

**PUBLIC WORKS DEPARTMENT  
ARUNACHAL PRADESH**



**SCHEDULE OF RATES  
FOR  
ROAD AND BRIDGE WORKS 2010**

**ZERO LEAD BASED:  
(EXCLUDING CARTAGE COST)**

**PUBLISHED UNDER THE AUTHORITY OF  
THE CHIEF ENGINEER (DESIGN & PLANNING) P.W.D,  
ARUNACHAL PRADESH  
ITANAGAR**

## FOREWORD

The schedule of Rates for Roads and Bridges works under PWD, Arunachal Pradesh, was last revised in 2009.

Because of the increase in the market of road construction materials such as bitumen, stone aggregates, cement steel etc; wages of labour; and cost of POL etc, it has become necessary to revise the schedule. Hence the new **Arunachal Pradesh Works Department Schedule of Rates (Roads and Bridges) 2010** is now being brought out.

Basic structure and methodology for analysis of items are as per the Standard Data Book of the Ministry of Road Transport and Highways, Govt of India, New Delhi. The related computer programme of ministry has been deployed for undertaking the analysis. The programme will enable the department to update the schedule as and when required.

The rates adopted for factory products such as cement, steel, bitumen are based on current market rate prevailing at Guwahati. As regards quarry and forest produces, the rate prevailing at Itanagar has been adopted. Thus the work item rates are nominal rates, analysed with basic rates of material at zero lead. *For arriving at the actual works rate applicable at the given location, cartage rates derived as per prescribed methodology must be added to this nominal item rates to account for the cost of transportation of the construction materials to the work site. The user of this SOR would, therefore, be advised to add cartage costs to the nominal item rates contained herein, as would be applicable and appropriate and otherwise arrived at separately through prescribed procedure, as mentioned above.*

Although, all care has been taken to update the schedule in the best possible manner, there may be still undetected error and scope for its further improvement. All Superintending Engineers, Executive Engineers, Assistant Engineer under PWD and other works department may, therefore feel free to point out any error, or give their suggestion for further improvement and feedback on reasonability of rates while preparing estimates.

I would like to record my sincere appreciation of the efforts of Er. Tabe Doni, SE and his team of dedicated officers especially Er. C.S. Namshum, EE, Er. Chukhu Tacho, AE, Er. Kading Dai, JE and other staff in bringing out this Schedule of Rate.

Finally, I take pleasure in releasing the Arunachal **Pradesh Public Works Department Schedule of Rates (Roads and Bridges) 2010** for its official use.



(Kenjom Ete)

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## **A. Roads Works**

### **Basic Notes for Preparation of Schedule of Rates**

The basic approach for the preparation of schedule of rates for Road Works is indicated as under :

#### **Description of items**

1. The description of items is given briefly and linked with the relevant clause of the MoRT&H Specifications for Road and Bridge Works, which may be referred for detailed description, provisions and interpretation.
  
2. **Mechanical Means**  
  
Due to mechanization of construction work, rate for various items have been derived using mechanical means. However, manual means have also been provided for certain cases, where areas may be inaccessible for machines or quantum of work may not be large enough to justify use of machines.
  
3. **Overhead Charges**
  - i. Site accomodation, setting up plant, access road, water supply, electricity and general site arrangements.
  - ii. Office furniture, equipment and communications.
  - iii. Expenditure on
    - a) Corporate office of contractor
    - b) Site Supervision
    - c) Documentation and "as built" drawings
  - iv. Mobilisation/de-mobilisation of resources.
  - v. Labour camps with minimum amenities and transportation to work sites.
  - vi. Light vehicles for site supervision including administrative and managerial requirements
  - vii. Laboratory equipment and quality control including field and laboratory testing
  - viii. Minor T&P and survey instruments and setting out works, including verification of line, dimensions, trial pits and bore holes, where required
  - ix. Watch and ward
  - x. Traffic management during construction
  - xi. Expenditure on safeguarding environment
  - xii. Sundries
  - xiii. Financing Expenditure
  - xiv. Sales/Turn over tax
  - xv. Work Insurance/compensation
  
- 3.1 10 percent overhead charges has been considered in the schedule of rates

#### 4. **Contractor Profit**

10 percent of cost of works. Contractor profit is also added on overhead charges.

#### 5. **Basic Inputs**

Basic inputs are only given in the standard data book. The rates for material and labour are as per the prevailing market/govt. rates at Itanagar.

#### 6. **Plants and Equipment**

6.1 A dozer is proposed for excavation where cutting and filling for the roadway is within 100 m. For longer leads, a combination of hydraulic excavator and tipper is proposed.

6.2 Keeping in view the job and managerial factors and the age factor of machines, the output of plant and equipment is taken approximately 70 percent of the rated capacity given by manufacture under ideal conditions.

6.3 It has been assumed that a water tanker would make one trip per hour on an average. Water charges have not been included for items where the requirement is very nominal. It is assumed that the same would be covered under sundries.

6.4 Output of plant/equipment is considered for the compacted quantities.

6.5 The usage charges for machines include ownership charges, cost of repair and maintenance including replacement of tyres and running and operating charges which includes crew, fuel and lubricants.

#### 7. **Materials**

7.1 Quantities of materials considered in the rate are approximate for the purpose of estimating and include normal wastages. Actual consumption would have to be based on mix design.

7.2 Arunachal Pradesh has typical and hard terrain having different altitude, wherein maximum construction material are brought from Assam and utilised in different station located in state. Hence, to maintain the uniformity in rates, it is decided to prepare the APSR-2010 without considering any lead on materials and aggregate. ***The transportation cost shall be included in the estimate as per distance from the source of procurement of material/aggregate.*** The following sources has been adopted in the schedule 2010.

(1) All steel items/Bitumen product - Guwahati Plus Lead upto Itanagar.

(2) Cement :- Guwahati Plus Lead upto Itanagar.

(3) Bricks :- Nearest Kiln in Assam( Borgaon) Plus lead upto Itanagar.

(4) Aggregate :- At nearest Quarry / Batching plant at Itanagar

(5) Other items :- Avarage market rates fixed for Itanagar.

(6) R.C.C. Hume Pipes :- Naharlagun/Likabali or nearby source in Assam.

7.3 The alternative proposal for crushing own aggregate by installing crusher is compared with procurement of crushed aggregates from the market and proposal found economical is adopted.

7.4 The specifications of materials shall be governed by section 1000 of MoRT&H Specifications for Road and Bridge Works.

8. **Labour**

8.1 The average market rate has been adopted which are workable in the state

8.2 One mate has been provided for 25 labours

## 9. **Carriage of Materials**

9.1 The unit for vehicle for carriage has been taken as under :

- a) In hours where lead is variable. The loading and unloading for such cases have been provided separately.
- b) In tonne - km where lead is variable. The loading and unloading for such cases have been provided separately.
- c) Zero lead has been considered for the stone aggregates in order to work out the actual rates of aggregates by adding the transportation cost up to the site of work.
- d) In case of Hot Mix Plant Zero lead has been considered. The lead may be considered as per actual location of plant.

9.2 Where the quantity of material to be transported is small such as dismantled materials and the same are required to be loaded manually, provision of tractor-trolley has been made instead of tipper.

## 10. **General :**

10.1 The clause numbers refer to MoRT&H Specifications for Road and Bridges Works.

10.2 Assumptions made have been indicated in respective chapter in the form of notes, where required.

10.3 Sundries to cater for unforeseen contingency and miscellaneous items have been added in the overhead charges.

10.4 Arrangement for traffic during construction shall be as per Clause 112 of MoRT&H Specifications for Road and Bridge Works.

10.5 Contractor will make his own arrangements for borrowing earth. However, compensation for earth taken from private land has been included in the rate for construction of embankment with borrowed earth.

### 10.6 **Credit for Dismantled Material**

Credit for dismantled materials has not been included in this schedule of rates. The dismantled materials should be examined and a realistic assessment made for such materials, which can be utilised for works and to be reflected in the estimate.

10.7 The source of material and samples are required to be approved by the Engineer before start of any work.

10.8 The rates of items include cost of testing of soil, materials and works.

10.9 The use of surface by construction vehicles shall be governed by Clause 119 of MoRT&H Specifications.

10.10 The contractor shall arrange to provide and maintain an adequate equipment field laboratory as per Clause 121.

10.11 Quality Control of works shall be governed by Section 900 of MoRT&H Specifications.

10.12 The various activities of works shall also be documented by photographs and video cassettes as per Clauses 125 & 126 of MoRT&H Specifications.

- 10.13 The classification of soil shall be as per Clause 301.2 of MoRT&H Specifications.
- 10.14 The earth excavated from foundations has been considered to be backfilled and balance utilised locally for road work except in the case of marshy soil.
- 10.15 The rate for removal of unsuitable soil does not provide for replacement by suitable soil which will have to be paid separately.
- 10.16 Items for hilly terrain have been analysed separately.
- 10.17 The hire charge rates for machinery and equipment are taken from the Standard Data Book and prevailing market rate.
- 10.18 10 per cent extra cement has been provided for concreting under water, where required.
- 10.19 Grade of cement may be adopted as per mix design.
- 10.20 Quantities of cement in various grades of cement concrete have been taken as per IRC:21-2000 and IRC:18-2000.
- 10.21 The coarse and fine aggregates shall conform to IS:383.
- 10.22 For pricing of RCC slab culverts, the items given in respective chapters in bridge section may be referred.
- 10.23 Some of major steel producing firms have evolved thermo-mechanically treated steel which has enhanced strength, better corrosion resistance, ductility, weld ability and high temperature thermal resistance. Enquiries from these are made on technical specifications and use of such products considered in works based on performance in works where these have already been used.
- 10.24 In case it is decided to include the following items and their maintenance in the BOQ, the scope and specifications should be worked out and defined in a detailed manner in the tender document to avoid any dispute during execution.

MoRT&H Clause Item

- |     |   |
|-----|---|
| 120 | Site office and furniture for Engineer and his staff.                   |
| 122 | Site residential accomodation for Engineer and other supervisory staff. |
| 124 | Providing and maintaining vehicle for the Engineer.                     |

## **B. Bridge Works Basic Notes**

The basic approach for the preparation of schedule of rates for Bridge works is indicated as under :

**1. Description of items**

The description of items is given briefly and linked with relevant clause of MoRT&H's Specifications for Road and Bridge Works, which may be referred for detailed description, provisions and interpretation.

**2. Overhead Charges**

The rates include overhead charges considering the following elements -

- i. Site accommodation, setting up plant, access road, water supply, electricity and general site arrangements.
- ii. Office furniture, equipment and communications.
- iii. Expenditure on
  - a) Corporate office of contractor
  - b) Site Supervision
  - c) Documentation and "as built" drawings
- iv. Mobilisation/de-mobilisation of resources.
- v. Labour camps with minimum amenities and transportation to work sites.
- vi. Light vehicles for site supervision including administrative and managerial
- vii. Laboratory equipment and quality control including field and laboratory testing
- viii. Minor T&P and survey instruments and setting out works, including verification of line, dimensions, trial pits and bore holes, where required
- ix. Watch and ward
- x. Traffic management during construction
- xi. Expenditure on safeguarding environment
- xii. Sundries
- xiii. Financing Expenditure
- xiv. Sales/Turn over tax
- xv. Work Insurance/compensation

- 3.1 20 percent overhead charges has been considered in the schedule of rates
4. **Contractor Profit**
- 10 percent of cost of works. Contractor profit is also added on overhead charges.
5. **Basic Inputs**
- Basic inputs are only given in the standard data book. The rates for material and labour are as
6. **Plants and Equipment**
- The usage/hire charges of machinery/equipment have been worked out based upon present cost of equipments, repairs, POL and Operational charges.
7. **Materials**
- 7.1 Quantities of materials considered in the rate are approximate for the purpose of estimating and include normal wastages. Actual consumption would have to be based on mix design.
- 7.2 Arunachal Pradesh has typical and hard terrain having different altitude, wherein maximum construction material are brought from Assam and utilised in different station located in state. Hence, to maintain the uniformity in rates, it is decided to prepare the APSR-2010 without considering any lead on materials and aggregate. ***The transportation cost shall be included in the estimate as per distance from the source of procurement of material/aggregate.*** The following sources has been adopted in the schedule 2010.
- (1) All steel items/Bitumen product - Guwahati
  - (2) Cement :- Banderdewa/Bhalukpong/Likabali/Dholla/Margherita
  - (3) Bricks :- Klin in Assam nearby to Arunachal Pradesh
  - (4) Aggregate :- At quarry nearby site of work.
  - (5) Other items :- Avarage market rates fixed for all district headquarter of state.
  - (6) R.C.C. Hume Pipes :- Naharlagun/Likabali or nearby source in Assam.
- 7.3 The alternative proposal for crushing own aggregate by installing crusher is compared with procurement of crushed aggregates from the market and proposal found economical is adopted.
- 7.4 The specifications of materials shall be governed by section 1000 of MoRT&H Specifications for Road and Bridge Works.
8. **Labour**
- 8.1 The avarage market rate has been adopted which are workable in the state
- 8.2 One mate has been provided for 25 labours

9. **Carriage of Materials**

9.1 The unit for vehicle for carriage has been taken as under :

- a) In hours where lead is variable. The loading and unloading for such cases have been provided separately.
- b) In tonne - km where lead is variable. The loading and unloading for such cases have been provided separately.
- c) Zero lead has been considered for the stone aggregates in order to work out the actual rates of aggregates by adding the transportation cost up to the site of work.

10. **General :**

10.1 The clause numbers refer to MoRT&H Specifications for Road and Bridges Works.

10.2 Assumptions made have been indicated in respective chapter in the form of notes, where required.

10.3 Sundries to cater for unforeseen contingency and miscellaneous items have been added in the overhead charges.

10.4 Arrangement for traffic during construction shall be as per Clause 112 of MoRT&H Specifications for Road and Bridge Works.

10.5 Contractor will make his own arrangements for borrowing earth. However, compensation for earth taken from private land has been included in the rate for construction of embankment with borrowed earth.

10.6 **Credit for Dismantled Material**

Credit for dismantled materials has not been included in this schedule of rates. The dismantled materials should be examined and a realistic assessment made for such materials, which can be utilised for works and to be reflected in the estimate.

10.7 The source of material and samples are required to be approved by the Engineer before start of any work.

10.8 The rates of items include cost of testing of soil, materials and works.

10.9 The contractor shall arrange to provide and maintain an adequate equipment field laboratory as per Clause 121.

10.10 Quality Control of works shall be governed by Section 900 of MoRT&H Specifications.

10.11 The various activities of works shall also be documented by photographs and video cassettes as per Clauses 125 & 126 of MoRT&H Specifications.

10.12 The classification of soil shall be as per Clause 301.2 of MoRT&H Specifications.

10.13 The earth excavated from foundations has been considered to be backfilled and balance utilised locally for road work except in the case of marshy soil.

- 10.14 The rate for removal of unsuitable soil does not provide for replacement by suitable soil which will have to be paid separately.
- 10.15 The hire charge rates for machinery and equipment are taken from the Standard Data Book and prevailing market rate.
- 10.16 10 per cent extra cement has been provided for concreting under water, where required.
- 10.17 Grade of cement may be adopted as per mix design.
- 10.18 Quantities of cement in various grades of cement concrete have been taken as per IRC:21-2000 and IRC:18-2000.
- 10.19 The coarse and fine aggregates shall conform to IS:383.
- 10.20 Some of major steel producing firms have evolved thermo-mechanically treated steel which has enhanced strength, better corrosion resistance, ductility, weld ability and high temperature thermal resistance. Enquiries from these are made on technical specifications and use of such products considered in works based on performance in works where these have already been used.
- 10.21 In case it is decided to include the following items and their maintenance in the BOQ, the scope and specifications should be worked out and defined in a detailed manner in the tender document to avoid any dispute during execution.

11. **Guide Bund**

- 11.1 The item for the guide bund are excavation, embankment and protection works.
- 11.2 In case bridge construction works are to be done on wide and deep water channels in major rivers provision of floating barrages etc. for taking the construction materials and equipments inside water shall be made separately.
- 11.3 The item for sinking of wells cover diameters from 6 m to 12 and Twin D Type and size 12 m x 6 m. For other shapes like rectangular or any other size, the rates of sinking may be worked out on pro-rata basis.
- 11.4 The lift for casting of concrete in well steining may be 2 to 2.5 m restricting the free fall of concrete to 1.5 m and concreting layer to 450 mm.

MoRT&H Clause	Item
120	Site office and furniture for Engineer and his staff.
122	Site residential accommodation for Engineer and other supervisory staff.
124	Providing and maintaining vehicle for the Engineer.

