Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

ABSTRACT OF COST ESTIMATE

Sr.No.	Items of work	Amount (Rs)
	CONSTRUCTION COST	
1	Sliding Portion	139,249,788.00
2	Pavement work at Sliding Zone	2,679,664.00
3	Narrow Zone	146,311,054.40
4	Road Side Drain	31,540,000.00
5	Slope Protection Works	30,194,880.00
6	Bridge Repaining Works	967,171.00
7	Km Stones & Road Signs	7,098,242.50
8	Road Safety Measures	12,483,000.00
9	Non Civil Work	3,533,992.00
A	**Civil Cost Total of (1 to 9)**	**374,057,791.90**
B	**GST 12% of "A"**	**44,886,935.03**
C	**Civil cost Including GST (A+B)**	**418,944,726.93**
D	**Add Contigency 2.8% on "A"**	**10,473,618.17**
E	**Sub Total (C+D)**	**429,418,345.10**
F	Escalation (5.0% of A) for 1.0 years	18,702,889.60
G	Construction supervision Charge (3 % of A)	11,221,733.76
H	Agency NHIDCL) Charge (9 % of A)	33,665,201.27
	TOTAL CONSTRUCTION COST (E+F+G+H)	**493,008,169.73**
	Say	**493,100,000.00**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

Detailed Estimate for Sliding Zone

Sr.No.	Decription	Unit	Nos	L	B	D	Quantity	Rate in Rs.	Amount in Rs.
1/2.3A	**Site clearance** (Clearing and grubbing road land including uprooting rank vegetation, grass, bushes, shrubs, saplings and trees girth up to 300 mm, removal of stumps of trees cut earlier and disposal of unserviceable materials and stacking of serviceable material to be used or auctioned up to a lead of 50 metres including removal and disposal of top organic soil not exceeding 150 mm in thickness complete in accordance with Technical Specifications of MoRT&H and as per direction of the Engineer-in- Charge (By Manual Means)								
	Slide 1 & 2	Ha	1.00				1.50		
	Slide 3	Ha	1.00				3.70		
	Total	Ha					5.20	56593.00	294283.6
2/3.13 (ii)A	**Excavation of natural slope along the hill side** (Earthwork in excavation for foundation of structures as per drawing and technical specification including setting out, removing, spreading or stacking of spoils within a lead of 150 m. as directed and including trimming the sides of the trenches, levelling, dressing and ramming the bottom, complete in accordance with Technical Specifications of MoRT&H and as per direction of the Engineer-in- Charge in all sorts of soil excluding marshy soil & rocks (soft or hard) by mechanical and Manual Means)	Cum	1.00				21000.00	283.00	5943000.0
3	Scrubbing loose boulders on the surface, collecting the loose boulder at the bottom of slope and disposal at a dumping place within a lead of 150 meter including all lift and machinery etc. complete in accordance with Technical Specifications of MoRT&H and as per direction of the Engineer-in- Charge	Cum	1.00				14000.00	350.00	4900000.0

Sr.No.	Decription	Unit	Nos	L	B	D	Quantity	Rate in Rs.	Amount in Rs.
4/13.9A	**Backfilling Material** (Providing suitable material behind the wall as purpose of backfill with Locally available materials having PI < 6 and having good angle of internal friction ,including cost of all materials, labour, machinery, and all other ancillary operations etc., complete in accordance with Technical Specifications of MoRT&H and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)	Cum	1.00				2500.00	1085.00	2712500.0
5	**Horizontal Drainage Borings** (Providing ,Supply and Installation, construction and drilling holes which are inclined to the horizontal direction by not more than 10 degrees and providing and installing perforated pipes and protective pipes into the holes so drillng, including cost of all materials, labour, machinery, ,drainage and all other ancillary operations etc., complete with lead upto 1 km and all lifts.,in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)								
	Slide 1 & 2	Rm	1.00				348.00		
	Slide 3	Rm	1.00				924.00		
	Total	Rm	1.00				1272.00	11138.00	14167536.0
6	**Cast-in-situ Concrete Cribs Works** (Providing ,Supply and Installation, construction of cast in-situ concrete crib works on the slopes including reinforcement and formwork complete as per drawing and Technical specification and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)								
	Slide 1 & 2	Rm	1.00	4001			4001.00		
	Slide 3	Rm	1.00	2574			2574.00		
	Total	Rm	1.00				6575.00	3803.00	25004725.0
7	**Permanent Ground Anchor** (Supply and Installation of 70 Ton Wire anchors with a strand dia of 12.7/15.2 mm and yield strength more than 1770 N/mm2, with 2.0 c/c spacing horiontal and vertical with 35m length in soil zone and 20m rock zone , including all accessories for stressing, stressing operations and grouting , RCC M30 Grade End Block ,including reinforcement and formwork complete as per drawing and Technical specification and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)	Rm	1.00				350.00	18386.00	6435100.0

Sr.No.	Decription	Unit	Nos	L	B	D	Quantity	Rate in Rs.	Amount in Rs.
8	**Rock fall protection Net** (Supplying and placing of Mechanically Woven Double Twisted Hexagonal Shaped Wire Mesh netting roll, Mesh Type 10x12, (Zn+10%Al alloy) + PVC coated Mesh Wire dia. 2.7/3.7mm (ID/OD), end of roll mechanically edged / selvedged, with galvanization as per IS 16014:2012 and MoRTH (Fifth Revision) 2013, Clause 2500.) including fixing of Wire rope anchor,Nail with system spike plate complete as per drawing and Technical specification and Drawings or as directed by the Engineer)	Sqm					9190.00	2724.00	25033560.0
9	**Rock Bolts** (Providing and fixing 25 mm diameter and 5.0 m long steel rock bolts with mechanical/ wedge type anchorage including drilling 46 mm dia holes, providing 150 mm long 20 mm thick steel tapered wedge, 10 mm thick 150 x150 mm plate washer and nuts, tightening bolt by torque wrench,grouting , cost of all materials, machinery, labour, ventilation, lighting, drainage and all other ancillary operations etc., complete with lead upto 1 km and all lifts in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)								
	For Crib Work	Nos					1148.00		
	With Shotcrete Work	Nos					129.00		
	Rock Fall Protection Net	Nos					2298.00		
	Total	Nos					3575.00	9015.00	32228625.0
10	**Shotcreting** (Providing specified thick shortcrete on the slopesas per the mixed proporation of 10 mm size aggregate ,cement admixture determinded by contractor & approved by Engineer in Charge including cost of all materials, labour, machinery, ,drainage and all other ancillary operations etc., complete with lead upto 1 km and all lifts.,in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)	Cum					495.00	12892.00	6381540.0

Sr.No.	Decription	Unit	Nos	L	B	D	Quantity	Rate in Rs.	Amount in Rs.
11	**Shotcrete work chainlink wire mesh** (Providing specified thick shortcrete to sides and arch of tunnel as per the mixed proporation of 10 mm size aggregate ,cement admixture determinded by contractor & approved by Engineer in Charge including cost of all materials, labour, machinery, drainage and all other ancillaryoperations & excluding steel fibre etc., complete with lead upto 1 km and all lifts.)								
	Slide 1 & 2	Cum					207.74		
	Slide 3	Cum					177.67		
	Total	Cum					385.41	12892.00	4968705.7
12	**Chain link wire mesh** (Providing ,Supply and Installation, conform to be requirements of IS: 2140-1978 (Re affirmed 1991) for galvanized steel chain link wire mesh , mesh size of approximately 50mmx50mm and a wire diameter of 2mm including cost of all materials, labour, machinery, and all other ancillary operations etc., complete in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)	Sqm					3854.11	1393.00	5368775.2
13	**Gabian Structure for Retaining Earth** (Providing ,Supplying, construction and placing of Mechanically Woven Double Twisted Hexagonal Shaped Wire Mesh Gabion Boxes of required sizes, Mesh Type 10x12, (Zn+ 10%Al alloy) + PVC coated, Mesh Wire dia. 2.7/3.7mm (ID/OD), mechanically edged / selvedged with galvanization, with partitions at every 1m interval including cost of all materials, labour, machinery, and all other ancillary operations etc., complete in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer).	Cum	1	30			30.00	40176.60	1205298.0
14	**Surface Drains in all type soil and rock** (Construction of lined surface drain of M20 Grade of average cross sectional area 0.6 sqm including cost of all materials, labour, machinery, and all other ancillary operations etc., complete in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer).	Rm	1	900			900.00	3041.00	2736900.0

