702.00**	**931,845.00**
3/5.1	**Prime Coat**								
	(i) Low porosity								
	Providing and applying primer coat with Bitumen emulsion (SS-1) on prepared surface of granular base including cleaning of road surface and spraying primer at the rate of 0.70- 1.0 kg/sqm using mechanical means as per Technical Specification Clause 502.								
	Carriageway	Sqm	161.00	10.000		1.00	1610.00		
	Junction Development	Sqm	580.00			1.00	580.00		
	Total	**Sqm**					**2190.0**	**23.00**	**50,370.00**

Sl/SOR	Description	Unit	L	B	H	No	Qnty	Rate	Amount
4/5.2	**Tack Coat** (i) Providing and applying tack coat with Bitumen emulsion (RS-1) using emulsion distributor at the rate of 0.25 to 0.30 kg per sqm on the prepared Normal Bituminous Surface with primer and cleaned with Hydraulic broom as per Technical Specification Clause 503.								
	Carriageway	Sqm	161.00	10.000		1.00	1610.00		
	Junction Development	Sqm	580.00			1.00	580.00		
	Total	**Sqm**					**2190.00**	**14.00**	**30,660.00**
	(iii) Providing and applying tack coat with Bitumen emulsion (RS-1) using emulsion distributor at the rate of 0.25 to 0.30 kg per sqm on the prepared granular surface treated with primer and cleaned with Hydraulic broom as per Technical Specification Clause 503.								
	Carriageway	Sqm	161.00	10.000		1.00	1610.00		
	Junction Development	Sqm	580.00			1.00	580.00		
	Total	**Sqm**					**2190.00**	**12.00**	**26,280.00**
5/5.4	**60 mm thick Dense Graded Bituminous Macadam** Dense Graded Bituminous Macadam (Providing and laying dense bituminous macadam with 100-120 TPH batch type HMP producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.0 to 4.5% by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects.)								
	Case - II for Grading II (19 mm nominal size)	Cum	161.00	10.000	0.060	1.00	96.60		
	Junction Development	Sqm	580.00		0.060	1.00	34.80		
	Total	**Cum**					**131.40**	**7645.00**	**1,004,553.00**

Sl/SOR	Description	Unit	L	B	H	No	Qnty	Rate	Amount
6/5.5	**40 mm thick Bituminous Concrete**								
	Bituminous Concrete (Providing and laying bituminous concrete with 100-120 TPH batch type hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.4 to 5.6 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects)								
	Using Polymer Modified Bitumen								
	(i)for Grading-I (13 mm nominal size)	Cum	161.00	10.000	0.04	1.00	64.40		
	Junction Development	Sqm	580.00		0.04	1.00	23.20		
	Total	**Cum**					**87.60**	**8511.00**	**745,563.60**
7/1.1	**Loading and unloading of Lime, Aggregates, Stone boulder,Brick Aggregates etc. by manual means**								
	i) Loading of aggregates	Cum	Qnty taken from Pavment Qnty Calculation				1340.0	87.0	**116,580.00**
	ii) Loading of sand	Cum					369.0	87.0	**32,103.00**
8/1.3	**Loading and unloading of Bitumen drums by manual means including a lead upto 30m**								
	i)Unloading of Bitumen drums by manual means including a lead upto 30m	ton	Qnty taken from Pavment Qnty Calculation				26.00	154.00	**4,004.00**
9/1.4	**Haulage excluding Loading and Unloading**								
	Haulage of materials by tipper excluding cost of loading, unloading and stacking			**LEAD Km**			**Qnty Tonne**		
	For BC & DBM								
	Case-I : Surfaced road								
	a) Sand			10.00			12.00	5.60	**672.00**
	b) Aggregates			10.00			553.00	5.60	**30,968.00**
	c) Bitumen			8.00			26.00	5.60	**1,164.80**

Sl/SOR	Description	Unit	L	B	H	No	Qnty	Rate	Amount
	Case-II : Unsurfaced Gravelled Road								
	a) Sand			2.00			12.00	7.00	**168.00**
	b) Aggregates			2.00			553.00	7.00	**7,742.00**
	c) Bitumen			0.00			26.00	7.00	**0.00**
	For GSB& WMM								
	Case-I : Surfaced road								
	a) Sand			10.00			357.00	5.60	**19,992.00**
	b) Aggregates			10.00			787.0	5.60	**44,072.00**
	c) Bitumen			8.00			0.0	5.60	**0.00**
	Case-II : Unsurfaced Gravelled Road								
	a) Sand			2.00			357.0	7.00	**4,998.00**
	b) Aggregates			2.00			787.0	7.00	**11,018.00**
	c) Bitumen			0.00			0.0	7.00	**0.00**
									4,105,861.40
								Say	**4,105,861.00**

(Rupees forty one lakh five thousand eight hundred sixty one) only

Notes

Total length of Road	=	240.00	m
Total length of Bridge	=	79.00	m

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE

QUANTITY CALCULATION FOR PAVEMENT MATERIALS UNDER CARRIAGE ITEM

Name of Road :NH- 10 (Sevoka -Gangtok Section)

Ref Item no	Description	Requirement for	Bitumen	Aggregate	Crushed Sand	Total requirement from estimate	ividual requirement for whole length of r		
							Bitumen	Aggregate	Sand
			ton	m^3	m^3		ton	m^3	m^3
1	2	3	4	5	6	7	8	9	10
							7 / 3 x 4	7 / 3 x 5	7 / 3 x 6
1/4.1	GSB	225 m^3		201.00	86.400	251.20 m^3		224.41	96.46
2/4.12	WMM	225 m^3		207.90	89.100	246.38 m^3		227.66	97.57
			Total requirement for the whole length of the road =				**0.00**	**452.07**	**194.03**
						Ton/Unit quantity	1	1.74	1.84
						Total weight	**0.00**	**787.00**	**357.00**
							ton	**ton**	**ton**
3/5.1	Primer coat	3500 m^2	2.100			2190.00 m^2	1.31		
4/5.2	Tack coat	3500 m^2	1.050			4380.00 m^2	1.31		
5/5.4	DBM	195.00 m^3	19.13	281.50	5.750	131.40 m^3	12.89	189.69	3.87
6/5.5	BC	191.00 m^3	22.50	279.300	5.750	87.60 m^2	10.32	128.10	2.64
					Total requirement for the whole length of the road =		**25.83**	**317.79**	**6.51**
						Ton/Unit quantity	1	1.74	1.84
						Total weight	**26.00**	**553.00**	**12.00**
							ton	**ton**	**ton**

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM

Name of Road :NH- 10 (Sevoka -Gangtok Section)

DETAIL ESTIMATE FOR ROAD SIGN

Sr No.	SOR No.	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	**8.4**	Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing				
	(iii)	60 cm circular	each	2	5077.00	10154.00
2	**8.5**	Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorised sign asper IRC:67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75 x 75 x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing)	Sqm	2	13629.0	27258.00
4	**8.13**	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads on Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.)	Sqm	60	1060.00	63600.0
				TOTAL		**101012.0**