**LEAD CHART FOR CARRIAGE OF MATERIALS TO VARIOUS DESTINATIONS IN  
ARUNACHAL PRADESH FROM GUWAHATI**

**ALONG CIRCLE**

1	Guwahati to Along	= 671 Km
2	Guwahati to Yomcha	= 758 Km
3	Guwahati to Rungong	= 701 Km
4	Guwahati to Mechuka	= 921 Km

**BASAR CIRCLE**

1	Guwahati to Basar	= 621 Km
2	Guwahati to Dumporijo	= 736 Km
3	Guwahati to Daporijo	= 745 Km

**BOLENG CIRCLE**

1	Guwahati to Pasighat	= 620 Km
2	Guwahati to Boleng	= 710 Km
3	Guwahati to Yingkiang	= 785 Km
4	Guwahati to Mariyang	= 837 Km

**JAIRAMPUR CIRCLE**

1	Guwahati to Jairampur	= 587 Km
2	Guwahati to Changlang	= 589 Km
3	Guwahati to Khonsa	= 633 Km
4	Guwahati to Longding	= 685 Km

**TEZU CIRCLE**

1	Guwahati to Namsai	= 545 Km
2	Guwahati to Tezu	= 602 Km
3	Guwahati to Roing via Makum	= 587 Km
4	Guwahati to Hayuliang	= 702 Km
5	Guwahati to Anini	= 821 Km

**RUPA CIRCLE**

1	Guwahati to Bordila	= 364 Km
2	Guwahati to Tawang	= 545 Km
3	Guwahati to Jung	= 505 Km
4	Guwahati to Kalakang	= 398 Km

**BOBIA CIRCLE**

1	Guwahati to Seppa	= 410 Km
2	Guwahati to Bameng	= 462 Km
3	Guwahati to Sagalee	= 468 Km

**NAHARLAGUN CIRCLE**

1	Guwahati to Ziro	= 531 Km
2	Guwahati to Sangram	= 616 Km
3	Guwahati to Doimukh	= 397 Km

**CAPITAL CIRCLE**

1	Guwahati to Itanagar	= 410 Km
2	Guwahati to Naharlagun	= 400 Km
3	Guwahati to Banderdewa	= 380 Km

## Carriage Analysis for Plain Road

Carriage of materials by mechanical transport from Gauhati to Banderdewa including loading ,unloading and stacking in measurable stacks as per direction of Engineer in Charge.

Av. Lead(L)	380.00 KM			
Av. Speed(S)	30.00 KM	Capacity of Truck=		9.00 MT
Numbers of Trips(N)	= $\frac{8}{\frac{2L}{S} + 1}$	= $\frac{8}{\frac{760}{30.00} + 1}$	=	<b>0.304 Trips</b>
Number of km done	= 2 NL+6	2 x 115.52 + 6	=	237.04 KM
Diesel consumption	= @3.50 KM/Ltr			
	= $\frac{237.04}{3.50}$	= 67.73 ltr		
		<b>@ 36.97 /ltr</b>	=	<b>2503.98</b>
Mobile consumption	= @140.00 KM/Ltr			
	= $\frac{237.04}{140.00}$	= 1.69 ltr		
		<b>@ 190.00 /ltr</b>	=	<b>321.10</b>
Cost of Labour Male	= 5 Nos	x Rs. 200.00 /Each	=	<b>1000.00</b>
Hire charges of truck/day			=	<b>3500.00</b>
				<b>7325.08</b>
Add 10% contractor profit			41	732.51
				<b>8057.59</b>
Cost per Trip---	$\frac{8057.59}{0.304}$		Rs	<b>Rs. 26505.23</b>
Cost per MT	$\frac{26505.23}{9.00 \text{ MT}}$		Rs	<b>Rs. 2945.03</b>
Cost per KM per MT	$\frac{2945.025556}{380.00 \text{ KM}}$			<b>Rs. 7.75</b>
	<b>Cost per KM per MT=</b>	<b>Rs. 7.75</b>		

## Carriage Analysis for Hill Road

Carriage of materials by mechanical transport from Likabali to Migging including loading ,unloading and stacking in measurable stacks as per direction of Engineer in Charge.

Av. Lead(L)	401.00 KM			
Av. Speed(S)	20.00 KM	Capacity of Truck=		6.00 MT
Numbers of Trips(N)	= $\frac{8}{\frac{2L}{S} + 1}$	= $\frac{8}{\frac{802}{20.00} + 1}$	=	<b>0.195 Trips</b>
Number of km done	= 2 NL+6	2 x 78.20 + 6	=	162.39 KM
Diesel consumption	= @3.50 KM/Ltr			
	= $\frac{162.39}{3.50}$	= 46.40 ltr		
		<b>@ 36.97 /ltr</b>	=	<b>1715.41</b>
Mobile consumption	= @140.00 KM/Ltr			
	= $\frac{162.39}{140.00}$	= 1.16 ltr		
		<b>@ 190.00 /ltr</b>	=	<b>220.40</b>
Cost of Labour Male	=	5Nos x	<b>Rs. 200.00 /Each</b>	= <b>1000.00</b>
Hire charges of truck/day				<b>3500.00</b>
				<b>6435.81</b>
Add 10% contractor profit			4	643.58
				<b>7,079.39</b>
Cost per Trip---	$\frac{7079.39}{0.195}$			Rs <b>Rs. 36304.56</b>
Cost per MT	$\frac{36304.56}{6.00 MT}$			Rs <b>Rs. 6050.76</b>
Cost per KM per MT	$\frac{6050.76}{401.00 KM}$			<b>Rs. 15.09</b>
	<b>Cost per KM per MT=</b>			<b>Rs. 15.09</b>

**CARRIAGE OF MATERIALS BY MECHANICAL TRANSPORT**  
(INCLUDING LOADING, UNLOADING AND STACKING)

Lead in Km (L)	Average speed (S)	Number of trips (N) =8/(2L/S)+1	Number of KM done (2NL+6)	Diesel consumption (Litre)	Cost of Diesel @ Rs. 36.97 per Litre (Litre)	Mobil oil consumption (Litre)	Cost of Mobil oil @ Rs. 190.00 per Litre (Litre)	Cost of labour (male) 5 Nos. @ Rs. 200.00 +1/6 for P.H.	Hire Charges of truck per day	Total Cost (C6+C8 C9+C10)	Cost per trip (C11/C3)	Increase in cost per Km over previous Km	Avg. cost per addl.Km after 1st (5Km, 10Km, 20Km)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	16.00	7.11	20.22	4.04	149.36	0.144	27.36	1166.67	2160.00	3503.39	492.66	-	
2	17.00	6.48	31.90	6.38	235.87	0.228	43.32	1166.67	2160.00	3605.86	556.79	64.13	
3	17.50	5.96	41.74	8.35	308.7	0.298	56.62	1166.67	2160.00	3691.99	619.73	62.94	
4	18.00	5.54	50.31	10.06	371.92	0.359	68.21	1166.67	2160.00	3766.80	680.12	60.39	
5	18.50	5.19	57.93	11.58	428.11	0.414	78.66	1166.67	2160.00	3833.44	738.2	58.08	
6	19.00	4.90	64.84	12.96	479.13	0.463	87.97	1166.67	2160.00	3893.77	794.12	55.92	
7	19.50	4.66	71.19	14.25	526.82	0.509	96.71	1166.67	2160.00	3950.20	848.28	54.16	
8	20.00	4.44	77.11	15.41	569.71	0.550	104.5	1166.67	2160.00	4000.88	900.2	51.92	52.33
9	20.50	4.26	82.68	16.54	611.48	0.591	112.29	1166.67	2160.00	4050.44	950.87	50.67	
10	21.00	4.10	87.95	17.60	650.67	0.629	119.51	1166.67	2160.00	4096.85	999.83	48.96	
11	21.50	3.95	92.99	18.58	686.9	0.664	126.16	1166.67	2160.00	4139.73	1046.97	47.14	
12	22.00	3.83	97.83	19.58	723.87	0.699	132.81	1166.67	2160.00	4183.35	1093.38	46.41	
13	22.50	3.71	102.49	20.49	757.52	0.732	139.08	1166.67	2160.00	4223.27	1137.94	44.56	
14	23.00	3.61	107.02	21.36	789.68	0.763	144.97	1166.67	2160.00	4261.32	1181.13	43.19	
15	23.50	3.51	111.42	22.26	822.95	0.795	151.05	1166.67	2160.00	4300.67	1223.86	42.73	
16	24.00	3.43	115.71	23.15	855.86	0.827	157.13	1166.67	2160.00	4339.66	1265.73	41.87	42.23
17	24.50	3.35	119.91	23.98	886.54	0.856	162.64	1166.67	2160.00	4375.85	1306.06	40.33	
18	25.00	3.28	124.03	24.82	917.6	0.886	168.34	1166.67	2160.00	4412.61	1345.85	39.79	
19	25.50	3.21	128.08	25.60	946.43	0.914	173.66	1166.67	2160.00	4446.76	1384.16	38.31	
20	26.00	3.15	132.06	26.40	976.01	0.943	179.17	1166.67	2160.00	4481.85	1422.13	37.97	
21	26.50	3.09	135.99	27.16	1004.11	0.969	184.11	1166.67	2160.00	4514.89	1458.82	36.69	
22	27.00	3.04	139.86	27.95	1033.31	0.998	189.62	1166.67	2160.00	4549.60	1495.47	36.65	
23	27.50	2.99	143.69	28.71	1061.41	1.025	194.75	1166.67	2160.00	4582.83	1531.08	35.61	
24	28.00	2.95	147.47	29.52	1091.35	1.054	200.26	1166.67	2160.00	4618.28	1566.92	35.84	
25	28.50	2.90	151.22	30.20	1116.49	1.079	205.01	1166.67	2160.00	4648.17	1600.36	33.44	34.40
26	29.00	2.86	154.94	30.94	1143.85	1.105	209.95	1166.67	2160.00	4680.47	1634.13	33.77	
27	29.50	2.83	158.62	31.76	1174.17	1.134	215.46	1166.67	2160.00	4716.30	1668.69	34.56	
28	30.00	2.79	162.28	32.46	1200.05	1.159	220.21	1166.67	2160.00	4746.93	1700.98	32.29	
29	30.50	2.76	165.91	33.22	1228.14	1.186	225.34	1166.67	2160.00	4780.15	1733.78	32.8	
30	31.00	2.73	169.52	33.96	1255.5	1.216	231.04	1166.67	2160.00	4813.21	1766.14	32.36	

**CARRIAGE OF MATERIALS BY MECHANICAL TRANSPORT**  
(INCLUDING LOADING, UNLOADING AND STACKING)

Sl. No.	Material	Capacity (Net)	Unit of Rate	1 Km	2 Km	3 Km	4 Km	5 Km	Beyond 5 Km upto 10 Km addl. per Km	Beyond 10 Km upto 20 Km addl. per Km	Beyond 20 Km upto 30 Km addl. per Km	Beyond 30 Km addl. per Km
	Cost per trip			492.66	556.79	619.73	680.12	738.2	52.33	42.23	34.40	34.40
1.	Sand, Lime, Shingle, Aggreagte, Earth, Surkhi, Moorum, Excavated rock and Kerb stone	3.50	Cu.m.	140.76	159.08	177.07	194.32	210.91	14.95	12.07	9.83	9.83
	Add CPOH @ 10%			14.08	15.91	17.71	19.43	21.09	1.5	1.21	0.98	0.98
	Total			154.84	174.99	194.78	213.75	232	16.45	13.28	10.81	10.81
2.	Timber, Bamboo and Ballie	4	Cu.m.	123.17	139.2	154.93	170.03	184.55	13.08	10.56	8.6	8.6
	Add CPOH @ 10%			12.32	13.92	15.49	17	18.46	1.31	1.06	0.86	0.86
	Total			135.49	153.12	170.42	187.03	203.01	14.39	11.62	9.46	9.46
3.	Cement, Steel, Angle and Tee Channel	7	Ton	70.38	79.54	88.53	97.16	105.46	7.48	6.03	4.91	4.91
	Add CPOH @ 10%			7.04	7.95	8.85	9.72	10.55	0.75	0.6	0.49	0.49
	Total			77.42	87.49	97.38	106.88	116.01	8.23	6.63	5.4	5.4
4.	Bricks	1500	1000	328.44	371.19	413.15	453.41	492.13	34.88	28.15	22.93	22.93
	Add CPOH @ 10%			32.84	37.12	41.32	45.34	49.21	3.49	2.82	2.29	2.29
	Total			361.28	408.31	454.47	498.75	541.34	38.37	30.97	25.22	25.22
5.	Tar, Bitumen and Firewood	5	Ton	98.53	111.36	123.95	136.02	147.64	10.47	8.45	6.88	6.88
	Add CPOH @ 10%			9.85	11.14	12.4	13.6	14.76	1.05	0.85	0.69	0.69
	Total			108.38	122.5	136.35	149.62	162.4	11.52	9.3	7.57	7.57
6.	Stone for masonry & soling	3.50	Cu.m.	140.76	159.08	177.07	194.32	210.91	14.95	12.07	9.83	9.83
	Add CPOH @ 10%			14.08	15.91	17.71	19.43	21.09	1.5	1.21	0.98	0.98
	Total			154.84	174.99	194.78	213.75	232	16.45	13.28	10.81	10.81
7.	SW Pipe											
	a) 100 mm dia.	480	100 m	102.64	116	129.11	141.69	153.79	10.9	8.8	7.17	7.17
	Add CPOH @ 10%			10.26	11.6	12.91	14.17	15.38	1.09	0.88	0.72	0.72
	Total			112.9	127.6	142.02	155.86	169.17	11.99	9.68	7.89	7.89
	b) 150 mm dia.	240	100 m	205.28	232	258.22	283.38	307.58	21.8	17.6	14.33	14.33
	Add CPOH @ 10%			20.53	23.2	25.82	28.34	30.76	2.18	1.76	1.43	1.43
	Total			225.81	255.2	284.04	311.72	338.34	23.98	19.36	15.76	15.76

**CARRIAGE OF MATERIALS BY MECHANICAL TRANSPORT**  
(INCLUDING LOADING, UNLOADING AND STACKING)

Sl. No.	Material	Capacity (Net)	Unit of Rate	1 Km	2 Km	3 Km	4 Km	5 Km	Beyond 5 Km upto 10 Km addl. per Km	Beyond 10 Km upto 20 Km addl. per Km	Beyond 20 Km upto 30 Km addl. per Km	Beyond 30 Km addl. per Km
	Cost per trip			492.66	556.79	619.73	680.12	738.2	52.33	42.23	34.40	34.40
	c) 200 mm dia.	135	100 m	364.93	412.44	459.06	503.79	546.81	38.76	31.28	25.48	25.48
	Add CPOH @ 10%			36.49	41.24	45.91	50.38	54.68	3.88	3.13	2.55	2.55
	Total			401.42	453.68	504.97	554.17	601.49	42.64	34.41	28.03	28.03
	d) 230 mm dia.	105	100 m	469.20	530.28	590.22	647.73	703.05	49.83	40.22	32.76	32.76
	Add CPOH @ 10%			46.92	53.03	59.02	64.77	70.31	4.98	4.02	3.28	3.28
	Total			516.12	583.31	649.24	712.50	773.36	54.81	44.24	36.04	36.04
	e) 250 mm dia.	84	100 m	586.50	662.85	737.77	809.67	878.81	62.29	50.27	40.95	40.95
	Add CPOH @ 10%			58.65	66.29	73.78	80.97	87.88	6.23	5.03	4.10	4.10
	Total			645.15	729.14	811.55	890.64	966.69	68.52	55.3	45.05	45.05
	f) 300 mm dia.	66	100 m	746.45	843.62	938.98	1030.48	1118.48	79.28	63.98	52.12	52.12
	Add CPOH @ 10%			74.65	84.36	93.9	103.05	111.85	7.93	6.40	5.21	5.21
	Total			821.10	927.98	1032.88	1133.53	1230.33	87.21	70.38	57.33	57.33
	g) 350 mm dia.	48	100 m	1026.38	1159.98	1291.1	1416.92	1537.92	109.01	87.98	71.67	71.67
	Add CPOH @ 10%			102.64	116	129.11	141.69	153.79	10.9	8.8	7.17	7.17
	Total			1129.02	1275.98	1420.21	1558.61	1691.71	119.91	96.78	78.84	78.84
	h) 400 mm dia.	33	100 m	1492.91	1687.24	1877.97	2060.97	2236.97	158.56	127.97	104.25	104.25
	Add CPOH @ 10%			149.29	168.72	187.8	206.1	223.7	15.86	12.8	10.43	10.43
	Total			1642.20	1855.96	2065.77	2267.07	2460.67	174.42	140.77	114.68	114.68
	i) 450 mm dia.	27	100 m	1824.67	2062.19	2295.3	2518.96	2734.07	193.8	156.41	127.41	127.41
	Add CPOH @ 10%			182.47	206.22	229.53	251.90	273.41	19.38	15.64	12.74	12.74
	Total			2007.14	2268.41	2524.83	2770.86	3007.48	213.18	172.05	140.15	140.15
	j) 500 mm dia.	24	100 m	2052.75	2319.96	2582.21	2833.83	3075.83	218.03	175.96	143.34	143.34
	Add CPOH @ 10%			205.28	232	258.22	283.38	307.58	21.8	17.6	14.33	14.33
	Total			2258.03	2551.96	2840.43	3117.21	3383.41	239.83	193.56	157.67	157.67
	k) 600 mm dia.	18	100 m	2737.00	3093.28	3442.94	3778.44	4101.11	290.7	234.61	191.12	191.12
	Add CPOH @ 10%			273.70	309.33	344.29	377.84	410.11	29.07	23.46	19.11	19.11
	Total			3010.70	3402.61	3787.23	4156.28	4511.22	319.77	258.07	210.23	210.23
8.	RC Pipes, AC Pipes, Hume, Steel and CI Pipe											
	a) 100 mm dia.	292.80	100 m	168.26	190.16	211.66	232.28	252.12	17.87	14.42	11.75	11.75
	Add CPOH @ 10%			16.83	19.02	21.17	23.23	25.21	1.79	1.44	1.18	1.18
	Total			185.09	209.18	232.83	255.51	277.33	19.66	15.86	12.93	12.93
	b) 125 mm dia.	219.60	100 m	224.34	253.55	282.21	309.71	336.16	23.83	19.23	15.67	15.67
	Add CPOH @ 10%			22.43	25.36	28.22	30.97	33.62	2.38	1.92	1.57	1.57
	Total			246.77	278.91	310.43	340.68	369.78	26.21	21.15	17.24	17.24