Sr.No.	Decription	Unit	Nos	L	B	D	Quantity	Rate in Rs.	Amount in Rs.
15	**Hydroseeding 20 mm thick** ((Providing ,Supply and Installation on hill slope including cost of all materials, labour, machinery,and all other ancillary operations etc., complete with lead upto 1 km and all lifts.,in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)	Sqm	1				2752.93	679.00	1869239.5
								Total	**139249788.0**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

DETAILED ESTIMATE FOR RCC BALCONY

Sr.No./SOR	Description	Unit	Nos.	Length	Width	Depth	Quantity	Rate in Rs.	Amount in Rs.
	Km 53 for 325 m and Km 63 for 425 m								
1/3.13 (iv) A	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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
	Cross Beam	Cum	1	4500.00	0.75	0.75	2531.25		
	Main Beam	Cum	1	2068.00	0.75	0.90	1395.90		
	Total						3927.15	609.00	2391634.35
2/12.8-A	Providing and laying of PCC M 15 levelling course 100 mm thick below the foundation								
	Cross Beam	Cum	1	4500.00	0.50	0.10	225.00		
	Main Beam	Cum	1	2068.00	0.50	0.10	103.40		
	Total						328.40	5,761.00	1891912.40
3/14.1 -C(ii)	Furnishing and Placing Reinforced/Prestressed cement concrete in super-structure as per drawing and Technical Specification RCC Grade M 30								
a	Cross Beam	Cum	1	4500.00	0.50	0.50	1125.00		
b	Main Beam	Cum	1	3760.00	0.50	0.83	1560.40		
c	Deck slab	Cum	1	750.00	10.00	0.25	1875.00		
d	Crash Barrier	Cum	1	750.00	0.35	1.16	304.50		
	Safety Kerb	Cum	1	750.00	0.75	0.30	168.75		
	Total	Cum					5033.65	9,158.00	46098166.70
4/14.2	Supplying, fitting and placing uncoated HYSD bar reinforcement in foundation complete as per drawing and Technical specifications	MT	1				830.55	71,265.0	59189145.75

Sr.No./SOR	Description	Unit	Nos.	Length	Width	Depth	Quantity	Rate in Rs.	Amount in Rs.
5/13.10	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	1875	1.50	1.50	0.25	1054.69	969.00	1021994.61
6/A5	Providing and fixing 25 mm diameter steel rock bolts with mechanical/ wedge type anchorage including drilling 65 mm dia holes, providing150 mm long 20 mm thick steel tapered wedge, 10 mm thick 150 x150 mm plate washer and nuts, tightening bolt by torque wrench, cost of all materials, machinery, labour, ventilation, lighting, drainage and all other ancillary operations etc., complete with lead upto 1 km and alllifts.	Rm	1125	6.00			6750.00	1,803.00	12170250.00
7/14.9	Drainage Spouts complete as per drawing and Technical specification	Nos	150				150.00	1,333.00	199950.00
8/14.18(ii)	Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.	Rm	75	10.00			750.00	264.00	198000.00
9/14.5	Mastic Asphalt (Providing and laying 12 mm 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 required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 9.5 mm nominal size at the rate of 0.005cum per 10 sqm and 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 deg. C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 515.)	Sqm	1	750.00	9.00		6750.00	405.00	2733750.00

Sr.No./SOR	Description	Unit	Nos.	Length	Width	Depth	Quantity	Rate in Rs.	Amount in Rs.
10/5.8	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)	Cum	1	750.00	9.00	0.04	270.00	10,753.00	2903310.00
7/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	1	750.00			750.00	3,041.00	2280750.00
								Construction cost	**131078863.81**
	Carriage of Materials								
1.1	Loading and unloading by manual means	**Unit of reqd**		**Total quantity**					
	For M25 grade concrete								
	a) Sand		0.45	5,333.65		Cum	2,400.14	100.00	240,014.000
	b) Aggregates		0.90	5,333.65		Cum	4,800.29	100.00	480,029.000
	c) Cement		0.40	5,333.65		Ton	2,133.46	177.00	377,622.420
	d) Steel		1.05	830.55		Ton	872.08	177.00	154,358.160
1.4	Cost of Haulage Excluding Loading and Unloading		**Lead**		**Unit Wt**				
(i)	Surfaced Road								
	a) Cement		16.0	Kms		T/Km	2133.460	6.40	218466.30
	b) Steel		16.0	Kms		T/Km	872.080	6.40	89300.99
	c) Stone Aggregates		18.0		1.74	T/Km	4800.290	6.40	
	d) Sand		18.0	Kms	1.84	T/Km	2400.140	6.40	276496.13
(ii)	Case-II : Unsurfaced Gravelled Road								
	a) Cement		0.00	Kms		T/Km	2133.460	8.00	0.00
	b) Steel		0.00	Kms		T/Km	872.080	8.00	0.00
	c) Stone Aggregates		5.00			T/Km	4800.290	8.00	192011.60
	d) Sand		5.00	Kms		T/Km	2400.140	8.00	96005.60
								Carriage cost =	**2124304.20**
	Add provision for traffic diversion and lauching arrangement 10% of civil work cost								**13107886.38**

Total Construction cost = 146311054.4

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

COST ESTIMATE FOR BRIDGE REPAIRING

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

Sl/SOR	Description	Unit	Nos	L	B	H	Quantity	Rate in Rs.	Amount in Rs.
1/16.20	**Repair of RCC Railing** (Carrying out repair of RCC M30 railing to bring it to the original shape.)	Rm	2	150.0			300.0	134.0	40200.00
2/8.8	**Painting Two Coats on New Concrete Surfaces** (Painting two coats after filling the surface with synthetic enamel paint in all shades on new plastered concrete surfaces)								
	Post	Sqm	400.00		0.28	1.10	123.20		
	Beam	Sqm	1200.00		0.25	1.50	450.00		
	Total	Sqm					573.20	155.00	88846.00
3/5.14	**Mastic Asphalt** (Providing and laying 25 mm thick mastic asphalt wearing course with paving grade bitumen meeting the requirements given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine-grained hard stone chipping of 13.2 mm nominal size at the rate of 0.005cum per 10 sqm and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces not less than 1000C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 515.)	Sqm	1.00	150.0	7.50		1125.00	745.00	838125.00
								Total of Bridge Repairing	**967,171.0**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Baninool section) in the State of Sikkim

COST ESTIMATE FOR SIDE DRAIN

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

Sl/SOR	Description	Unit	L	B	H	Quantity	Rate in Rs.	Amount in Rs.
1/3.32	**Excavation in Hilly Areas in all type of Soil/rock for side drain 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 .)	Cum	10000.0	1.0	0.5	5000.0	226.0	1130000.00
2/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	10000.0			10000.00	3041.00	30410000.00
							Total of side drain	**31,540,000.0**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

DETAIL ESTIMATE FOR SLOPE PROTECTION WORKS

Sl/SOR	Description	Unit	L	B	H	Quantity	Rate in Rs.	Amount in Rs.
1	Toe wall for 3.0 m Height	Rm				100.00	23,034.00	2,303,400.00
2	Breast Wall 2.00m high	Rm	Location of Breast wall			600.00	11,729.00	7,037,400.00
3	Breast Wall 3.00m high	Rm				600.00	26,726.00	16,035,600.00
4	Gabion Wall 2.00 m high	Rm	Location of Gabion wall			600.00	8,030.80	4,818,480.00
				Total cost for slope protection works =				**30,194,880.00**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

DETAIL ESTIMATE FOR PAVEMENT WORKS

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

Sl/SOR	Description	Unit	L	B	H	Nos	Qnty	Rate	Amount
1/4.12	**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.)	Cum	200.0	8.00	0.25	1.00	400.00	2437.0	**974800.00**
2/5.1	**Prime Coat** (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.)	Sqm	200.0	7.00		1.00	1400.00	28.00	**39200.00**
3/5.6	**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	200.0	7.000	0.060	1.00	84.00	9592.00	**805,728.00**

