PREPARATORY STUDY
FOR
ROAD NETWORK IMPROVEMENT
IN
NORTH-EAST STATES OF INDIA

Preliminary Design of NH54 Bypass

Cost Estimate Report
(Draft as of 7 July 2016)

Chhiahtlang Bypass (BP-1)

L= 2.6 km

ABSTRACT OF COST ESTIMATE

S. NO.	DESCRIPTION	AMOUNT (Rs, Lac)	SHARE
(A) CONSTRUCTION COST			
A1	SITE CLEARANCE	2.8	0.05%
A2	EARTHWORK	864.0	15.62%
A3	PAVEMENT	1,465.7	26.49%
A4	DRAINAGE	269.6	4.87%
A5	BRIDGE	0.0	0.00%
A6	SLOPE PROTECTION	2,809.1	50.78%
A7	TRAFFIC SAFETY FACILITIES	120.5	2.18%
A8	ROAD APPURTENANCES	0.7	0.01%
	TOTAL OF (A-1)	**5,532.4**	**100%**
	CONSTRUCTION COST PER KM	**2,150.2**	
A9	ESCALATION (5%) UPTO BIDDING 2015 to 2017	567.1	
A10	CONTINGENCY (2.8%)	170.8	
	TOTAL CIVIL WORK COST (A-2)	**6,270.2**	
	CONSTRUCTION COST PER KM	**2,436.9**	
(B) GOVERNMENT COST			
B1	RELOCATION OF UTILITIES	4.4	
B2	LAND ACQUISITION AND RESETTLEMENT	198.8	
B3	ENVIRONMENTAL MANAGEMENT MEASURES	12.8	
	TOTAL OF (B)	**216.0**	
	TOTAL COST OF (A) + (B)	**6,486.3**	
(C) OTHER COST			
C1	CONSTRUCTION SUPERVISION CHARGE (3 %)	188.1	
C2	QUALITY CONTROL CHARGE (0.25%)	15.7	
C3	ROAD SAFTY AUDIT CHARGE (0.25%)	15.7	
C4	MAINTENANCE FOR 4 YEARS (1.5% + 2.0% x 3 = 7.5%	470.3	
C5	ESCALATION (15%)	940.5	
C6	AGENCY(NHIDCL) CHARGE (3 %)	188.1	
	TOTAL OF (C)	**1,818.4**	
	TOTAL PROJECT COST (A) + (B) + (C)	**8,304.6**	
	CONSTRUCTION COST PER KM	**3,227.6**	

Chhiahtlang Bypass (BP-1)

BREAKDOWN OF CONSTRUCTION COST **L= 2.6 km**

S. NO.	DESCRIPTION	Q'TY	UNIT	AMOUNT (Rs)
(A) CONSTRUCTION COST				
A1	**SITE CLEARANCE**			**279,547**
	A1.1 Clearing and Grubbing	4.63	hectare	198,423
	A1.2 Dismantling of Structures	1	LS	13,452
	A1.3 Cutting of Trees	60	each	67,672
A2	**EARTHWORK**			**86,399,762**
	A2.1 Excavation in Soil	24,039	cum	6,012,154
	A2.2 Excavation in Ordinary Rock	96,154	cum	33,951,977
	A2.3 Excavation in Hard Rock	0	cum	0
	A2.4 Excavation for Structures in Soil	1,461	cum	128,568
	A2.5 Excavation for Structures in Ordinary Rock	5,844	cum	683,748
	A2.6 Excavation for Structures in Hard Rock	0	cum	0
	A2.7 Embankment Construction	32,465	cum	6,817,650
	A2.8 Scarifying Existing Bituminous Surface	0	sqm	0
	A2.9 Subgrade	5,046	cum	2,669,334
	A2.10 Spoil Bank	3	each	36,136,331
A3	**PAVEMENT**			**146,566,124**
	A3.1 Granular Sub-base	8,715	cum	30,197,475
	A3.2 Wet Mix Macadam	7,177	cum	25,112,323
	A3.3 Prime Coat	28,708	sqm	1,349,276
	A3.4 Tack Coat	28,492	sqm	598,332
	A3.5 Dense Graded Bituminous Macadam	2,849	cum	41,507,081
	A3.6 Bituminous Concrete	1,136	cum	18,497,488
	A3.7 Surface Dressing	0	sqm	0
	A3.8 Carriage of Materials	1	LS	29,304,149
A4	**DRAINAGE**			**26,963,336**
	A4.1 Lined Ditch 300 mm	2,733	metre	6,545,535
	A4.2 Sub Surface Drain with Perforated Pipe	0	metre	0
	A4.3 Pipe Culvert 1,200 mm (Type-A)	8	each	9,124,552
	A4.4 Pipe Culvert 1,200 mm (Type-B)	11	each	8,330,784
	A4.5 Box Culvert 2 m x 2 m	1	each	2,962,465
	A4.6 Box Culvert 3 m x 3 m	0	each	0
	A4.7 Box Culvert 4 m x 4 m	0	each	0
	A4.8 Box Culvert 4 m x 6 m	0	each	0
A5	**BRIDGE**			**0**
	A5.1 Bridge	0	LS	0
A6	**SLOPE PROTECTION**			**280,909,218**
	A6.1 Wet Masonry Retaining Wall (H=3m)	1,040	metre	17,937,920
	A6.2 Wet Masonry Retaining Wall (H=7m)	880	metre	55,614,240
	A6.3 Gravity Wall (H=1.5m)	140	metre	2,793,140
	A6.4 Gravity Wall (H=2m)	120	metre	3,192,160
	A6.5 Gravity Wall (H=3m)	280	metre	11,172,560
	A6.6 Gravity Wall (H=4m)	280	metre	14,896,747
	A6.7 Gravity Wall (H=5m)	200	metre	13,300,667
	A6.8 Gravity Wall (H=6m)	200	metre	15,960,800
	A6.9 Reinforced Earth Retaining Wall (H=7m)	160	metre	30,172,985
	A6.10 Reinforced Earth Retaining Wall (H=8m)	140	metre	30,172,985
	A6.11 Reinforced Earth Retaining Wall (H=9m)	80	metre	19,396,919
	A6.12 Reinforced Earth Retaining Wall (H=10m)	60	metre	16,164,099
	A6.13 Reinforced Earth Retaining Wall (H=11m)	100	metre	29,634,182
	A6.14 Reinforced Earth Retaining Wall (H=12m)	20	metre	6,465,640
	A6.15 Reinforced Earth Retaining Wall (H=13m)	40	metre	14,008,886
	A6.16 Reinforced Earth Retaining Wall (H=14m)	0	metre	0
	A6.17 Reinforced Earth Retaining Wall (H=15m)	0	metre	0
	A6.18 Gabion Wall (1:0.3)	0	cum	0
	A6.19 Rockfall Prevention Wall (H=3m)	0	metre	0
	A6.20 Rockfall Prevention Fence (H=2m)	0	metre	0
	A6.21 Hydroseeding (t=5cm)	0	sqm	0
	A6.22 Seeding and Mulching (Soil Cut Slope)	0	sqm	0
	A6.23 Turfing (Embankment)	281	sqm	25,290
	A6.24 Vegetation Mat (Steep Slope)	0	sqm	0
	A6.25 Crib Work (F300)	0	sqm	0
	A6.26 Crib Work (F500)	0	sqm	0
	A6.27 Non-frame	0	sqm	0
	A6.28 Earth Removal	0	cum	0
	A6.29 Counterweight Fill	0	cum	0
	A6.30 Groundwater Drainage Work	0	metre	0
	A6.31 Anchor Work	0	metre	0
	A6.32 Rock-bolt Work	0	metre	0
	A6.33 Landslide Prevention Work	0	LS	0
A7	**TRAFFIC SAFETY FACILITIES**			**12,051,929**
	A7.1 Traffic Sign	1	LS	377,321
	A7.2 Road Marking	643	sqm	856,476
	A7.3 Road Delineator	132	each	640,332
	A7.4 Guard Rail	1,200	metre	7,742,400
	A7.5 Street Furniture	1,650	each	2,435,400
A8	**ROAD APPURTENANCES**			**67,564**
	A8.1 Kilometer Stone (5km)	0	each	0
	A8.2 Kilometer Stone (1km)	2	each	7,402
	A8.3 Kilometer Stone (200m)	10	each	10,190
	A8.4 Boundary Stone	52	each	49,972
	A8.5 Bus Bay and Road Amenity	0	each	0
	A8.6 View Point	0	each	0
	TOTAL OF (A)			**553,237,480**
	CONSTRUCTION COST PER KM			**215,016,510**

UC (BP-1)

A1.1 Clearing and Grubbing

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
2.3	**Clearing and Grubbing Road Land.** (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 1000 metres including removal and disposal of top organic soil not exceeding 150 mm in thickness.)								
(ii)	By Mechanical Means								
A	In area of light jungle						hectare	34,923	0
B	In area of thorny jungle					4.63	hectare	42,856	198,423
					TOTAL	**4.63**	**hectare**		**198,423**

UC (BP-1)

A1.2 Dismantling of Structures

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
A.1.2.1	**Dismantling of Structures**								
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					1.52	cum	835	1,266
(iii)	Dismantling Stone Masonry								
B	Rubble stone masonry in cement mortar					20.99	cum	530	11,124
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			36.01	tonne.km	11.80	1,062
					SUB TOTAL				**13,452**
A.1.2.2	**Dismantling of Flexible Pavemets**								
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					0.00	cum	508	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0.00	tonne.km	11.80	0
					SUB TOTAL				**0**
					TOTAL	**1**	**LS**		**13,452**

UC (BP-1)

A1.3 Cutting of Trees

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
2.1	**Cutting of Trees, including Cutting of Trunks, Branches and Removal** (Cutting of trees, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all lifts and up to a lead of 1000 mtrs and earth filling in the depression/pit.)								
(i)	Girth from 300 mm to 600 mm					32	each	428	13,824
(ii)	Girth from 600 mm to 900 mm					20	each	778	15,232
(iii)	Girth from 900 mm to 1800 mm					6	each	4,277	27,021
(iv)	Girth above 1800 mm					1	each	8,555	11,595
					TOTAL	**60**	**each**		**67,672**

UC (BP-1)

A2.1 Excavation in Soil

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.30	**Excavation in Hilly Areas in Ordinary Soil By Mechanical Means** (Excavation in ordinary soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					24,039	cum	197	4,735,683
	Case-II: Disposing cut material on the valley sid						cum	90	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			43270	tonne.km	11.80	1,276,471
					TOTAL	**24039**	**cum**		**6,012,154**