**CARRIAGE OF MATERIALS BY MECHANICAL TRANSPORT**  
(INCLUDING LOADING, UNLOADING AND STACKING)

Sl. No.	Material	Capacity (Net)	Unit of Rate	1 Km	2 Km	3 Km	4 Km	5 Km	Beyond 5 Km upto 10 Km addl. per Km	Beyond 10 Km upto 20 Km addl. per Km	Beyond 20 Km upto 30 Km addl. per Km	Beyond 30 Km addl. per Km
	Cost per trip			492.66	556.79	619.73	680.12	738.2	52.33	42.23	34.40	34.40
	c) 150 mm dia.	183	100 m	269.21	304.26	338.65	371.65	403.39	28.59	23.08	18.80	18.8
	Add CPOH @ 10%			26.92	30.43	33.87	37.17	40.34	2.86	2.31	1.88	1.88
	Total			296.13	334.69	372.52	408.82	443.73	31.45	25.39	20.68	20.68
	d) 200 mm dia.	109.80	100 m	448.69	507.09	564.42	619.42	672.31	47.66	38.46	31.33	31.33
	Add CPOH @ 10%			44.87	50.71	56.44	61.94	67.23	4.77	3.85	3.13	3.13
	Total			493.56	557.8	620.86	681.36	739.54	52.43	42.31	34.46	34.46
	e) 250 mm dia.	80.52	100 m	611.85	691.49	769.66	844.66	916.79	64.99	52.45	42.72	42.72
	Add CPOH @ 10%			61.19	69.15	76.97	84.47	91.68	6.5	5.25	4.27	4.27
	Total			673.04	760.64	846.63	929.13	1008.47	71.49	57.70	46.99	46.99
	f) 300 mm dia.	62.22	100 m	791.8	894.87	996.03	1093.09	1186.44	84.1	67.87	55.29	55.29
	Add CPOH @ 10%			79.18	89.49	99.6	109.31	118.64	8.41	6.79	5.53	5.53
	Total			870.98	984.36	1095.63	1202.4	1305.08	92.51	74.66	60.82	60.82
	g) 350 mm dia.	43.92	100 m	1121.72	1267.74	1411.04	1548.54	1680.78	119.14	96.15	78.33	78.33
	Add CPOH @ 10%			112.17	126.77	141.1	154.85	168.08	11.91	9.62	7.83	7.83
	Total			1233.89	1394.51	1552.14	1703.39	1848.86	131.05	105.77	86.16	86.16
	h) 400 mm dia.	32.94	100 m	1495.63	1690.32	1881.39	2064.72	2241.04	158.85	128.2	104.44	104.44
	Add CPOH @ 10%			149.56	169.03	188.14	206.47	224.1	15.89	12.82	10.44	10.44
	Total			1645.19	1859.35	2069.53	2271.19	2465.14	174.74	141.02	114.88	114.88
	i) 450 mm dia.	25.62	100 m	1922.95	2173.26	2418.93	2654.64	2881.34	204.24	164.83	134.27	134.27
	Add CPOH @ 10%			192.3	217.33	241.890	265.46	288.13	20.42	16.48	13.43	13.43
	Total			2115.25	2390.59	2660.82	2920.1	3169.47	224.66	181.31	147.7	147.7
	j) 600, 700, 750, 800, 18.30		100 m	2692.13	3042.57	3386.50	3716.5	4033.88	285.93	230.77	187.98	187.98
	900, 1200 mm dia.			269.21	304.26	338.65	371.65	403.39	28.59	23.08	18.80	18.8
	Add CPOH @ 10%			269.21	304.26	338.65	371.65	403.39	28.59	23.08	18.80	18.8
	Total			2961.34	3346.83	3725.15	4088.15	4437.27	314.52	253.85	206.78	206.78

**(A) Usage Rates of Plant and Machinery**

Sl. No.	Description of Machine	Activity	Output of Machine	Output	Unit	Rate
P&M-001	Air Compressor	General Purpose	capacity in cfm	170/250	hour	469
P&M-002	Batching and Mixing Plant (a) 30 cum capacity	Concrete Mixing	cum/hour	20	hour	2218
P&M-003	Batching and Mixing Plant (b) 15 - 20 cum capacity	Concrete Mixing	cum/hour	13	hour	1848
P&M-004	Bitumen Pressure Distributor	Applying bitumen tack coat	sqm/hour	1750	hour	1067
P&M-005	Bitumen Boiler oil fired	Bitumen Spraying	capacity in litre	1500	hour	197
P&M-006	Concrete Paver Finisher with 40 HP Motor	Paving of concrete surface	cum / hour	20	hour	2657
P&M-007	Concrete Pump of 45 & 30 cum capacity	Pumping of concrete	cum / hour	33 / 22	hour	254
P&M-008	Concrete Bucket	For Pouring concrete	capacity in cum	1	hour	15
P&M-009	Concrete Mixer (a) 0.4/0.28 cum	Concrete Mixing	cum/hour	2.5	hour	220
P&M-010	Concrete Mixer (b) 1 cum	Concrete Mixing	cum/hour	7.5	hour	220
P&M-011	Crane (a) 80 tonnes	Lifting Purpose			hour	1271
P&M-012	Cranes b) 35 tonnes	Lifting Purpose			hour	847
P&M-013	Cranes c) 3 tonnes	Lifting Purpose			hour	354
P&M-014	Dozer D - 80 - A 12	Spreading /Cutting / Clearing	cum/hour	300/ 150/250	hour	3286
P&M-015	Dozer D - 50 - A 15	Spreading /Cutting / Clearing	cum/hour	200/ 120/150	hour	2393
P&M-016	Emulsion Pressure Distributor	Applying emulsion tack coat	sqm/hour	1750	hour	794
P&M-017	Front End loader 1 cum bucket capacity	Soil loading / Aggregate loading	cum/hour	60 /25	hour	1139
P&M-018	Generator (a) 125 KVA	Genration of electric Energy	KVA	100	hour	715
P&M-019	Generator( b) 63 KVA	Genration of electric Energy	KVA	50	hour	495
P&M-020	GSB Plant 50 cum	Producing GSB	cum/hour	40	hour	1032
P&M-021	Hotmix Plant - 120 TPH capacity	DBM/BM/SDC/ Premix	cum/hour	40	hour	23254
P&M-022	Hotmix Plant - 100 TPH capacity	DBM/BM/SDC/ Premix	cum/hour	30	hour	17197
P&M-023	Hotmix Plant - 60 to 90 TPH capacity	DBM/BM/SDC/ Premix	cum/hour	25	hour	13752
P&M-024	Hotmix Plant - 40 to 60 TPH capacity	DBM/BM/SDC/ Premix	cum/hour	17	hour	11011
P&M-025	Hydraulic Chip Spreader	Surface Dressing	sqm/hour	1500	hour	2618
P&M-026	Hydraulic Excavator of 1 cum bucket	Soil Ordinary/Soil Marshy / Soil Unsuitable	cum/hour	60 /60 /60	hour	1428
P&M-027	Integrated Stone Crusher 100THP	Crushing of Spalls	TPH	100	hour	8609
P&M-028	Integrated Stone Crusher 200 HP	Crushing of Spalls	TPH	200	hour	18110
P&M-029	Kerb Casting Machine	Kerb Making	Rm/hour	80	hour	308
P&M-030	Mastic Cooker	Mastic Wearing coat	capacity in tonne	1	hour	62
P&M-031	Mechanical Broom Hydraulic	Surface Cleaning	sqm/hour	1250	hour	354
P&M-032	Motor Grader 3.35 mtr blade	Clearing /Spreading /GSB /WBM	cum/hour	200/200/50/50	hour	2379
P&M-033	Mobile slurry seal equipment	Mixing and laying slurry seal	sqm/hour	2700	hour	1001
P&M-034	Paver Finisher Hydrostatic with sensor control 100 TPH	Paving of DBM/ BM/SDC/ Premix	cum/hour	40	hour	2657
P&M-035	Paver Finisher Mechanical 100 TPH	Paving of WMM /Paving of DLC	cum/hour	40/30	hour	968
P&M-036	Piling Rig with Bantonite Pump	0.75 m dia to 1.2 m dia Boring attachment	Rm/hour	2 to 3	hour	5429
P&M-037	Pneumatic Road Roller	Rolling of Asphalt Surface	cum/hour	25	hour	1235
P&M-038	Pneumatic Sinking Plant	Pneumatic Sinking of wells	cum/hour	1.5 to 2.00	hour	4143
P&M-039	Pot Hole Repair Machine	Repair of potholes	cum/hour	4	hour	901
P&M-040	Prestressing Jack with Pump & access	Stressing of steel wires/stands			hour	128
P&M-041	Ripper	Scarifying	cum/hour	60	hour	28
P&M-042	Rotavator	Scarifying	cum/hour	25	hour	17
P&M-043	Road marking machine	Road marking	Sqm/hour	100	hour	92
P&M-044	Smooth Wheeled Roller 8 tonne	Soil Compaction /BM Compaction	cum/hour	70/25	hour	458
P&M-045	Tandem Road Roller	Rolling of Aspalt Surface	cum/hour	30	hour	1136
P&M-046	Tipper - 5 cum	Transportation of soil, GSB, WMM, Hotmix etc.	Capacity in cum	5.5	km	28
P&M-047	Tipper - 5 cum	Transportation of soil, GSB, WMM, Hotmix etc.	Capacity in cum	5.5	tonne.km	0
P&M-048	Tipper - 5 cum	Transportation of soil, GSB, WMM, Hotmix etc.	Capacity in cum	5.5	hour	554
P&M-049	Transit Mixer 4.0/4.5 cum	Transportation of Concrete Mix to site	cum/hour	4.5	hour	924
P&M-050	Transit Mixer 4/4.5 cum	Transportation of Concrete Mix to site	cum/hour	4.5	tonne.km	0

P&M-051	Transit Mixer 3.0 cum	Transportation of Concrete Mix to site	cum/hour	3	hour	847
P&M-052	Transit Mixer 3.0 cum	Transportation of Concrete Mix to site	cum/hour	3	tonne.km	0
P&M-053	Tractor	Pulling	capacity in HP	50	hour	388
P&M-054	Tractor with Rotevator	Rate of Tractor + Rotevator			hour	333
P&M-055	Tractor with Ripper	Rate of Tractor 6+ Ripper			hour	343
P&M-056	Truck 5.5 cum per 10 tonnes	Material Transport	capacity/cum	4.5	km	22
P&M-057	Truck 5.5 cum per 10 tonnes	Material Transport	capacity/cum	4.5	hour	444
P&M-058	Truck 5.5 cum per 10 tonnes	Material Transport	capacity/cum	4.5	tonne.km	22
P&M-059	Three wheel 80-100 kN Statis Roller	Earth or soil / GSB / WBM	cum/hour	100/60/60	hour	598
P&M-060	Water Tanker	Water Transport	capacity in KL	6	hour	444
P&M-061	Water Tanker	Water Transport	capacity in KL	6	km	22
P&M-062	Wet Mix Plant 60 TPH	Wet Mix	cum/hour	25	hour	1197
<b>Sl. No.</b>	<b>Description of Machine</b>				<b>Unit</b>	<b>Rate</b>
P&M-063	Air compressor with pneumatic chisel attachment for cutting hard clay.				hour	517
P&M-064	Batch type cold mixing plant 100-120 TPH capacity producing an average output of 75 tonne per hour				hour	17050
P&M-065	Belt conveyor system				hour	1650
P&M-066	Boat to carry atleast 20 persons				hour	1650
P&M-067	Cement concrete batch mix plant @ 20 cum per hour (effective output)				hour	2882
P&M-068	Cement concrete batch mix plant @ 75 cum per hour				hour	3850
P&M-069	Cold milling machine @ 20 cum per hour				hour	input
P&M-070	Crane 5 tonne capacity				hour	605
P&M-071	Crane 10 tonne capacity				hour	627
P&M-072	Crane 15 tonne capacity				hour	660
P&M-073	Crane 20 tonne capacity				hour	715
P&M-074	Crane 40 T capacity				hour	880
P&M-075	Crane with grab 0.75 cum capacity				hour	660
P&M-076	Compressor with guniting equipment along with accessories				hour	660
P&M-077	Drum mix plant for cold mixes of appropriate capacity but not less than 75 tonnes/hour.				hour	330
P&M-078	Epoxy Injection gun				hour	2750
P&M-079	Generator 33 KVA				hour	370
P&M-080	Generator 100 KVA				hour	693
P&M-081	Generator 250 KVA				hour	825
P&M-082	Induction, deinduction and erection of plant and equipment including all components and accessories for pneumatic method of well sinking.				hour	input
P&M-083	Joint Cutting Machine with 2-3 blades (for rigid pavement)				hour	88
P&M-084	Jack for Lifting 40 tonne lifting capacity.				day	input
P&M-085	Piling rig Including double acting pile driving hammer (Hydraulic rig)				hrs	5429
P&M-086	Plate compactor				hour	275
P&M-087	Snow blower equipment 140 HP @ 600 cum per hour				hour	input
P&M-088	Texturing machine (for rigid pavement)				hour	220
P&M-089	Truck Trailor 30 tonne capacity				hour	input
P&M-090	Truck Trailor 30 tonne capacity				t.km	input
P&M-091	Tunnel Boring machine				hour	input
P&M-092	Vibrating Pile driving hammer complete with power unit and accessories.				hour	input
P&M-093	Wet Mix Plant 100 TPH				hour	1650
P&M-094	Wet Mix Plant 75 TPH					1320

<b>(B) Labour</b>			
<b>Sl. No.</b>	<b>Description of Labour</b>	<b>Unit</b>	<b>Rate</b>
L-01	Blacksmith (IInd class)	day	250
L-02	Blacksmith (1st class)/ Welder/ Plumber/ Electrician	day	300
L-03	Blaster (Stone cutter)	day	250
L-04	Carpenter I Class	day	300
L-05	Chiseller (Head Mazdoor)	day	250
L-06	Driller (Jumper)	day	250
L-07	Diver	day	300
L-08	Fitter	day	300
L-09	Mali	day	250
L-10	Mason (IInd class)	day	250
L-11	Mason (1st class)	day	300
L-12	Mate / Supervisor	day	250
L-13	Mazdoor	day	200
L-14	Mazdoor/Dresser (Semi Skilled)	day	250
L-15	Mazdoor/Dresser/Sinker (Skilled)	day	300
L-16	Medical Officer	day	250
L-17	Operator(grouting)	day	300
L-18	Painter I class	day	300
L-19	Para medical personnel	day	250
<b>(C) Materials</b>			
<b>Sl. No.</b>	<b>Description</b>	<b>Unit</b>	<b>Rate</b>
M-001	Stone Boulder of size 150 mm and below at Cruser Plant	cum	468
M-002	Supply of quarried stone 150 - 200 mm size for Hand Broken at site	cum	440
M-003	Boulder with minimum size of 300 mm for Pitching at Site	cum	385
M-004	Coarse sand at Mixing Plant	cum	490
M-005	Coarse sand at Site	cum	490
M-006	Fine sand at Site	cum	490
M-007	Moorum at Site	cum	165
M-008	Gravel/Quarry spall at Site	Cum	400
M-009	Granular Material or hard murrum for GSB works at Site	Cum	340
M-010	Granular Material or hard murrum for GSB works at Mixing Plant	Cum	165
M-011	Fly ash conforming to IS: 3812 ( Part II & I) atHMP Plant / Batching Plant / Crushing Plant	Cum	input
M-012	Filler media/Filter Material as per Table 300-3 (MoRT&H Specification)	Cum	957