Sl/SOR	Description	Unit	L	B	H	Nos	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. (Normal Bituminous Surface)	Sqm	200.0	7.000		1.00	1400.00	13.00	**18,200.00**
5/5.8	**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) Case-I Using Bitumen 60/70 grade (i)for Grading-I (13 mm nominal size)	Cum	200.0	7.000	0.04	1.00	56.00	10621	**594,776.00**
6/1.1	**Loading and unloading of Lime, Aggregates, Stone boulder,Brick Aggregates etc. by manual means**								
	i) Loading of aggregates	Cum	Qnty taken from Pavment				539.3	100.0	**53,930.00**
	ii) Loading of sand	Cum	Qnty Calculation				196.8	100.0	**19,680.00**
7/1.9	**Loading and unloading of Bitumen drums by manual means including a lead upto 30m**								
	i) Bitumen drums by manual means including a lead upto 30m	ton	Qnty taken from Pavment Qnty Calculation				16.00	72.00	**1,152.00**

Sl/SOR	Description	Unit	L	B	H	Nos	Qnty	Rate	Amount
8/1.4	**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			18.00			71.00	6.40	**8,179.20**
	b) Aggregates			18.00			295.00	6.40	**33,984.00**
	d) Bitumen			16.00			16.00	6.40	**1,638.40**
	Case-II : Unsurfaced Gravelled Road								
	a) Sand			2.00			71.00	8.00	**1,136.00**
	b) Aggregates			2.00			295.00	8.00	**4,720.00**
	c) Bitumen			0.00			16.00	8.00	**0.00**
	For WMM								
	Case-I : Surfaced road								
	a) Sand			18.00			291.00	6.40	**33,523.20**
	b) Aggregates			18.00			643.00	6.40	**74,073.60**
	c) Bitumen			16.00			0.0	6.40	**0.00**
	Case-II : Unsurfaced Gravelled Road								
	a) Sand			2.00			291.00	8.00	**4,656.00**
	b) Aggregates			2.00			643.00	8.00	**10,288.00**
	c) Bitumen			0.00			0.0	8.00	**0.00**
									2,679,664.40
								Say	**2,679,664.00**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

QUANTITY CALCULATION FOR PAVEMENT MATERIALS UNDER CARRIAGE ITEM

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

Ref Item no	Description	Requirement for	Bitumen	Aggregate	Crushed Sand	Total requirement from estimate	Individual requirement for whole length of road		
							Bitumen	Aggregate	Sand
			ton	m^3	m^3		ton	m^3	m^3
1	2	3	4	5	6	7	8	9	10
1/4.12	WMM	225 m^3		207.9	89.100	400.00 m^3		369.60	158.40
		Total requirement for the whole length of the road =					**0.00**	**369.60**	**158.40**
					Ton/Unit quantity		1	1.74	1.84
					Total weight		**0.00**	**643.00**	**291.00**
							ton	**ton**	**ton**
2/5.1	Primer coat	3500 m^2	2.100			1400.00 m^2	0.84	0.00	0.00
3/5.4	DBM	195.00 m^3	19.13	281.5	5.750	84.00 m^3	8.24	121.26	2.48
4/5.2	Tack coat	3500 m^2	1.050			1400.00 m^2	0.42	0.00	0.00
5/5.8	Bituminous Concrete	191.00 m^3	22.50	165.3	122.620	56.00 m^3	6.60	48.46	35.95
		Total requirement for the whole length of the road =					**16.10**	**169.72**	**38.43**
						Ton/Unit quantity	1	1.74	1.84
						Total weight	**16.00**	**295.00**	**71.00**
							ton	**ton**	**ton**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

DETAIL ESTIMATE FOR KM STONE & 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				
	(i)	90 cm equilateral triangle	each	12	6712.00	80544.00
	(ii)	60 cm equilateral triangle	each	25	4123.00	103075.00
	(iii)	60 cm circular	each	32	5818.00	186176.00
	(iv)	80 mm x 60 mm rectangular	each	28	8447.00	236516.00
	(v)	60 cm x 45 cm rectangular	each	22	5644.00	124168.00
	(vi)	60 cm x 60 cm square	each	30	6846.00	205380.00
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	7.5	15605.00	117037.50
3	**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	4000	1212.00	4848000.0
4	**8.15**	**Road Delineators** (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming toIRC-79 and the drawings.)	each	14	3239.00	45346.00

Sr No.	SOR No.	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
5	**8.35**	**Street Furniture** (Road Markers/Road Stud with Lense Reflector (Providing and fixing of road stud 100x 100 mm, die cast in aluminium, resistant to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30 mm upto a depth of 60 mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973)	each	1200	960.00	1152000.00
				TOTAL		**7098242.5**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

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	3000	4161.00	12483000
					TOTAL		**12483000**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

DETAILED ESTIMATE FOR NON SCHEDULED WORKS					
Sr.No.	**Decription**	**Unit**	**Quantity**	**Rate in Rs.**	**Amount in Rs.**
4.01	Disposal of land slide material with all lifts and lead up to 1000 meters.Land Slide clearing MoRT&H 301.3.9	Cum	10,000	37.00	370000.00
4.02	Disposal of landslide material for additional haul involving beyond 1km and upto 6km	Cum	6,000	53.76	322560.00
4.03	**Dayworks**				
	Use of contractor's equipment inclusive of all costs for run time only				
	Cranes 3 tonnes	Hours	100	915.47	91547.00
	Dozer D - 50 - A 15	Hours	100	2,631.98	263198.00
	Hydraulic Excavator of 1 cum bucket	Hours	300	1,258.77	377631.00
	Front End loader 1 cum bucket capacity	Hours	300	915.47	274641.00
	Tipper - 5 cum	Hours	1,000	514.95	514950.00
	Generator 33 KVA	Hours	500	457.74	228870.00
	Concrete Mixer 1 cum	Hours	500	171.65	85825.00
	Needle Vibrator	Hours	500	150.00	75000.00
	Plate Compactor	Hours	500	205.98	102990.00
	Water Tank	Hours	500	343.30	171650.00
	Tractor	Hours	500	406.24	203120.00
4.04	Supply of Labor including tools and plants				
	Mason/Mistri	Mandays	300	343.30	102990.00
	Other skill labor/Electrician/Mechanics/ carpenter etc	Mandays	100	343.30	34330.00
	Unskilled Labor	Mandays	1,000	314.69	314690.00
				Total	**3533992.00**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo

COST ESTIMATE PER METER OF TOE WALL

Height of Retaining wall H	=	03.0 m
Inclined Base Width B1 = 0.4H+0.6	=	01.8 m
Depth of tranch D=0.1H+0.3	=	0.6 m
Length of wall L	=	10.0 m
Top width of retaining wall	=	0.6 m
Horizontal base width B	=	01.7 m
Depth of Slope H1 = 0.4 m Depth of back filling	=	02.10 m

Sl. No	Sor. No	Description of item	Nos	L	B	H	Unit	Quantity	Rate (Rs. P)	Amount (Rs. P)
1	3.13	**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	2.10	1.80	Cum	38.934	226.00	8,799.08
2	12.8-A	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 mi	1	10.30	2.10	0.15	Cum	3.245	5,761.00	18,694.45
3	A3	Providing & laying Plum concrete in 1:2:4 c.c. (1cement, 2coarse sand, 4clean hard graded stone chips of 20 mm down nominal gauge) with 50% clean hard stone of sizes not exceeding 15cm including shuttering, compacting and curing complete.								
		Trapezodial Wall :	1	10.00	1.15	3.00	Cum	34.500		
		Triangular portion :	1	10.00	0.850	0.40	Cum	3.400		
		Total :					Cum	37.900	4,793.00	181,654.70

Sl. No	Sor. No	Description of item	Nos	L	B	H	Unit	Quantity	Rate (Rs. P)	Amount (Rs. P)
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	2.10	Cum	6.300	1,085.00	6,835.50
									Construction cost =	**215,983.73**
5	1.1	**Carriage of Materials** Loading and unloading by manual means	**Unit of reqd**		**Total quantity**					
		For M15 grade concrete								
		a) Sand	0.450		3.245		Cum	1.460	100.000	146.000
		b) Aggregates	0.90		3.245		Cum	2.921	100.000	292.100
		c) Cement	0.280		3.245		Ton	0.909	177.000	160.893
		For Plum concrete								
		a) Sand	0.45		37.900		Cum	17.055	100.000	1,705.500
		b) Aggregates	0.36		37.900		Cum	13.644	100.000	1,364.400
		c) Cement	0.28		37.900		Ton	10.612	177.000	1,878.324
		d) Masonry stone	0.54		37.900		Cum	20.466	100.000	2,046.600
6	1.6	Haulage of materials by tipper excluding cost of loading, unloading and stacking	**Lead**			**Unit Weigh t**				
		Case-I : Surfaced road								
		a) Sand	18.00	Kms		1.84	T/Km	34.07	6.40	3924.86
		b) Aggregates	18.00	Kms		1.74	T/km	28.82	6.40	3320.06
		c) Cement	16.00	Kms			T/km	11.52	6.40	1179.65
		d) Masonry stone	15.00	Kms		1.74	T/km	35.61	6.40	3418.56
		Case-II : Unsurfaced Gravelled Road								
		a) Sand	5.00	Kms			T/Km	34.07	8.00	1362.80
		b) Aggregates	5.00	Kms			T/Km	28.82	8.00	1152.80
		c) Cement	0.00	Kms			T/Km	11.52	8.00	0.00
		d) Masonry stone	0.00	Kms			T/Km	35.61	8.00	0.00
									Carriage cost =	**14358.73**
									Cost for 10.00m =	**Rs. 230,342**
									Cost per meter =	**Rs. 23,034**
									Say =	**Rs. 23,034**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including

COST ESTIMATE PER METER OF BREAST WALL TYPE-I.