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

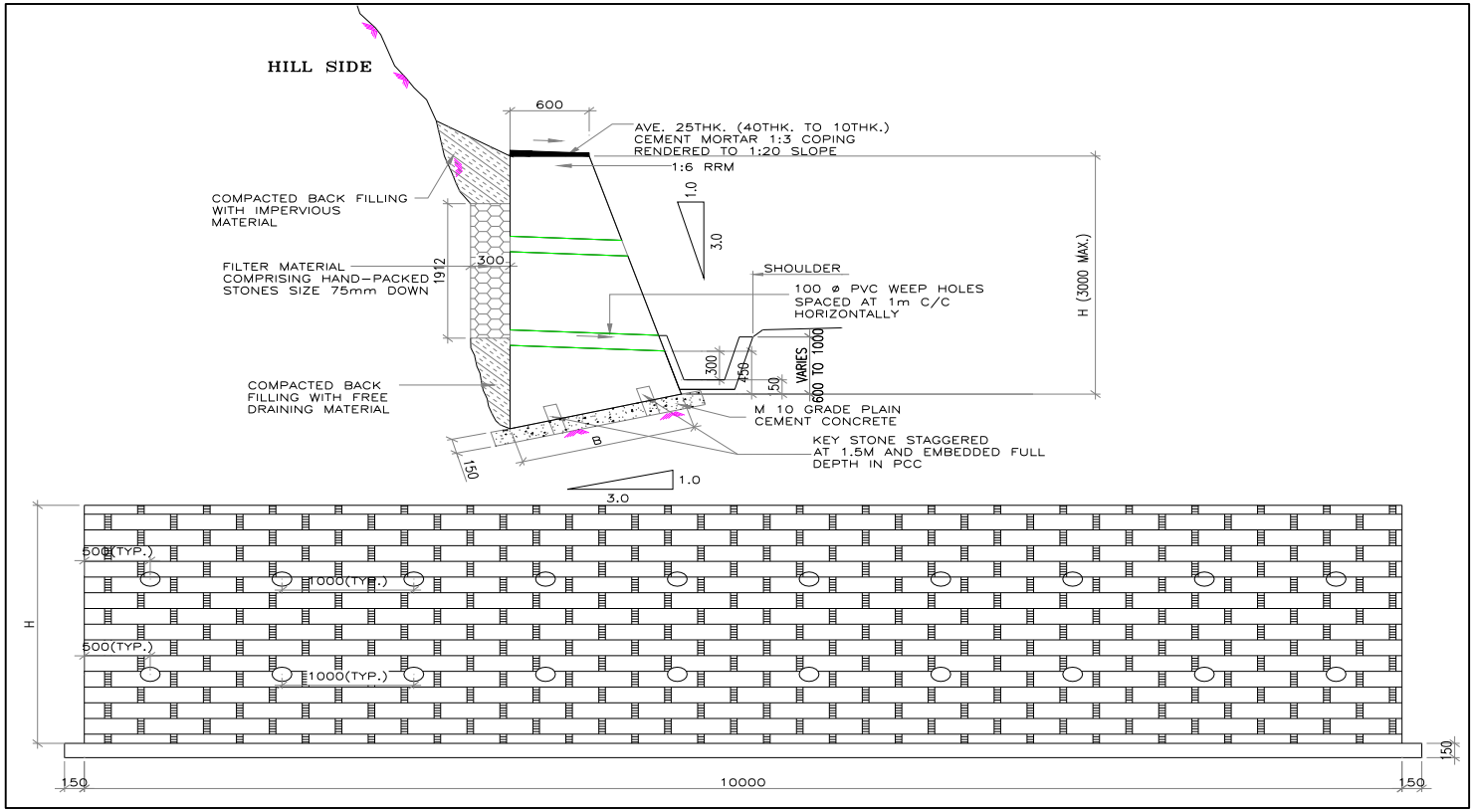
Name of Road :NH- 10 (Sevoka -Gangtok Section)

DETAIL ESTIMATE FOR ROAD SAFETY MEASURES

Item No.	Ref to SOR No.	Description	Unit	Nos	Quantity	Rate (Rs)	Amount (Rs)
1	**8.23-A**	Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810)	metre	1	100	3636.00	363600
		Lighting on Bridges (Providing and fixing lighting on bridges, mounted on steel hollow circular poles of standard specifications, 5 m high fixed on parapets with cement concrete, 10 m apart and fitted with LED Light with solar system)	Nos	2	8	81452.00	1303232
					TOTAL		**1666832**

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

COST ESTIMATE PER METER OF BREAST WALL TYPE-II



Height of Breast wall H	=	3.00	m
Base Width B1 = 0.4H+0.3	=	1.50	m
Depth of tranch D=0.1H+0.3	=	0.60	m
Length of wall L	=	10.00	m
Top width of retaining wall	=	0.60	m
B	=	1.423	m
H1	=	0.47	m
Depth of back filling	=	1.10	m

COST ESTIMATE PER METER OF BREAST WALL TYPE-II

Length of breast wall = 10.00 m, Height = 3.00 m

Sl. No	Sor. No	Description of item	No.	Length (m)	Width (m)	Height (m)	Unit	Quantity	Rate (Rs. P)	Amount (Rs. P)
1	3.11	**Excavation for Structures** (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.) I. Ordinary soil A Manual Means (i). upto 3m depth	1	10.30	1.80	1.80	m3	33.372	198.00	6,607.66
2	12.8	Plain/Reinforced cement concrete in open foundation complete as per drawing and technical specifications, placed in foundation and compacted by vibration including curing for 14 days.. I. PCC grade M15 Nominal mix 1 : 2 : 4 (hand mixing)	1	10.30	1.80	0.15	m3	2.781	4,978.00	13,843.82
3	12.7	**Stone masonry work in cement mortar 1:3** in foundation complete as drawing and Technical Specification b) Random Rubble Masonry — Main Wall :	1	10.00	3.00	(0.60 + 1.423) / 2		30.345		
		Triangular portion :	1	10.00	1.423	(0.47 + 0.00) / 2	m3	3.344 33.689	3,708.00	124,918.81
4	13.9	Back filling behind abutment, wing wall and return wall complete as per drawing and Technical specification (a) Granular material	1	10.00	0.30	1.10	m3	3.300	948.00	3,128.40
5	12.6	Cement mortar 1:3 (1cement :3 sand) for 25 mm thick coping On top of wall	1	10.00	0.60	0.025	m3	0.150	4,733.00	709.95
									Construction cost =	**149,208.64**

Sl. No	Sor. No	Description of item	No.	Length (m)	Width (m)	Height (m)	Unit	Quantity	Rate (Rs. P)	Amount (Rs. P)
6	1.1	Loading and unloading by manual means								
		i) Loading of masonry stone					m3	33.69	87.00	2,931.03
		i) Loading of aggregates					m3	2.50	87.00	217.50
		ii) Loading of sand					m3	13.86	87.00	1,205.82
7	1,3	Loading and unloading of cement by manual means and stacking					ton	5.31	154.0	817.74
8	1.4	Haulage of materials by tipper excluding cost of loading, unloading and stacking								
		Case-I : Surfaced road		Lead						
		a) Sand		10.00 Kms			T/Km	26.00	5.60	1456.00
		b) Aggregates		10.00 Kms			T/Km	4.00	5.60	224.00
		c) Cement		10.00 Kms			T/Km	5.31	5.60	297.36
		d) Masonry stone		10.00 Kms			T/Km	59.00	5.60	3304.00
		Case-II : Unsurfaced Gravelled Road								
		a) Sand		2.00 Kms			ton/km	26.00	7.00	364.00
		b) Aggregates		2.00 Kms			ton/km	4.00	7.00	56.00
		c) Cement		0.00 Kms			ton/km	5.31	7.00	0.00
		d) Masonry stone		2.00 Kms			ton/km	59.00	7.00	826.00
								Carriage cost =		**11699.45**

Notes : 1. Material quantity workout sheet attached

2. Detail drawing enclosed.

Cost for 10.00m = 160908.09

Cost per meter = 16,090.81

Say = 16091.00

(Rupees sixteen thousand ninety one) only.

BW2est

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

QUANTITY CALCULATION FOR BREAST WALL TYPE-II MATERIALS UNDER CARRIAGE ITEM

Name of Road :NH- 10 (Sevoka -Gangtok Section)

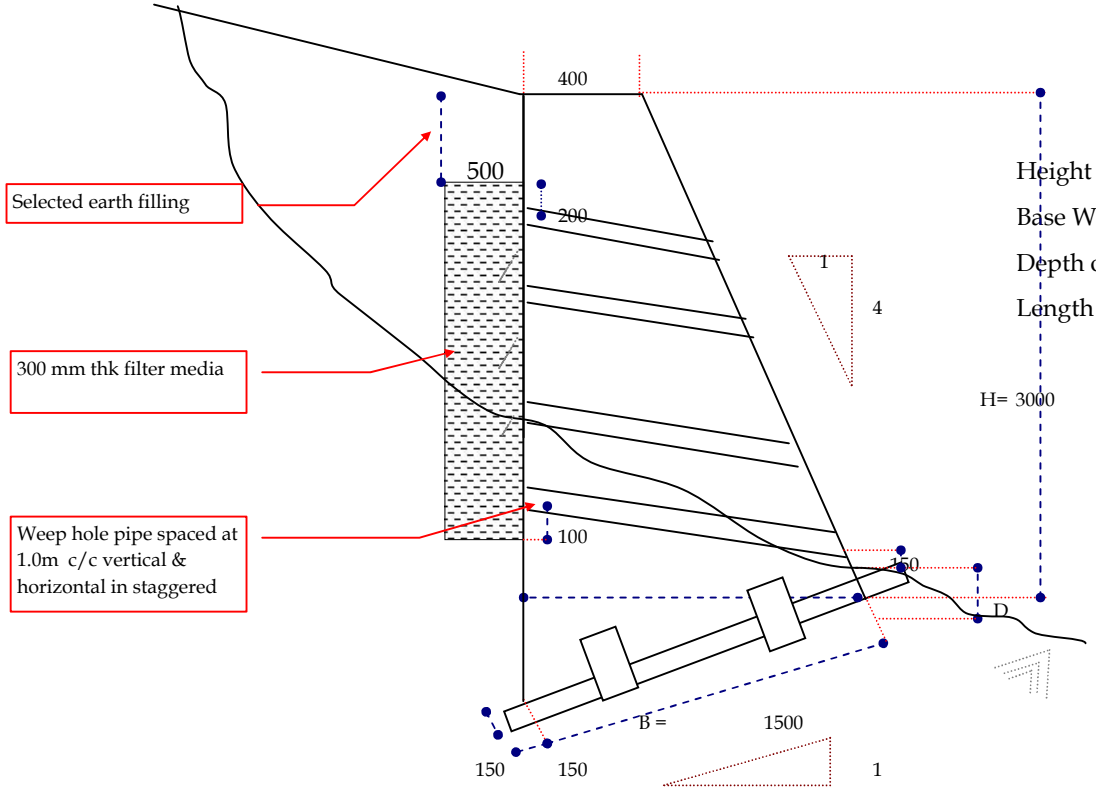
Length of breast wall = 10.00 m, Height = 3.00 m