	Description	Unit	Rate at Plant	Rate at Site
M-013	Close graded Granular sub-base Material 53 mm to 9.5 mm	cum	700	700
M-014	Close graded Granular sub-base Material 37.5 mm to 9.5 mm	cum	750	750
M-015	Close graded Granular sub-base Material 26.5 mm to 9.5 mm	cum	550	550
M-016	Close graded Granular sub-base Material 9.5 mm to 4.75 mm	cum	600	600
M-017	Close graded Granular sub-base Material 9.5 mm to 2.36 mm	cum	580	580
M-018	Close graded Granular sub-base Material 4.75mm to 2.36 mm	cum	500	500
M-019	Close graded Granular sub-base Material 4.75mm to 75 micron mm		480	480
M-020	Close graded Granular sub-base Material 2.36 mm	cum	440	440
M-021	Stone crusher dust finer than 3mm with not more than 10% passing 0.075 sieve.	cum	460	460
M-022	Coarse graded Granular sub-base Material 2.36 mm & below	cum	460	460
M-023	Coarse graded Granular sub-base Material 4.75mm to 75 micron mm		500	500
M-024	Coarse graded Granular sub-base Material 4.75 mm to 2.36 mm	cum	500	500
M-025	Coarse graded Granular sub-base Material 9.5 mm to 4.75 mm	cum	550	550
M-026	Coarse graded Granular sub-base Material 26.5 mm to 4.75 mm	cum	600	600
M-027	Coarse graded Granular sub-base Material 26.5 mm to 9.5 mm	cum	650	650
M-028	Coarse graded Granular sub-base Material 37.5 mm to 9.5 mm	cum	700	700
M-029	Coarse graded Granular sub-base Material 53 mm to 26.5mm	cum	750	750
M-030	Aggregates below 5.6 mm	cum	1640	1640
M-031	Aggregates 22.4 mm to 2.36 mm	cum	775	775
M-032	Aggregates 22.4 mm to 5.6 mm	cum	1365	1365
M-033	Aggregates 45 mm to 2.8 mm	cum	540	540
M-034	Aggregates 45 mm to 22.4 mm	cum	750	750
M-035	Aggregates 53 mm to 2.8 mm	cum	600	600
M-036	Aggregates 53 mm to 22.4 mm	cum	660	726
M-037	Aggregates 63 mm to 2.8 mm	cum	575	575
M-038	Aggregates 63 mm to 45 mm	cum	640	704
M-039	Aggregates 90 mm to 45 mm	cum	620	682
M-040	Aggregates 10 mm to 5 mm	cum	1590	1749
M-041	Aggregates 11.2 mm to 0.09 mm	cum	850	850
M-042	Aggregates 13.2 mm to 0.09 mm	cum	715	715
M-043	Aggregates 13.2 mm to 5.6 mm	cum	1500	1500
M-044	Aggregates 13.2 mm to 10 mm	cum	1125	1238
M-045	Aggregates 20 mm to 10 mm	cum	1300	1300
M-046	Aggregates 25 mm to 10 mm	cum	1250	1250
M-047	Aggregates 19 mm to 6 mm	cum	1365	1365
M-048	Aggregates 37.5 mm to 19 mm	cum	850	850
M-049	Aggregates 37.5 mm to 25 mm	cum	750	750
M-050	Aggregates 6 mm nominal size	cum	1640	1640
M-051	Aggregates 10 mm nominal size	cum	1500	1650
M-052	Aggregates 13.2/12.5 mm nominal size	cum	970	1067
M-053	Aggregates 20 mm nominal size	cum	660	726
M-054	Aggregates 25 mm nominal size	cum	650	715
M-055	Aggregates 40 mm nominal size	cum	540	594

Sl. No.	Description	Unit	Rate
M-056	AC pipe 100 mm dia	metre	28
M-057	Acrylic polymer bonding coat	litre	110
M-058	Alluminium Paint	litre	275
M-059	Aluminium alloy plate 2mm Thick	sqm	input
M-060	Aluminium alloy/galvanised steel	tonne	38500
M-061	Aluminium sheeting fixed with encapsulated lens type reflective sheeting including 2% towards lettering, cost of angle iron, cost of drilling holes, nuts, bolts etc.and signs as applicable	sqm	132
M-062	Aluminium studs 100 x 100 mm fitted with lense reflectors	nos	440
M-063	Barbed wire	kg	42
M-064	Bearing (Cost of parts)	nos	input
M-065	Bearing (Cast steel rocker bearing assembly of 250 tonne )	nos	275000
M-066	Bearing (Elastomeric bearing assembly consisting of 7 internal layers of elastomer bonded to 6 nos. internal reinforcing steel laminates by the process of vulcanisation,)	nos	13200
M-067	Bearing (Forged steel roller bearing of 250 tonne)	nos	242000
M-068	Bearing (Pot type bearing assembly consisting of a metal piston supported by a disc, PTFE pads providing sliding surfaces against stainless steel mating together with cast steel assemblies/fabricated structural steel assemblies duly painted with all components)	nos	55000
M-069	Bearing (PTFE sliding plate bearing assembly of 80 tonnes )	nos	165000
M-070	Bearing (Supply of sliding plate bearing of 80 tonne)	nos	13200
M-071	Bentonite	kg	2.25
M-072	Binding wire	kg	70
M-073	Bitumen ( Cationic Emulsion )	tonne	32575
M-074	Bitumen (60-70 grade)	tonne	37830
M-075	Bitumen (80-100 grade )	tonne	36878
M-076	Bitumen (Cutback )	tonne	35855.00
M-077	Bitumen (emulsion)	tonne	35417
M-078	Bitumen (modified graded)	tonne	40210
M-079	Brick	each	6.50
M-080	C.I.shoes for the pile	kg	50
M-081	Cement	tonne	7989
M-082	Cold twisted bars (HYSD Bars)	tonne	38219
M-083	Coller for joints 300 mm dia	nos	115
M-084	Compressible Fibre Board(20mm thick)	sqm	620
M-085	Connectors/ Staples	each	50
M-086	Copper Plate(12m long x 250mmwide)	kg	600
M-087	Corrosion resistant Structural steel	tonne	45
M-088	Corrugated sheet, 0.63 mm thick, "Thrie" beam section railing	kg	55
M-089	Credit for excavated rock found suitable for use	cum	210
M-090	Curing compound	liter	45
M-091	Delineators from ISI certified firm as per the standard drawing given in IRC - 79	each	input
M-092	Earth Cost or compensation for earth taken from private land	cum	0
M-093	Elastomeric slab seal expansion joint assembly manufactured by using chloroprene, elastomer for elastomeric slab unit conforming to clause 915.1 of IRC: 83 (part II),	metre	9000
M-094	Electric Detonators @ 1 detonator for 1/2 gelatin stick of 125 gms each	100 nos	900
M-095	Epoxy compound with accessories for preparing epoxy mortar	kg	200
M-096	Epoxy mortar	kg	input
M-097	Epoxy primer	kg	110
M-098	Epoxy resin-hardner mix for prime coat	kg	90
M-099	Flag of red color cloth 600 x 600 mm	each	55
M-100	Flowering Plants	each	12
M-101	Galvanised MS flat clamp	nos	30
M-102	Galvanised steel wire crates of mesh size 100 mm x 100 mm woven with 4mm dia. GI wire in rolls of required size.	sqm	155
M-103	Galvanised structural steel plate 200 mm wide, 6 mm thick, 24 m long	kg	180
M-104	Gelatin 80%	kg	135
M-105	Geo grids	sqm	input
M-106	Geomembrane	sqm	input
M-107	Geonets	sqm	input
M-108	Geotextile	sqm	25
M-109	Geotextile filter fabric	sqm	input

M-110	GI bolt 10 mm Dia	nos	35
M-111	Grouting pump with agitator	hour	150
M-112	Grass (Doob)	kg	12
M-113	Grass (Fine)	kg	12
M-114	HDPE pipes 75mm dia	metre	35
M-115	HDPE pipes 90mm dia	metre	input
M-116	Hedge plants	each	7
M-117	Helical pipes 600mm diameter	metre	1050
M-118	Hot applied thermoplastic compound	litre	100
M-119	HTS strand	tonne	58000
M-120	Joint Sealant Compound	kg	275
M-121	Jute netting, open weave, 2.5 cm square opening for seeding and Mulching	sqm	12
M-122	LDO for steam curing	litre	37
M-123	M.S. Clamps	nos	50
M-124	M.S. Clamps	kg	200
M-125	M.S.shoes @ 35 Kg per pile of 15 m	kg	46
M-126	<b>Tor Steel bars</b>	<b>tonne</b>	<b>38219</b>
M-127	Modular strip/box seal expansion joint including anchorage catering to a horizontal movement beyond 70 mm and upto 140mm assembly comprising of edge beams, central beam,2 modules chloroprene seal, anchorage elements, support and control system, all steel sections protected against corrosion and installed by the manufacturer or his authorised representative	metre	190000
M-128	Modular strip/box seal expansion joint catering to a horizontal movement beyond 140mm and upto 210mm box/box seal joint assembly containing 3 modules/cells and comprising of edge beams, two central beams, chloroprene seal, anchorage elements, support and control system, all steel sections protected against corrosion and installed by the manufacturer or his authorised representative	metre	210000
M-129	Nipples 12mm	nos	25
M-130	Nuts and bolts	kg	50
M-131	Paint	litre	180
M-132	Pavement Marking Paint	litre	160
M-133	Paving Fabric	sqm	input
M-134	Perforated geosynthetic pipe 150 mm dia	metre	input
M-135	Perforated pipe of cement concrete, internal dia 100 mm	metre	78
M-136	Pesticide	kg	280
M-137	Pipes 200 mm dia, 2.5 m long for drainage	metre	input
M-138	Plastic sheath, 1.25 mm thick for dowel bars	sqm	0.8
M-139	Plastic tubes 50 cm dia, 1.2 m high	nos	input
M-140	Polymer braids	metre	input
M-141	Pre moulded Joint filler,25 mm thick for expansion joint.	sqm	500
M-142	Pre-coated stone chips of 13.2 mm nominal size	cum	950
M-143	Preformed continuous chloroprene elastomer or closed cell foam sealing element with high tear strength, vulcanised in a single operation for the full length of a joint to ensure water tightness.	metre	4000
M-144	Pre-moulded asphalt filler board	sqm	55
M-145	Pre-packed cement based polymer concrete of strength 45 Mpa at 28 days	kg	30
M-146	Primer	kg	155
M-147	Quick setting compound	kg	46
M-148	Random Rubble Stone	cum	470
M-149	RCC Pipe NP 2 heavy duty non pressure pipe 1000 mm dia	metre	775
M-150	RCC Pipe NP 2 heavy duty non pressure pipe 1200 mm dia	metre	1050
M-151	RCC Pipe NP 2 heavy duty non pressure pipe 300 mm dia	metre	385
M-152	Reflectorising glass beads	kg	80
M-153	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Copper Strips)	metre	input
M-154	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Galvanised carbon steel strips)	metre	input
M-155	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Glass reinforced polymer/fibre reinforced polymer/polymeric strips)	metre	input
M-156	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Stainless steel strips)	metre	input
M-157	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. Aluminium strips)	metre	input
M-158	Rivets	each	0.8
M-159	Sand bags (Cost of sand and Empty cement bag)	nos	8
M-160	Sapling 2 m high 25 mm dia	each	80
M-161	Scrap tyres of size 900 x 20	nos	110
M-162	Seeds	kg	275
M-163	Selected earth	cum	165

M-164	Separation Membrane of impermeable plastic sheeting 125 micron thick		sqm	25
M-165	Sheathing duct		metre	90
M-166	Shrubs		each	10
M-167	Sludge / Farm yard manure @ 0.18 cum per 100 sqm at site of work for turfing		cum	110
M-168	Sodium vapour lamp		each	1650
M-169	Square Rubble Coursed Stone		cum	470
M-170	Steel circular hollow pole of standard specification for street lighting to mount light at 5 m height above deck level		each	5000
M-171	Steel circular hollow pole of standard specification for street lighting to mount light at 9 m height above road level		each	8250
M-172	Steel drum 300 mm dia 1.2 m high/empty bitumen drum		nos	55
M-173	Steel helmet and cushion block on top of pile head during driving.		kg	165
M-174	Steel pipe 25 mm external dia as per IS:1239		metre	175
M-175	Steel pipe 50 mm external dia as per IS:1239		metre	350
M-176	Steel wire rope 20 mm		kg	222.60
M-177	Steel wire rope 40 mm		kg	201.15
M-178	Strip seal expansion join		metre	11000
M-179	Structural Steel		tonne	45219
M-180	Super plastisizer admixture IS marked as per 9103-1999		kg	50
M-181	Synthetic Geogrids as per clause 3102.8 and approved design and specifications.		sqm	input
M-182	Through and bond stone		each	12
M-183	Tie rods 20mm diameter		nos	225
M-184	Tiles size 300 x 300 mm and 25 mm thick		each	input
M-185	Timber		cum	14000
M-186	Traffic cones with 150 mm reflective sleeve		nos	1200
M-187	Tube anchorage set complete with bearing plate, permanent wedges etc		nos	3800
M-188	Unstaked lime		tonne	10500
M-189	Water		KL	55
M-190	Water based cement paint		litre	70
M-191	Welded steel wire fabric		kg	40
M-192	Wire mesh 50mm x 50mm size of 3mm wire		kg	132
M-193	Wooden ballies 2" Dia for bracing		each	35
M-194	Wooden ballies 8" Dia and 9 m long		each	450
M-195	Wooden packing		cum	3300
M-196	Wooden staff for fastening of flag 25 mm dia, one m long		each	55
	Overheads for Road Works	10 %		
	Contractors profit for Road Works	10 %		
	Overheads for Bridge Works	20 %		
	Overheads for Bridge Works (Rehabilitation)	10 %		
	Contractors profit for Bridge Works	10 %		
	Lead from Mixing Plant to working site		0 km	
	Lead for E/W borrow area to site		3 km	
	Lead for fly ash from source to site		50 km	