UC (BP-1)

A2.2 Excavation in Ordinary Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
A.2.2.1	**Excavation in Ordinary Rock not Requiring Blasting**								
3.31	**Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting.** (Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					96,154	cum	300	28,846,200
	Case-II: Disposing cut material on the valley side						cum	155	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			173,077	tonne.km	11.80	5,105,777
					SUB TOTAL	**96,154**	**cum**		**33,951,977**
A.2.2.2	**Excavation in Ordinary Rock Requiring Blasting**								
3.32	Excavation in Hilly Areas in laminated rock (requiring blasting) By Mechanical Means (Excavation for roadway in hilly areas in laminated rock (requiring blasting) which are not suitable for construction of masonry and pavement by drilling, blasting and breaking, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections, loading and disposal of cut road with in all lifts and leads upto 1000 metres.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					0	cum	392	0
	Case-II: Disposing cut material on the valley side						cum	290	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0	tonne.km	11.80	0
					SUB TOTAL	**0**	**cum**		**0**
					TOTAL	**96,154**	**cum**		**33,951,977**

UC (BP-1)

A2.3 Excavation in Hard Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.33	**Excavation in Hilly Areas in Hard Rock Requiring Blasting** (Excavation in hilly areas in hard rock requiring blasting, by mechanical means including trimming of slopes and disposal of cut material.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					0	cum	556	0
	Case-II: Disposing cut material on the valley side						cum	411	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0	tonne.km	11.80	0
					TOTAL	**0**	**cum**		**0**

A2.4 Excavation for Structures in Soil

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(i)	Ordinary soil								
B	Mechanical Means (Depth upto 3 m)					1461	cum	88	128,568
					TOTAL	**1461**	**cum**		**128,568**

A2.5 Excavation for Structures in Ordinary Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(ii)	Ordinary rock (not requiring blasting)								
B	Mechanical Means					5,844	cum	117	683,748
					TOTAL	**5,844**	**cum**		**683,748**

UC (BP-1)

A2.6 Excavation for Structures in Hard Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(iii)	Hard rock (requiring blasting)								
A	Manual Means					0	cum	999	0
					TOTAL	**0**	**cum**		**0**

A2.7 Embankment Construction

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.15	**Construction of Embankment with Material Deposited from Roadway Cutting** (Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2)					32,465	cum	210	6,817,650
					TOTAL	**32,465**	**cum**		**6,817,650**

A2.8 Scarifying Existing Bituminous Surface

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.13	**Scarifying existing bituminous surface to a depth of 50 mm by mechanical means** (Scarifying the existing bituminous road surface to a depth of 50 mm and disposal of scarified material with in all lifts and lead upto 1000 metres.)					0	sqm	21	0
					TOTAL	**0**	**sqm**		**0**

A2.9 Subgrade

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.16	**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)					5,046	cum	529	2,669,334
					TOTAL	**5,046**	**cum**		**2,669,334**

UC (BP-1)

A3.1 Granular Sub-base

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
4.1	**Granular Sub-base with Close Graded Material (Table:- 400-1)**								
A	**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- I Material						cum	3,391	0
(ii)	for grading- II Material					8,715	cum	3,465	30,197,475
(iii)	for grading-III Material						cum	3,359	0
					TOTAL	**8,715**	**cum**		**30,197,475**

A3.2 Wet Mix Macadam

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					7,177	cum	3,499	25,112,323
					TOTAL	**7,177**	**cum**		**25,112,323**

A3.3 Prime Coat

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.1	**Prime coat** (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate shown in 500-1 using mechanical means.)								
	i) Low Porosity					28,708	sqm	47	1,349,276
					TOTAL	**28,708**	**sqm**		**1,349,276**

A3.4 Tack Coat

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.2	**Tack coat** (Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at required rate on the prepared bituminous/granular surface cleaned with mechanical broom.)								
i)	Normal Bituminous Surface					28,492	sqm	21	598,332
iii)	Granular Surface Treated with Primer						sqm	28	0
					TOTAL	**28,492**	**sqm**		**598,332**

UC (BP-1)

A3.5 Dense Graded Bituminous Macadam

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.4	**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.)								
(ii)	for Grading II (19 mm nominal size)					2,849	cum	14,569	41,507,081
					TOTAL	**2,849**	**cum**		**41,507,081**

A3.6 Bituminous Concrete

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.5	**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)					1,136	cum	16,283	18,497,488
					TOTAL	**1,136**	**cum**		**18,497,488**

A3.7 Surface Dressing

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.6	Surface Dressing (Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder laid on prepared surface and rolling with 8-10 tonne smooth wheeled steel roller)								
	Case-I: 19 mm nominal chipping size					0	sqm		0
					TOTAL	**0**	**sqm**		**0**

UC (BP-1)

A3.8 Carriage of Materials

SOR. NO.	DESCRIPTION			WORK Q'TY	UNIT Q'TY	CARRIAGE Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
-	**Cost of Haulage for Granular Sub-base**								
	i) Aggregate			8,715	1.28	11,155	cum	1,011.06	11,278,623
	ii) Sand						cum	1,026.87	0
	iii) Lime/Fille						cum	1,784.33	0
	iv) Bitumen						tonne	1,516.00	0
-	**Cost of Haulage for Wet Mix Macadam**								
	i) Aggregate			7,177	1.32	9,474	cum	1,011.06	9,578,458
	ii) Sand						cum	1,026.87	0
	iii) Lime/Fille						cum	1,784.33	0
	iv) Bitumen						tonne	1,516.00	0
-	**Cost of Haulage for Dense Graded Bituminous Macadam**								
	i) Aggregate			2,849	1.44	4,103	cum	1,011.06	4,147,951
	ii) Sand			2,849	0.45	1,282	cum	1,026.87	1,316,493
	iii) Lime/Fille			2,849	0.02	57	cum	1,784.33	101,671
	iv) Bitumen			2,849	0.1	285	tonne	1,516.00	431,908
-	**Cost of Haulage for Bituminous Concrete**								
	i) Aggregate			1,136	1.46	1,659	cum	1,011.06	1,676,911
	ii) Sand			1,136	0.45	511	cum	1,026.87	524,934
	iii) Lime/Fille			1,136	0.02	23	cum	1,784.33	40,540
	iv) Bitumen			1,136	0.12	136	tonne	1,516.00	206,661
					TOTAL	**1**	**LS**		**29,304,149**

UC (BP-1)

A7.1 Traffic Sign

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.4	Retro- reflectorised Traffic signs (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					19	each	11,171	212,249
(ii)	60 cm equilateral triangle					0	each	6,901	0
(iii)	60 cm circular					4	each	9,696	38,784
(iv)	80 mm x 60 mm rectangular					9	each	14,032	126,288
(v)	60 cm x 45 cm rectangular					0	each	9,410	0
(vi)	60 cm x 60 cm square					0	each	11,391	0
					TOTAL	**32**	**each**		**377,321**

A7.2 Road Marking

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					643	sqm	1,332	856,476
					TOTAL	**643**	**sqm**		**856,476**

A7.3 Road Delineator

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					132	each	4,851	640,332
					TOTAL	**132**	**each**		**640,332**

A7.4 Guard Rail

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.23	**Metal Beam Crash Barrier**								
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)					1,200	metre	6,452	7,742,400
					TOTAL	**1,200**	**metre**		**7,742,400**

A7.5 Street Furniture

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.35	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					1,650	each	1,476	2,435,400
					TOTAL	**1,650**	**each**		**2,435,400**

UC (BP-1)

A8.1 Kilometer Stone (5km)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(i)	5th kilometre stone (precast)					0	each	6,147	0
					TOTAL	**0**	**each**		**0**

A8.2 Kilometer Stone (1km)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(ii)	Ordinary Kilometer stone (Precast)					2	each	3,701	7,402
					TOTAL	**2**	**each**		**7,402**

A8.3 Kilometer Stone (200m)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(iii)	Hectometer stone (Precast)					10	each	1,019	10,190
					TOTAL	**10**	**each**		**10,190**

A8.4 Boundary Stone

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.16	Boundary pillar (Reinforced cement concrete M15 grade boundary pillars of standard design as per IRC:25-1967, fixed in position including finishing and lettering but excluding painting)					52	each	961	49,972
					TOTAL	**52**	**each**		**49,972**

Sl.No.	Name of Materials	Unit	Truck Capacity Per Trip	Multiplying Factor	Net Payable Quantity	Cost of Loading and Unloading (In Rs)	Cost (in Rs) of Haulage in t-km			Multiplying Factor For			Lead in km			Cost of Carriage (In Rs) $=[(H_s.L_s+H_u.L_u+H_k.L_k) + Col.\ 7]$	Remarks
							Surfaced Road	Unsurfaced Gravelled Road	Katcha Track & Track in River Bed/Nallah Bed & Choe Bed	Surface Road = (8/Col. 6)xCol. 8	Unsurfaced Road = (8/Col. 6) x Col. 9	Katcha Track & Track in River Bed/Nalah Bed & Choe Bed =(8/Col. 6) x Col. 10	Surfaced Road	Unsurfaced Gravelled Road	Katcha Track & Track in River Bed/Nallah Bed & Choe Bed		
										H_s	H_u	H_k	L_s	L_u	L_k		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
01	Local Sand (Fine)	m^3	6	0.8	4.80	211	11.8	13.5	18.4	19.67	22.50	30.67	40	2	0	1042.67	Rs Per M^3
09	Coarse Sand	m^3	5.4	0.924	4.99	211	11.8	13.5	18.4	18.92	21.65	29.50	40	2	0	1011.06	
01	Lime	m^3	6	1	6	211	11.8	13.5	18.4	15.73	18.00	24.53	100	0	0	1784.33	
07	Stone Chips, Stone Aggregate 50mm & down	m^3	5.4	0.924	4.99	211	11.8	13.5	18.4	18.92	21.65	29.50	40	2	0	1011.06	
12	Bitumen Barauni	MT	8	1	8	336	11.8	13.5	18.4	11.80	13.5	18.4	100	0	0	1516.00	Rs Per MT

Note: This calculation sheet was derived from cost estimate of DPR (NH54 Section 2)
Lead distances were revised by JICA Study Team for Bypass

Serchhip Bypass (BP-2)