Ref Item no	Description	Requirement for	Masonry stone	Cement	Aggregate	Sand	Total requirement from estimate	Individual requirement for whole length of road			
								M.Stone	Cement	Aggregate	Sand
			m3	MT	m3	m3		m3	MT	m3	m3
1	2	3	4	5	6	7	8	9	10	11	12
								= (8) / (3) x (4)	= (8) / (3) x (5)	= (8) / (3) x (6)	= (8) / (3) x (7)
2/12.8A	PCC M15	1 m3		0.280	0.90	0.450	2.781 m3		0.78	2.50	1.25
3/12.7-D	Masonry works 1:3 for main wall	5 m3	5.000	0.6600		1.848	33.689 m3	33.69	4.45		12.45
5/12.6 A	Architectural coping (1:3)	1 m3		0.510		1.050	0.150 m		0.08		0.16
							Total requirement for 3.0m Breast wall (Type-II) =	**33.69**	**5.31**	**2.50**	**13.86**
							Unit Weight as per IS : 875 (Part I)	1.74		1.74	1.84
							Total weight	**59.00**	**5.31**	**4.00**	**26.00**
								MT	**MT**	**MT**	**MT**

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

Name of Road :NH- 10 (Sevoka -Gangtok Section)

QUANTITY CALCULATION FOR TOE WALL 3.0 m HEIGHT



Height of Retaining wall H =	3.0 m
Base Width B = 0.4H+0.3 =	1.5 m
Depth of tranch D=0.1H+0.3 =	.60 m
Length of wall L =	10.0 m

Sr.No	Ref to SOR No.	Description	Unit	Nos	Length	Width	Depth	Quantity	Rate in Rs	Amount in Rs
1	3.11	**Excavation for Structures** (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.) I. Ordinary soil								
		A Manual Means (i). upto 3m depth	Cum	1	10.3	1.8	1.05	19.47	198.00	3855.06
2	12.8 A	Plain/Reinforced cement concrete in open foundation as per drawing and technical specifications .								
		PCC Grade M15	Cum	1	10.30	1.80	0.15	2.78	4,978.00	13838.84
3	12.8 A	Plain/Reinforced cement concrete in substructure complete as per drawing and technical specifications *(for coping on top of Toe walls)*								
		PCC Grade M15	Cum	1	10.00	0.40	0.08	0.30	4978.00	1493.40
4	12.7	Stone masonry work in cement mortar 1:3 for substructure complete as per drawing andTechnical Specification								
	(D)	**Random Rubble Masonry**								
		Main Wall :	Cum	1	10.00	1.46	0.36	2.63		
		Triangular portion :	Cum	1	10.00	0.93	3.00	27.90		
		Total	Cum					30.53	3,708.00	113205.24

5	**13.09** **A**	Backfilling behind the abutment, wing wall and return walls complete as per drawing and Technical specification **Granular Material**	Cum	1	10.00	0.30	1.54	2.31	948.00	2189.88
6	Chapter-1	***Carriage of Materials***								
	1.1	Loading and unloading of stone aggregates	Cum					2.770	87.00	240.99
		Loading and unloading of masonry stone	Cum					35.410	87.00	3080.67
		Loading and unloading of sand	Cum					12.170	87.00	1058.79
	1.3	Loading and unloading of cement by manual means and stacking	Tonne					6.000	154.00	924.00
	1.6	Cost of Haulage Excluding Loading and Unloading								
	(i)	Surfaced Road								
		a) Sand	ton. km	10.00				22.000	5.60	1232.00
		b) Aggregates	ton. km	10.00				5.000	5.60	280.00
		c) Cement	ton. km	10.00				6.000	5.60	336.00
		d) Masonry stone	ton. km	10.00				62.000	5.60	3472.00
	(iii)	Case-II : Unsurfaced Gravelled Road								
		a) Sand	ton. km	2.00				22.000	7.00	308.00
		b) Aggregates	ton. km	2.00				5.000	7.00	70.00
		c) Cement	ton. km	0.00				6.000	7.00	0.00
		d) Masonry stone	ton. km	2.00					7.00	0.00

Total cost for 10Rm 0f T/Wall 3.0m high = 141729.81

Therefore,Rate per Rm = 14173.00

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

QUANTITY CALCULATION FOR TOE WALL TYPE-II MATERIALS UNDER CARRIAGE ITEM

Name of Road :NH- 10 (Sevoka -Gangtok Section)

Length of toe wall = 10.00 m, Height = 3.0 m

Ref Item no	Description	Requirement for	Masonry stone	Cement	Aggregate	Sand	Total requirement from estimate	Individual requirement for whole length of road			
								M.Stone	Cement	Aggregate	Sand
			m3	MT	m3	m3		m3	MT	m3	m3
1	2	3	4	5	6	7	8	9	10	11	12
								= (8) / (3) x (4)	= (8) / (3) x (5)	= (8) / (3) x (6)	= (8) / (3) x (7)
2/12.8A	PCC M15	1 m3		0.280	0.90	0.450	2.780 m3		0.78	2.50	1.25
3/13.5	Architectural coping PCC M15	1 m3		0.280	0.90	0.450	0.300 m3		0.08	0.27	0.14
4/12.7	Masonry works 1:3	1 m3	1.160	0.1683		0.353	30.53 m3	35.41	5.14		10.78
Total requirement for 3.00m Toe wall (Type-II) =								**35.41**	**6.00**	**2.77**	**12.17**
					Unit Weight as per IS : 875 (Part I)			1.74		1.74	1.84
					Total weight			**62.00**	**6.00**	**5.00**	**22.00**
								MT	**MT**	**MT**	**MT**

ANALYSIS-1

Sr. No.	Description	Unit	Quantity	Rate Rs	Cost Rs
1	**Type -1 Side Drain**				
	Plain/Reinforced Cement Concrete in Open Foundation complete as per Drawing and Ref. to MoRTH Technical Specifications 1500, 1700 & 2100				
	PCC Grade M20 ***Unit : cum*** ***Taking output = 15 cum***				
	a) Material				
	Cement	tonne	5.16	8081.10	41698.48
	Coarse sand	cum	6.75	400.00	2700.00
	40 mm Aggregate	cum	5.40	780.00	4212.00
	20 mm Aggregate	cum	5.40	930.00	5022.00
	10 mm Aggregate	cum	2.70	1100.00	2970.00
	b) Labour				
	Mate	day	0.86	300.00	258.00
	Mason	day	1.50	300.00	450.00
	Mazdoor	day	20.00	200.00	4000.00
	c) Machinery				
	Concrete mixer (cap. 0.40/0.28 cum)	hour	6.00	120.00	720.00
	Generator 33 KVA	hour	6.00	400.00	2400.00
	d) Formwork @ 4 per cent on cost of concrete i.e. cost of material, labour and machinery				2577.22
	e) Overhead charges @ 25 % on (a+b+c+d)				16751.9
	f) Contractor's profit @ 10 % on (a+b+c+d+e)				8376.0
	Cost for 15 cum = a+b+c+d+e+f				92135.6
	Rate per cum = (a+b+c+d+e+f)/15				6142.4
				say	**6142.00**
	Cross sectional area of lined drain	sqm			**0.196**
	Rate per running meter	RM			**1203.8**

Description	Unit	Co-efficient	Total quantity	Unit weight	Carriage	Quantity	Rate in Rs	Amount in Rs
Loading and unloading of stone boulder/stone aggregates/sand								
Stone aggregates	**Cum**	0.90	0.20			0.18	87.00	15.66
Sand	**Cum**	0.45	0.20			0.09	87.00	7.83
Cement	**MT**	0.34	0.20			0.07	154.00	10.78
Cost of Haulage Excluding Loading and Unloading								
Surfaced Road								
Cement	**ton. km**				10.00	0.07	5.60	3.92
Stone aggregates	**ton. km**				10.00	0.18	5.60	10.08
Sand	**ton. km**				10.00	0.09	5.60	5.04
Case-II : Unsurfaced Gravelled Road								
a) Cement	**ton. km**				0.00	0.07	7.00	0.00
b) Stone Aggregates	**ton. km**			1.74	2.00	0.18	7.00	4.38
b) Sand	**ton. km**			1.84	2.00	0.09	7.00	2.32