Height of Breast wall H	=	02.0 m	Top width of retaining	=	0.60 m
Inclined Base Width B1 = 0.4H+0.3	=	01.1 m	Horizontal base width B	=	01.04 m
Depth of tranch D=0.1H+0.3	=	0.5 m	Depth of Slope H1	=	0.35 m
Length of wall L	=	10.0 m	Depth of back filling	=	01.35 m

Sl. No	Sor. No	Description of item	Nos	L	B	H	Unit	Quantity	Rate (Rs. P)	Amount (Rs. P)
1	3.13	**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	1.40	1.25	Cum	18.025	226.00	4,073.65
2	12.8-A	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	1.40	0.15	Cum	2.163	5,761.00	12,461.04
3	A3	Providing & laying Plum concrete in 1:2:4 c.c. (1cement, 2coarse sand, 4clean hard graded stone chips of 20 mm down nominal gauge) with 50% clean hard stone of sizes not exceeding 15cm including shuttering, compacting and curing complete.								
		Trapezodial Wall :	1	10.00	0.82	2.00	Cum	16.400		
		Triangular portion :	1	10.00	0.520	0.35	Cum	1.820		
		Total :					Cum	18.220	4,793.00	87,328.46
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	1.35	Cum	4.050	1,085.00	4,394.25

Sl. No	Sor. No	Description of item	Nos	L	B	H	Unit	Quantity	Rate (Rs. P)	Amount (Rs. P)
								Construction cost =		108,257.40
		Carriage of Materials								
5	1.1	Loading and unloading by manual means	**Unit of reqd**		**Total quantity**					
		For M15 grade concrete								
		a) Sand		0.450	2.163		Cum	0.973	100.0	97.300
		b) Aggregates		0.90	2.163		Cum	1.947	100.0	194.700
	1.3	c) Cement		0.280	2.163		Ton	0.606	177.0	107.262
		For Plum concrete								
		a) Sand		0.45	18.220		Cum	8.199	100.0	819.900
		b) Aggregates		0.36	18.220		Cum	6.559	100.0	655.900
	1.3	c) Cement		0.28	18.220		Ton	5.102	177.0	903.054
		d) Masonry stone		0.54	18.220		Cum	9.839	100.0	983.900
6	1.6	Haulage of materials by tipper excluding cost of loading, unloading and stacking		**Lead**		**Unit Wt**				
		Case-I : Surfaced road		Lead						
		a) Sand		18.00 Kms		1.84	T/Km	16.88	6.40	1944.58
		b) Aggregates		18.00 Kms		1.74	T/Km	14.80	6.40	1704.96
		c) Cement		16.00 Kms			T/Km	5.71	6.40	584.70
		d) Masonry stone		15.00 Kms		1.74	T/Km	17.12	6.40	1643.52
		Case-II : Unsurfaced Gravelled Road								
		a) Sand		5.00 Kms			T/Km	16.88	8.00	675.20
		b) Aggregates		5.00 Kms			T/Km	14.80	8.00	592.00
		c) Cement		0.00 Kms			T/Km	5.71	8.00	0.00
		d) Masonry stone		0.00 Kms			T/Km	17.12	8.00	0.00
								Carriage cost =		**9031.91**

Cost for 10.00m = Rs. 117,289

Cost per meter = Rs. 11,729

Say = Rs. 11,729

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470

COST ESTIMATE PER METER OF BREAST WALL TYPE-II.

Height of Breast wall H	=	03 m	Top width of retaining v	=	0.60 m
Inclined Base Width B1 = 0.4H+0.3	=	02 m	Horizontal base width l	=	01.90 m
Depth of tranch D=0.1H+0.3	=	01 m	Depth of Slope H1	=	0.63 m
Length of wall L	=	10 m	Depth of back filling	=	02.07 m

Sl. No	Sor. No	Description of item	Nos	L	B	H	Unit	Quantity	Rate (Rs. P)	Amount (Rs. P)
1	3.13	**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	10.3	2.30	2.00	Cum	47.380	226.00	10,707.88
2	12.8-A	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	10.3	2.30	0.15	Cum	3.554	5,761.00	20,474.59
3	A3	Providing & laying Plum concrete in 1:2:4 c.c. (1cement, 2coarse sand, 4clean hard graded stone chips of 20 mm down nominal gauge) with 50% clean hard stone of sizes not exceeding 15cm including shuttering, compacting and curing complete.								
		Trapezodial Wall :	1	10.0	1.25	3.00	Cum	37.500		
		Triangular portion :	1	10.0	0.950	0.63	Cum	5.985		
		Total :					Cum	43.485	4,793.00	208,423.61
4	13.9	Back filling behind abutment, wing wall and return wall complete as per drawing and Technical specification (a) Granular material	1	10.0	0.30	2.07	Cum	6.210	1,085.00	6,737.85
									Construction cost =	**246,343.93**

Sl. No	Sor. No	Description of item	Nos	L	B	H	Unit	Quantity	Rate (Rs. P)	Amount (Rs. P)
		Carriage of Materials								
5	1.1	Loading and unloading by manual means	**Unit of reqd**		**Total quantity**					
		For M15 grade concrete								
		a) Sand		0.45	3.55		Cum	1.598	100.000	159.800
		b) Aggregates		0.90	3.55		Cum	3.195	100.000	319.500
		c) Cement		0.28	3.55		Ton	0.994	177.000	175.938
		For Plum concrete								
		a) Sand		0.45	43.49		Cum	19.571	100.000	1,957.100
		b) Aggregates		0.36	43.49		Cum	15.656	100.000	1,565.600
		c) Cement		0.28	43.49		Ton	12.177	177.000	2,155.329
		d) Masonry stone		0.54	43.49		Cum	23.485	100.000	2,348.500
6	1.6	Haulage of materials by tipper excluding cost of loading, unloading and stacking		**Lead**		**Unit Wt**				
		Case-I : Surfaced road		Lead						
		a) Sand		18.0 Kms		1.84	T/Km	38.95	6.40	4487.04
		b) Aggregates		18.0 Kms		1.74	T/Km	32.80	6.40	3778.56
		c) Cement		16.0 Kms			T/Km	13.17	6.40	1348.61
		d) Masonry stone		15.0 Kms		1.74	T/Km	40.86	6.40	3922.56
		Case-II : Unsurfaced Gravelled Road								
		a) Sand		5.00 Kms			T/Km	38.95	8.00	1558.00
		b) Aggregates		5.00 Kms			T/Km	32.80	8.00	1312.00
		c) Cement		0.00 Kms			T/Km	13.17	8.00	0.00
		d) Masonry stone		0.00 Kms			T/Km	40.86	8.00	0.00
								Carriage cost =		**20910.60**

Cost for 10.00m = Rs. 267,255

Cost per meter = Rs. 26,726

Say = Rs. 26,726

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

COST ESTIMATE PER METER OF GABION WALL TYPE-I.