L= 11.8 km

ABSTRACT OF COST ESTIMATE

S. NO.	DESCRIPTION	AMOUNT (Rs, Lac)	SHARE
(A) CONSTRUCTION COST			
A1	SITE CLEARANCE	13.1	0.05%
A2	EARTHWORK	5,022.2	19.60%
A3	PAVEMENT	6,670.6	26.04%
A4	DRAINAGE	1,513.0	5.91%
A5	BRIDGE	251.9	0.98%
A6	SLOPE PROTECTION	11,731.7	45.79%
A7	TRAFFIC SAFETY FACILITIES	415.0	1.62%
A8	ROAD APPURTENANCES	3.2	0.01%
	TOTAL OF (A-1)	**25,620.7**	**100%**
	CONSTRUCTION COST PER KM	**2,170.3**	
A9	ESCALATION (5%) UPTO BIDDING 2015 to 2017	2,626.1	
A10	CONTINGENCY (2.8%)	790.9	
	TOTAL CIVIL WORK COST (A-2)	**29,037.8**	
	CONSTRUCTION COST PER KM	**2,459.8**	
(B) GOVERNMENT COST			
B1	RELOCATION OF UTILITIES	3.7	
B2	LAND ACQUISITION AND RESETTLEMENT	980.4	
B3	ENVIRONMENTAL MANAGEMENT MEASURES	58.9	
	TOTAL OF (B)	**1,043.0**	
	TOTAL COST OF (A) + (B)	**30,080.8**	
(C) OTHER COST			
C1	CONSTRUCTION SUPERVISION CHARGE (3 %)	871.1	
C2	QUALITY CONTROL CHARGE (0.25%)	72.6	
C3	ROAD SAFTY AUDIT CHARGE (0.25%)	72.6	
C4	MAINTENANCE FOR 4 YEARS (1.5% + 2.0% x 3 = 7.5%	2,177.8	
C5	ESCALATION (15%)	4,355.7	
C6	AGENCY(NHIDCL) CHARGE (3 %)	871.1	
	TOTAL OF (C)	**8,421.0**	
	TOTAL PROJECT COST (A) + (B) + (C)	**38,501.8**	
	CONSTRUCTION COST PER KM	**3,261.5**	

BREAKDOWN OF CONSTRUCTION COST **L= 11.8 km**

S. NO.	DESCRIPTION	Q'TY	UNIT	AMOUNT (Rs)
(A) CONSTRUCTION COST				
A1	**SITE CLEARANCE**			**1,313,618**
	A1.1 Clearing and Grubbing	23.14	hectare	991,688
	A1.2 Dismantling of Structures	1	LS	11,449
	A1.3 Cutting of Trees	273	each	310,481
A2	**EARTHWORK**			**502,219,302**
	A2.1 Excavation in Soil	142,230	cum	35,571,723
	A2.2 Excavation in Ordinary Rock	533,364	cum	188,330,828
	A2.3 Excavation in Hard Rock	35,558	cum	21,658,378
	A2.4 Excavation for Structures in Soil	6,523	cum	574,024
	A2.5 Excavation for Structures in Ordinary Rock	24,462	cum	2,862,054
	A2.6 Excavation for Structures in Hard Rock	1,631	cum	1,629,369
	A2.7 Embankment Construction	167,084	cum	35,087,640
	A2.8 Scarifying Existing Bituminous Surface	0	sqm	0
	A2.9 Subgrade	21,001	cum	11,109,529
	A2.10 Spoil Bank	13	each	205,395,757
A3	**PAVEMENT**			**667,060,208**
	A3.1 Granular Sub-base	41,341	cum	143,246,565
	A3.2 Wet Mix Macadam	33,965	cum	118,843,535
	A3.3 Prime Coat	135,862	sqm	6,385,514
	A3.4 Tack Coat	134,630	sqm	2,827,230
	A3.5 Dense Graded Bituminous Macadam	13,463	cum	196,142,447
	A3.6 Bituminous Concrete	5,367	cum	87,390,861
	A3.7 Surface Dressing	0	sqm	0
	A3.8 Carriage of Materials	1	LS	112,224,056
A4	**DRAINAGE**			**151,303,350**
	A4.1 Lined Ditch 300 mm	13,425	metre	31,293,675
	A4.2 Sub Surface Drain with Perforated Pipe	0	metre	0
	A4.3 Pipe Culvert 1,200 mm (Type-A)	31	each	34,697,587
	A4.4 Pipe Culvert 1,200 mm (Type-B)	47	each	35,135,320
	A4.5 Box Culvert 2 m x 2 m	8	each	23,264,280
	A4.6 Box Culvert 3 m x 3 m	2	each	8,525,170
	A4.7 Box Culvert 4 m x 4 m	3	each	18,387,318
	A4.8 Box Culvert 4 m x 6 m	0	each	0
A5	**BRIDGE**			**25,190,795**
	A5.1 Bridge (BP-2 4+530)	1	LS	25,190,795
	A5.2 Bridge (BP-2 10+800)	1	LS	357,108,178
A6	**SLOPE PROTECTION**			**1,173,169,214**
	A6.1 Wet Masonry Retaining Wall (H=3m)	3,920	metre	65,601,200
	A6.2 Wet Masonry Retaining Wall (H=7m)	5,880	metre	359,950,080
	A6.3 Gravity Wall (H=1.5m)	260	metre	5,010,460
	A6.4 Gravity Wall (H=2m)	560	metre	14,389,013
	A6.5 Gravity Wall (H=3m)	880	metre	33,916,960
	A6.6 Gravity Wall (H=4m)	640	metre	32,889,173
	A6.7 Gravity Wall (H=5m)	920	metre	59,097,733
	A6.8 Gravity Wall (H=6m)	1,540	metre	118,709,360
	A6.9 Reinforced Earth Retaining Wall (H=7m)	560	metre	105,605,447
	A6.10 Reinforced Earth Retaining Wall (H=8m)	480	metre	103,450,234
	A6.11 Reinforced Earth Retaining Wall (H=9m)	360	metre	87,286,135
	A6.12 Reinforced Earth Retaining Wall (H=10m)	280	metre	75,432,462
	A6.13 Reinforced Earth Retaining Wall (H=11m)	140	metre	41,487,854
	A6.14 Reinforced Earth Retaining Wall (H=12m)	140	metre	45,259,477
	A6.15 Reinforced Earth Retaining Wall (H=13m)	40	metre	14,008,886
	A6.16 Reinforced Earth Retaining Wall (H=14m)	0	metre	0
	A6.17 Reinforced Earth Retaining Wall (H=15m)	20	metre	9,698,459
	A6.18 Gabion Wall (1:0.3)	0	cum	0
	A6.19 Rockfall Prevention Wall (H=3m)	0	metre	0
	A6.20 Rockfall Prevention Fence (H=2m)	0	metre	0
	A6.21 Hydroseeding (t=5cm)	0	sqm	0
	A6.22 Seeding and Mulching (Soil Cut Slope)	0	sqm	0
	A6.23 Turfing (Embankment)	15,292	sqm	1,376,280
	A6.24 Vegetation Mat (Steep Slope)	0	sqm	0
	A6.25 Crib Work (F300)	0	sqm	0
	A6.26 Crib Work (F500)	0	sqm	0
	A6.27 Non-frame	0	sqm	0
	A6.28 Earth Removal	0	cum	0
	A6.29 Counterweight Fill	0	cum	0
	A6.30 Groundwater Drainage Work	0	metre	0
	A6.31 Anchor Work	0	metre	0
	A6.32 Rock-bolt Work	0	metre	0
	A6.33 Landslide Prevention Work	0	LS	0
A7	**TRAFFIC SAFETY FACILITIES**			**41,495,215**
	A7.1 Traffic Sign	1	LS	1,010,578
	A7.2 Road Marking	2,951	sqm	3,930,732
	A7.3 Road Delineator	1,155	each	5,602,905
	A7.4 Guard Rail	3,150	metre	20,323,800
	A7.5 Street Furniture	7,200	each	10,627,200
A8	**ROAD APPURTENANCES**			**321,311**
	A8.1 Kilometer Stone (5km)	2	each	12,294
	A8.2 Kilometer Stone (1km)	9	each	33,309
	A8.3 Kilometer Stone (200m)	48	each	48,912
	A8.4 Boundary Stone	236	each	226,796
	A8.5 Bus Bay and Road Amenity	0	each	0
	A8.6 View Point	0	each	0
	TOTAL OF (A)			**2,562,073,013**
	CONSTRUCTION COST PER KM			**217,032,868**

UC (BP-2)

A1.1 Clearing and Grubbing

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
2.3	**Clearing and Grubbing Road Land.** (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 1000 metres including removal and disposal of top organic soil not exceeding 150 mm in thickness.)								
(ii)	By Mechanical Means								
A	In area of light jungle						hectare	34,923	0
B	In area of thorny jungle					23.14	hectare	42,856	991,688
					TOTAL	**23.14**	**hectare**		**991,688**

UC (BP-2)

A1.2 Dismantling of Structures

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
A.1.2.1	**Dismantling of Structures**								
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					1.29	cum	835	1,077
(iii)	Dismantling Stone Masonry								
B	Rubble stone masonry in cement mortar					17.86	cum	530	9,467
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			30.64	tonne.km	11.80	904
					SUB TOTAL				**11,449**
A.1.2.2	**Dismantling of Flexible Pavemets**								
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					0.00	cum	508	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0.00	tonne.km	11.80	0
					SUB TOTAL				**0**
					TOTAL	**1**	**LS**		**11,449**

UC (BP-2)

A1.3 Cutting of Trees

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
2.1	**Cutting of Trees, including Cutting of Trunks, Branches and Removal** (Cutting of trees, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all lifts and up to a lead of 1000 mtrs and earth filling in the depression/pit.)								
(i)	Girth from 300 mm to 600 mm					148	each	428	63,423
(ii)	Girth from 600 mm to 900 mm					90	each	778	69,887
(iii)	Girth from 900 mm to 1800 mm					29	each	4,277	123,975
(iv)	Girth above 1800 mm					6	each	8,555	53,197
					TOTAL	**273**	**each**		**310,481**

UC (BP-2)

A2.1 Excavation in Soil

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.30	**Excavation in Hilly Areas in Ordinary Soil By Mechanical Means** (Excavation in ordinary soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					142,230	cum	197	28,019,310
	Case-II: Disposing cut material on the valley sid						cum	90	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			256014	tonne.km	11.80	7,552,413
					TOTAL	**142230**	**cum**		**35,571,723**