Cost of Carriage of material **60.01**

Grand Total cost per metre length of line drain carriage cost **1263.810**

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

Name of Road :NH- 10 (Sevoka -Gangtok Section)

ESTIMATE FOR RCC CANTILEVEL RETAINING WALL FOR HEIGHT 10M

Sr.No.	Description	Unit	Nos.	Length	Width	Depth	Quantity	Rate in Rs.	Amount in Rs.
A	**Foundation**								
1	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material	Cum							
	(i) Depth upto 3 m	Cum	1	10.00	7.30	2.85	208.05	96.00	19972.80
2	**PCC M 15 Lean Concrete** Providing and laying of PCC M 15 levelling course 150 mm thick below the foundation	Cum	1	10.00	7.30	0.15	10.95	4978.00	54509.10
3	**M25 grade concrete for Retaining wall** Plain/Reinforced Cement Concrete in M 25 in open foundation complete as per Drawing and Technical specifications								
a	Base Slab								
	Toe slab	Cum	1	10.00	2.50	0.90	22.50		
	Below stem	Cum	1	10.00	1.30	1.30	16.90		
	Heel Slab	Cum	1	10.00	3.20	0.90	28.80		
	Total	Cum					68.20	6504.00	443572.80
4	Supplying, fitting and placing uncoated HYSD bar reinforcement in foundation complete as per drawing and Technical specifications	MT	1				8.87	50097.00	444160.00
B	**Sub Structure**								
1	**M25 grade concrete for Retaining wall** Plain/Reinforced Cement Concrete in M 25 in open foundation complete as per Drawing and Technical specifications								
	Stem a) PCC Grade M 25 upto 5 m	Cum	1	10.00	0.80	8.70	69.60	6,896.00	479961.60
2	Supplying, fitting and placing uncoated HYSD bar reinforcement in foundation complete as per drawing and Technical specifications	MT	1				10.44	50,203.00	524119.32
3	Providing weep holes in brick masonry/plain/reinforced concrete abutment , wing wall/return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V : 20H towards drawing foce. Complete as per drawing and Technical Specifications	Nos	1				87.00	1,124.00	97788.00

4	Providing and laying of Filter media with granular materials/stone crushed aggregates satisfying the rerquirements laid down in clause 2504.2.2 of MOSRT&H specifications to a thickness of not less than 600mm with smaller size towards the soil and bigger size towards the wall and provided over the enire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and Technical specifications	Cum	1	10.00	0.30	8.20	24.60	847.00	20836.20
							Construction cost =		**2084919.82**
	Carriage of Materials								
1.1	Loading and unloading of stone aggregates	Cum					163.400	87.00	**14215.80**
	Loading and unloading of sand	Cum					66.940	87.00	**5823.78**
1.3	Loading and unloading of cement by manual means and stacking	Ton					58.190	154.00	**8961.26**
	Loading and unloading of steel by manual means and stacking	Ton					20.270	154.00	**3121.58**
1.6	Cost of Haulage Excluding Loading and Unloading								
(i)	Surfaced Road								
	a) Cement	T.Km	10.0				58.190	5.60	**3258.64**
	b) Steel	T.Km	10.0				20.270	5.60	**1135.12**
	c Stone Aggregates	T.Km	10.0				284.000	5.60	**15904.00**
	d) Sand	T.Km	10.0				123.000	5.60	**6888.00**
(ii)	Case-II : Unsurfaced Gravelled Road								
	a) Cement	T.Km	0.0				58.190	7.00	**0.00**
	b) Steel	T.Km	0.0				20.270	7.00	**0.00**
	c Stone Aggregates	T.Km	2.0				284.000	7.00	**3976.00**
	d) Sand	T.Km	2.0				123.000	7.00	**1722.00**

Carriage cost = **65006.18**

Cost for 10.00m = 2,149,926.00

Cost per meter = 214,992.60

Say = 214,993.00

Notes :

1. Material quantity workout sheet attached

2. Detail drawing enclosed.

(Rupees two lakh fourteen thousand nine hundred ninety three) only.

Construction of Additional Bridge adjacent to the existing bridge at Km 52.100 on NH-10 at Rangpo at the border of West Bengal and Sikkim State.

Name of Road :NH- 10 (Sevoka -Gangtok Section)

QUANTITY CALCULATION FOR RCC RETAINING WALL MATERIALS UNDER CARRIAGE ITEM

Ref Item no	Description	Requirement for	Cement	Aggregate	Sand	Steel	Total requirement from estimate		Individual requirement for whole length of road			
									Cement	Aggregate	Sand	Steel
			ton	m3	m3	m			ton	m3	m3	m
1	2	3	4	5	6	7	8		9	10	11	12
									= (8) / (3) x (4)	= (8) / (3) x (5)	= (8) / (3) x (6)	= (8) / (3) x (7)
2/12.8-A	PCC M15	1 m3	0.280	0.90	0.450		10.950	m3	3.07	9.86	4.93	
4/12.8 -E	RCC M25	1 m3	0.400	0.90	0.450		137.800	m3	55.12	124.02	62.01	
5/12.40	Steel	1 MT				1.050	19.306	MT				20.27
8/13.10	Back filling in wall	10 m3		12.000			24.600	m3		29.52		
							Total requirement for one culvert =		**58.19**	**163.40**	**66.94**	**20.27**
							Unit Weight as per IS : 875 (Part I)			1.74	1.84	1
							Total weight		**58.19**	**284.00**	**123.00**	**20.27**
									ton	**ton**	**ton**	**ton**

CONSTRUCTION OF ADDITIONAL BRIDGE ADJACENT TO THE EXISTING BRIDGE AT KM 52.100 ON NH-10 AT RANGPO AT THE BORDER OF WEST BENGAL AND SIKKIM STATE.

Name of Road :NH- 10 (Sevoka -Gangtok Section)

COST ESTIMATE		
Sr. No.	**Description**	**Amount (Rs)**
	Span Arrangement =1x72	
1	**Foundation**	**45,677,367.15**
2	**Sub Structure**	**8,393,704.95**
3	**Super Structure**	**27,013,572.56**
4	**Carriage cost**	**737,362.81**
	Grand Total	**81,822,007.47**
	Say	**81,820,000.00**

(Rupees eight crore eighteen lakh twenty thousand) only.

ESTIMATE COST FOR BRIDGE

Item No.	SOR ref	Description	Unit	Rate (Rs)	Quantity	Amount (Rs)
A		**Foundation**				
1.0	**12.1 -B**	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material				
	I	**Ordinary soil (Manual Means)**				
		(i) Depth upto 3 m	Cum	96.00	242.48	23278.01
		(ii) 3 m to 6 m depth	Cum	123.00	0.00	0.00
	II	**Ordinary rock (not requiring blasting) (Manual Means)**				
		Depth upto 3 m	Cum	137.00	323.31	44292.88
	III	**Hard rock (requiring blasting)**	Cum	392.00	0.00	0.00
	IV	**Hard rock (blasting prohibited)**	Cum	408.00	242.48	98931.53
2.0	12.39	Levelling course for Pile cap	Cum	4767.00	45.26	215773.49
3.0	12.38-D	Cement concrete for reinforced concrete in pile cap M 35 complete as per drawing and Technical Specification.	Cum	6737.00	659.13	4440585.76
4.0	12.40	Supplying, fitting and placing uncoated HYSD bar reinforcement in foundation complete as per drawing and Technical specifications	MT	50097.00	214.03	10722505.49
5.0	12.25	Bored cast-in-situ M-35 grade R.C.C pile excluding reinforcement complete as per drawing and Technical Specifical Specifications and removal of excavated earth will all lifts and lead upto 1000 m.(Pile diameter 1200mm)	RM	44543.00	600.00	26725800.00
6.0	A-1	Providing Steel Liner 10 mm thick for pile including Fabricating and Setting out as per Detailed Drawing.	RM	22708.00	150.00	3406200.00
		Total Foundation				**45677367.15**
B		**Sub Structure**				
1.00	13.5	Plain/Reinforced Cement Concrete in open foundation complete as per Drawing and Technical specifications				
	G-(p)-C-I	a)RCC Grade M 30 upto 5 m	Cum	6935.00	90.66	628709.07
	G-(q)-C-I	b)RCC Grade M 30 above 5 m and upto 10 m	Cum	7130.00	302.19	2154624.21
	G-(r)-C-I	c)RCC Grade M 30 above 10 m	Cum	7407.00	120.88	895332.48
2.00	13.6	Supplying, fitting and placing uncoated HYSD bar reinforcement in substructure complete as per drawing and Technical specifications	MT	50203.00	54.39	2730764.08
3.00	13.8	Providing weep holes in stone masonry/plain/reinforced concrete abutment , wing wall/return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V : 20H towards drawing foce. Complete as per drawing and Technical Specifications	Nos	1124.00	45.00	50580.00
4.00	13.9	Back filling behind abutment, wing wall and return wall complete as per drawing and Technical specification (A. Granular material)	Cum	948.00	152.04	144132.29