Items No.	Summary of Rates calculated and used for analysis of rates of other items	Unit	Rate
Item 8.3	Printing new letter and figures of any shade (ii) English Roman	per cm height per letter	0.40
Item 8.8	Painting Two Coats on New Concrete Surfaces	sqm	56.90
Item 8.9	Painting angle iron post two coats	sqm	53.32
Item 12.6 (B)	Cement mortar 1:2 (Excluding OH & CP)	cum	6,014.00
Item 12.6 (A)	Cement mortar 1:3 (Excluding OH & CP)	cum	4,779.00
Item 12.6 (D)	Cement mortar 1:6 (Excluding OH & CP)	cum	3,146.00
Item 12.7 (A)	Course Rubble masonry in cement mortar 1:3 (including OH & CP)	cum	3,799.00
Item 12.7 (Addl) B)	Random Rubble masonry in cement mortar 1:6 (including OH & CP)	cum	3,740.21
Item 12.8 (A)	PCC Grade M15 including OH & CP for Open Foundation by Mixer	cum	5,055.00
Item 12.8 (A)	PCC Grade M15 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	3,683.00
Item 12.8 (B) PCC	PCC Grade M20 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	4,288.00
Item 12.8 (C)	RCC Grade M20 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	4,529.00
Item 12.8 (C) RCC	RCC Grade M20 including OH & CP for Open Foundation by Batching Plant	cum	5,849.00
Item 12.8 (C)	RCC Grade M20 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,261.00
Item 12.8 (D)	PCC Grade M25 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	4,565.00
Item 12.8 (D)	PCC Grade M25 including OH & CP for Open Foundation by Batching Plant	cum	6,142.00
Item 12.8 (D)	PCC Grade M25 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,485.00
Item 12.8 (E)	RCC Grade M25 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	4,976.00
Item 12.8 (E)	RCC Grade M25 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,789.00
Item 12.8 (F)	PCC Grade M30 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	4,778.00
Item 12.8 (F)	PCC Grade M30 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,528.00
Item 12.8 (G)	RCC Grade M30 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	5,003.00
Item 12.8 (G)	RCC Grade M30 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,736.00
Item 12.8 (H)	RCC Grade M35 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	5,125.00
Item 12.8 (H)	RCC Grade M35 including OH & CP for Open Foundation by Batching Plant	cum	5,061.00
Item 12.8 (H)	RCC Grade M35 excluding OH & CP for Open Foundation by Batching Plant	cum	6,605.00
Item 12.8 (H)	RCC Grade M35 for Open Foundation Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,914.00
Item 12.11 (C) i	PCC Grade M20 for Open Foundation (Bottom Plug) Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	4,700.00
Item 12.11 (C) i	PCC Grade M20 for Open Foundation (Bottom Plug) Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,505.00
Item 12.11 (C) ii	PCC Grade M25 for Open Foundation (Bottom Plug) Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	4,945.00
Item 12.11 (C) ii	PCC Grade M25 for Open Foundation (Bottom Plug) Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,747.00
Item 12.11 (C) iii	PCC Grade M30 for Open Foundation (Bottom Plug) Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	4,993.00
Item 12.11 (C) iii	PCC Grade M30 for Open Foundation (Bottom Plug) Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,798.00
Item 12.11 (C) iv	PCC Grade M35 for Open Foundation (Bottom Plug) Per Cum Basic Cost of Labour, Material & Machinery by Mixer	cum	5,105.00
Item 12.11 (C) iv	PCC Grade M35 including OH & CP for Well Foundation (Bottom Plug) by Batching Plant	cum	6,778.00
Item 12.11 (C) iv	PCC Grade M35 for Open Foundation (Bottom Plug) Per Cum Basic Cost of Labour, Material & Machinery by Batching Plant	cum	4,907.00
Item 12.11 (F) iv	PCC Grade M35 including OH & CP for Well Foundation (Well Cap) by Batching Plant	cum	6,605.00
Item No. 3.13	Excavation for Structures (Manual Means)	cum	203.00
Item No. 3.13	Excavation for Structures (Mechanical Meanse)	cum	41.00
Item 14.1(A)	RCC Grade M20 for super-structure including OH & CP by Batching Plant	cum	6,670.00
Item 14.1(B)	RCC Grade M20 for super-structure including OH & CP by Batching Plant	cum	7,413.00
Item 14.1(E)	RCC Grade M20 for super-structure including OH & CP by Batching Plant	cum	936,974.28
Item 14.1(C)	RCC Grade M30 for super-structure including formwork and excluding OH & CP by Batching Plant	cum	7,507.00
Item 14.1(C)	RCC Grade M30 for super-structure excluding formwork and excluding OH & CP by Batching Plant	cum	5,687.00
Item 14.2 A	Supplying ,fitting and placing HYSD bar reinforcement in super-structure exncluding OH & CP	tonne	8.00
Item 13.6	Supplying, fitting and placing HYSD including OH & CP for sub-structure	tonne	56,146.13
Item 5.17	Fog Seal	sqm	38.00
Item 5.21 Case-I	Crack Prevention courses. Case-I Stress Absorbing Membrane (SAM) crack width less than 6 mm	sqm	67.00
Item 5.21 Case-II	Crack Prevention courses. Case-II Stress Absorbing Membrane (SAM) with crack width 6 mm to 9 mm	sqm	77.00
Item 5.21 Case-IV	Crack Prevention courses. Case-III Stress Absorbing Membrane (SAM) crack width above 9 mm and cracked area above 50 %	sqm	101.00
Item 5.21 Case-IV	Crack Prevention courses. Case-IV Bitumen Impregnated Geotextile	sqm	84.00
Item 5.15 Case-I	Slurry Seal Case-I 5 mm thickness	sqm	70.00
Item 5.15 Case-II	Slurry Seal Case-II 3 mm thickness	sqm	42.00
Item 5.15 Case-III	Slurry Seal Case III 1.5 mm thickness	sqm	26.00
Item 5.9 Case-I	Surface Dressing Case-I 19 mm nominal chipping size	sqm	74.00
Item 5.9 Case-II	Surface Dressing Case-II 13 mm nominal size chipping	sqm	65.00

**CHAPTER - 1**  
**CARRIAGE OF MATERIALS**

***Preamble:***

- 1 The rate analysis of loading and unloading of various items include stacking.
- 2 The rate analysis for loading and unloading has been given both by manual and mechanical means. Means of loading/unloading appropriate to the work and site is to be adopted.
- 3 The rate analysis for haulage of materials has been made in terms of tonne-kilometre (t.km) for ease of adoption depending upon the lead in km and load in tonnes.
- 4 The cost of carriage will vary depending upon the riding surface of the road. Provision has accordingly been made considering surfaced roads, unsurfaced gravel roads and katcha tracks.
- 5 Analysis for carriage of materials is exclusive of the loading, unloading and stacking and this has to be added as applicable.
- 6 Carriage of materials if done by boats shall be paid at the same rates as given for carriage of materials by road.

**CHAPTER-1**  
**CARRIAGE OF MATERIALS**

<i>Item No.</i>	<i>Descriptions</i>	<i>Unit</i>	<i>Rate</i>
1.1	<i>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)</i>	cum	122.90
1.2	<i>Loading and Unloading of Boulders by Manual Means</i>	cum	130.45
1.3	<i>Loading and Unloading of Cement or Steel by Manual Means and stacking.</i>	tonne	158.25
1.4	<i>Cost of Haulage Excluding Loading and Unloading</i>		
(i)	<i>Surfaced Road</i>	tonne. km	4.65
(ii)	<i>Unsurfaced Gravelled Road</i>	tonne. km	5.55
(iii)	<i>Katcha Track and Track in river bed / nallah bed and choe bed.</i>	tonne. km	11.20

## Chapter – 2

### SITE CLEARANCE

#### **Preamble:**

- 1 Unless otherwise stated, the rates include sorting and disposal of unserviceable material and stacking of serviceable material with all lifts and upto a lead of 1000 m.
- 2 The rates include Tools & Plants (T&P) and scaffolding required for items of dismantling.
- 3 Carriage of dismantled materials, bushes, branches of tree, etc. has been catered with a tractor-trolley of 3 tonnes capacity with manual loading and unloading @ 2 trips per hour within a lead of 1000 m. This will be economical for such works as compared with a tipper.
- 4 The dismantling of structures has been catered both by manual and mechanical means. The Engineer can use his discretion depending upon quantum of work and particular site conditions.
- 5 Rate analysis for removing of stumps and roots has also been provided separately.
- 6 Dismantling of Hume pipes has been catered manually as pipes can be easily rolled by men to a suitable stacking place within the right-of-way.
- 7 For dismantling of structures, which remain submerged in water, the cost may be enhanced by 50 per cent. If site conditions warrant lowering of water level to facilitate dismantling, the cost may be enhanced by additional 25 per cent.
- 8 Dismantling of utilities, like, water supply lines, electric and telephone lines is required to be done under the supervision of concerned departments with prior information to the user public.
- 9 In certain items of dismantling, like, pipe culverts, utilities, etc. excavation in earth and dismantling of masonry works is not included in this analysis for which suitable notes have been inserted in respective Chapters. These items are required to be priced separately based on actual quantities at site and nature of work.
- 10 The dismantled materials should be examined and a realistic assessment and provision should be made after due process for the salvage value for such materials, which can be utilized for works or auctioned.
- 11 In case where lead for disposal is more than 1000 m, extra cost of carriage is required to be added based on tonne-kilometerage as per Chapter 1.
- 12 All minor Tools & Plants (T&P) items required for dismantling have been considered to have been included in overhead charges.

**CHAPTER-2**  
**SITE CLEARANCE**

2.1	<i>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>		
(i)	<i>Girth from 300 mm to 600 mm</i>	each	198.20
(ii)	<i>Girth from 600 mm to 900 mm</i>	each	370.75
(iii)	<i>Girth from 900 mm to 1800 mm</i>	each	696.00
2.2	<i>Clearing Grass and Removal of Rubbish</i>	hectare	12705.00
2.3	<i>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 stackin 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.)</i>		
(i)	<i>By Manual Means:-</i>		
A	<i>In area of light jungle</i>	hectare	38584.50
B	<i>In area of thorny jungle</i>	hectare	51758.95
(ii)	<i>By Mechanical Means</i>		
A	<i>In area of light jungle</i>	hectare	41246.50
B	<i>In area of thorny jungle</i>	hectare	49941.55
2.4	<i>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&amp;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>		
(i)	<i>Lime /Cement Concrete</i>		
I	<i>By Manual Means</i>		
A	<i>Lime Concrete, cement concrete grade M-10 and below</i>	cum	304.70
B	<i>Cement Concrete Grade M-15 &amp; M-20</i>	cum	355.50
C	<i>Prestressed / Reinforced cement concrete grade M-20 &amp; above</i>	cum	887.90
II	<i>By Mechanical Means for items No. 202( b) &amp; ( c)</i>		
A	<i>Cement Concrete Grade M-15 &amp; M-20</i>	cum	519.30

<i>B</i>	<i>Prestressed / Reinforced cement concrete grade M-20 &amp; above</i>	cum	848.20
<i>(ii)</i>	<i>Dismantling Brick / Tile work</i>		
<i>A</i>	<i>In lime mortar</i>	cum	203.05
<i>B</i>	<i>In cement mortar</i>	cum	253.90
<i>C</i>	<i>In mud mortar</i>	cum	182.70
<i>D</i>	<i>Dry brick pitching or brick soling</i>	cum	172.55
<i>(iii)</i>	<i>Dismantling Stone Masonry</i>		
<i>A</i>	<i>Rubble stone masonry in lime mortar</i>	cum	223.40
<i>B</i>	<i>Rubble stone masonry in cement mortar.</i>	cum	253.90
<i>C</i>	<i>Rubble Stone Masonry in mud mortar.</i>	cum	203.05
<i>D</i>	<i>Dry rubble masonry</i>	cum	192.90
<i>E</i>	<i>Dismantling stone pitching/ dry stone spalls.</i>	cum	182.70
<i>F</i>	<i>Dismantling boulders laid in wire crates including opening of crates and stacking dismantled materials.</i>	cum	203.05
<i>(iv)</i>	<i>Wood work wrought framed and fixed in frames of trusses upto a height of 5 m above plinth level</i>	cum	454.70
<i>(v)</i>	<i>Steel work in all types of sections upto a height of 5 m above plinth level excluding cutting of rivet.</i>		
<i>A</i>	<i>Including dismembering</i>	tonne	1115.40
<i>B</i>	<i>Excluding dismembering.</i>	tonne	830.15
<i>C</i>	<i>Extra over item No(V) A and(V) B for cutting rivets.</i>	tonne	8.15
<i>(vi)</i>	<i>Scraping of bricks dismantled from brick work including stacking.</i>		
<i>A</i>	<i>In lime/Cement mortar</i>	1000 numbers	889.35
<i>B</i>	<i>In mud mortar</i>	1000 numbers	317.60
<i>(vii)</i>	<i>Scraping of Stone from dismantled stone masonry</i>		
<i>A</i>	<i>In cement and lime mortar</i>	cum	356.95
<i>B</i>	<i>In Mud mortar</i>	cum	75.60
<i>(viii)</i>	<i>Scarping plaster in lime or cement mortar from brick/ stone masonry</i>	sqm	11.65
<i>(ix)</i>	<i>Removing all type of hume pipes and stacking within a lead of 1000 metres including earthwork and dismantling of masonry works.</i>		
<i>A</i>	<i>Up to 600 mm dia</i>	metre	131.90
<i>B</i>	<i>Above 600 mm to 900 mm dia</i>	metre	178.50
<i>C</i>	<i>Above 900 mm</i>	metre	305.50

2.5	<b>Dismantling of Flexible Pavements</b> (Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately)		
<i>I</i>	<b>By Manual Means</b>		
<i>A</i>	<b>Bituminous courses</b>	cum	559.55
<i>B</i>	<b>Granular courses</b>	cum	409.05
<i>II</i>	<b>By Mechanical Means</b>		
<i>A</i>	<b>Bituminous course</b>	cum	261.10
2.6	<b>Dismantling of Cement Concrete Pavement</b> (Dismantling of cement concrete pavement by mechanical means using pneumatic tools, breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately)	cum	1143.10
2.7	<b>Dismantling Guard Rails</b> (Dismantling guard rails by manual means and disposal of dismantled material with all lifts and up to a lead of 1000 metres, stacking serviceable materials and unserviceable materials separately.)	metre	61.60
2.8	<b>Dismantling Kerb Stone</b> (Dismantling kerb stone by manual means and disposal of dismantled material with all lifts and up to a lead of 1000 metre)	metre	13.30
2.9	<b>Dismantling Kerb Stone channel</b> (Dismantling kerb stone channel by manual means and disposal of dismantled material with all lifts and up to a lead of 1000 metre)	metre	20.00
2.10	<b>Dismantling Kilometre Stone</b> (Dismantling of kilometre stone including cutting of earth, foundation and disposal of dismantled material with all lifts and lead upto 1000 m and back filling of pit.)		
<i>A</i>	<b>5th KM stone</b>	each	291.25
<i>B</i>	<b>Ordinary KM Stone</b>	each	174.00
<i>C</i>	<b>Hectometre Stone</b>	each	34.80
2.11	<b>Dismantling of Fencing</b> (Dismantling of barbed wire fencing/ wire mesh fencing including posts, foundation concrete, back filling of pit by manual means including disposal of dismantled material with all lifts and up to a lead of 1000 metres, stacking serviceable material and unserviceable material separately. )	metre	37.15

2.12	<b><i>Dismantling of CI Water Pipe Line</i></b> (Dismantling of CI water pipe line 600 mm dia including disposal with all lifts and lead upto 1000 metres and stacking of serviceable material and unserviceable material separately under supervision of concerned department)	metre	95.05
2.13	<b><i>Removal of Cement Concrete Pipe of Sewer Gutter</i></b> (Removal of cement concrete pipe of sewer gutter 1500 mm dia under the supervision of concerned department including disposal with all lifts and up to a lead of 1000 metres and stacking of serviceable and unserviceable material separately but excluding earth excavation and dismantling of masonry works.)	metre	139.20
2.14	<b><i>Removal of Telephone / Electric Poles and Lines</i></b> (Removal of telephone / Electric poles including excavation and dismantling of foundation concrete and lines under the supervision of concerned department, disposal with all lifts and up to a lead of 1000 metres and stacking the serviceable and unserviceable material separately)	each	133.20

## Chapter – 3

### EARTHWORK, EROSION CONTROL AND DRAINAGE

#### Preamble:

- 1 The rates have been analysed using mechanical means. Manual means for certain items have also been provided which can be used for areas inaccessible to machines and also for small jobs.
- 2 In the rate analyses of earthwork, compacted volume of earth has been considered.
- 3 Cutting of earth by dozer has been proposed where the cut earth can be utilized for filling for embankment within a lead upto 100 m.
- 4 Where lead for transporting of earth is more than 100 m, excavator and tipper have been provided.
- 5 The rate caters for disposal of unsuitable soil only upto a distance of 1 km. The cost of transportation beyond the initial lead of 1 km will be paid separately based on tonne-kilometerage.
- 6 The replacement of unsuitable soil by suitable soil shall be provided separately in the estimate. The rate analysis for removal of unsuitable soil does not provide for replacement by suitable soil.
- 7 In cases where embankment is constructed with earth taken from roadway, the cost of depositing the earth at the site of embankment is already included in the disposal of excavated earth and, therefore, the input of dozer for spreading earth can be deleted.
- 8 For narrow and restricted areas, plate compactor has been proposed for compaction to achieve the desired density.
- 9 In case excavated rock is found suitable for incorporation in works, suitable credit for the available rock shall be given.
- 10 For excavation of structures refer to Chapter 11 dealing with items of Foundation.
- 11 The possibility of using the blasted rock fragments for backfilling behind structures or backfilling of foundation pits or filling in medians/separators or use in service road shall be examined before proposing disposal of excavated rock.
- 12 For inhabited areas, controlled blasting with limited charges of explosives has been provided. This involves smaller drill holes and additional requirement of electric detonators. Provision has been made accordingly.
- 13 Any work involved for crossing of water courses for irrigation purpose, etc. will be priced under respective items, like, excavation, grubbing, clearing, etc. for which rate analysis have separately been made.
- 14 Earth excavated from drains can be used in roadway berms. Hence carriage for disposal of same is not provided.
- 15 In case of rock fill embankment, it is assumed that material is available at site from rock cutting.