UC (BP-2)

A2.2 Excavation in Ordinary Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
A.2.2.1	**Excavation in Ordinary Rock not Requiring Blasting**								
3.31	**Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting.** (Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					533,364	cum	300	160,009,200
	Case-II: Disposing cut material on the valley side						cum	155	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			960,055	tonne.km	11.80	28,321,628
					SUB TOTAL	**533,364**	**cum**		**188,330,828**
A.2.2.2	**Excavation in Ordinary Rock Requiring Blasting**								
3.32	Excavation in Hilly Areas in laminated rock (requiring blasting) By Mechanical Means (Excavation for roadway in hilly areas in laminated rock (requiring blasting) which are not suitable for construction of masonry and pavement by drilling, blasting and breaking, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections, loading and disposal of cut road with in all lifts and leads upto 1000 metres.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					0	cum	392	0
	Case-II: Disposing cut material on the valley side						cum	290	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0	tonne.km	11.80	0
					SUB TOTAL	**0**	**cum**		**0**
					TOTAL	**533,364**	**cum**		**188,330,828**

UC (BP-2)

A2.3 Excavation in Hard Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.33	**Excavation in Hilly Areas in Hard Rock Requiring Blasting** (Excavation in hilly areas in hard rock requiring blasting, by mechanical means including trimming of slopes and disposal of cut material.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					35,558	cum	556	19,770,248
	Case-II: Disposing cut material on the valley side						cum	411	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			64,004	tonne.km	11.80	1,888,130
					TOTAL	**35,558**	**cum**		**21,658,378**

A2.4 Excavation for Structures in Soil

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(i)	Ordinary soil								
B	Mechanical Means (Depth upto 3 m)					6523	cum	88	574,024
					TOTAL	**6523**	**cum**		**574,024**

A2.5 Excavation for Structures in Ordinary Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(ii)	Ordinary rock (not requiring blasting)								
B	Mechanical Means					24,462	cum	117	2,862,054
					TOTAL	**24,462**	**cum**		**2,862,054**

UC (BP-2)

A2.6 Excavation for Structures in Hard Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(iii)	Hard rock (requiring blasting)								
A	Manual Means					1,631	cum	999	1,629,369
					TOTAL	**1,631**	**cum**		**1,629,369**

A2.7 Embankment Construction

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.15	**Construction of Embankment with Material Deposited from Roadway Cutting** (Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2)					167,084	cum	210	35,087,640
					TOTAL	**167,084**	**cum**		**35,087,640**

A2.8 Scarifying Existing Bituminous Surface

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.13	**Scarifying existing bituminous surface to a depth of 50 mm by mechanical means** (Scarifying the existing bituminous road surface to a depth of 50 mm and disposal of scarified material with in all lifts and lead upto 1000 metres.)					0	sqm	21	0
					TOTAL	**0**	**sqm**		**0**

A2.9 Subgrade

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.16	**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)					21,001	cum	529	11,109,529
					TOTAL	**21,001**	**cum**		**11,109,529**

UC (BP-2)

A3.1 Granular Sub-base

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
4.1	**Granular Sub-base with Close Graded Material (Table:- 400-1)**								
A	**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- I Material						cum	3,391	0
(ii)	for grading- II Material					41,341	cum	3,465	143,246,565
(iii)	for grading-III Material						cum	3,359	0
					TOTAL	**41,341**	**cum**		**143,246,565**

A3.2 Wet Mix Macadam

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					33,965	cum	3,499	118,843,535
					TOTAL	**33,965**	**cum**		**118,843,535**

A3.3 Prime Coat

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.1	**Prime coat** (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate shown in 500-1 using mechanical means.)								
	i) Low Porosity					135,862	sqm	47	6,385,514
					TOTAL	**135,862**	**sqm**		**6,385,514**

A3.4 Tack Coat

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.2	**Tack coat** (Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at required rate on the prepared bituminous/granular surface cleaned with mechanical broom.)								
i)	Normal Bituminous Surface					134,630	sqm	21	2,827,230
iii)	Granular Surface Treated with Primer						sqm	28	0
					TOTAL	**134,630**	**sqm**		**2,827,230**

UC (BP-2)

A3.5 Dense Graded Bituminous Macadam

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.4	**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.)								
(ii)	for Grading II (19 mm nominal size)					13,463	cum	14,569	196,142,447
					TOTAL	**13,463**	**cum**		**196,142,447**

A3.6 Bituminous Concrete

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.5	**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)					5,367	cum	16,283	87,390,861
					TOTAL	**5,367**	**cum**		**87,390,861**

A3.7 Surface Dressing

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.6	Surface Dressing (Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder laid on prepared surface and rolling with 8-10 tonne smooth wheeled steel roller)								
	Case-I: 19 mm nominal chipping size					0	sqm		0
					TOTAL	**0**	**sqm**		**0**

UC (BP-2)

A3.8 Carriage of Materials

SOR. NO.	DESCRIPTION			WORK Q'TY	UNIT Q'TY	CARRIAGE Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
-	**Cost of Haulage for Granular Sub-base**								
	i) Aggregate			41,341	1.28	52,916	cum	813.85	43,066,286
	ii) Sand						cum	825.76	0
	iii) Lime/Fille						cum	1,692.33	0
	iv) Bitumen						tonne	1,447.00	0
-	**Cost of Haulage for Wet Mix Macadam**								
	i) Aggregate			33,965	1.32	44,834	cum	813.85	36,488,165
	ii) Sand						cum	825.76	0
	iii) Lime/Fille						cum	1,692.33	0
	iv) Bitumen						tonne	1,447.00	0
-	**Cost of Haulage for Dense Graded Bituminous Macadam**								
	i) Aggregate			13,463	1.44	19,387	cum	813.85	15,777,958
	ii) Sand			13,463	0.45	6,058	cum	825.76	5,002,745
	iii) Lime/Fille			13,463	0.02	269	cum	1,692.33	455,678
	iv) Bitumen			13,463	0.1	1,346	tonne	1,447.00	1,948,096
-	**Cost of Haulage for Bituminous Concrete**								
	i) Aggregate			5,367	1.46	7,836	cum	813.85	6,377,213
	ii) Sand			5,367	0.45	2,415	cum	825.76	1,994,335
	iii) Lime/Fille			5,367	0.02	107	cum	1,692.33	181,655
	iv) Bitumen			5,367	0.12	644	tonne	1,447.00	931,926
					TOTAL	**1**	**LS**		**112,224,056**

UC (BP-2)

A7.1 Traffic Sign

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.4	Retro- reflectorised Traffic signs (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					70	each	11,171	781,970
(ii)	60 cm equilateral triangle					0	each	6,901	0
(iii)	60 cm circular					12	each	9,696	116,352
(iv)	80 mm x 60 mm rectangular					8	each	14,032	112,256
(v)	60 cm x 45 cm rectangular					0	each	9,410	0
(vi)	60 cm x 60 cm square					0	each	11,391	0
					TOTAL	**90**	**each**		**1,010,578**

A7.2 Road Marking

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					2,951	sqm	1,332	3,930,732
					TOTAL	**2,951**	**sqm**		**3,930,732**

A7.3 Road Delineator

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					1,155	each	4,851	5,602,905
					TOTAL	**1155**	**each**		**5,602,905**

A7.4 Guard Rail

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.23	**Metal Beam Crash Barrier**								
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)					3,150	metre	6,452	20,323,800
					TOTAL	**3,150**	**metre**		**20,323,800**

A7.5 Street Furniture

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.35	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					7,200	each	1,476	10,627,200
					TOTAL	**7,200**	**each**		**10,627,200**

UC (BP-2)

A8.1 Kilometer Stone (5km)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(i)	5th kilometre stone (precast)					2	each	6,147	12,294
					TOTAL	**2**	**each**		**12,294**

A8.2 Kilometer Stone (1km)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(ii)	Ordinary Kilometer stone (Precast)					9	each	3,701	33,309
					TOTAL	**9**	**each**		**33,309**

A8.3 Kilometer Stone (200m)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(iii)	Hectometer stone (Precast)					48	each	1,019	48,912
					TOTAL	**48**	**each**		**48,912**

A8.4 Boundary Stone

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.16	Boundary pillar (Reinforced cement concrete M15 grade boundary pillars of standard design as per IRC:25-1967, fixed in position including finishing and lettering but excluding painting)					236	each	961	226,796
					TOTAL	**236**	**each**		**226,796**

Sl.No.	Name of Materials	Unit	Truck Capacity Per Trip	Multiplying Factor	Net Payable Quantity	Cost of Loading and Unloading (In Rs)	Cost (in Rs) of Haulage in t-km			Multiplying Factor For			Lead in km			Cost of Carriage (In Rs) $=[(H_s.L_s+H_u.L_u+H_k.L_k) + Col.\ 7]$	Remarks
							Surfaced Road	Unsurfaced Gravelled Road	Katcha Track & Track in River Bed/Nallah Bed & Choe Bed	Surface Road = (8/Col. 6)xCol. 8	Unsurfaced Road = (8/Col. 6) x Col. 9	Katcha Track & Track in River Bed/Nalah Bed & Choe Bed =(8/Col. 6) x Col. 10	Surfaced Road	Unsurfaced Gravelled Road	Katcha Track & Track in River Bed/Nallah Bed & Choe Bed		
										H_s	H_u	H_k	L_s	L_u	L_k		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
01	Local Sand (Fine)	m^3	6	0.8	4.80	211	11.8	13.5	18.4	19.67	22.50	30.67	25	6	0	837.67	Rs Per M^3
09	Coarse Sand	m^3	5.4	0.924	4.99	211	11.8	13.5	18.4	18.92	21.65	29.50	25	6	0	813.85	
01	Lime	m^3	6	1	6	211	10.1	11.9	16.2	13.47	15.85	21.60	110	0	0	1692.33	
07	Stone Chips, Stone Aggregate 50mm & down	m^3	5.4	0.924	4.99	211	11.8	13.5	18.4	18.92	21.65	29.50	25	6	0	813.85	
12	Bitumen Barauni	MT	8	1	8	336	10.1	11.9	16.2	10.10	11.89	16.2	110	0	0	1447.00	Rs Per MT

Note: This calculation sheet was derived from cost estimate of DPR (NH54 Section 2)
Lead distances were revised by JICA Study Team for Bypass

Hnahthial Bypass (BP-3)