Item No.	SOR ref	Description	Unit	Rate (Rs)	Quantity	Amount (Rs)
5.00	13.10	Providing and laying of Filter media with granular materials/stone crushed aggregates satisfying the rerquirements laid down in clause 2504.2.2 of MOSRT&H specifications to a thickness of not less than 600mm with smaller size towards the soil and bigger size towards the wall and provided over the enire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and Technical specifications	Cum	847.00	1109.28	939562.81
6.00	13.16	Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, completre assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC: 83 part-I & II respectively and other parts conforming to BS: 5400, section 9.1 & 9.2 and clause 2006 of MoRTH Specifications complete asper drawing and approved technical specifications.				
		POT-CUM PTFE	Nos	75000.00	7.00	525000.00
		GUIDE	Nos	100000.00	2.00	200000.00
		PIN	Nos	125000.00	1.00	125000.00
		Total Sub Structure				8393704.95
C		**Super Structure**				
1.00	14.1	Furnishing and placing reinforced/Prestressed cement concrete in superstructure as per drawing and Technical specifications				
	C-(ii)-(p)-C-1	RCC Grade M 30	Cum	7902.00	94.18	744200.09
	E-(ii)-(p)-C-1	RCC Grade M 45	Cum	11410.00	929.95	10610761.85
2.00	14.2	Supplying, fitting and placing HYSD bar reinforcement in superstructure complete as per drawing and Technical specifications	MT	51196.00	158.33	8105794.35
3.00	14.3	High tensile steel wire/strands including all accessories for stressing, stressing operations and grouting complete as per drawing and Technical specifications	MT	168377.00	37.20	6263306.74

Item No.	SOR ref	Description	Unit	Rate (Rs)	Quantity	Amount (Rs)
4.00	14.5	Providing and laying 56mm thick mastic asphalt wearing course on top of deck slab excluding prime coat with paving grade bitumen meeting the requirements given in Table 500-29, prepared by using mastic cooker and laid to reqired level and slope after cleaning the surface including providing anti-skid surface with bitumen precoated fine grained hard stone chipping of 9.50mm nominal size at the rate of 0.005 cum per 10 Sqm ans at an approximate spacing of 10 cm center to center in both directions pressed into surface when the temperature of surfaces not less than 100 C protuding 1mm to 4mm over mastiv surfaces all complete as per clause 515.	SQM	330.00	856.17	282536.10

Item No.	SOR ref	Description	Unit	Rate (Rs)	Quantity	Amount (Rs)
5.00	14.7	**Construction of RCC railing of M30 Grade in-situ with 20 mm nominal size aggregate,** true to line and grade, tolurence of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications.	RM	1646.00	163.08	268429.68
6.00	14.9	Drainage spouts complete as per drawing and Technical Specifications	Nos	1165.00	30.00	34950.00
7.00	14.10	PCC M 15 grade levelling course below approach slab complete as per drawing and Technical Specifications	Cum	4787.00	3.83	18346.18
8.00	14.11	Reinforced cement concrete approach slab in RCC M 30 grade including reinforcement and form work complete as per drawing and Technical specifications	Cum	10222.00	29.19	298380.18
9.00	14.18-(iii)	Providing and fixing in position 20mm thick premoulded joint filler in expansion joint for fixed ends of simply supported spans not exceeding 10m to cater for a horizontal movement upto 20mm covered with sealant complete as per drawing and Technical specifications	RM	162.00	27.80	4503.60
10.00	14.22	Providing and laying of a strip seal expansion joint catering to maximum horizontal movement upto 70mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring	RM	12831.00	29.80	382363.80
		Total Super Structure				27013572.56

Carriage of Materials

Sr.No.	SOR reference	Description	Unit	Unit of requirement	Total quantity	Unit weight	Carriage distance	Quantity	Rate in Rs	Amount in Rs
1.0	**1.1**	**Loading and unloading of stone boulder/stone aggregates/sand**								
a		**Loading and unloading of stone aggregates**								
		M15 grade concrete	**Cum**	0.89	49.10			43.70	87.00	3801.54
		M30 grade concrete	**Cum**	0.90	637.09			573.38	87.00	49884.46
		M35 grade concrete	**Cum**	0.90	1337.72			1203.95	87.00	104743.32
		M40 grade concrete	**Cum**	0.90	929.95			836.96	87.00	72815.31
b		**Loading and unloading of sand**								
		For M15 grade concrete	**Cum**	0.445	49.10			21.85	87.00	1900.77
		M30 grade concrete	**Cum**	0.450	637.09			286.69	87.00	24942.23
		M35 grade concrete	**Cum**	0.450	1337.72			601.97	87.00	52371.66
		M40 grade concrete	**Cum**	0.450	929.95			418.48	87.00	36407.65
c	**1.3**	**Loading and unloading of cement by manual means and stacking**								
		For M15 grade concrete	**Tonne**	0.320	49.10			15.71	154.00	2419.48
		M30 grade concrete	**Tonne**	0.410	637.09			261.21	154.00	40226.11
		M35 grade concrete	**Tonne**	0.420	1337.72			561.84	154.00	86523.60
		M40 grade concrete	**Tonne**	0.430	929.95			399.88	154.00	61581.48
		Steel	**Tonne**	1.050	463.96			487.15	154.00	75021.70
2.0	**1.4**	**Cost of Haulage Excluding Loading and Unloading**								
	(i)	**Surfaced Road**								
		a) Cement	**Ton. km**				10.00	276.92	5.60	15507.49
		b) Stone Aggregates					10.00	617.08	5.60	34556.51
		c) Sand					10.00	308.54	5.60	17278.25
		d) Steel	**Ton. km**				10.00	487.15	5.60	27280.62
	(ii)	**Unsurface road**								
		a) Cement	**Ton. km**				0.00	276.92	7.00	0.00

Sr.No.	SOR reference	Description	Unit	Unit of requirement	Total quantity	Unit weight	Carriage distance	Quantity	Rate in Rs	Amount in Rs
		b) Stone Aggregates	**Ton. km**			1.74	2.00	617.08	7.00	15032.08
		c) Sand	**Ton. km**			1.84	2.00	308.54	7.00	7948.00
		d) Steel	**Ton. km**				0.00	487.15	7.00	0.00
2.0		**Wearing coat**								
a	**1.1**	Loading and unloading of stone aggregates	**Cum**	0.0135				11.558	87.00	1005.57
b	**1.1**	Loading and unloading of Lime stone dust filler with calcium carbonate	**Cum**	0.0050				4.281	87.00	372.43
c	**1.3**	Loading/Unloading & Carriage cost of Bitument for wearing coat	**Tonnes**	0.0028				2.397	154.00	369.18
	1.4	Cost of Haulage Excluding Loading and Unloading								
	(i)	**Surface road**								
a		Bitumens	**Ton. km**				90.00	2.40	5.60	1208.23
b		Line stone dust	**Ton. km**			1.80	90.00	4.28	5.60	3883.59
	(ii)	**Unsurface road**								
a		Bitumens	**Ton. km**				0.00	4.28	7.00	0.00
b		Stone Aggregates	**Ton. km**			1.74	2.00	11.558	7.00	281.56
c		Lime stone dust	**Ton. km**			1.80	0.00	4.281	7.00	0.00
		Grand Total cost for carriage of material								**737362.81**

QUANTITY CALCULATION FOR ABUTMENT WALL (A1)