Height of Retaining wall H	=	2 m	Depth of tranch D	=	.30 m
Base Width B	=	2 m	Length of wall L	=	10.0 m
Top Width T	=	1 m	Depth of Gabion box	=	1.0 m

Sr. No	Ref to SOR No.	Description	Unit	Nos	L	B	H	Quantity	Rate in Rs	Amount in Rs
1	3.13	**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	2	0.65	13.0	226.00	2938
2	15.12	**Gabian Structure for Retaining Earth** (Providing and construction of a gabain structure for retaining earth with segments of wire crates of size 7 m x 3 m x 0.6 m each divided into 1.5 m compartments by cross netting, made from 4 mm galvanised steel wire @ 32 kg per 10sqm having minimum tensile strength of 300 Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into mesh with double twist, mesh size not exceeding 100 x 100 mm, filled with boulders with least dimension of 200 mm, all loose ends to be tied with 4 mm galvanised steel wire								
		Bottom layer	Cum	1	10	2	1	20.0		
		Top layer	Cum	1	10	1	1	10.0		
		Total quantity	Cum					**30.00**	2479.00	74370.00
3		***Carriage of Materials***								
	1.1	Loading and unloading of stone boulder	Cum					30.00	100.00	3000.00
	1.6	Cost of Haulage Excluding Loading and Unloading								
	(ii)	Case-II : Unsurfaced Gravelled Road								
		b) Stone boulder	on. kr	0			1.74	52.20	8.00	0.00

Total cost for 10Rm 0f Gabion Wall 2.00m high = 80308

Therefore,Rate per Rm = 8030.8

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

COST ESTIMATE PER METER OF GABION WALL TYPE-II.

Height of Retaining wall H	=	6 m	Depth of tranch D	=	.30 m
Base Width B	=	4 m	Length of wall L	=	10.0 m
Top Width T	=	1 m	Depth of Gabion box	=	1.0 m

Sr. No	Ref to SOR	Description	Unit	Nos	L	B	H	Quantity	Rate in Rs	Amount in Rs
1	3.13	**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	10.00	4.00	1.65	66.00	226.00	14916.00
2	15.12	Gabian Structure for Retaining Earth (Providing and construction of a gabain structure for retaining earth with segments of wire crates of size 7 m x 3 m x 0.6 m each divided into 1.5 m compartments by cross netting, made from 4 mm galvanised steel wire @ 32 kg per								
		1st Layer	Cum	1	10.00	4.00	1.00	40.00		
		2nd Layer	Cum	1	10.00	3.00	1.00	30.00		
		3rd Layer	Cum	1	10.00	3.00	1.00	30.00		
		4th Layer	Cum	1	10.00	2.00	1.00	20.00		
		5th Layer	Cum	1	10.00	2.00	1.00	20.00		
		6th Layer	Cum	1	10.00	1.00	1.00	10.00		
		Total quantity =	Cum					150.00	2479.00	371850.00
3		***Carriage of Materials***								
	1.1	Loading and unloading of stone boul	Cum					150.00	100.00	15000.00
	1.4	Cost of Haulage Excluding Loading and Unloading								
	(iii)	Case-II : Unsurfaced Gravelled Road								
		b) Stone boulder	ton. k	0.00			1.74	261.00	8.00	0.00
								Total cost for 10Rm 0f Gabion Wall 6.0m high =		**401766.00**
								Therefore,Rate per Rm =		**40176.60**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10

ANALYSIS OF RCC SIDE DRAIN

Sr. No	Description	Unit	Quantity	Rate Rs	Cost Rs
A1	**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	9424.00	48627.84
	Coarse sand	cum	6.75	457.74	3089.75
	40 mm Aggregate	cum	5.40	893	4822
	20 mm Aggregate	cum	5.40	1064.24	5746.90
	10 mm Aggregate	cum	2.70	1258.77	3398.68
	b) Labour				
	Mate	day	0.86	343.30	295.24
	Mason	day	1.50	343.30	514.95
	Mazdoor	day	20.00	228.87	4577.40
	c) Machinery				
	Concrete mixer (cap. 0.40/0.28 cum)	hour	6.00	137.32	823.92
	Generator 33 KVA	hour	6.00	457.74	2746.44
	d) Formwork @ 4 per cent on cost of concrete i.e. cost of material, labour and machinery				2985.72
	e) Overhead charges @ 25 % on (a+b+c+d)				19407.2
	f) Contractor's profit @ 10 % on (a+b+c+d+e)				9703.6
	Cost for 15 cum = a+b+c+d+e+f				106739.6
	Rate per cum = (a+b+c+d+e+f)/15				7116.0
				say	**7116.00**
	Cross sectional area of lined drain	sqm			**0.400**
	Rate per running meter	RM			**2846.4**

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	0.40			0.36	100.00	36.00
Sand	**Cum**	0.45	0.40			0.18	100.00	18.00
Cement	**MT**	0.34	0.40			0.14	177.00	24.78
Cost of Haulage Excluding Loading and Unloading								
Surfaced Road								
Cement	**ton. km**				16.00	0.14	6.40	14.34
Stone aggregates	**ton. km**				18.00	0.36	6.40	41.47
Sand	**ton. km**				18.00	0.18	6.40	20.74
Case-II : Unsurfaced Gravelled Road								
a) Cement	**ton. km**				0.00	0.14	8.00	0.00
b) Stone Aggregates	**ton. km**			1.74	5.00	0.36	8.00	25.06
b) Sand	**ton. km**			1.84	5.00	0.18	8.00	13.25

Cost of Carriage of material **193.64**

Say **3040.04**

Grand Total cost per metre length of line drain carriage cost **3041.00**

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470 on NH-10 (Rangpo To Ranipool section) in the State of Sikkim.

Rate Analysis for Plum Concrete (1:2:4)

Sr No	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
A2	**Providing & laying Plum concrete in 1:2:4 c.c. (1cement, 2coarse sand, 4clean hard graded stone chips of 20 mm down nominal gauge) with 50% clean hard stone of sizes not exceeding 15cm including shuttering, compacting and curing complete.**					
	Unit = cum					
	Taking output = 15 cum					
	a) Material					
	Cement	tonn	3.45	9424.00	32512.80	M-081
	Coarse sand	cum	3.53	457.74	1615.82	M-005
	Hard selected stone	cum	7.50	343.30	2574.75	M-001
	20 mm Aggregate	cum	5.29	1064.24	5629.83	M-053
	10 mm Aggregate	cum	1.76	1258.77	2215.44	M-051
	b) Labour					
	Mate	day	0.86	343.30	295.24	L-12
	Mason	day	1.50	343.30	514.95	L-11
	Mazdoor	day	15.00	228.87	3433.05	L-13
	c) Machinery					
	Concrete mixer (cap. 0.40/0.28 cum)	hour	6.00	137.32	823.92	P&M-009
	Generator 33 KVA	hour	6.00	457.74	2746.44	P&M-079
	d) Formwork @ 4 per cent on cost of concrete i.e. cost of material, labour and machinery				2094.49	
	e) Overhead charges @ 20 % on (a+b+c+d)				10891.35	
	f) Contractor's profit @ 10 % on (a+b+c+d+e)				6534.81	
	Cost for 15 cum = a+b+c+d+e+f				71882.89	
	Rate per cum = (a+b+c+d+e+f)/15				4792.19	
				say	***4793.00***	

ANALYSIS-OF ANCHORE PIN

Sr No	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
A3	Supplying, fitting and placing HYSD bar reinforcement as a anchor Pin 12 mm dia 500 mm length including drilling & grouting with cement complete as per drawing and technical specifications					
	Unit = 1 MT					
	Taking output = 0.2225 MT (500 Nos of Pin 12mm dia,Length - 500 mm)					
	a) Material					
	Fixing of Anchor Bar 12 mm dia and 0.5 m length	Kg	222.22	49.14	10919.89	M-082
	Cement for grouting including 3 per cent wastage	Kg	554.106	9.42	5219.68	M-081
	Admixtures (anti shrinkage compound) @ 20 % of cost of cement				1043.94	
	Add 10% cost of material for Spacers, Insulation tape and miscellaneous items				1718.35	
	b) Labour					
	i) For making and fixing cables, anchorages					
	Foreman	day	0.16	1500.00	240.00	
	Mate	day	0.16	343.30	54.93	L-12
	Blacksmith	day	1.00	343.30	343.30	L-02
	Mazdoor	day	3.00	228.87	686.61	L-13
	ii) For grouting/drilling					
	Foreman	day	0.05	1500.00	75.00	
	Mate/Supervisor	day	0.05	343.30	17.17	L-12
	Mason	day	0.25	343.30	85.83	L-11
	Mazdoor	day	1.00	228.87	228.87	L-13
	c) Machinery					
	Air compressor 250 cfm with two leads for pneumatic cutters/ hammers @ 1 cum per hour	hour	2.50	400.52	1001.30	P&M-001
	Grouting pump with agitator	hour	1.00	400.52	400.52	M-111
	Generator 33 KVA.	hour	3.50	457.74	1602.09	P&M-079
	d) Overhead charges @ 20 % on (a+b+c)				4727.50	
	e) Contractor's profit @ 10 % on (a+b+c+d)				2836.50	
	Cost for 0.2225 MT (a+b+c+d+e)				31201.48	
	Rate per MT = (a+b+c+d+e)/0.2225				140231.37	
	Rate per Nos.			*say*	***280.00***	