L= 7.0 km

ABSTRACT OF COST ESTIMATE

S. NO.	DESCRIPTION	AMOUNT (Rs, Lac)	SHARE
(A) CONSTRUCTION COST			
A1	SITE CLEARANCE	7.5	0.05%
A2	EARTHWORK	2,475.8	16.33%
A3	PAVEMENT	4,894.1	32.28%
A4	DRAINAGE	1,264.5	8.34%
A5	BRIDGE	0.0	0.00%
A6	SLOPE PROTECTION	6,318.5	41.68%
A7	TRAFFIC SAFETY FACILITIES	197.8	1.30%
A8	ROAD APPURTENANCES	1.9	0.01%
	TOTAL OF (A-1)	**15,160.3**	**100%**
	CONSTRUCTION COST PER KM	**2,158.0**	
A9	ESCALATION (5%) UPTO BIDDING 2015 to 2017	1,553.9	
A10	CONTINGENCY (2.8%)	468.0	
	TOTAL CIVIL WORK COST (A-2)	**17,182.2**	
	CONSTRUCTION COST PER KM	**2,445.9**	
(B) GOVERNMENT COST			
B1	RELOCATION OF UTILITIES	0.9	
B2	LAND ACQUISITION AND RESETTLEMENT	557.5	
B3	ENVIRONMENTAL MANAGEMENT MEASURES	35.1	
	TOTAL OF (B)	**593.5**	
	TOTAL COST OF (A) + (B)	**17,775.7**	
(C) OTHER COST			
C1	CONSTRUCTION SUPERVISION CHARGE (3 %)	515.5	
C2	QUALITY CONTROL CHARGE (0.25%)	43.0	
C3	ROAD SAFTY AUDIT CHARGE (0.25%)	43.0	
C4	MAINTENANCE FOR 4 YEARS (1.5% + 2.0% x 3 = 7.5%	1,288.7	
C5	ESCALATION (15%)	2,577.3	
C6	AGENCY(NHIDCL) CHARGE (3 %)	515.5	
	TOTAL OF (C)	**4,982.8**	
	TOTAL PROJECT COST (A) + (B) + (C)	**22,758.5**	
	CONSTRUCTION COST PER KM	**3,239.6**	

BREAKDOWN OF CONSTRUCTION COST **L= 7.0 km**

S. NO.	DESCRIPTION	Q'TY	UNIT	AMOUNT (Rs)
(A) CONSTRUCTION COST				
A1	**SITE CLEARANCE**			**748,085**
	A1.1 Clearing and Grubbing	13.05	hectare	559,271
	A1.2 Dismantling of Structures	1	LS	4,051
	A1.3 Cutting of Trees	163	each	184,763
A2	**EARTHWORK**			**247,582,383**
	A2.1 Excavation in Soil	108,196	cum	27,059,820
	A2.2 Excavation in Ordinary Rock	252,458	cum	89,142,920
	A2.3 Excavation in Hard Rock	0	cum	0
	A2.4 Excavation for Structures in Soil	5,655	cum	497,640
	A2.5 Excavation for Structures in Ordinary Rock	13,195	cum	1,543,815
	A2.6 Excavation for Structures in Hard Rock	0	cum	0
	A2.7 Embankment Construction	76,906	cum	16,150,260
	A2.8 Scarifying Existing Bituminous Surface	0	sqm	0
	A2.9 Subgrade	12,602	cum	6,666,458
	A2.10 Spoil Bank	5	each	106,521,470
A3	**PAVEMENT**			**489,413,729**
	A3.1 Granular Sub-base	24,830	cum	86,035,950
	A3.2 Wet Mix Macadam	20,406	cum	71,400,594
	A3.3 Prime Coat	81,625	sqm	3,836,375
	A3.4 Tack Coat	80,901	sqm	1,698,921
	A3.5 Dense Graded Bituminous Macadam	8,090	cum	117,863,210
	A3.6 Bituminous Concrete	3,226	cum	52,528,958
	A3.7 Surface Dressing	0	sqm	0
	A3.8 Carriage of Materials	1	LS	156,049,721
A4	**DRAINAGE**			**126,451,864**
	A4.1 Lined Ditch 300 mm	8,350	metre	22,553,350
	A4.2 Sub Surface Drain with Perforated Pipe	0	metre	0
	A4.3 Pipe Culvert 1,200 mm (Type-A)	16	each	20,397,056
	A4.4 Pipe Culvert 1,200 mm (Type-B)	24	each	19,962,744
	A4.5 Box Culvert 2 m x 2 m	12	each	39,440,304
	A4.6 Box Culvert 3 m x 3 m	5	each	24,098,410
	A4.7 Box Culvert 4 m x 4 m	0	each	0
	A4.8 Box Culvert 4 m x 6 m	0	each	0
A5	**BRIDGE**			**0**
	A5.1 Bridge	0	LS	0
A6	**SLOPE PROTECTION**			**631,853,745**
	A6.1 Wet Masonry Retaining Wall (H=3m)	2,683	metre	52,745,097
	A6.2 Wet Masonry Retaining Wall (H=7m)	2,963	metre	214,793,796
	A6.3 Gravity Wall (H=1.5m)	160	metre	3,699,840
	A6.4 Gravity Wall (H=2m)	320	metre	9,866,240
	A6.5 Gravity Wall (H=3m)	693	metre	32,049,864
	A6.6 Gravity Wall (H=4m)	543	metre	33,483,552
	A6.7 Gravity Wall (H=5m)	580	metre	44,706,400
	A6.8 Gravity Wall (H=6m)	780	metre	72,146,880
	A6.9 Reinforced Earth Retaining Wall (H=7m)	100	metre	18,858,116
	A6.10 Reinforced Earth Retaining Wall (H=8m)	200	metre	43,104,264
	A6.11 Reinforced Earth Retaining Wall (H=9m)	160	metre	38,793,838
	A6.12 Reinforced Earth Retaining Wall (H=10m)	180	metre	48,492,297
	A6.13 Reinforced Earth Retaining Wall (H=11m)	40	metre	11,853,673
	A6.14 Reinforced Earth Retaining Wall (H=12m)	20	metre	6,465,640
	A6.15 Reinforced Earth Retaining Wall (H=13m)	0	metre	0
	A6.16 Reinforced Earth Retaining Wall (H=14m)	0	metre	0
	A6.17 Reinforced Earth Retaining Wall (H=15m)	0	metre	0
	A6.18 Gabion Wall (1:0.3)	0	cum	0
	A6.19 Rockfall Prevention Wall (H=3m)	0	metre	0
	A6.20 Rockfall Prevention Fence (H=2m)	0	metre	0
	A6.21 Hydroseeding (t=5cm)	0	sqm	0
	A6.22 Seeding and Mulching (Soil Cut Slope)	0	sqm	0
	A6.23 Turfing (Embankment)	8,825	sqm	794,250
	A6.24 Vegetation Mat (Steep Slope)	0	sqm	0
	A6.25 Crib Work (F300)	0	sqm	0
	A6.26 Crib Work (F500)	0	sqm	0
	A6.27 Non-frame	0	sqm	0
	A6.28 Earth Removal	0	cum	0
	A6.29 Counterweight Fill	0	cum	0
	A6.30 Groundwater Drainage Work	0	metre	0
	A6.31 Anchor Work	0	metre	0
	A6.32 Rock-bolt Work	0	metre	0
	A6.33 Landslide Prevention Work	0	LS	0
A7	**TRAFFIC SAFETY FACILITIES**			**19,783,255**
	A7.1 Traffic Sign	1	LS	502,612
	A7.2 Road Marking	1,756	sqm	2,338,992
	A7.3 Road Delineator	801	each	3,885,651
	A7.4 Guard Rail	1,200	metre	7,742,400
	A7.5 Street Furniture	3,600	each	5,313,600
A8	**ROAD APPURTENANCES**			**192,386**
	A8.1 Kilometer Stone (5km)	1	each	6,147
	A8.2 Kilometer Stone (1km)	6	each	22,206
	A8.3 Kilometer Stone (200m)	28	each	28,532
	A8.4 Boundary Stone	141	each	135,501
	A8.5 Bus Bay and Road Amenity	0	each	0
	A8.6 View Point	0	each	0
	TOTAL OF (A)			**1,516,025,447**
	CONSTRUCTION COST PER KM			**215,804,334**

UC (BP-3)

A1.1 Clearing and Grubbing

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
2.3	**Clearing and Grubbing Road Land.** (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 1000 metres including removal and disposal of top organic soil not exceeding 150 mm in thickness.)								
(ii)	By Mechanical Means								
A	In area of light jungle						hectare	34,923	0
B	In area of thorny jungle					13.05	hectare	42,856	559,271
					TOTAL	**13.05**	**hectare**		**559,271**

UC (BP-3)

A1.2 Dismantling of Structures

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
A.1.2.1	**Dismantling of Structures**								
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					0.32	cum	835	269
(iii)	Dismantling Stone Masonry								
B	Rubble stone masonry in cement mortar					4.47	cum	530	2,367
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			7.66	tonne.km	11.80	226
					SUB TOTAL				**2,862**
A.1.2.2	**Dismantling of Flexible Pavemets**								
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					2.14	cum	508	1,088
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			3.43	tonne.km	11.80	101
					SUB TOTAL				**1,189**
					TOTAL	**1**	**LS**		**4,051**

UC (BP-3)

A1.3 Cutting of Trees

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
2.1	**Cutting of Trees, including Cutting of Trunks, Branches and Removal** (Cutting of trees, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all lifts and up to a lead of 1000 mtrs and earth filling in the depression/pit.)								
(i)	Girth from 300 mm to 600 mm					88	each	428	37,742
(ii)	Girth from 600 mm to 900 mm					53	each	778	41,589
(iii)	Girth from 900 mm to 1800 mm					17	each	4,277	73,776
(iv)	Girth above 1800 mm					4	each	8,555	31,657
					TOTAL	**163**	**each**		**184,763**

UC (BP-3)

A2.1 Excavation in Soil

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.30	**Excavation in Hilly Areas in Ordinary Soil By Mechanical Means** (Excavation in ordinary soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					108,196	cum	197	21,314,612
	Case-II: Disposing cut material on the valley sid						cum	90	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			194753	tonne.km	11.80	5,745,208
					TOTAL	**108196**	**cum**		**27,059,820**

UC (BP-3)