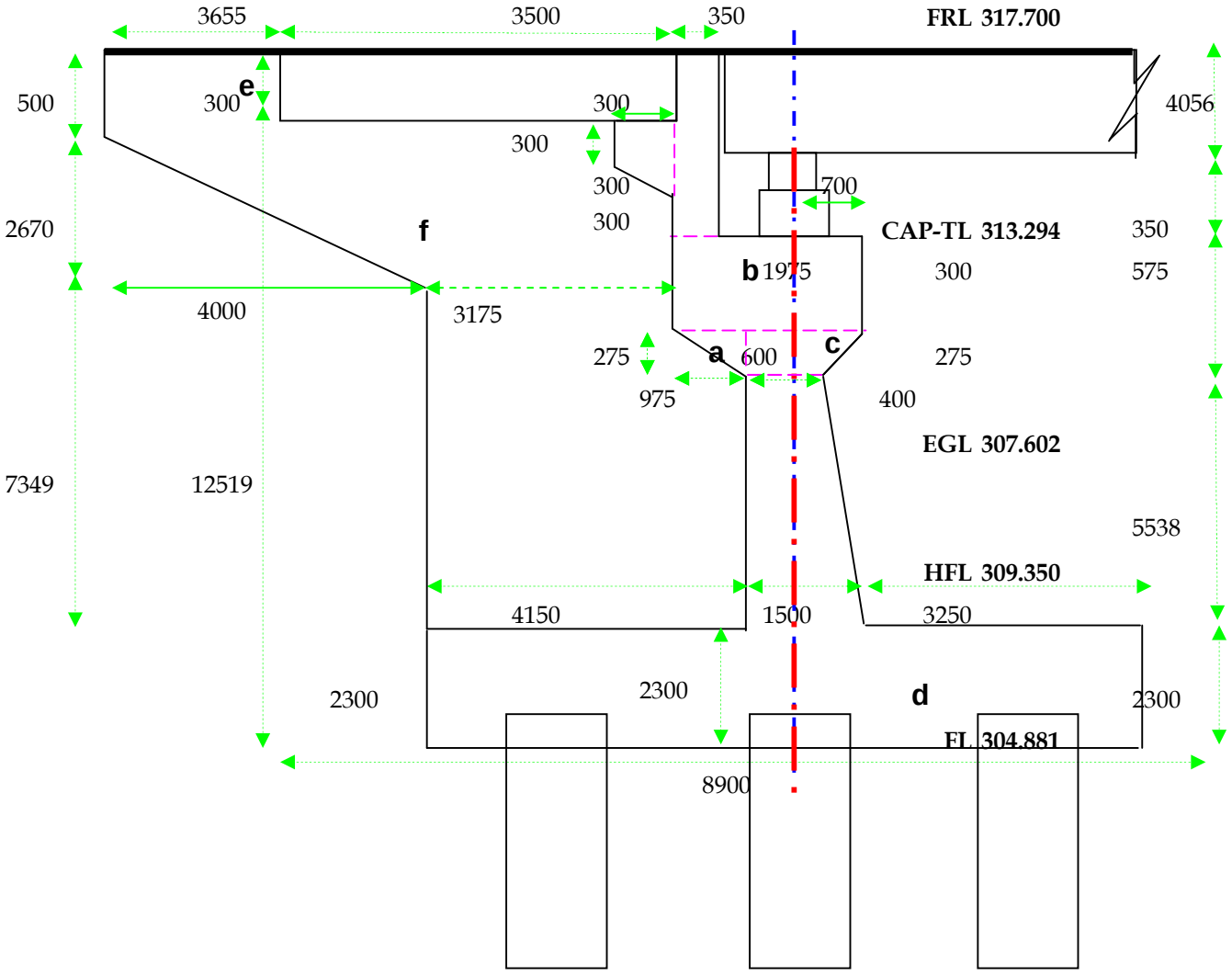
Design Data:

Number of spans	= 1	
Span Length	= 73.75	m
Centre to Centre of span length	= 72.00	m
Number of traffic lanes	= 3	
Overall width of carriageway	= 10.50	m
Overall width bridge	= 14.90	m
Road Crest Level	= 317.70	m
Percentage of camber	= 2.50	%
Depth of Box girder	= 4.000	m
Vertical Clearance	= 4.294	m
Soffit level	= 313.644	m
Bottom Level of bearing (Top of pedastal)	= 313.444	m
Top level of abutment cap	= 313.294	m
Bottom of abutment cap	= 312.719	m
H.F.L	= **309.350**	m
Existing groung level	= **307.602**	m
Abutment stem bottom Level	**= 307.181**	m
Foundation level	**= 304.881**	m
Number of main girders	= 1	
Width of cap excluding dirt wall	= **1.625**	m
Length of bearing	= 0.8	m
Width of bearing	= 0.8	m
Thickness of bearing	= 0.2	m
Depth of bearing pedastal	= 0.15	m
Depth of abutment cap	= 0.575	m
Depth of abutment wall	= 5.538	m
Number of bearings per support	= 1	
Wearing coat thickness	= 0.056	m
Thickness of return wall	= 0.5	m
Bearing capacity of bed rock	= 350	KN/m^2
Foundation strata	Weathered rock	
Angle of Skew θ	= 0	Degree

Cos q = Sin q 0 =

Length of span skew	= 73.75	m
Length of abutment wall	= 14.9	m
Rare slope of stem wall with respect Vertical	= 0	Degree

Abutment Figure



SIDE VIEW OF ABUTMENT WALL A1

Sr.No.	Description	Unit	Nos.	Length	Width	Depth	Quantity
1	Earthwork for footing						
	up to 3m height from top	Cum	1	9.200	16.400	2.871	433.176
	3m to 6m height from top	Cum	1	9.200	16.400	0.000	0.000
	Total quantity	Cum`					433.176
2	Lean concrete M15 PCC	Cum	1	9.200	16.400	0.150	22.632
3	Pile of length & 1.2 m dia	Rm	15	20.000			300.000
4	Pile Linner	Rm	15	5.000			75.000
5	Pile Cap Slab M35	Cum	1	16.100	8.900	2.300	329.567
	M35grade concrete for pile & pilecap	Cum					668.859
	Steel @ 160 kg /Cum	MT					107.017
6	Back fill with filter media	Cum	1	13.900	0.600	10.019	83.559
7	Back fill with granular media	Cum	1	13.900	4.150	10.519	606.789
8	Dirt Wall M30	Cum	1	14.900	0.350	4.350	22.685
9	Bracket of dirt wall M30	Cum	1	14.900	0.350	0.450	2.347
10	Bearing pedestal T-1 M30	Cum	2	0.800	0.800	0.200	0.256

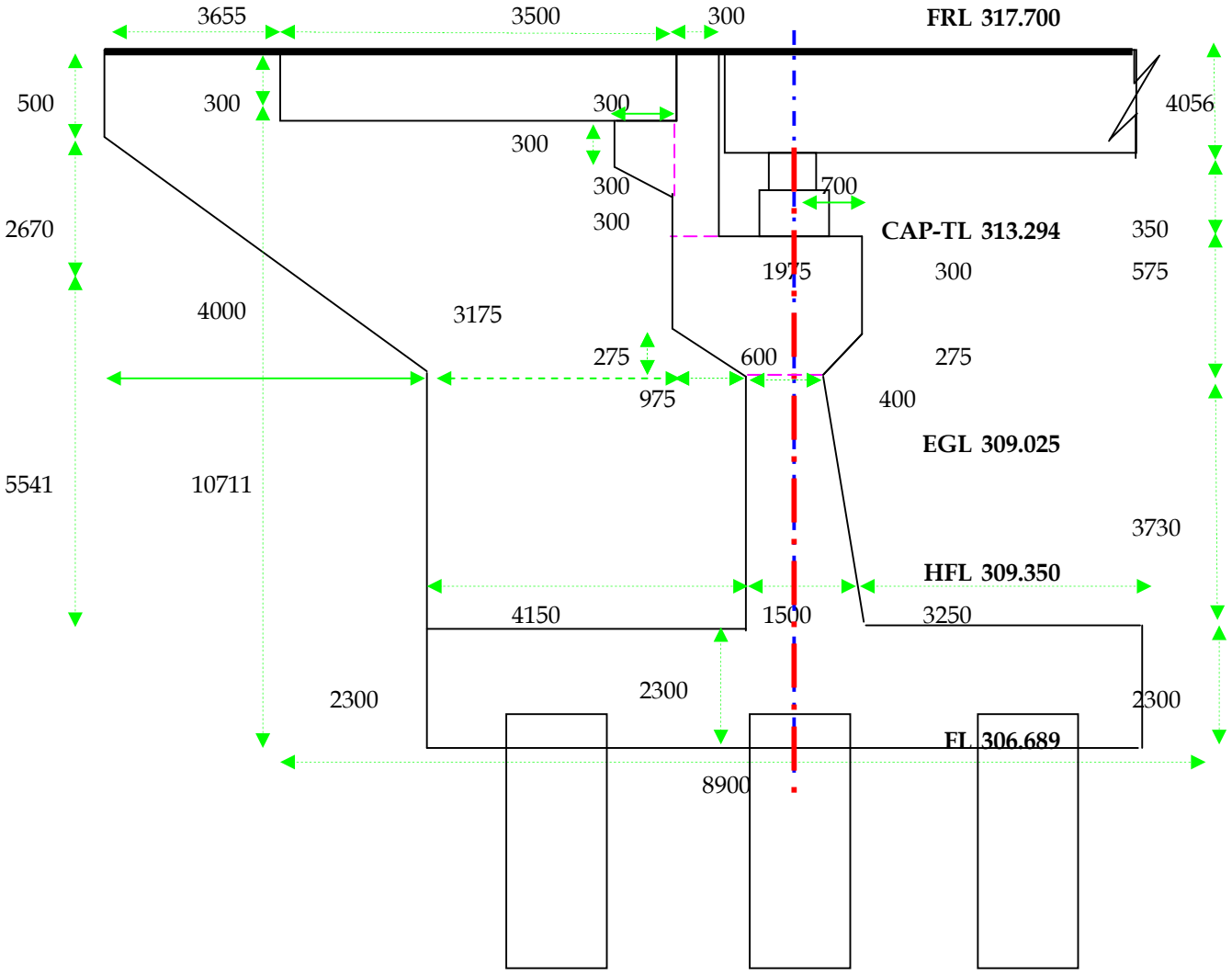
Sr.No.	Description	Unit	Nos.	Length	Width	Depth	Quantity
	Bearing pedestal T-2 M31	Cum	1	0.800	0.800	0.200	0.128
11	**Abutment Cap M30**						
	Haunch below dirt wall	Cum	1	14.900	1.288	0.275	5.276
	Full width cap	Cum	1	14.900	1.975	0.300	8.828
12	**Stem M30**	Cum	1	14.900	1.050	5.538	86.642
13	**Return wall M30**						
	Top rectangular portion	Cum	2	4.000	0.350	0.500	1.400
	Top trapezoidal portion	Cum	2	4.000	0.350	1.335	3.738
	Bottom rectangular portion	Cum	2	3.663	0.500	10.519	38.526
	M30 grade concrete for Substructure	**Cum**					**169.826**
	Steel @ 180 kg /Cum	**MT**					**30.569**
14	**Weep hole**	No	1.00	15.000			15.000
15	**Bearing**	No					
	POT-CUM PTFE	No	2			2.000	2.000
	GUIDE	No	0			0.000	0.000
	PIN	No	1			1.000	1.000
16	**Expansion joint for 50mm**	Rm	1.00	14.900			14.900
17	**Premoulded expansion joint**	Rm	1.00	13.900			13.900
18	**Approach slab M30**	Cum	1.00	3.500	13.900	0.300	14.595
19	**PCC below approach slab M15**	Cum	1.00	3.650	3.500	0.150	1.916