ANALYSIS-OF ANCHORE BARS

Sr. No.	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
A4	**Supplying, fitting and placing HYSD bar reinforcement as a anchor Bar 20 mm dia 800 mm length including drilling & grouting with cement complete as per drawing and technical specifications**					
	Unit = 1 MT					
	Taking output = 0.198 MT (100nos of Bar 20 mm dia,Length -800 mm					
	a) Material					
	Fixing of Anchor Bar 20mm dia and 0.8 m length	Kg	197.53	49.14	9706.62	M-082
	Cement for grouting including 3 per cent wastage	Kg	155.26	9.42	1462.55	M-081
	Admixtures (anti shrinkage compound) @ 20 % of cost of cement				292.51	
	Add 10% cost of material for Spacers, Insulation tape and miscellaneous items				1146.17	
	b) Labour					
	i) For making and fixing bar, anchorages					
	Foreman	day	0.16	1500.00	240.00	
	Mate	day	0.16	343.30	54.93	L-12
	Blacksmith	day	1.00	343.30	343.30	L-02
	Mazdoor	day	3.00	228.87	686.61	L-13
	ii) For grouting/drilling					
	Foreman	day	0.05	1500.00	75.00	
	Mate/Supervisor	day	0.05	343.30	17.17	L-12
	Mason	day	0.25	343.30	85.83	L-11
	Mazdoor	day	1.00	228.87	228.87	L-13
	c) Machinery					
	Air compressor 250 cfm with two leads for pneumatic cutters/ hammers @ 1 cum per hour	hour	2.50	400.52	1001.30	P&M-001
	Grouting pump with agitator	hour	1.00	400.52	400.52	M-111
	Generator 33 KVA.	hour	3.50	457.74	1602.09	P&M-079
	d) Overhead charges @ 20 % on (a+b+c)				3468.69	
	e) Contractor's profit @ 10 % on (a+b+c+d)				2081.22	
	Cost for 0.198 MT (a+b+c+d+e)				22893.38	
	Rate per MT = (a+b+c+d+e)/0.198				115623.1	
	Rate per Nos.			*say*	***1156.0***	

Analysis of Rock Bolts 25 mm Dia

Sr No	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
A5	**Rock Bolts** (Providing and fixing 25 mm diameter and 5.0 m long steel rock bolts with mechanical/ wedge type anchorage including drilling 65 mm dia holes, providing 150 mm long 20 mm thick steel tapered wedge, 10 mm thick 150 x150 mm plate washer and nuts, tightening bolt by torque wrench,grouting , cost of all materials, machinery, labour, ventilation, lighting, drainage and all other ancillary operations etc., complete with lead upto 1 km and all lifts in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)					
	Unit = 1 Rm					
	Taking output = 5 Rm					
	a) Material					
	Fixing of Anchor Bar 25 mm dia and 5.0 m length,including 2.5% Wastage in cutting	Kg	19.772	49.135	971.50	M-082
	Cement for grouting including 3 per cent wastage	Kg	20.358	9.424	191.85	M-081
	Admixtures (anti shrinkage compound) @ 20 per cent of cost of cement				38.37	
	Anchor Plate	Nos			250.00	
	Nut	Nos			120.00	
	Add 20 % cost of material for Spacers, Insulation tape ,Cutting & making tip ,Threading and miscellaneous items				314.34	
	b) Labour					
	i) For making and fixing bar, anchorages					
	Foreman	day	0.16	1500.00	240.00	
	Mate	day	0.16	343.30	54.93	L-12
	Blacksmith	day	1.00	343.30	343.30	L-02
	Mazdoor	day	3.00	228.87	686.61	L-13
	ii) For grouting/drilling					
	Foreman	day	0.05	1500.00	75.00	
	Mate/Supervisor	day	0.05	343.30	17.17	L-12
	Mason	day	0.25	343.30	85.83	L-11
	Mazdoor	day	1.00	228.87	228.87	L-13
	c) Machinery					
	Air compressor 250 cfm with two leads for pneumatic cutters/ hammers @ 1 cum per hour	hour	2.50	400.52	1001.30	P&M-001
	Compressor with guniting equipment along with	hour	1.00	606.50	606.50	P&M-076
	Generator 33 KVA.	hour	3.50	457.74	1602.09	P&M-079
	d) Overhead charges @ 20 % on (a+b+c)				1365.53	
	e) Contractor's profit @ 10 % on (a+b+c+d)				819.32	
	Cost for 5 Rm (a+b+c+d+e)				9012.51	
	Rate per Rm = (a+b+c+d+e)/5				1802.50	
				say	***1803.00***	

Special Protection Work on Rehabilitation and restoration of Sinking/Sliding Zone from Km 70+900 to Km 71+100 and Km 71+550 to Km 71+850 with JICA Technical Assistant including widening of Narrow Zone from Km 53+775 to Km 54+100 and from Km 63+045 to Km 63+470

A6 : COST ESTIMATE FOR CRIB WORK

Name of Road :NH-10 within Sikkim (KM 52+00 TO KM- 80+000)

Length of road : 28.00 Km

Sl. No.	Ref to SOR	Description	Unit	Nos.	L	B	H	Quantity	Rate	Amount
1	3.13	**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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)	Cum	1	100.0	0.45	0.15	6.75		
	I	Ordinary Soil A.Manual means (i) upto 3m depth	Cum	70%				4.725	226.00	1067.85
	II	Ordinary rock (not requiring blasting) A.Manual means (i) upto 3m depth	Cum	30%				2.025	283.00	573.08
2	14.1-B	Furnishing and Placing Reinforced cement concrete in super-structure as per drawing and Technical Crib Beam	Cum	1	100.0	0.3	0.300	9.00	9743.00	87687.00
3	14.2	Supplying, fitting and placing HYSD bar reinforcement in super-structure complete as per drawing and technical specifications 150 kg/Cum	MT	1				1.35	71265.00	96207.75
4		Supplying, fitting and placing HYSD bar reinforcement as a anchor Bar 20 mm dia 800 mm length including drilling & grouting with 1:1 cement complete as per drawing and technical specifications	Nos	51				51.00	1156.0	58956.00
5		Supplying, fitting and placing HYSD bar reinforcement as a anchor pin 12 mm dia 500 mm length including drilling & grouting with 1:1 cement complete as per drawing and technical specifications	Nos	450				450.00	280.0	126000.00
6	13.09	Back filling behind abutment, wing wall and return wall complete as per drawing and Technical specification A --Granular material	Cum	1	100.00	0.3	0.3	9.000	1085.00	9765.00
							Construction cost =			**380,256.68**

Sl. No.	Ref to SOR	Description	Unit	Nos.	L	B	H	Quantity	Rate	Amount
7	1.1	**Carriage of Materials** Loading and unloading by manual means	**Unit of reqd**		**Total quantity**					
		For M25 grade concrete								
		a) Sand		0.45	9.000		Cum	4.050	100.00	405.00
		b) Aggregates		0.90	9.000		Cum	8.100	100.00	810.00
		c) Cement		0.40	9.000		Ton	3.600	177.00	637.20
		d) Steel		1.05	1.350		Ton	1.418	177.00	250.99
		Back filling material		1.2	9.000		Cum	10.800	100.00	1,080.00
	1.4	Cost of Haulage Excluding Loading and Unloading	**Lead**			**Unit Wgt**				
	(i)	Surfaced Road								
		a) Cement		16.0	Kms		T/Km	3.600	6.40	368.64
		b) Steel		16.0	Kms		T/Km	1.418	6.40	145.20
		c) Stone Aggregates		18.0	Kms	1.74	T/Km	32.886	6.40	3,788.47
		d) Sand		18.0	Kms	1.84	T/Km	27.324	6.40	3,147.72
	(ii)	Case-II : Unsurfaced Gravelled Road								
		a) Cement		0.00	Kms		T/Km	3.600	8.00	0.00
		b) Steel		0.00	Kms		T/Km	1.418	8.00	0.00
		c Stone Aggregates		5.00	Kms		T/Km	32.886	8.00	1,315.44
		d) Sand		5.00	Kms		T/Km	27.324	8.00	1,092.96