A2.2 Excavation in Ordinary Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
A.2.2.1	**Excavation in Ordinary Rock not Requiring Blasting**								
3.31	**Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting.** (Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					252,458	cum	300	75,737,400
	Case-II: Disposing cut material on the valley side						cum	155	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			454,424	tonne.km	11.80	13,405,520
					SUB TOTAL	**252,458**	**cum**		**89,142,920**
A.2.2.2	**Excavation in Ordinary Rock Requiring Blasting**								
3.32	Excavation in Hilly Areas in laminated rock (requiring blasting) By Mechanical Means (Excavation for roadway in hilly areas in laminated rock (requiring blasting) which are not suitable for construction of masonry and pavement by drilling, blasting and breaking, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections, loading and disposal of cut road with in all lifts and leads upto 1000 metres.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					0	cum	392	0
	Case-II: Disposing cut material on the valley side						cum	290	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0	tonne.km	11.80	0
					SUB TOTAL	**0**	**cum**		**0**
					TOTAL	**252,458**	**cum**		**89,142,920**

UC (BP-3)

A2.3 Excavation in Hard Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.33	**Excavation in Hilly Areas in Hard Rock Requiring Blasting** (Excavation in hilly areas in hard rock requiring blasting, by mechanical means including trimming of slopes and disposal of cut material.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					0	cum	556	0
	Case-II: Disposing cut material on the valley side						cum	411	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0	tonne.km	11.80	0
					TOTAL	**0**	**cum**		**0**

A2.4 Excavation for Structures in Soil

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(i)	Ordinary soil								
B	Mechanical Means (Depth upto 3 m)					5655	cum	88	497,640
					TOTAL	**5655**	**cum**		**497,640**

A2.5 Excavation for Structures in Ordinary Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(ii)	Ordinary rock (not requiring blasting)								
B	Mechanical Means					13,195	cum	117	1,543,815
					TOTAL	**13,195**	**cum**		**1,543,815**

UC (BP-3)

A2.6 Excavation for Structures in Hard Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(iii)	Hard rock (requiring blasting)								
A	Manual Means					0	cum	999	0
					TOTAL	**0**	**cum**		**0**

A2.7 Embankment Construction

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.15	**Construction of Embankment with Material Deposited from Roadway Cutting** (Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2)					76,906	cum	210	16,150,260
					TOTAL	**76,906**	**cum**		**16,150,260**

A2.8 Scarifying Existing Bituminous Surface

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.13	**Scarifying existing bituminous surface to a depth of 50 mm by mechanical means** (Scarifying the existing bituminous road surface to a depth of 50 mm and disposal of scarified material with in all lifts and lead upto 1000 metres.)					0	sqm	21	0
					TOTAL	**0**	**sqm**		**0**

A2.9 Subgrade

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.16	**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)					12,602	cum	529	6,666,458
					TOTAL	**12,602**	**cum**		**6,666,458**

UC (BP-3)

A3.1 Granular Sub-base

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
4.1	**Granular Sub-base with Close Graded Material (Table:- 400-1)**								
A	**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- I Material						cum	3,391	0
(ii)	for grading- II Material					24,830	cum	3,465	86,035,950
(iii)	for grading-III Material						cum	3,359	0
					TOTAL	**24,830**	**cum**		**86,035,950**

A3.2 Wet Mix Macadam

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					20,406	cum	3,499	71,400,594
					TOTAL	**20,406**	**cum**		**71,400,594**

A3.3 Prime Coat

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.1	**Prime coat** (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate shown in 500-1 using mechanical means.)								
	i) Low Porosity					81,625	sqm	47	3,836,375
					TOTAL	**81,625**	**sqm**		**3,836,375**

A3.4 Tack Coat

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.2	**Tack coat** (Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at required rate on the prepared bituminous/granular surface cleaned with mechanical broom.)								
i)	Normal Bituminous Surface					80,901	sqm	21	1,698,921
iii)	Granular Surface Treated with Primer						sqm	28	0
					TOTAL	**80,901**	**sqm**		**1,698,921**

UC (BP-3)

A3.5 Dense Graded Bituminous Macadam

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.4	**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.)								
(ii)	for Grading II (19 mm nominal size)					8,090	cum	14,569	117,863,210
					TOTAL	**8,090**	**cum**		**117,863,210**

A3.6 Bituminous Concrete

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.5	**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)					3,226	cum	16,283	52,528,958
					TOTAL	**3,226**	**cum**		**52,528,958**

A3.7 Surface Dressing

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.6	Surface Dressing (Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder laid on prepared surface and rolling with 8-10 tonne smooth wheeled steel roller)								
	Case-I: 19 mm nominal chipping size					0	sqm		0
					TOTAL	**0**	**sqm**		**0**

UC (BP-3)

A3.8 Carriage of Materials

SOR. NO.	DESCRIPTION			WORK Q'TY	UNIT Q'TY	CARRIAGE Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
-	**Cost of Haulage for Granular Sub-base**								
	i) Aggregate			24,830	1.28	31,782	cum	1,905.73	60,568,515
	ii) Sand						cum	1,939.20	0
	iii) Lime/Fille						cum	2,567.67	0
	iv) Bitumen						tonne	2,103.50	0
-	**Cost of Haulage for Wet Mix Macadam**								
	i) Aggregate			20,406	1.32	26,936	cum	1,905.73	51,332,457
	ii) Sand						cum	1,939.20	0
	iii) Lime/Fille						cum	2,567.67	0
	iv) Bitumen						tonne	2,103.50	0
-	**Cost of Haulage for Dense Graded Bituminous Macadam**								
	i) Aggregate			8,090	1.44	11,650	cum	1,905.73	22,200,934
	ii) Sand			8,090	0.45	3,641	cum	1,939.20	7,059,642
	iii) Lime/Fille			8,090	0.02	162	cum	2,567.67	415,448
	iv) Bitumen			8,090	0.1	809	tonne	2,103.50	1,701,732
-	**Cost of Haulage for Bituminous Concrete**								
	i) Aggregate			3,226	1.46	4,710	cum	1,905.73	8,975,889
	ii) Sand			3,226	0.45	1,452	cum	1,939.20	2,815,131
	iii) Lime/Fille			3,226	0.02	65	cum	2,567.67	165,666
	iv) Bitumen			3,226	0.12	387	tonne	2,103.50	814,307
					TOTAL	**1**	**LS**		**156,049,721**

UC (BP-3)

A7.1 Traffic Sign

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.4	Retro- reflectorised Traffic signs (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					28	each	11,171	312,788
(ii)	60 cm equilateral triangle					0	each	6,901	0
(iii)	60 cm circular					8	each	9,696	77,568
(iv)	80 mm x 60 mm rectangular					8	each	14,032	112,256
(v)	60 cm x 45 cm rectangular					0	each	9,410	0
(vi)	60 cm x 60 cm square					0	each	11,391	0
					TOTAL	**44**	**each**		**502,612**

A7.2 Road Marking

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					1,756	sqm	1,332	2,338,992
					TOTAL	**1,756**	**sqm**		**2,338,992**

A7.3 Road Delineator

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					801	each	4,851	3,885,651
					TOTAL	**801**	**each**		**3,885,651**

UC (BP-3)

A7.4 Guard Rail

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.23	**Metal Beam Crash Barrier**								
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)					1,200	metre	6,452	7,742,400
					TOTAL	**1,200**	**metre**		**7,742,400**

A7.5 Street Furniture

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.35	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					3,600	each	1,476	5,313,600
					TOTAL	**3,600**	**each**		**5,313,600**

UC (BP-3)

A8.1 Kilometer Stone (5km)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(i)	5th kilometre stone (precast)					1	each	6,147	6,147
					TOTAL	**1**	**each**		**6,147**

A8.2 Kilometer Stone (1km)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(ii)	Ordinary Kilometer stone (Precast)					6	each	3,701	22,206
					TOTAL	**6**	**each**		**22,206**

A8.3 Kilometer Stone (200m)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(iii)	Hectometer stone (Precast)					28	each	1,019	28,532
					TOTAL	**28**	**each**		**28,532**

A8.4 Boundary Stone

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.16	Boundary pillar (Reinforced cement concrete M15 grade boundary pillars of standard design as per IRC:25-1967, fixed in position including finishing and lettering but excluding painting)					141	each	961	135,501
					TOTAL	**141**	**each**		**135,501**

Carriage (BP-3)

Sl.No.	Name of Materials	Unit	Truck Capacity Per Trip	Multiplying Factor	Net Payable Quantity	Cost of Loading and Unloading (In Rs)	Cost (in Rs) of Haulage in t-km			Multiplying Factor For			Lead in km			Cost of Carriage (In Rs) =[(H_s.L_s+H_u.L_u+H_k.L_k) + Col. 7]	Remarks
							Surfaced Road	Unsurfaced Gravelled Road	Katcha Track & Track in River Bed/Nallah Bed & Choe Bed	Surface Road = (8/Col. 6)xCol. 8	Unsurfaced Road = (8/Col. 6) x Col. 9	Katcha Track & Track in River Bed/Nalah Bed & Choe Bed =(8/Col. 6) x Col. 10	Surfaced Road	Unsurfaced Gravelled Road	Katcha Track & Track in River Bed/Nallah Bed & Choe Bed		
										H_s	H_u	H_k	L_s	L_u	L_k		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
01	Local Sand (Fine)	m^3	6	0.8	4.80	211	11.8	13.5	18.4	19.67	22.50	30.67	85	4	0	1972.67	Rs Per M^3
09	Coarse Sand	m^3	5.4	0.924	4.99	211	11.8	13.5	18.4	18.92	21.65	29.50	85	4	0	1905.73	
01	Lime	m^3	6	1	6	211	10.1	11.9	16.2	13.47	15.85	21.60	175	0	0	2567.67	
07	Stone Chips, Stone Aggregate 50mm & down	m^3	5.4	0.924	4.99	211	11.8	13.5	18.4	18.92	21.65	29.50	85	4	0	1905.73	
12	Bitumen Barauni	MT	8	1	8	336	10.1	11.9	16.2	10.10	11.89	16.2	175	0	0	2103.50	Rs Per MT

Note: This calculation sheet was derived from cost estimate of DPR (NH54 Section 2)
Lead distances were revised by JICA Study Team for Bypass

Lawngtlai Bypass (BP-4)