**CHAPTER-3**  
**EARTH WORK, EROSION CONTROL AND DRAINAGE**

<b>3.1</b>	<b><i>Excavation in Soil by Manual Means.</i></b> <i>(Excavation for roadway in soil using manual means including loading in truck for carrying of cut earth to embankment site with all lifts and lead upto 1000 metres.)</i>	cum	140.05
<b>3.2</b>	<b><i>Excavation in ordinary rock by manual means</i></b> <i>(Excavation in ordinary rock using manual means including loading in a truck and carrying of excavated material to embankment site with in all lifts and leads upto 1000 metres)</i>	cum	193.00
<b>3.3</b>	<b><i>Excavation in Soil with Dozer with lead upto 100 metres</i></b> <i>(Excavation for road way in soil by mechanical means including cutting and pushing the earth to site of embankment upto a distance of 100 metres (average lead 50 metres), including trimming bottom and side slopes in accordance with requirements of lines, grades and cross sections.)</i>	cum	135.35
<b>3.4</b>	<b><i>Excavation in Ordinary Rock with Dozer with lead upto 100 metres</i></b> <i>(Excavation for roadway in ordinary rock by deploying a dozer, 80 HP including cutting and pushing the cut earth to site of embankment upto a distance of 100 metres ( average lead 50 metres), trimming bottom and side slopes in accordance with the requirements of lines, grades and cross sections.)</i>	cum	227.95

3.5	<b>Excavation in Hard Rock (requiring blasting) with disposal upto 1000 metres</b> (Excavation for roadway in hard rock (requiring blasting) 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 )	cum	192.85
3.6	<b>Excavation in Soil using Hydraulic Excavator CK 90 and Tippers with disposal upto 1000 metres.</b> (Excavation for roadwork in soil with hydraulic excavator of 0.9 cum bucket capacity including cutting and loading in tippers, trimming bottom and side slopes, in accordance with requirements of lines, grades and cross sections, and transporting to the embankment location within all lifts and lead upto 1000m)	cum	60.00
3.7	<b>Excavation in Ordinary Rock using Hydraulic Excavator CK-90 and Tippers with disposal upto 1000 metres.</b> (Excavation for roadway in ordinary rock with hydraulic excavator of 0.9 cum bucket capacity including cutting and loading in tippers, transporting to em	cum	76.05
3.8	<b>Excavation in Hard Rock (blasting prohibited)</b> (Excavation for roadway in hard rock (blasting prohibited) with rock breakers including breaking rock, loading in tippers and disposal within all lifts and lead upto 1000 metres, trimming bottom and side slopes in accordance with requirements of lines, grades and cross sections.)		
<b>A</b>	<b>Mechanised</b>	cum	352.55
<b>B</b>	<b>Manual Method</b>	cum	743.90

3.9	<b>Excavation in Hard Rock (controlled blasting) with disposal upto 1000 metres</b> (Excavation for roadway in hard rock with controlled blasting 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 )	cum	245.35
3.10	<b>Excavation in Marshy Soil</b> (Excavation for roadway in marshy soil with hydraulic excavator 0.9 cum bucket capacity including cutting and loading in tippers and disposal with in all lifts and lead upto 1000 metres, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections.)	cum	66.75
3.11	<b>Removal of Unserviceable Soil with Disposal upto 1000 metres</b> (Removal of unserviceable soil including excavation, loading and disposal upto 1000 metres lead but excluding replacement by suitable soil which shall be paid separately as per clause 305.)	cum	60.65
3.12	<b>Pre-splitting of Rock Excavation Slopes</b> (Carrying out excavation in hard rock to achieve a specified slope of the rock face by controlled use of explosives and blasting accessories in properly aligned and spaced drill holes, collection of the excavated rock by a 80 HP dozer, loading in tipper by a front end loader and disposing of the material with all lifts and lead upto 1000 m, all as specified in clause No. 303)	sqm	133.80

3.13	<b>Excavation for Structures</b> (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work.)		
(i)	<b>Ordinary soil</b>		
A	<b>Manual Means (Depth upto 3 m)</b>	cum	203.30
B	<b>Mechanical Means (Depth upto 3 m)</b>	cum	41.35
(ii)	<b>Ordinary rock (not requiring blasting)</b>		
A	<b>Manual Means (Depth upto 3 m)</b>	cum	254.10
B	<b>Mechanical Means</b>	cum	55.05
(iii)	<b>Hard rock (requiring blasting)</b>		
A	<b>Manual Means</b>	cum	454.20
(iv)	<b>Hard rock (blasting prohibited)</b>		
A	<b>Mechanical Means</b>	cum	694.55
(v)	<b>Marshy soil</b>		
A	<b>Manual means (upto 3 m depth)</b>	cum	479.30
B	<b>Mechanical Means</b>	cum	210.20
3.14	<b>Scarifying Existing Granular Surface to a Depth of 50 mm by Manual Means</b> (Scarifying the existing granular road surface to a depth of 50 mm and disposal of scarified material within all lifts and leads upto 1000 metres.)	sqm	20.55
3.15	<b>Scarifying existing bituminous surface to a depth of 50 mm by mechanical means</b> (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.)	sqm	5.25

3.16	<b>Embankment Construction with Material Obtained from Borrow Pits</b> (Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2)	cum	265.30
3.17	<b>Construction of Embankment with Material Deposited from Roadway Cutting</b> (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)	cum	94.65
3.18	<b>Construction of Subgrade and Earthen Shoulders</b> (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 300-2)	cum	309.10

<b>3.19</b>	<b>Compacting Original Ground</b>		
<i>Case-I</i>	<i>Compacting original ground supporting subgrade (Loosening of the ground upto a level of 500 mm below the subgrade level, watered, graded and compacted in layers to meet requirement of table 300-2 for subgrade construction.)</i>	cum	51.55
<i>Case-II</i>	<i>:Compacting original ground supporting embankment</i>	cum	20.30
<b>3.20</b>	<b>Stripping and Storing Top Soil</b> (Stripping, storing of top soil by road side at 15 m internal and re-application on embankment slopes, cut slopes and other areas in localities where the available embankment material is not conducive to plant growth)	cum	166.80
<b>3.21</b>	<b>Stripping, storing and re-laying top soil from borrow areas in agriculture fields.</b> (Stripping of top soil from borrow areas located in agriculture fields, storing at a suitable place, spreading and re-laying after taking the borrow earth to maintain fertility of the agricultural field, finishing it to the required levels and satisfaction of the farmer.)	cum	81.20
<b>3.22</b>	<b>Turfing with Sods</b> (Furnishing and laying of the live sods of perennial turf forming grass on embankment slope, verges or other locations shown on the drawing or as directed by the engineer including preparation of ground, fetching of rods and watering)	sqm	31.30

3.23	<b>Seeding and Mulching</b> (Preparation of seed bed on previously laid top soil, furnishing and placing of seeds, fertilizer, mulching material, applying bituminous emulsion at the rate of 0.23 litres per sqm and laying and fixing jute netting, including watering for 3 months all as per clause 308)	sqm	100.95
3.24	<b>Surface Drains in Soil</b> (Construction of unlined surface drains of average cross sectional area 0.40 sqm in soil to specified lines, grades, levels and dimensions to the requirement of clause 301 and 309. Excavated material to be used in embankment within a lead of 50 metres (average lead 25 metres))		
<b>A</b>	<b>Mechanical means</b>	metre	63.35
<b>B</b>	<b>Manual Means</b>	metre	51.80
3.25	<b>Surface Drains in Ordinary Rock</b> (Construction of unlined surface drain of average cross sectional area 0.4 sqm in ordinary rock to specified lines, grades, levels and dimensions as per approved design and to the requirement of clause 301 to 309. Excavated material to be used in embankment at site.)		
<b>A</b>	<b>Mechanical Means</b>	metre	128.45
<b>B</b>	<b>Manual Means</b>	metre	76.25
3.26	<b>Surface Drains in Hard Rock</b> (Rate per metre may be worked out based on quantity of hard rock as per design.)		

3.27	<p><b>Sub Surface Drains with Perforated Pipe</b>  <i>(Construction of subsurface drain with perforated pipe of 100 mm internal diameter of metal/ asbestos cement/ cement concrete/PVC, closely jointed, perforations ranging from 3 mm to 6 mm depending upon size of material surrounding the pipe, with 150 mm bedding below the pipe and 300 mm cushion above the pipe, cross section of excavation 450 x 550 mm. Excavated material to be utilised in roadway at site )</i></p>	metre	421.90
3.28	<p><b>Aggregate Sub- Surface Drains</b>  <i>(Construction of aggregate sub surface drain 300 mm x 450 mm with aggregates conforming to table 300-4, excavated material to be utilised in roadway )</i></p>	metre	193.25
3.29	<p><b>Underground Drain at Edge of Pavement</b>  <i>(Construction of an underground drain 1 m x 1 m (inside dimensions) lined with RCC-20 cm thick and covered with RCC slab 10 cm in thickness on urban roads)</i></p>	metre	2956.75
3.30	<p><b>Preparation and Surface Treatment of formation.</b> <i>(Preparation and surface treatment of formation by removing mud and slurry, watering to the extent needed to maintain the desired moisture content, trimming to the required line, grade, profile and rolling with 8-10 tonne smooth wheeled roller, complete as per clause 310.)</i></p>	sqm	1.80

3.31	<b>Construction of Rock fill Embankment</b> (Construction of rock fill embankment with broken hard rock fragments of size not exceeding 300 mm laid in layers not exceeding 500 mm thick including filling of surface voids with stone spalls, blinding top layer with granular material, rolled with vibratory road roller, all complete as per clause 313)	cum	49.60
3.32 (i)	<b>Excavation in Hill Area in Soil by Mechanical Means</b> (Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres)	cum	135.45
3.32 (ii)	<b>Depositing of excavated earth on the barren valley side.</b> (Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth on the Barren Valley side)	cum	72.70
3.33 (i)	<b>Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting.</b> (Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material with all lift and lead upto 1000 metres )	cum	198.50
3.33 (ii)	<b>Disposal of excavated earth on the barren valley side.</b> (Excavation in hilly area in ordinary rock not requiring blasting by mechanical means including cutting and trimming of slopes and disposal of excavated earth on the barren valley side)	cum	114.15

3.34	<b>Excavation in Hilly Areas in Hard Rock Requiring Blasting</b> (Excavation in hilly areas in hard rock requiring blasting, by mechanical means including trimming of slopes and disposal of cut material with all lifts and lead upto 1000 metres.)	cum	264.95
3.35 (i) A	<b>Excavation in Hilly Areas in Soil by Manual Means</b> (Excavation in soil in Hilly Area by Manual Means including cutting and trimming of side slopes and disposing of excavated earth with a lift upto 1.5 m and a lead upto 20 m as per drawing and Technical Specification Clause 1603.1)	cum	127.05
3.35 (i) B	Deduct for quantum of earthwork of all types disposal directly by throwing into the valley without involving any lead and lift (Ordinary and Hard Soil/Hard Shale, Soil containing shingle or small size boulders.	cum	48.15
3.35 (ii) A	<b>Excavation in Hilly Area in Ordinary Rock by Manual Means</b> (Excavation in Ordinary Rock using Manual Means including loading in a truck and carrying of excavated material to embankment site with a lift upto 1.5 m and lead upto 20 m as per Clause 1603.2.)	cum	279.50
3.35 (ii) B	Deduct for quantum of earthwork of all types disposal directly by throwing into the valley without involving any lead and lift. (Ordinary and Hard Rock)	cum	77.20

## Chapter – 4

### SUB-BASES, BASES (NON-BITUMINOUS) AND SHOULDERS

#### Preamble:

- 1 Quantities of materials provided are approximate and are meant for the purpose of estimating only. Actual quantities shall be as per mix design.
- 2 For construction of sub-base, two alternatives as under have been provided.
  - a. Mix in place method
  - b. Plant mix method
- 3 Construction of shoulders: - Earthen, Hard and Paved shoulders have been considered, the rates applicable are for subgrade, sub-base and different layers of pavement respectively.
- 4 In the case of improvement of subgrade with lime stabilization, soil is assumed to be available at the site and has not been provided for. Only lime has been catered. In the case of lime stabilization of sub-base, soil has been provided to form the sub-base.
- 5 While providing for the rate of materials, detailed local enquires should be made and prevailing market rates ascertained from concerned suppliers in the area keeping in view the location of crushing plants and lead involved.
- 6 The quantities considered in the output are the compacted quantities. The quantities of aggregates provided in the rate analysis under the head material are the uncompacted quantities.

**CHAPTER-4**  
**SUB-BASES, BASES (NON-BITUMINOUS) AND SHOULDERS**

4.1	<b>Granular Sub-base with Close Graded Material (Table:- 400-1)</b>		
<b>A</b>	<b>Plant Mix Method</b> (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 )		
	<b>(i) for grading- I Material</b>	cum	1164.55
	<b>(ii) for grading- II Material</b>	cum	1035.55
	<b>(iii) for grading-III Material</b>	cum	1020.05
<b>B</b>	<b>By Mix in Place Method</b> (Construction of granular sub-base by providing close graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401)		
	<b>(i) for grading- I Material</b>	cum	1032.80
	<b>(ii) for grading- II Material</b>	cum	903.80
	<b>(iii) for grading-III Material</b>	cum	888.30
4.2	<b>Granular Sub-Base with Coarse Graded Material ( Table:- 400- 2)</b> (Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401)		
	<b>(i) for grading- I Material</b>	cum	1057.90
	<b>(ii) for grading- II Material</b>	cum	965.75
	<b>(iii) for grading-III Material</b>	cum	895.70
4.3	<b>Lime Stabilisation for Improving Subgrade</b> (Laying and spreading available soil in the subgrade on a prepared surface, pulverising, mixing the spread soil in place with rotavator with 3 % slaked lime having minimum content of 70% of CaO, grading with motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved sub grade)		
<b>A</b>	<b>By Mechanical Means</b>	cum	796.10
<b>B</b>	<b>By Manual Means</b>	cum	788.90

4.4	<i>Lime Treated Soil for Sub- Base (Providing, laying and spreading soil on a prepared sub grade, pulverising, mixing the spread soil in place with rotavator with 3 % slaked lime with minimum content of 70% of CaO, grading with motor grader and compacting with the road roller at OMC to achieve at least 98%of the max dry density to form a layer of sub base.)</i>	cum	991.90
4.5	<i>Cement Treated Soil Sub Base/ Base (Providing, laying and spreading soil on a prepared sub grade, pulverising, adding the designed quantity of cement to the spread soil, mixing in place with rotavator, grading with the motor grader and compacting with the road roller at OMC to achieve the desired unconfined compressive strength and to form a layer of sub-base/base.)</i>	cum	1001.55
4.8	<i>Inverted Choke (Construction of inverted choke by providing, laying, spreading and compacting screening B type/ coarse sand of specified grade in uniform layer on a prepared surface with motor grader and compacting with power roller etc)</i>	cum	785.75
4.9	<i>Water Bound Macadam (Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density.)</i>		
<b>A</b>	<b>By Manual Means</b>		
(i)	<b>Grading- I (Using Screening Crushable type such as Moorum or Gravel)</b>		
(a)	<i>Using Screening Crushable type such as Moorum or Gravel</i>	cum	1311.45
(b)	<i>Using Screening Type-A (13.2mm Agg.)</i>	cum	1616.11
(ii)	<b>Grading- II (Using Screening Crushable type such as Moorum or Gravel)</b>		
(a)	<i>Using Screening Crushable type such as Moorum or Gravel</i>	cum	1342.30
(b)	<i>Using Screening Type-A (13.2mm Agg.)</i>	cum	1506.30
(c)	<i>Using Screening Type-B (11.2mm Agg.)</i>	cum	1778.90
(iii)	<b>Grading- III (Using Screening Crushable type such as Moorum or Gravel)</b>		

(a)	<i>Using Screening Crushable type such as Moorum or Gravel</i>	cum	1374.55
(b)	<i>Using Screening Type-B (11.2mm Agg.)</i>	cum	1811.10
<b>B</b>	<b><i>By Mechanical Means:</i></b>		
(i)	<b><i>Grading- I (Using Screening Crushable type such as Moorum or Gravel)</i></b>		
(a)	<i>Using Screening Crushable type such as Moorum or Gravel</i>	cum	1203.15
(b)	<i>Using Screening Type-A (13.2mm Agg.)</i>	cum	1507.82
(ii)	<b><i>Grading- II (Using Screening Crushable type such as Moorum or Gravel)</i></b>		
(a)	<i>Using Screening Crushable type such as Moorum or Gravel</i>	cum	1234.00
(b)	<i>Using Screening Type-A (13.2mm Agg.)</i>	cum	1398.00
(c)	<i>Using Screening Type-B (11.2mm Agg.)</i>	cum	1670.60
(iii)	<b><i>Grading- III (Using Screening Crushable type such as Moorum or Gravel)</i></b>		
(a)	<i>Using Screening Crushable type such as Moorum or Gravel</i>	cum	1266.25
(b)	<i>Using Screening Type-B (11.2mm Agg.)</i>	cum	1702.80
4.10	<b><i>Crushed Cement Concrete Sub-base / Base</i></b> <i>(Breaking and crushing of material obtained by breaking damaged cement concrete slabs to size range not exceeding 75 mm as specified in table 400.7 transporting the aggregates obtained from breaking of cement concrete slabs at a lead of L km., laying and compacting the same as sub base/ base course, constructed as WBM to clause 404 except the use of screening or binding Material.)</i>	cum	188.30
4.11	<b><i>Penetration Coat Over Top Layer of Crushed Cement Concrete Base</i></b> <i>(Spraying of bitumen over cleaned dry surface of crushed cement concrete base at the rate of 25 kg per 10 sqm by a bitumen pressure distributor, spreading of key aggregates at the rate of 0.13 cum per 10 sqm by a mechanical gritter and rolling the surface as per clause 506.3.8)</i>	sqm	31.20
4.12	<b><i>Wet Mix Macadam</i></b> <i>(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.)</i>	cum	1269.50