QUANTITY CALCULATION FOR ABUTMENT WALL (A2)

Design Data:

Number of spans	= 1	
Span Length	= 73.75	m
Centre to Centre of span length	= 72.00	m
Number of traffic lanes	= 3	
Overall width of carriageway	= 10.50	m
Overall width bridge	= 14.90	m
Road Crest Level	= 317.700	m
Percentage of camber	= 2.50	%
Depth of Box girder	= 4.000	m
Vertical Clearance	= 4.294	m
Soffit level	= 313.644	m
Bottom Level of bearing (Top of pedastal)	= 313.444	m
Top level of abutment cap	= 313.294	m
Bottom of abutment cap	= 312.719	m
H.F.L	= **309.350**	m
Existing groung level	= **309.025**	m
Abutment stem bottom Level	**= 308.989**	m
Foundation level	**= 306.689**	m
Number of main girders	= 5	
Width of cap excluding dirt wall	= **1.625**	m
Length of bearing	= 0.8	m
Width of bearing	= 0.8	m
Thickness of bearing	= 0.2	m
Depth of bearing pedastal	= 0.15	m
Depth of abutment cap	= 0.575	m
Depth of abutment wall	= 3.730	m
Number of bearings per support	= 1	
Wearing coat thickness	= 0.056	m
Thickness of return wall	= 0.5	m
Bearing capacity of bed rock	= 350	KN/m^2
Foundation strata	Weathered rock	
Angle of Skew θ	= 0	Degree
Cos q 1 =	Sin q 0 =	
Length of span skew	= 73.75	m
Length of abutment wall	= 14.9	m
Rare slope of stem wall with respect Vertical	= 0	Degree

Abutment Figure



SIDE VIEW OF ABUTMENT WALL A1

Sr.No.	Description	Unit	Nos.	Length	Width	Depth	Quantity
1	Earthwork for footing						
	up to 3m height from top	Cum	1	9.200	16.400	2.486	375.088
	3m to 6m height from top	Cum	1	9.200	16.400	0.000	0.000
	Total quantity	Cum`					375.088
2	Lean concrete M15 PCC	Cum	1	9.200	16.400	0.150	22.632
3	Pile of length & 1.2 m dia	Rm	15	20.000			300.000
4	Pile Linner	Rm	15	5.000			75.000
5	Pile Cap Slab M35	Cum	1	16.100	8.900	2.300	329.567
	M35grade concrete for pile & pilecap	Cum					668.859
	Steel @ 160 kg /Cum	MT					107.017
6	Back fill with filter media	Cum	1	13.900	0.600	8.211	68.480
7	Back fill with granular media	Cum	1	13.900	4.150	8.711	502.494

Sr.No.	Description	Unit	Nos.	Length	Width	Depth	Quantity
8	**Dirt Wall M30**	Cum	1	14.900	0.300	4.350	19.445
9	**Bracket of dirt wall M30**	Cum	1	14.900	0.300	0.450	2.012
10	**Bearing pedestal T-1 M30**	Cum	5	0.800	0.800	0.200	0.640
	Bearing pedestal T-2 M31	Cum	2	0.800	0.800	0.600	0.768
11	**Abutment Cap M30**						
	Haunch below dirt wall	Cum	1	14.900	1.288	0.275	5.276
	Full width cap	Cum	1	14.900	1.975	0.300	8.828
12	**Stem M30**	Cum	1	14.900	1.050	3.730	58.356
13	**Return wall M30**						
	Wing wall top portion	Cum	2	4.000	0.350	0.500	1.400
	Wing wall bottom portion	Cum	2	4.000	0.350	1.335	3.738
	Bottom rectangular portion	Cum	2	3.663	0.500	8.711	31.904
	M30 grade concrete for Substructure	**Cum**					**132.366**
	Steel @ 180 kg /Cum	**MT**					**23.826**
14	**Weep hole**	No	2.00	15.000			30.000
15	**Bearing**	No					
	POT-CUM PTFE	No	5			5.000	5.000
	GUIDE	No	2			2.000	2.000
	PIN	No	0			0.000	0.000
16	**Expansion joint for 50mm**	Rm	1.00	14.900			14.900
17	**Premoulded expansion joint**	Rm	1.00	13.900			13.900
18	**Approach slab M30**	Cum	1.00	3.500	13.900	0.300	14.595
19	**PCC below approach slab M15**	Cum	1.00	3.650	3.500	0.150	1.916

QUANTITY CALCULATION FOR SUPER STRUCTURE

Design Data: **No of span**

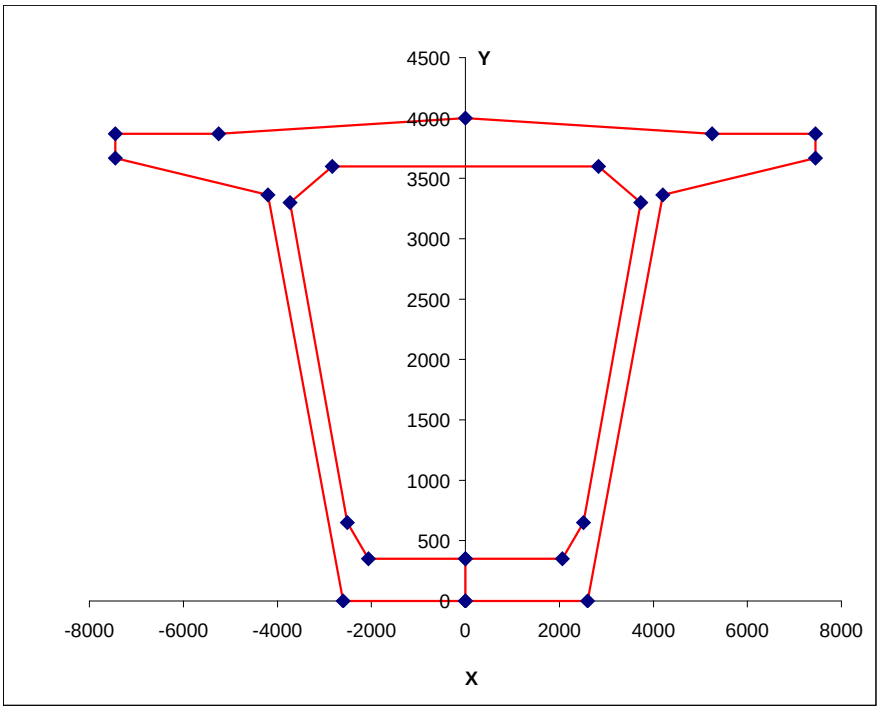
Span Length	=	1	72.00	m
Overall width of carriageway	=		10.5	m
Overall width bridge	=		14.9	m