L= 2.6 km

ABSTRACT OF COST ESTIMATE

S. NO.	DESCRIPTION	AMOUNT (Rs, Lac)	SHARE
(A) CONSTRUCTION COST			
A1	SITE CLEARANCE	3.1	0.05%
A2	EARTHWORK	1,638.4	23.76%
A3	PAVEMENT	1,544.3	22.39%
A4	DRAINAGE	390.6	5.66%
A5	BRIDGE	0.0	0.00%
A6	SLOPE PROTECTION	3,193.0	46.30%
A7	TRAFFIC SAFETY FACILITIES	126.9	1.84%
A8	ROAD APPURTENANCES	0.7	0.01%
	TOTAL OF (A-1)	**6,897.1**	**100%**
	CONSTRUCTION COST PER KM	**2,616.5**	
A9	ESCALATION (5%) UPTO BIDDING 2015 to 2017	707.0	
A10	CONTINGENCY (2.8%)	212.9	
	TOTAL CIVIL WORK COST (A-2)	**7,817.0**	
	CONSTRUCTION COST PER KM	**2,965.5**	
(B) GOVERNMENT COST			
B1	RELOCATION OF UTILITIES	4.1	
B2	LAND ACQUISITION AND RESETTLEMENT	236.7	
B3	ENVIRONMENTAL MANAGEMENT MEASURES	13.2	
	TOTAL OF (B)	**253.9**	
	TOTAL COST OF (A) + (B)	**8,070.9**	
(C) OTHER COST			
C1	CONSTRUCTION SUPERVISION CHARGE (3 %)	234.5	
C2	QUALITY CONTROL CHARGE (0.25%)	19.5	
C3	ROAD SAFTY AUDIT CHARGE (0.25%)	19.5	
C4	MAINTENANCE FOR 4 YEARS (1.5% + 2.0% x 3 = 7.5%	586.3	
C5	ESCALATION (15%)	1,172.5	
C6	AGENCY(NHIDCL) CHARGE (3 %)	234.5	
	TOTAL OF (C)	**2,266.9**	
	TOTAL PROJECT COST (A) + (B) + (C)	**10,337.8**	
	CONSTRUCTION COST PER KM	**3,921.8**	

BREAKDOWN OF CONSTRUCTION COST **L= 2.6 km**

S. NO.	DESCRIPTION	Q'TY	UNIT	AMOUNT (Rs)
(A) CONSTRUCTION COST				
A1	**SITE CLEARANCE**			**311,894**
	A1.1 Clearing and Grubbing	5.66	hectare	242,565
	A1.2 Dismantling of Structures	1	LS	0
	A1.3 Cutting of Trees	61	each	69,329
A2	**EARTHWORK**			**163,843,539**
	A2.1 Excavation in Soil	24,138	cum	6,036,914
	A2.2 Excavation in Ordinary Rock	193,108	cum	68,186,435
	A2.3 Excavation in Hard Rock	24,138	cum	14,702,456
	A2.4 Excavation for Structures in Soil	563	cum	49,544
	A2.5 Excavation for Structures in Ordinary Rock	4,503	cum	526,851
	A2.6 Excavation for Structures in Hard Rock	563	cum	562,437
	A2.7 Embankment Construction	61,991	cum	13,018,110
	A2.8 Scarifying Existing Bituminous Surface	0	sqm	0
	A2.9 Subgrade	5,774	cum	3,054,446
	A2.10 Spoil Bank	5	each	57,706,346
A3	**PAVEMENT**			**154,428,956**
	A3.1 Granular Sub-base	8,959	cum	31,042,935
	A3.2 Wet Mix Macadam	7,361	cum	25,756,139
	A3.3 Prime Coat	29,444	sqm	1,383,868
	A3.4 Tack Coat	29,188	sqm	612,948
	A3.5 Dense Graded Bituminous Macadam	2,919	cum	42,526,911
	A3.6 Bituminous Concrete	1,164	cum	18,953,412
	A3.7 Surface Dressing	0	sqm	0
	A3.8 Carriage of Materials	1	LS	34,152,743
A4	**DRAINAGE**			**39,064,973**
	A4.1 Lined Ditch 300 mm	3,143	metre	8,005,221
	A4.2 Sub Surface Drain with Perforated Pipe	0	metre	0
	A4.3 Pipe Culvert 1,200 mm (Type-A)	5	each	6,023,430
	A4.4 Pipe Culvert 1,200 mm (Type-B)	8	each	6,436,472
	A4.5 Box Culvert 2 m x 2 m	6	each	18,599,850
	A4.6 Box Culvert 3 m x 3 m	0	each	0
	A4.7 Box Culvert 4 m x 4 m	0	each	0
	A4.8 Box Culvert 4 m x 6 m	0	each	0
A5	**BRIDGE**			**0**
	A5.1 Bridge	0	LS	0
A6	**SLOPE PROTECTION**			**319,303,304**
	A6.1 Wet Masonry Retaining Wall (H=3m)	1,040	metre	18,775,120
	A6.2 Wet Masonry Retaining Wall (H=7m)	880	metre	58,225,200
	A6.3 Gravity Wall (H=1.5m)	140	metre	2,921,800
	A6.4 Gravity Wall (H=2m)	120	metre	3,339,200
	A6.5 Gravity Wall (H=3m)	280	metre	11,687,200
	A6.6 Gravity Wall (H=4m)	280	metre	15,582,933
	A6.7 Gravity Wall (H=5m)	200	metre	13,913,333
	A6.8 Gravity Wall (H=6m)	200	metre	16,696,000
	A6.9 Reinforced Earth Retaining Wall (H=7m)	160	metre	30,172,985
	A6.10 Reinforced Earth Retaining Wall (H=8m)	140	metre	30,172,985
	A6.11 Reinforced Earth Retaining Wall (H=9m)	80	metre	19,396,919
	A6.12 Reinforced Earth Retaining Wall (H=10m)	60	metre	16,164,099
	A6.13 Reinforced Earth Retaining Wall (H=11m)	100	metre	29,634,182
	A6.14 Reinforced Earth Retaining Wall (H=12m)	20	metre	6,465,640
	A6.15 Reinforced Earth Retaining Wall (H=13m)	40	metre	14,008,886
	A6.16 Reinforced Earth Retaining Wall (H=14m)	0	metre	0
	A6.17 Reinforced Earth Retaining Wall (H=15m)	0	metre	0
	A6.18 Gabion Wall (1:0.3)	0	cum	0
	A6.19 Rockfall Prevention Wall (H=3m)	0	metre	0
	A6.20 Rockfall Prevention Fence (H=2m)	0	metre	0
	A6.21 Hydroseeding (t=5cm)	0	sqm	0
	A6.22 Seeding and Mulching (Soil Cut Slope)	3,361	sqm	904,109
	A6.23 Turfing (Embankment)	265	sqm	23,850
	A6.24 Vegetation Mat (Steep Slope)	1,091	sqm	2,621,830
	A6.25 Crib Work (F300)	1,510	sqm	5,522,343
	A6.26 Crib Work (F500)	0	sqm	0
	A6.27 Non-frame	0	sqm	0
	A6.28 Earth Removal	0	cum	0
	A6.29 Counterweight Fill	0	cum	0
	A6.30 Groundwater Drainage Work	0	metre	0
	A6.31 Anchor Work	0	metre	0
	A6.32 Rock-bolt Work	1,133	metre	7,137,900
	A6.33 Landslide Prevention Work	1	LS	15,936,790
A7	**TRAFFIC SAFETY FACILITIES**			**12,686,807**
	A7.1 Traffic Sign	1	LS	430,588
	A7.2 Road Marking	659	sqm	877,788
	A7.3 Road Delineator	181	each	878,031
	A7.4 Guard Rail	1,250	metre	8,065,000
	A7.5 Street Furniture	1,650	each	2,435,400
A8	**ROAD APPURTENANCES**			**69,544**
	A8.1 Kilometer Stone (5km)	0	each	0
	A8.2 Kilometer Stone (1km)	2	each	7,402
	A8.3 Kilometer Stone (200m)	11	each	11,209
	A8.4 Boundary Stone	53	each	50,933
	A8.5 Bus Bay and Road Amenity	0	each	0
	A8.6 View Point	0	each	0
	TOTAL OF (A)			**689,709,017**
	CONSTRUCTION COST PER KM			**261,649,855**

UC (BP-4)

A1.1 Clearing and Grubbing

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
2.3	**Clearing and Grubbing Road Land.** (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 1000 metres including removal and disposal of top organic soil not exceeding 150 mm in thickness.)								
(ii)	By Mechanical Means								
A	In area of light jungle						hectare	34,923	0
B	In area of thorny jungle					5.66	hectare	42,856	242,565
					TOTAL	**5.66**	**hectare**		**242,565**

UC (BP-4)

A1.2 Dismantling of Structures

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
A.1.2.1	**Dismantling of Structures**								
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					0.00	cum	835	0
(iii)	Dismantling Stone Masonry								
B	Rubble stone masonry in cement mortar					0.00	cum	530	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0.00	tonne.km	11.80	0
					SUB TOTAL				**0**
A.1.2.2	**Dismantling of Flexible Pavemets**								
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					0.00	cum	508	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0.00	tonne.km	11.80	0
					SUB TOTAL				**0**
					TOTAL	**1**	**LS**		**0**

UC (BP-4)

A1.3 Cutting of Trees

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
2.1	**Cutting of Trees, including Cutting of Trunks, Branches and Removal** (Cutting of trees, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all lifts and up to a lead of 1000 mtrs and earth filling in the depression/pit.)								
(i)	Girth from 300 mm to 600 mm					33	each	428	14,162
(ii)	Girth from 600 mm to 900 mm					20	each	778	15,605
(iii)	Girth from 900 mm to 1800 mm					6	each	4,277	27,683
(iv)	Girth above 1800 mm					1	each	8,555	11,879
					TOTAL	**61**	**each**		**69,329**

UC (BP-4)

A2.1 Excavation in Soil

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.30	**Excavation in Hilly Areas in Ordinary Soil By Mechanical Means** (Excavation in ordinary soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					24,138	cum	197	4,755,186
	Case-II: Disposing cut material on the valley sid						cum	90	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			43448	tonne.km	11.80	1,281,728
					TOTAL	**24138**	**cum**		**6,036,914**

UC (BP-4)