4.13	<i>Construction of Median and Island with Soil Taken from Roadway Cutting (Construction of Median and Island above road level with approved material deposited at site from roadway cutting and excavation for drain and foundation of other structures, spread, graded and compacted as per clause 407)</i>	cum	212.25
4.14	<i>Construction of Median and Island with Soil Taken from Borrow Areas (Construction of median and Island above road level with approved material brought from borrow pits, spread, sloped and compacted as per clause 407)</i>	cum	448.80
4.15	<i>Construction of Shoulders (A. Earthen Shoulders)</i>		
4.17	<i>Crusher Run Macadam Base (Providing crushed stone aggregate, depositing on a prepared surface by hauling vehicles, spreading and mixing with a motor grader, watering and compacting with a vibratory roller to clause 410 to form a layer of sub-base/Base)</i>		
<b>A</b>	<b><i>By Mix in Place Method</i></b>		
(i)	For 53 mm maximum size	cum	2082.65
(ii)	For 45 mm maximum size	cum	2425.85
<b>B</b>	<b><i>By Mixing Plant :</i></b>		
(i)	For 53 mm maximum size	cum	2209.10
(ii)	For 45 mm maximum size	cum	1598.55
4.18 (A)	<i>Preparation of sub grade (Preparation of sub grade by excavating earth to an average depth of 22.50 cm, dressing to camber and consolidating with road roller, making good the undulations etc. and disposal of surplus earth, lead upto 50 m.)</i>	sqm	52.90
4.18 (B)	<i>Consolidation of sub-grade with road roller of 8 to 12 tonne capacity including making good the undulations etc. with earth or quarry spoils etc. and reolling the sub grade.</i>	sqm	3.25

## Chapter – 5

### BASES AND SURFACE COURSES (BITUMINOUS)

#### Preamble:

- 1 Various alternatives for machines and materials have been provided. The one that suits a particular situation and design may be adopted.
- 2 The outputs considered for construction equipment are for compacted quantities of relevant items and not for loose quantities.
- 3 In case of prime coat and tack coat, average quantities of binder indicated in specifications have been taken.
- 4 Tack coat and prime coat, wherever provided, are required to be measured and paid separately.
- 5 Cleaning of surface is a part of the item of prime coat and tack coat. As such cleaning of surface has not been provided for bituminous courses as the same is already catered in prime/tack coat. However, for those cases where such coats are not required to be done, cleaning of surface shall be included and paid.
- 6 Rolling of bituminous courses is required to be done as per Clause 501.6 of MORD Specifications. Provision in the analysis has been made accordingly. It has been observed during actual practice at work sites, that the availability of road roller is generally inadequate. As compaction is the key to good construction, this point is being specifically highlighted to ensure that adequate number of road rollers as per provision in the rate analysis are deployed at site.
- 7 Spreading of bituminous materials shall be done by mechanical means except in areas where a mechanical paver cannot have access.
- 8 Hot Mazdoor is the one who work for Bitumen heating/spreading or spreading of hot bituminous mix. He will be paid the same wages. However, he will be provided safety kits containing normally gumboots, hand gloves, dark goggles, barnol, country soap, coconut oil, tarring outfits, etc. For this purpose, additional 0.5 per cent sundries have been provided in the analysis of rates in addition to the normal sundries covered by overheads.
- 9 Where the proposed aggregates fail to pass the stripping value test, an approved adhesion agent shall be added to the binder as per Clause 507.2.4 with the approval of the Engineer and cost of the adhesion agent shall be added under the subhead of materials.
- 10 The Factor for usage of rollers has been taken as 0.65 in case of Bituminous Macadam only.

**CHAPTER-5**  
**BASES AND SURFACE COURSES (BITUMINOUS)**

5.1	<i>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 of 0.60 kg/sqm using mechanical means.)</i>	sqm	27.65
5.2	<i>Tack coat</i>		
	<i>Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at the rate of 0.20 kg per sqm on the prepared bituminous/granular surface cleaned with mechanical broom.</i>	sqm	10.25
5.3	<i>Bituminous Macadam (Providing and laying bituminous macadam with 100-120 TPH hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading premixed with bituminous binder, transported to site, laid over a previously prepared surface with paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction)</i>		
(i)	<i>for Grading I ( 40 mm nominal size )</i>	cum	6567.40
(ii)	<i>for Grading II (19 mm nominal size)</i>	cum	6816.50
5.4	<i>Bituminous Penetration Macadam (Construction of penetration macadam over prepared Base by providing a layer of compacted crushed coarse aggregate using chips spreader with alternate applications of bituminous binder and key aggregates and rolling with a smooth wheeled steel roller 8-10 tonne capacity to achieve the desired degree of compaction)</i>		
A	<i>50 mm thick</i>	sqm	286.15
B	<i>75 mm thick</i>	sqm	389.90

5.5	<i>Built-Up-Spray Grout (Providing, laying and rolling of built-up-spray grout layer over prepared base consisting of a two layer composite construction of compacted crushed coarse aggregates using motor grader for aggregates. key stone chips spreader may be used with application of bituminous binder after each layer, and with key aggregates placed on top of the second layer to serve as a Base conforming to the line, grades and cross-section specified, the compacted layer thickness being 75 mm)</i>	sqm	233.85
5.6	<i>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.)</i>		
(i)	<i>for Grading I ( 40 mm nominal size )</i>	cum	8243.40
(ii)	<i>for GradingII(19 mm nominal size)</i>	cum	8466.10
5.7	<i>Semi - Dense Bituminous Concrete (Providing and laying semi dense bituminous concrete 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 @ 4.5 to 5 % 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. 508 complete in all respects)</i>		
(i)	<i>for Grading I ( 13 mm nominal size )</i>	cum	8731.65
(ii)	<i>for GradingII(10 mm nominal size)</i>	cum	9398.05

5.8	<b>Bituminous Concrete</b> (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)		
(i)	<b>for Grading-I ( 13 mm nominal size )</b>	cum	9410.70
(ii)	<b>for Grading-II(10 mm nominal size)</b>	cum	9344.80
5.9	<b>Surface Dressing</b> (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)		
<b>Case - I</b>	<b>:-19 mm nominal chipping size</b>	sqm	72.55
<b>Case - II</b>	<b>13 mm nominal size chipping</b>	sqm	63.50
5.10	<b>Open - Graded Premix Surfacing</b> (Providing, laying and rolling of open - graded premix surfacing of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen or cut-back or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a smooth wheeled roller 8-10 tonne capacity, finished to required level and grades.)		
(i)	<b>Case - I: Mechanical method using Penetration grade Bitumen and HMP of appropriate capacity not less than 75 tonnes/hour .</b>	sqm	135.30
(ii)	<b>Case - II: Open-Graded Premix Surfacing using cationic Bitumen Emulsion</b>	sqm	145.35

5.11	<i>Close Graded Premix Surfacing/Mixed Seal Surfacing (Mechanical means using HMP of appropriate capacity not less than 75 tonnes/hour. Providing, laying and rolling of close-graded premix surfacing material of 20 mm thickness composed of 11.2 mm to 0.09 mm (Type-a) or 13.2 mm to 0.09 mm (Type-b) aggregates using penetration grade bitumen to the required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a Smooth wheeled roller 8-10 tonne capacity, and finishing to required level and grade. )</i>	sqm	146.35
5.12	<i>Seal Coat (Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall using Type A and B seal coats)</i>		
(i)	<i>Case - I : Type A</i>	sqm	65.90
(ii)	<i>Case - II : Type B (Providing and laying of premix sand seal coat with HMP of appropriate capacity not less than 75 tonnes/ hours using crushed stone chipping 6.7 mm size and penetration bitumen of suitable grade.)</i>	sqm	49.20
5.13	<i>Supply of Stone Aggregates for Pavement Courses (Supply of stone aggregates from approved sources confirming to the physical requirement, specified in the respective specified clauses, including royalties, fees rents, collection, transportation, stacking and testing and measured in cum as per clause 514.5 Competitive market rates to be ascertained. Alternatively, rates for stone crushing given in chapter 1 may be adopted, if found economical. In case for supply of aggregates at site are not available, nearest crusher site may be ascertained. Loading and un-loading charges and cost of carriage may be added to these rates to arrive at the cost at site.)</i>	cum	

5.14	<i>Mastic Asphalt (Providing and laying 25 mm thick mastic asphalt wearing course with paving grade bitumen meeting the requirements given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine-grained hard stone chipping of 13.2 mm nominal size at the rate of 0.005cum per 10 sqm and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces not less than 1000C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 515.)</i>	sqm	578.90
5.15	<i>Slurry Seal Providing and laying slurry seal consisting of a mixture of fine aggregates, portland cement filler, bituminous emulsion and water on a road surface including cleaning of surface, mixing of slurry seal in a suitable mobile plant, laying and compacting to provide even riding surface)</i>		
(i)	<i>5 mm thickness</i>	sqm	69.70
(ii)	<i>3 mm thickness</i>	sqm	41.96
(iii)	<i>1.5 mm thickness</i>	sqm	25.65
5.17	<i>Fog Spray</i>	sqm	33.55
added	<i>1.In case it is decided by the engineer to blind the fog spray, the following may be added</i>	sqm	4.00
5.18	<i>Bituminous Cold Mix ( Including Gravel Emulsion) (Providing, laying and rolling of bituminous cold mix on prepared base consisting of a mixture of unheated mineral aggregate and emulsified or cutback bitumen, including mixing in a plant of suitable type and capacity, transporting, laying, compacting and finishing to specified grades and levels.)</i>		
(i)	<i>Using bitumen emulsion and 9.5 mm or 13.2 mm nominal size aggregate</i>	cum	10775.90
(ii)	<i>Using bitumen emulsion and 19 mm or 26.5 mm nominal size aggregate</i>	cum	10456.25
(iii)	<i>Using cutback bitumen and 9.5 mm or 13.2 mm nominal size aggregate</i>	cum	8091.25
(iv)	<i>Using cutback bitumen and 19 mm or 26.5 mm nominal size aggregate</i>	cum	7779.40

5.19	<b>Sand Asphalt Base Course</b> (Providing, laying and rolling sand-asphalt base course composed of sand, mineral filler and bituminous binder on a prepared sub-grade or sub-base to the lines, levels, grades and cross sections as per the drawings including mix in a plant of suitable type and capacity, transporting, laying, compacting and finishing.)	cum	7020.20
5.20	<b>Modified Binder</b> (Supply of modified binder produced by mixing bitumen with modifier such as natural rubber or crumb rubber or any other polymer found compatible with bitumen and which allows properties given in clause 521.3 and IRC: SP: 53 blending of modifier with bitumen to be done either at the refinery or at the site plant capable of producing the modified binder to be delivered in drums which shall be agitated in melted condition using suitable device before use to ensure uniform dispersion.)	tonne	
5.21	<b>Crack Prevention Courses</b>		
(i)	<b>Stress Absorbing Membrane (SAM) crack width less than 6 mm</b> (Providing and laying of a stress absorbing membrane over a cracked road surface, with crack width below 6 mm after cleaning with a mechanical broom, using modified binder complying with clause 521, sprayed at the rate of 9 kg per 10 sqm and spreading 5.6 mm crushed stone aggregates @ 0.11 cum per 10 sqm with hydraulic chip spreader, sweeping the surface for uniform spread of aggregates and surface finished to conform to clause 902.)	sqm	67.20
(ii)	<b>Stress Absorbing Membrane (SAM) with crack width 6 mm to 9 mm</b> (Providing and laying of a stress absorbing membrane over a cracked road surface, with crack width 6 to 9 mm after cleaning with a mechanical broom, using modified binder complying with clause 521, sprayed at the rate of 11 kg per 10 sqm and spreading 11.2 mm crushed stone aggregates @ 0.12 cum per 10 sqm, sweeping the surface for uniform spread of aggregates and surface finished to conform to clause 902.)	sqm	77.05

(iii)	<i>Stress Absorbing Membrane (SAM) crack width above 9 mm and cracked area above 50 % (Providing and laying a single coat of a stress absorbing membrane over a cracked road surface, with crack width above 9 mm and cracked area above 50 % after cleaning with a mechanical broom, using modified binder complying with clause 521, sprayed at the rate of 15 kg per 10 sqm and spreading 11.2 mm crushed stone aggregates @ 0.12 cum per 10 sqm, sweeping the surface for uniform spread of aggregates and surface finished to conform to clause 902.)</i>	sqm	101.60
5.22	<i>Recipe Cold Mix (Providing and laying of premix of crushed stone aggregates and emulsion binder, mixed in a batch type cold mixing plant, laid over prepared surface, by paver finisher, rolled with a pneumatic tyred roller initially and finished with a smooth steel wheel roller, all as per clause 519.3)</i>		
(i)	<i>75 mm thickness</i>	cum	6011.45
(ii)	<i>40 mm thickness</i>	cum	9059.75
(iii)	<i>25 mm thickness</i>	cum	11441.25

## Chapter – 6

### CEMENT CONCRETE PAVEMENT

**Preamble:**

- 1 High capacity batch mix plants of 75 cum/hour (effective output) has been considered in the rate analysis of cement concrete pavement works.
- 2 While tippers have been provided for transportation of dry lean cement concrete and rolled cement concrete, transit truck mixers have been considered for the cement concrete pavement.
- 3 Super plasticizer admixture has been provided to improve workability with reduced water cement ratio.
- 4 Cement 43 grade has been catered for the cement concrete pavement i.e., for pavement quality concrete to get higher strength. However, for dry lean concrete, cement of 33 grade may be preferred.
- 5 While a slip form paver has been catered for the top layer of concrete pavement, a mechanical paver has been provided for dry lean and roller cement concrete.
- 6 Materials provided in the rate analysis are for estimating purpose. Exact quantity of materials be determined for the job mix formula.