Sr.No.	Description	Unit	Nos.	Length	Width	Depth	Quantity
1	**Crash barrier M45**	Cum	2.00	81.54	0.34	0.90	49.536
2	**Safety Kerb M30**	Cum	2.00	81.54	1.75	0.33	94.179
3	**RCC Railing**	Rm	2.00	81.54			163.080
3	**Drainage spout**	No	2.00	15.00			30.000
4	**Wearing coat in Asphaltic concrete**	Sqm	1.00	81.54	10.50		856.170
5	**48m Span**						
a	**Main Girder RCC M45**						
	For end portion	Cum	2.00	4.375	12.511		109.471
	For tapered portion	Cum	2.00	5.500	11.36		124.911
	For middle portion	Cum	1.00	54.000	10.200		550.800
	Quantity per girder	**Cum**					**785.182**
b	External Strut	Cum	100.00	5.140	0.200	0.340	34.952
c	Internal Strut	Cum	32.00	3.400	0.200	0.200	4.352
d	**Cross girders M45**	Cum	7.000	6.018	0.300	3.250	41.073
e	**End Cross Girder M45**	Cum	2.000	5.413	0.450	3.050	14.859
	Total Quantity for 72m span	Cum					**880.417**
6	**Total Quantity M45 Concrete**	**Cum**					**929.953**
7	**Total Quantity M30 Concrete**	**Cum**					**94.179**
8	**Steel @ 150 kg/Cum for PSC & 200 kg/Cum for RCC**	**MT**					**158.329**
9	**Prestress steel @ 40 kg/Cum**	**MT**					**37.198**

SECTIONAL PROPERTIES FOR 72m SPAN

INNER		OUTER	
X	Y	X	Y
0	0	0	0
2064	0	2600	0
2514	300	4200	3363
3734	2950	7450	3669
2834	3250	7450	3869
-2834	3250	5250	3869
-3734	2950	0	4000
-2514	300	-5250	3869
-2064	0	-7450	3869
0	0	-7450	3669
		-4200	3363
		-2600	0
		0	0
		0	350
		2064	350
		2514	650
		3734	3300
		2834	3600
		-2834	3600
		-3734	3300
		-2514	650
		-2064	350
		0	350

SECTION PROPERTIES FOR RUNNING SECTION :



OUTER PORTION

CROSS SECTIONAL AREA =	30101050	mm^2
CENTROID X =	0.00	mm
CENTROID Y =	2258.28	mm
SECOND MOMENT OF AREA Ixx =	4.0170E+13	mm^4
SECOND MOMENT OF AREA Iyy =	1.9475E+14	mm^4

INNER PORTION

CROSS SECTIONAL AREA =	19901000	mm^2
CENTROID X =	0.00	mm
CENTROID Y =	1740.66	mm
SECOND MOMENT OF AREA Ixx =	1.6663E+13	mm^4
SECOND MOMENT OF AREA Iyy =	6.5554E+13	mm^4

Depth of box girder = 4000 mm

Depth of bottom slab = 350 mm

Area of Box girder =Outer - Inner = **30101050-19901000** = 10200050 mm^2

= **10.200** m^2

Centroid of the section= **(30101050x2258.281-19901000x(1740.66+350))/10200050**

= 2585.33 mm = 2.585 m

MOMENT OF INERTIA

I_{XX} = 2.35E+13 mm^4 = 23.507 m^4

I_{YY} = 1.29E+14 mm^4 = 129.193 m^4

S1 = 6.177 **S2 =** 2.633 **S3 =** 4.115 **h=** 2.423

t1 = 0.271 **t2 =** 0.35 **t3 =** 0.225

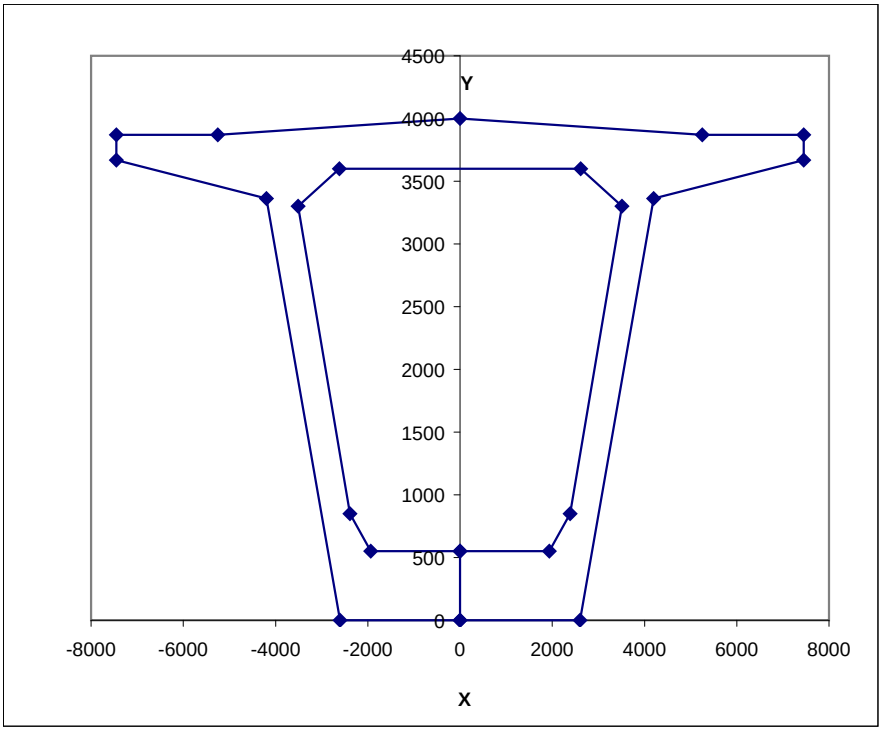
I_{ZZ} = $4A^2/(s1/t1+2 \times s2/t2+s3/t3)$ **=** 11.08 m^4

Z_b = 9.092 m^3 **Z_t =** 16.617 m^3

Torasion area = 12.469 m^2 Web area = 1.59 m^2

INNER		OUTER	
X	Y	X	Y
0	0	0	0
1936	0	2600	0
2386	300	4200	3363
3514	2750	7450	3669
2614	3050	7450	3869
-2614	3050	5250	3869
-3514	2750	0	4000
-2386	300	-5250	3869
-1936	0	-7450	3869
0	0	-7450	3669
		-4200	3363
		-2600	0
		0	0
		0	550
		1936	550
		2386	850
		3514	3300
		2614	3600
		-2614	3600
		-3514	3300
		-2386	850
		-1936	550
		0	550

SECTION PROPERTIES FOR SUPPORT SECTION :



OUTER PORTION

CROSS SECTIONAL AREA =	30101050	mm^2
CENTROID X =	0.00	mm
CENTROID Y =	2258.28	mm
SECOND MOMENT OF AREA Ixx =	4.0170E+13	mm^4
SECOND MOMENT OF AREA Iyy =	1.9475E+14	mm^4

INNER PORTION

CROSS SECTIONAL AREA =	17590000	mm^2
CENTROID X =	0.00	mm
CENTROID Y =	1631.12	mm
SECOND MOMENT OF AREA Ixx =	1.3138E+13	mm^4
SECOND MOMENT OF AREA Iyy =	5.1382E+13	mm^4

Depth of box girder = 4000 mm

Depth of bottom slab = 550 mm

Area of Box girder =Outer - Inner = **30101050-17590000** = 12511050 mm^2

= **12.511** m^2

Centroid of the section= **(30101050x2258.281-17590000x(1631.123+550))/12511050**

= 2366.77 mm = 2.367 m

MOMENT OF INERTIA

I_{XX} = 2.70E+13 mm^4 = 27.032 m^4

I_{YY} = 1.43E+14 mm^4 = 143.366 m^4

S1 = 5.949 **S2 =** 2.55 **S3 =** 3.966 **h=** 2.347

t1 = 0.271 **t2 =** 0.55 **t3 =** 0.225

$I_{ZZ} = 4A^2/(s1/t1+2 \times s2/t2+s3/t3)$ = 11.09 m^4

Z_b = 11.421 m^3 Z_t = 16.551 m^3

Torasion area = 11.635 m^2 Web area = 2.34 m^2