A2.2 Excavation in Ordinary Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
A.2.2.1	**Excavation in Ordinary Rock not Requiring Blasting**								
3.31	**Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting.** (Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					193,108	cum	300	57,932,400
	Case-II: Disposing cut material on the valley side						cum	155	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			347,594	tonne.km	11.80	10,254,035
					SUB TOTAL	**193,108**	**cum**		**68,186,435**
A.2.2.2	**Excavation in Ordinary Rock Requiring Blasting**								
3.32	Excavation in Hilly Areas in laminated rock (requiring blasting) By Mechanical Means (Excavation for roadway in hilly areas in laminated rock (requiring blasting) which are not suitable for construction of masonry and pavement by drilling, blasting and breaking, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections, loading and disposal of cut road with in all lifts and leads upto 1000 metres.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					0	cum	392	0
	Case-II: Disposing cut material on the valley side						cum	290	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			0	tonne.km	11.80	0
					SUB TOTAL	**0**	**cum**		**0**
					TOTAL	**193,108**	**cum**		**68,186,435**

UC (BP-4)

A2.3 Excavation in Hard Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.33	**Excavation in Hilly Areas in Hard Rock Requiring Blasting** (Excavation in hilly areas in hard rock requiring blasting, by mechanical means including trimming of slopes and disposal of cut material.)								
	Case-I : Disposal of cut material with all lifts and lead upto 1000 metres					24,138	cum	556	13,420,728
	Case-II: Disposing cut material on the valley side						cum	411	0
1.1	**Loading and unloading of stone boulder/stone aggregates/sand/ kanker/moorum.** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)						cum	211	0
1.6	**Cost of Haulage Excluding Loading and Unloading For Short Haul for a distance upto 100 km**		Lead (km)						
(i)	Surfaced Road		2.5			43,448	tonne.km	11.80	1,281,728
					TOTAL	**24,138**	**cum**		**14,702,456**

A2.4 Excavation for Structures in Soil

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(i)	Ordinary soil								
B	Mechanical Means (Depth upto 3 m)					563	cum	88	49,544
					TOTAL	**563**	**cum**		**49,544**

A2.5 Excavation for Structures in Ordinary Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(ii)	Ordinary rock (not requiring blasting)								
B	Mechanical Means					4,503	cum	117	526,851
					TOTAL	**4,503**	**cum**		**526,851**

UC (BP-4)

A2.6 Excavation for Structures in Hard Rock

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)								
(iii)	Hard rock (requiring blasting)								
A	Manual Means					563	cum	999	562,437
					TOTAL	**563**	**cum**		**562,437**

A2.7 Embankment Construction

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.15	**Construction of Embankment with Material Deposited from Roadway Cutting** (Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2)					61,991	cum	210	13,018,110
					TOTAL	**61,991**	**cum**		**13,018,110**

A2.8 Scarifying Existing Bituminous Surface

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.13	**Scarifying existing bituminous surface to a depth of 50 mm by mechanical means** (Scarifying the existing bituminous road surface to a depth of 50 mm and disposal of scarified material with in all lifts and lead upto 1000 metres.)					0	sqm	21	0
					TOTAL	**0**	**sqm**		**0**

A2.9 Subgrade

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
3.16	**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)					5,774	cum	529	3,054,446
					TOTAL	**5,774**	**cum**		**3,054,446**

UC (BP-4)

A3.1 Granular Sub-base

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
4.1	**Granular Sub-base with Close Graded Material (Table:- 400-1)**								
A	**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- I Material						cum	3,391	0
(ii)	for grading- II Material					8,959	cum	3,465	31,042,935
(iii)	for grading-III Material						cum	3,359	0
					TOTAL	**8,959**	**cum**		**31,042,935**

A3.2 Wet Mix Macadam

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					7,361	cum	3,499	25,756,139
					TOTAL	**7,361**	**cum**		**25,756,139**

A3.3 Prime Coat

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.1	**Prime coat** (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate shown in 500-1 using mechanical means.)								
	i) Low Porosity					29,444	sqm	47	1,383,868
					TOTAL	**29,444**	**sqm**		**1,383,868**

A3.4 Tack Coat

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.2	**Tack coat** (Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at required rate on the prepared bituminous/granular surface cleaned with mechanical broom.)								
i)	Normal Bituminous Surface					29,188	sqm	21	612,948
iii)	Granular Surface Treated with Primer						sqm	28	0
					TOTAL	**29,188**	**sqm**		**612,948**

UC (BP-4)

A3.5 Dense Graded Bituminous Macadam

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.4	**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.)								
(ii)	for Grading II (19 mm nominal size)					2,919	cum	14,569	42,526,911
					TOTAL	**2,919**	**cum**		**42,526,911**

A3.6 Bituminous Concrete

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.5	**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)					1,164	cum	16,283	18,953,412
					TOTAL	**1,164**	**cum**		**18,953,412**

A3.7 Surface Dressing

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
5.6	Surface Dressing (Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder laid on prepared surface and rolling with 8-10 tonne smooth wheeled steel roller)								
	Case-I: 19 mm nominal chipping size					0	sqm		0
					TOTAL	**0**	**sqm**		**0**

UC (BP-4)

A3.8 Carriage of Materials

SOR. NO.	DESCRIPTION			WORK Q'TY	UNIT Q'TY	CARRIAGE Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
-	**Cost of Haulage for Granular Sub-base**								
	i) Aggregate			8,959	1.28	11,468	cum	1,119.29	12,835,472
	ii) Sand						cum	1,137.23	0
	iii) Lime/Fille						cum	4,116.33	0
	iv) Bitumen						tonne	3,265.00	0
-	**Cost of Haulage for Wet Mix Macadam**								
	i) Aggregate			7,361	1.32	9,717	cum	1,119.29	10,875,596
	ii) Sand						cum	1,137.23	0
	iii) Lime/Fille						cum	4,116.33	0
	iv) Bitumen						tonne	3,265.00	0
-	**Cost of Haulage for Dense Graded Bituminous Macadam**								
	i) Aggregate			2,919	1.44	4,203	cum	1,119.29	4,704,776
	ii) Sand			2,919	0.45	1,314	cum	1,137.23	1,493,806
	iii) Lime/Fille			2,919	0.02	58	cum	4,116.33	240,312
	iv) Bitumen			2,919	0.1	292	tonne	3,265.00	953,054
-	**Cost of Haulage for Bituminous Concrete**								
	i) Aggregate			1,164	1.46	1,699	cum	1,119.29	1,902,165
	ii) Sand			1,164	0.45	524	cum	1,137.23	595,680
	iii) Lime/Fille			1,164	0.02	23	cum	4,116.33	95,828
	iv) Bitumen			1,164	0.12	140	tonne	3,265.00	456,055
					TOTAL	**1**	**LS**		**34,152,743**

UC (BP-4)

A7.1 Traffic Sign

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.4	Retro- reflectorised Traffic signs (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					20	each	11,171	223,420
(ii)	60 cm equilateral triangle					0	each	6,901	0
(iii)	60 cm circular					4	each	9,696	38,784
(iv)	80 mm x 60 mm rectangular					12	each	14,032	168,384
(v)	60 cm x 45 cm rectangular					0	each	9,410	0
(vi)	60 cm x 60 cm square					0	each	11,391	0
					TOTAL	**36**	**each**		**430,588**

A7.2 Road Marking

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					659	sqm	1,332	877,788
					TOTAL	**659**	**sqm**		**877,788**

A7.3 Road Delineator

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
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.)					181	each	4,851	878,031
					TOTAL	**181**	**each**		**878,031**

A7.4 Guard Rail

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.23	**Metal Beam Crash Barrier**								
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)					1,250	metre	6,452	8,065,000
					TOTAL	**1,250**	**metre**		**8,065,000**

A7.5 Street Furniture

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.35	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					1,650	each	1,476	2,435,400
					TOTAL	**1,650**	**each**		**2,435,400**

UC (BP-4)

A8.1 Kilometer Stone (5km)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(i)	5th kilometre stone (precast)					0	each	6,147	0
					TOTAL	**0**	**each**		**0**

A8.2 Kilometer Stone (1km)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(ii)	Ordinary Kilometer stone (Precast)					2	each	3,701	7,402
					TOTAL	**2**	**each**		**7,402**

A8.3 Kilometer Stone (200m)

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.14	Kilo Metre Stone (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)								
(iii)	Hectometer stone (Precast)					11	each	1,019	11,209
					TOTAL	**11**	**each**		**11,209**

A8.4 Boundary Stone

SOR. NO.	DESCRIPTION	NO. (each)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	Q'TY	UNIT	RATE (Rs)	AMOUNT (Rs)
8.16	Boundary pillar (Reinforced cement concrete M15 grade boundary pillars of standard design as per IRC:25-1967, fixed in position including finishing and lettering but excluding painting)					53	each	961	50,933
					TOTAL	**53**	**each**		**50,933**

Sl.No.	Name of Materials	Unit	Truck Capacity Per Trip	Multiplying Factor	Net Payable Quantity	Cost of Loading and Unloading (In Rs)	Cost (in Rs) of Haulage in t-km			Multiplying Factor For			Lead in km			Cost of Carriage (In Rs) $=[(H_s.L_s+H_u.L_u+H_k.L_k) + Col.\ 7]$	Remarks
							Surfaced Road	Unsurfaced Gravelled Road	Katcha Track & Track in River Bed/Nallah Bed & Choe Bed	Surface Road = (8/Col. 6)xCol. 8	Unsurfaced Road = (8/Col. 6) x Col. 9	Katcha Track & Track in River Bed/Nalah Bed & Choe Bed =(8/Col. 6) x Col. 10	Surfaced Road	Unsurfaced Gravelled Road	Katcha Track & Track in River Bed/Nallah Bed & Choe Bed		
										H_s	H_u	H_k	L_s	L_u	L_k		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
01	Local Sand (Fine)	m^3	6	0.8	4.80	211	11.8	13.5	18.4	19.67	22.50	30.67	40	7	0	1155.17	Rs Per M^3
09	Coarse Sand	m^3	5.4	0.924	4.99	211	11.8	13.5	18.4	18.92	21.65	29.50	40	7	0	1119.29	
01	Lime	m^3	6	1	6	211	10.1	11.9	16.2	13.47	15.85	21.60	290	0	0	4116.33	
07	Stone Chips, Stone Aggregate 50mm & down	m^3	5.4	0.924	4.99	211	11.8	13.5	18.4	18.92	21.65	29.50	40	7	0	1119.29	
12	Bitumen Barauni	MT	8	1	8	336	10.1	11.9	16.2	10.10	11.89	16.2	290	0	0	3265.00	Rs Per MT

Note: This calculation sheet was derived from cost estimate of DPR (NH54 Section 2)
Lead distances were revised by JICA Study Team for Bypass