Carriage cost = 13041.62

Cost per Rm of Crib Work= 3802.93

Say = 3803.00

A7 : Analysis of Earth Anchor

1. Condition of Cost Estimation

[Total Length of Anchor]	10.0 m	
- Gravel Soil :	(7.0 m)	
- Soft Rock :	(3.0 m)	
[Interval of Anchor]	2.0 m	
[Drilling Method]	Double Casing Boring	
[Type of Anchor Cable]	Prestressed Strand Wire Cable	45.6 (7 x 15.2)
[Diameter of Drilling]	135	

2. Cost Estimation for Earth Anchor

(1) Drilling (per 10 m)

1) Gravel Soil

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	0.55	1,200	660.0
Skill Worker	man-day	0.55	600	330.0
Common Worker	man-day	1.10	400	440.0
Boring Machine	day	0.55	33,801	18,590.6
Generator	day	0.55	6,000	3,300.0
Boring Equipment				
- Shank Rod	nos	0.04	34,891	1,395.6
- Cleaning Adapter	nos	0.03	62,305	1,869.2
- Extension Rod	nos	0.04	23,728	949.1
- Drill Pipe (1.5 m)	piece	0.20	34,891	6,978.2
- Inner Rod (1.5 m)	piece	0.22	20,509	4,512.0
- Ring Bit	nos	0.20	36,345	7,269.0
- Inner Bit	nos	0.16	25,441	4,070.6
- Water Swivel	nos	0.02	78,401	1,568.0
Miscellaneous Expense	15.0 % of drilling machine / labor			3,003.1
sub-total:				54,935.4
			cost of 10 m :	38,454.8

2) Soft Rock

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	0.66	1,200	792.0
Skill Worker	man-day	0.66	600	396.0
Common Worker	man-day	1.32	400	528.0
Boring Machine	day	0.66	33,801	22,308.7
Air Compressor	day	0.66	5,500	3,630.0
Generator	day	0.66	6,000	3,960.0
Boring Equipment				
- Shank Rod	nos	0.05	34,891	1,744.6
- Cleaning Adapter	nos	0.04	62,305	2,492.2
- Extension Rod	nos	0.05	23,728	1,186.4
- Drill Pipe (1.5 m)	piece	0.29	34,891	10,118.4
- Inner Rod (1.5 m)	piece	0.34	20,509	6,973.1
- Ring Bit	nos	0.24	36,345	8,722.8
- Inner Bit	nos	0.16	25,441	4,070.6
- Water Swivel	nos	0.02	78,401	1,568.0
Miscellaneous Expense	15.0 % of drilling machine / labor			3,603.7
sub-total:				72,094.5
			cost of 10 m :	21,628.4

(2) Assembling and Installing Anchor (per 10 location)

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	4.35	1,200	5,220.0
Skill Worker (Slope)	man-day	4.35	600	2,610.0
Common Worker	man-day	8.70	400	3,480.0
Miscellaneous Expense	3.0 % of labor cost			339.3
sub-total:				11,649.3
			cost of 10 m :	1,164.9

(3) Grouting (per 10.0 m3)

grount volune per 1 hole: 0.3149 m3

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	2.44	1,200	2,928.0
Skill Worker (Slope)	man-day	2.44	600	1,464.0
Common Worker	man-day	4.88	400	1,952.0
Grount	m3	10.00	13,438	134,380.0
Miscellaneous Expense	23.0 % of labor cost			1,459.1
sub-total:				142,183.1
			cost of 10 m :	4,477.3

(4) Moving to Next Achor Location (10 times)

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	3.13	1,200	3,756.0
Skill Worker	man-day	3.13	600	1,878.0
Common Worker	man-day	6.25	400	2,500.0
Crane (25 ton)	day	3.13	8,768	27,443.8
sub-total:				35,577.8
			cost of 10.0 m :	3,557.8

(5) Tensioning, Fixing and Anchor Head Treatment (per 10 location)

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	7.14	1,200	8,568.0
Skill Worker (Slope)	man-day	7.14	600	4,284.0
Common Worker	man-day	14.29	400	5,716.0
Miscellaneous Expense	19.0 % of labor cost			3,527.9
sub-total:				22,095.9
			cost of 10 m :	2,209.6

(6) Stet-up and Removal of Scaffolding (100 m3 of scaffolding)

total scaffolding (4 m2/ location): 3 m3

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	2.94	1,200	3,528.0
Skill Worker (Slope)	man-day	8.82	600	5,292.0
Common Worker	man-day	5.88	400	2,352.0
Lease of Scaffolding Material				1,000.0
Miscellaneous Expense	8.0 %			893.8
sub-total:				13,065.8
			cost of 4 m2 :	392.0

(7) Material Cost of Anchor (1 location : 10 m)

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Strad Cable with Sheath	m	9.00	2,318	20,862.0
Machon	set	1.00	51,750	51,750.0
Anchor Cap	nos	1.00	4,933	4,933.0
Anchor Plate	nos	1.00	3,790	3,790.0
sub-total:				81,335.0
			cost of 10 m :	81,335.0

3. Construciton Cost of 10.0 m (1 location)

Item	Cost (Rs.)
1. Drilling	
- Gravel Soil	38,455
- Soft Rock	21,628
2. Assembling and Installing Anchor	1,165
3. Grouting	4,477
4. Moving to Next Achor Location	3,558
5. Tensioning, Fixing and Anchor Head Treatment	2,210
6. Stet-up and Removal of Scaffolding	392
7. Material Cost of Anchor	81,335
Total Direct Cost (10.0 m) :	153,220
Overhead (10 %) :	15,322
Profit (10 %) :	15,322
Total Cost (10.0 m):	**183,864**
Unit Cost (per m) :	**18,386**

A8 : Analysis of Horizontal Drainage Boring

1. Condition of Cost Estimation

[Total Drainage Length per Well]	50.0 m	
- Gravel Soil :	(40.0 m)	
- Soft Rock :	(10.0 m)	
[Drainage Pipe]	VP φ50	(with strainer)
[Diameter of Drilling]	115	
[Gabion Mat at Outlet]	6.25	m^3/wall

2. Cost Estimation Horizontal Drainage Boring

(1) Drilling (per 10 m)

1) Gravel Soil

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	0.67	1,200	804.0
Skill Worker	man-day	0.67	600	402.0
Common Worker	man-day	1.34	400	536.0
Boring Machine	day	0.67	33,801	22,646.7
Generator	day	0.67	6,000	4,020.0
Boring Equipment				
- Shank Rod	nos	0.04	34,891	1,395.6
- Cleaning Adapter	nos	0.03	62,305	1,869.2
- Extension Rod	nos	0.04	23,728	949.1
- Drill Pipe (1.5 m)	piece	0.30	34,891	10,467.3
- Inner Rod (1.5 m)	piece	0.33	20,509	6,768.0
- Ring Bit	nos	0.20	36,345	7,269.0
- Inner Bit	nos	0.16	25,441	4,070.6
- Water Swivel	nos	0.02	78,401	1,568.0
Miscellaneous Expense	10.0 % of drilling machine / labor			2,438.9
sub-total:				65,204.4
			cost of 50 m :	260,817.6

2) Soft Rock

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	0.70	1,200	840.0
Skill Worker	man-day	0.70	600	420.0
Common Worker	man-day	1.40	400	560.0
Boring Machine	day	0.70	33,801	23,660.7
Generator	day	0.70	6,000	4,200.0
Boring Equipment				
- Shank Rod	nos	0.05	34,891	1,744.6
- Cleaning Adapter	nos	0.04	62,305	2,492.2
- Extension Rod	nos	0.05	23,728	1,186.4
- Drill Pipe (1.5 m)	piece	0.30	34,891	10,467.3
- Inner Rod (1.5 m)	piece	0.51	20,509	10,459.6
- Ring Bit	nos	0.24	36,345	8,722.8
- Inner Bit	nos	0.16	25,441	4,070.6
- Water Swivel	nos	0.02	78,401	1,568.0
Miscellaneous Expense	15.0 % of drilling machine / labor			3,822.1
sub-total:				74,214.3
			cost of 50 m :	74,214.3

(2) Assembling and Installing Drainage Pipe (per 10 m)

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	3.10	1,200	3,720.0
Skill Worker	man-day	4.35	600	2,610.0
Common Worker	man-day	8.70	400	3,480.0
VP Pipe	m	10.80	189	2,041.2
Geotextile Filter	m2	1.81	331	598.7
Boring Machine	day	0.10	33,801	3,380.1
Miscellaneous Expense	11.0 % of labor cost			1,741.3
sub-total:				17,571.3
			cost of 50 m :	87,856.5

(3) Setup and Moving of Boring Machine (1 location)

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	3.10	1,200	3,720.0
Skill Worker	man-day	4.30	600	2,580.0
Common Worker	man-day	6.00	400	2,400.0
Crane (4.9 ton)	day	2.50	6,640	16,600.0
sub-total:				25,300.0
			cost of 50.0 m :	25,300.0

(4) Stet-up and Removal of Scaffolding (100 m3 of scaffolding)

total scaffolding (4 m2/ location): 3 m3

Item	Unit	Q'ty	Unit Cost (Rs.)	Price (Rs.)
Foreman	man-day	2.94	1,200	3,528.0
Skill Worker (Slope)	man-day	8.82	600	5,292.0
Common Worker	man-day	5.88	400	2,352.0
Lease of Scaffolding Material				1,000.0
Miscellaneous Expense	8.0 %			893.8
sub-total:				13,065.8
			cost of 50 m :	392.0

3. Construciton Cost of 50.0 m (1 well)

Item	Cost (Rs.)
1. Drilling	
- Gravel Soil	260,818
- Soft Rock	74,214
2. Assembling and Installing Drainage Pipe	87,857
3. Setup and Moving of Boring Machine	25,300
4. Stet-up and Removal of Scaffolding	392
5. Gabion Mat at Outlet	15,494
Total Direct Cost (10.0 m) :	464,075
Overhead (10 %) :	46,408
Profit (10 %) :	46,408
Total Cost (10.0 m):	**556,891**
Unit Cost (per m) :	**11,138**

A9 : Analysis of Hydroseeding

Sr No	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
	Hydroseeding 20 mm thick (Providing ,Supply and Installation on hill slope including cost of all materials, labour, machinery,and all other ancillary operations etc., complete with lead upto 1 km and all lifts.,in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)					
	Unit = Sq.m					
	Taking output = 1 Sq.m					
	a) Labour					
	Skilled Mazdoor	Day	0.0033	500.00	1.65	
	Semi Skilled Mazdoor	Day	0.0200	330.00	6.60	
	b) Machinery					
	Tractor-trolley	hour	1.000	406.24	406.24	P&M-053
	c) Material					
	Non-woven coir erosion control blanket	Sqm	1.000	75.00	75.00	
	GI "U" Hook - 1 No. per Sqmtr of effective slope face area having size of 12"x3"x12" with 3.5mm-3.8mm diameter	Sqm	1.000	15.00	15.00	
	Native Grass Seeds of approx. 1Kg per 9Sqm of effective slope face area	Sqm	1.000	43.00	43.00	
	Cow dung manure	Sqm	1.000	7.00	7.00	
	Live Sticks	Sqm	1.000	7.00	7.00	
	d) Overhead charges @ 10% on (a+b+c)				56.15	
	e) Contractor's profit @ 10% on (a+b+c+d)				61.76	
	Cost for 1.0 Sq.m = a+b+c+d+e				679.40	
	Rate per Square metre = (a+b+c+d+e)/1				679.40	
				say	***679.00***	

A9 : Analysis of Chain link wire mesh						
Sr No	**Description**	**Unit**	**Quantity**	**Rate Rs**	**Cost Rs**	**Remarks/ Input ref.**
	Chain link wire mesh (Providing ,Supply and Installation, conform to be requirements of IS: 2140-1978 (Re affirmed 1991) for galvanized steel chain link wire mesh , mesh size of approximately 50mmx50mm and a wire diameter of 2mm including cost of all materials, labour, machinery, and all other ancillary operations etc., complete in accordance with Technical Specifications and lines, levels and grades, dimensions and cross-sections shown in the Drawings or as directed by the Engineer)					
	Unit = Sq.m					
	Taking output = 90 Sq.m					
	a) Labour					
	Skilled Mazdoor	day	10.000	500.00	5000.00	
	Semi Skilled Mazdoor	day	20.000	330.00	6600.00	
	Very Skilled Climbers	Day	8.000	2400.00	19200.00	
	b) Machinery					
	Tractor-trolley	hour	2.000	406.24	812.48	P&M-053
	c) Material					
	Supply and Installation of Item as Explained in ,above	Sq.m	90.000	800.000	72000.00	
	d) Overhead charges @ 10% on (a+b+c)				10361.25	
	e) Contractor's profit @ 10% on (a+b+c+d)				11397.37	
	Cost for 90 Sq.m = a+b+c+d+e				125371.10	
	Rate per Square metre = (a+b+c+d+e)/90				1393.01	
				say	***1393.00***	

A10 : Analysis of Rock fall protection Net

Sr No	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
	Rock fall protection Net (Supplying and placing of Mechanically Woven Double Twisted Hexagonal Shaped Wire Mesh netting roll, Mesh Type 10x12, (Zn+10%Al alloy) + PVC coated Mesh Wire dia. 2.7/3.7mm (ID/OD), end of roll mechanically edged / selvedged, with galvanization as per IS 16014:2012 and MoRTH (Fifth Revision) 2013, Clause 2500.) including fixing of Wire rope anchor,Nail with system spike plate complete as per drawing and Technical specification and Drawings or as directed by the Engineer)					
	Unit = Sq.m					
	Taking output = 90 Sq.m					
	a) Labour					
	Skilled Mazdoor	day	10.000	500.00	5000.00	
	Semi Skilled Mazdoor	day	20.000	330.00	6600.00	
	Very Skilled Climbers	Day	8.000	2400.00	19200.00	
	b) Machinery					
	Tractor-trolley	hour	2.000	406.24	812.48	P&M-053
	c) Material					
	Supply and Installation of Item as Explained in ,above	Sq.m	90.000	1900.000	171000.00	
	d) Overhead charges @ 10% on (a+b+c)				20261.25	
	e) Contractor's profit @ 10% on (a+b+c+d)				22287.37	
	Cost for 90 Sq.m = a+b+c+d+e				245161.10	
	Rate per Square metre = (a+b+c+d+e)/90				2724.01	
				say	***2724.00***	

A11 :Rate Analysis of Shotcrete

Sr No	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
	Shotcrete					
	Unit = 1 cum					
	Taking output = 120 cum					
	a) Material					
	Cement	tonne	55.20	9424.00	520204.80	M-081
	Coarse sand	cum	102.80	457.74	47055.67	M-004
	10 mm Aggregate	cum	53.00	1258.77	66714.81	M-051
	Admixture @ 0.4 per cent of cement	kg	235.20	125.88	29606.98	M-180
	b) Labour					
	Foreman	day	1.00	1500.00	1500.00	
	Operator	day	1.00	1500.00	1500.00	
	Mate	day	1.00	343.30	343.30	L-12
	Mason	day	3.50	343.30	1201.55	L-11
	Mazdoor	day	20.00	228.87	4577.40	L-13
	c) Machinery					
	Batching Plant @ 20 cum/hour	hour	6.00	2557.60	15345.60	P&M-002
	Generator 100 KVA	hour	6.00	801.04	4806.24	P&M-080
	Loader	hour	6.00	915.47	5492.82	P&M-017
	Transit Mixer (capacity 4.0 cu.m)					
	Transit Mixer 4 cum capacity lead upto1 Km	hour	15.00	881.14	13217.10	P&M-049
	Lead beyond 1 Km, L - lead in Kilometer	tonne.km	300L	19.42	58260.00	Lead =10 km & P&M-050
	Concrete Pump	hour	6.00	246.03	1476.18	P&M-007
	Air Compressor	hour	6.00	400.52	2403.12	P&M-001
	Basic Cost of Labour, Material & Machinery (a+b+c) for 120 cum		**773706.00**			
	For formwork and staging add for Height above 10m					
	Height above 10m					
	Basic Cost of Labour, Material & Machinery (a+b+c) for 120 cum				773706.00	
	d) Formwork and staging 55 per cent of (a+b+c)				425538.30	
	e) Overhead charges @ 20 % on (a+b+c+d)				239848.86	
	f) Contractor's profit @ 7.5 % on (a+b+c+d+e)				107931.99	
	Cost for 120 cum = a+b+c+d+e+f				1547025.15	
	Rate per cum = (a+b+c+d+e+f)/120				12891.88	
				say	***12892.00***	