**CHAPTER-6**  
**CEMENT CONCRETE PAVEMENTS**

6.1	<i>Dry Lean Cement Concrete Sub- base (Construction of dry lean cement concrete Sub- base over a prepared sub-grade with coarse and fine aggregate conforming to IS: 383, the size of coarse aggregate not exceeding 25 mm, aggregate cement ratio not to exceed 15:1, aggregate gradation after blending to be as per table 600-1, cement content not to be less than 150 kg/ cum, optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, laid with a paver with electronic sensor, compacting with 8-10 tonnes vibratory roller, finishing and curing.)</i>	cum	2781.05
6.2	<i>Cement Concrete Pavement (Construction of un-reinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with 43 grade cement @ 400 kg per cum, coarse and fine aggregate conforming to IS 383, maximum size of coarse aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design, transported to site, laid with a fixed form or slip form paver, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing )</i>	cum	6230.60
6.3	<i>Rolled Cement Concrete Base (Construction of rolled cement concrete base course with coarse and fine aggregate conforming to IS:383, the size of coarse aggregate not exceeding 25 mm with minimum, aggregate cement ratio15:1 and minimum cement content of 200 kg/cum, aggregate gradation to be as per table 600-4 after blending, mixing in batching plant at optimum moisture content, transporting to site, laying with a paver with electronic sensor, compacting with 8-10 tonnes smooth wheeled vibratory roller to achieve, the designed flexural strength, finishing and curing.)</i>	cum	3265.75

6.4	<p><b><i>Transition section between rigid and flexible pavement</i></b> <i>(Due to change in the properties of materials and type of construction, a gradual changeover from rigid pavement to flexible pavement is desirable to avoid any damage at the butting joint. After provision of an expansion joint in the cement concrete slab, the thickness of slab should be tapered to 10 cm over a length of 3 m towards the flexible pavement. The deficiency of thickness caused due to tapering of the slab should be made up by the asphaltic layers.)</i></p>		
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## Chapter–8

### TRAFFIC SIGNS, MARKINGS AND OTHER APPURTENANCES

#### Preamble:

- 1 Rate analysis for fencing has been done for two different heights, i.e., 1.20 m and 1.80 m. Any of these two can be adopted depending upon a particular situation and design.
- 2 Rate analysis for fencing provides for three types as under :
  - a) Barbed wire fencing
  - b) Welded steel wire fencing with mesh size of 75X25 mm
  - c) Welded steel wire fabric with mesh size of 75X50 mm
- 3 Kerbstone laying and road marking has been provided for laying by mechanical means.
- 4 Back filling of foundation of boundary pillars has been proposed with stone spalls, tightly packed and compacted.
- 5 The item pertaining to road traffic signals has not been analysed as this is a specialised work and rates can be obtained from firms having specialisation for design and installation of this work.
- 6 For metal beam crash barrier, a 'W' shaped beam of size 311 x 83 mm flange width made with structural steel corrugated plate 3 mm thick and having a length of 4.5 m has been provided, over a channel post of 150 x 75 x 5 mm with a spacer of channel section 150 x 75 x 5 mm, 330 mm long.
- 7 Printing of letters and signs is required to be measured and paid separately. A separate rate for lettering has been prepared and included in this chapter for this purpose.
- 8 Two supports have been provided for direction and place identification signs where size is more than 0.9 sqm. Only one support is provided for size up to 0.9 sqm.
- 9 The traffic signs proposed are of retro-reflectorised type made of encapsulated lens type reflective sheeting fixed over aluminium sheeting as per Clause 801.3 and installation.
- 10 The size, location of traffic signs shall be as per IRC:67.
- 11 The rates for rigid, semi-rigid and flexible crash barriers have been included.
- 12 Provision has been made for a crane for installation of overhead signs.
- 13 Separate rates have been derived for Tubular steel railing with RCC posts and MS steel posts.
- 14 The organisation and financial aspects are required to be finalised in consultation with administrative and traffic authorities.
- 15 The rate for message display board for gantry mounted variable message sign is required to be ascertained from the market, this being a commercially produced item by specialised firms.
- 16 The rate analysis for traffic impact attenuators at abutments and piers have been included.

17 In the case of road signs and direction boards the depth of foundation and quantity of cement concrete provided in the rate analysis are indicative. These may be suitably increased in areas of higher wind velocities like coastal areas.

18 **Ducts for Utility Services Along and Across the Expressway/Highways :**

The running metre cost of duct along the road including inspection chambers (where applicable) or across the road will depend upon the approved design. The various items involved are earthen work, plain cement concrete, brick stone masonry, reinforcement cement concrete, form work, steel reinforcement, laying of pipe line (where duct is of pipe) and cast iron/RCC cover for the inspection chamber. The rate for these items are available under respective clauses which can be applied and running metre cost of duct worked out as per the approved design and drawing for particular situations. In case cast iron cover for the inspection chamber, the rate can be ascertained from the market for the size provided in the design and approved drawings.

19 **Noise Barriers :**

Noise barrier can be provided in the form of a brick wall of a suitable height as per the site requirement and approved design. The items involved for the construction of this barrier like earthwork, brick masonry, plain cement concrete, etc. are available in the Data Book, which can be applied to arrive at the cost of noise barrier based on the design adopted.

Alternatively, wherever space permits, cluster of trees, shrubs and plants can be grown by the road side 6 m away from the edge of the roadway. This will intercept the annoying sound waves and fumes from road vehicles.

## CHAPTER-8

### TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES

8.1	<i>Cast in Situ Cement Concrete M20 kerb (Construction of cement concrete kerb with top and bottom width 115 and 165 mm respectively, 250 mm high in M 20 grade PCC on M-10 grade foundation 150 mm thick, foundation having 50 mm projection beyond kerb stone, kerb stone laid with kerb laying machine, foundation concrete laid manually, all complete as per clause 408)</i>		
<b>A</b>	<i>Using Concrete Mixer</i>	metre	265.65
<b>B</b>	<i>Using Concrete Batching and Mixing Plant</i>	metre	262.15
8.2	<i>Cast in Situ Cement Concrete M 20 Kerb with Channel (Construction of cement concrete kerb with channel with top and bottom width 115 and 165 mm respectively, 250 mm high in M 20 grade PCC on M10 grade foundation 150 mm thick, kerb channel 300 mm wide, 50 mm thick in PCC M20 grade, sloped towards the kerb, kerb stone with channel laid with kerb laying machine, foundation concrete laid manually, all complete as per clause 408)</i>		
<b>A</b>	<i>Using Concrete Mixer</i>	metre	490.05
<b>B</b>	<i>Using Concrete Batching and Mixing Plant</i>	metre	486.55
8.3	<i>Printing new letter and figures of any shade (Printing new letter and figures of any shade with synthetic enamel paint black or any other approved colour to give an even shade)</i>		
<b>(i)</b>	<i>Hindi (Matras commas and the like not to be measured and paid for Half letter shall be counted as half )</i>	cm height per letter	0.70
<b>(ii)</b>	<i>English and Roman</i>	cm height per letter	0.45
8.5	<i>Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorised sign as per IRC:67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75 x 75 x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing)</i>	sqm	2130.45

8.6	<b>Direction and Place Identification signs with size more than 0.9 sqm size board.</b> (Providing and erecting direction and place identification retro- reflectorised sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area exceeding 0.9 sqm supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm, 2 Nos. firmly fixed to the ground by means of properly designed foundation with M 15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing)	sqm	4158.85
8.8	<b>Painting Two Coats on New Concrete Surfaces</b> (Painting two coats after filling the surface with synthetic enamel paint in all shades on new plastered concrete surfaces)	sqm	57.15
8.9	<b>Painting on Steel Surfaces</b> (Providing and applying two coats of ready mix paint of approved brand on steel surface after through cleaning of surface to give an even shade)	sqm	53.30
8.10	<b>Painting on Wood Surfaces</b> (Providing and applying two coats of ready mix paint of approved brand on wood surface after through cleaning of surface to give an even shade)	sqm	59.70
8.11	<b>Painting Lines, Dashes, Arrows etc on Roads in Two Coats on New Work</b> (Painting lines, dashes, arrows etc on roads in two coats on new work with ready mixed road marking paint conforming to IS:164 on bituminous surface, including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control )		
(i)	<b>Over 10 cm in width</b>	sqm	88.85
(ii)	<b>Up to 10 cm in width</b>	sqm	76.15
8.12	<b>Painting Lines, Dashes, Arrows etc on Roads in Two Coats on Old Work</b> (Painting lines, dashes, arrows etc on roads in two coats on old work with ready mixed road marking paint conforming to IS: 164 on bituminous surface, including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control )		
(i)	<b>Over 10 cm in width</b>	sqm	60.40
(ii)	<b>Up to 10 cm in width</b>	sqm	64.90
8.13	<b>Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads on Bituminous Surface</b> (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.)	sqm	329.25
8.14	<b>Kilo Metre Stone</b> (Reinforced cement concrete M15 grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)		

	<b>(i) 5th kilometre stone (precast)</b>	each	3217.80
	<b>(ii) Ordinary Kilometer stone (Precast)</b>	each	1956.45
	<b>(iii) Hectometer stone (Precast)</b>	each	534.00
8.16	<b>Boundary pillar</b> (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)	each	458.20
8.17	<b>G.I Barbed wire Fencing 1.2 metre high</b> (Providing and fixing 1.2 metres high G.I barbed wire fencing with 1.8 m angle iron posts 40 mm x 40 mm x 6 mm placed every 3 metres center to center founded in M15 grade cement concrete, 0.6 metre below ground level, every 15th post, last but one end post and corner post shall be strutted on both sides and end post on one side only and provided with 9 horizontal lines and 2 diagonals interwoven with horizontal wires, fixed with G.I staples, turn buckles etc complete as per clause 807 )	metre	227.85
8.18	<b>G.I Barbed wire Fencing 1.8 metre high</b> (Providing and fixing 1.8 metres high G.I barbed wire fencing with 2.4 m angle iron posts 50 mm x 50 mm x 6 mm placed every 3 metres center to center founded in M15 grade cement concrete, 0.6 metre below ground level, every 15th post, last but one end post and corner post shall be strutted on both sides and end post on one side only and provided with 12 horizontal lines and 2 diagonals interwoven with horizontal wires, fixed with G.I staples, turn buckles etc complete as per clause 807 )	metre	385.35
8.19	<b>Fencing with welded steel wire Fabric 75 mm x 50 mm (Suggestive)</b> (Providing 1.20 metre high fencing with angle iron posts 50 mm x 50 mm x 6 mm at 3 metre center to center with 0.40 metre embedded in M15 grade cement concrete, corner, end and every 10th post to be strutted, provided with welded steel wire fabric of 75 mm x 50 mm mesh or 75 mm x 25 mm mesh and fixed to iron posts by flat iron 50 x 5 mm and bolts etc. complete in all respects.)	metre	529.50
8.20	<b>Tubular Steel Railing on Medium Weight steel channel ( ISMC series) 100 mm x 50 mm</b> (Providing, fixing and erecting 50 mm dia steel pipe railing in 3 rows duly painted on medium weight steel channels (ISMC series) 100 mm x 50 mm, 1.2 metres high above ground, 2 m centre to centre, complete as per approved drawings)	metre	2305.55
8.21	<b>Tubular Steel Railing on Precast RCC posts, 1.2 m high above ground level</b> (Providing, fencing and erecting 50 mm dia painted steel pipe railing in 3 rows on precast M20 grade RCC vertical posts 1.8 metres high (1.2 m above GL) with 3 holes 50 mm dia for pipe, fixed 2 metres centre to, complete as per approved drawing)	metre	1883.75

8.22	<b>Reinforced Cement Concrete Crash Barrier</b> (Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with M-20 grade concrete with HYSD reinforcement conforming to IRC:21 and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified)		
(i)	<b>M 20 grade concrete</b>	metre	3323.40
8.23	<b>Metal Beam Crash Barrier</b>		
A	<b>Type - A, "W" : Metal Beam Crash Barrier</b> (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 2m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810)	metre	2663.85
B	<b>Type - B, "THRIE" : Metal Beam Crash Barrier</b> (Providing and erecting a "Thrie" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 85 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 2 m high with 1.15 m below ground 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 space of channel section 150 x 75 x 5 mm, 546 mm long complete as per clause 810)	metre	3564.40
8.24	<b>Road Traffic Signals electrically operated</b> (Since it is a ready made item commercially produced and erected by specialised firm in the electrical and electronic field, rate may be taken based on market enquiry from firms specialised in this field and ISI certified for the approved design and drawing.)		

8.25	<b>Flexible Crash Barrier, Wire Rope Safety Barrier</b> (Providing and erecting a wire rope safety barrier with vertical posts of medium weight RS Joist (ISMB series) 100 mm x 75 mm (11.50 kg/m), 1.50 m long 0.85 m above ground and 0.65 m below ground level, split at the bottom for better grip, embedded in M 15 grade cement concrete 450 x 450 x 450 mm, 1.50 m center to center and with 4 horizontal steel wire rope 40 mm dia and anchored at terminal posts 15 m apart. Terminal post to be embedded in M 15 grade cement concrete foundation 2400 x 450 x 900 mm (depth), strengthened by a strut of RS joist 100 x 75 mm, 2 m long at 450 inclination and a tie 100 x 8 mm, 1.50 m long at the bottom, all embedded in foundation concrete as per approved design and drawing, rate excluding excavation and cement concrete.)	metre	2857.90
8.27	<b>Street Lighting</b> (Providing and erecting street light mounted on a steel circular hollow pole of standard specifications for street lighting, 9 m high spaced 40 m apart, 1.8 m overhang on both sides if fixed in the median and on one side if fixed on the footpath, fitted with sodium vapour lamp and fixed firmly in concrete foundation.)		
(i)	<b>For Fixing in Median</b>	each	13103.55
(ii)	<b>For fixing in Footpath</b>	each	13044.15
8.28	<b>Lighting on Bridges</b> (Providing and fixing lighting on bridges, mounted on steel hollow circular poles of standard specifications, 5 m high fixed on parapets with cement concrete, 20 m apart and fitted with sodium vapour lamp)	each	8448.70
8.29	<b>Cable Duct Across the Road</b> (Providing and laying of a reinforced cement concrete pipe duct, 300 mm dia, across the road (new construction), extending from drain to drain in cuts and toe of slope to toe of slope in fills, constructing head walls at both ends, providing a minimum fill of granular material over top and sides of RCC pipe as per IRC:98-1997, bedded on a 0.3 m thick layer of granular material free of rock pieces, outer to outer distance of pipe at least half dia of pipe subject to minimum 450 mm in case of double and triple row ducts, joints to be made leak proof, invert level of duct to be above higher than ground level to prevent entry of water and dirt, all as per IRC: 98 - 1997 and approved drawings.)		
(i)	<b>Single Row for one utility service</b>	metre	1154.30
(ii)	<b>Double Row for two utility services</b>	metre	2050.85
(iii)	<b>Triple Row for three utility services</b>	metre	2962.70

8.35	<b>Road Markers/Road Stud with Lense Reflector</b> (Providing and fixing of road stud 100x 100 mm, die cast in aluminium, resistant to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30 mm upto a depth of 60 mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973)	each	590.70
8.36	<b>Traffic Cone</b> (Provision of red fluorescent with white reflective sleeve traffic cone made of low density polyethylene (LDPE) material with a square base of 390 x 390 x 35 mm and a height of 770 mm, 4 kg in weight, placed at 1.5 m interval, all as per BS 873)	each	1454.55
8.38	<b>Rumble Strips</b> (Provision of 15 nos rumble strips covered with premix bituminous carpet, 15-20 mm high at center, 250 mm wide placed at 1 m center to center at approved locations to control speed, marked with white strips of road marking paint.)	sqm	
8.40	<b>High Mast Pole Lighting at Interchanges and Flyovers</b> (Providing and erecting a high mast pole lighting with 30 m high hot dip galvanised mast designed to withstand forces exerted with wind speeds of 180 km per hour with 3 seconds gust, as per IS:875 (Part 3) - 1978, fitted with a base flange, door at the base of mast with heavy duty internal lock, lantern carriage, suitable winching arrangement for safe working load of 750 kg and high powered electrically driven power tools for raising and lowering of lantern carriage, flexible 8 core electric cable, lightning conductor, earthing terminal, and fixing 2 nos aviation obstruction lights on top of the mast, all complete as per approved design and drawings This is a specialised work and is generally done by firms who specialise in such jobs. The detailed designs and estimates are submitted by the firms alongwith their tender for checks by the Department. The cost of this work is required to be worked out based on approved design, drawings and estimate of the lowest tender. A separate contract for this work is concluded as the contractors for road and br		
8.43	<b>Portable Barricade in Construction Zone</b> (Installation of a steel portable barricade with horizontal rail 300 mm wide, 2.5 m in length fitted on a 'A' frame made with 45 x 45 x 5 mm angle iron section, 1.5 m in height, horizontal rail painted (2 coats) with yellow and white stripes, 150 mm in width at an angle of 450, 'A' frame painted with 2 coats of yellow paint, complete as per IRC:SP:55-2001	each	2680.05

<b>8.44</b>	<b>Permanent Type Barricade in Construction Zone</b>		
<b>A</b>	<b>With Steel Components</b> (Construction of a permanent type barricade made of steel components, 1.5 m high from road level, fitted with 3 horizontal rails 200 mm wide and 4 m long on 50 x 50 x 5 mm angle iron vertical support, painted with yellow and white strips, 150 mm in width at an angle of 450, complete as per IRC:SP:55-2001 )	each	4259.85
<b>B</b>	<b>With Wooden Components</b> (Construction of a permanent type barricade made of wooden components, 1.5 m high from road level, fitted with 3 horizontal planks 200 mm wide and 3.66 m long on 100 x 100mm wooden vertical post, painted with yellow and white strips, 150 mm in width at an angle of 450, complete as per IRC:SP:55-2001 )	each	3603.00
<b>C</b>	<b>With Bricks</b> (Construction of a permanent type barricade made with brick work in mud mortar, 1.5 m high, 4 m long, 600 mm thick, plastered with cement mortar 1:6, painted with yellow and white strips)	each	16582.90
<b>8.45</b>	<b>Drum Delineator in Construction Zone</b> (Provision of metal drum/empty bitumen drum delineator, 300 mm in diameter, 800 mm high, filled with earth for stability, painted in circumferential strips of alternate black and white 100 mm wide fitted with reflectors 3 Nos of 7.5 cm dia, all as per IRC:SP:55-2001)	each	332.75
<b>8.46</b>	<b>Flagman</b> (Positioning of a smart flagman with a yellow vest and a yellow cap and a red flag 600 x 600 mm securely fastened to a staff 1 m in length for guiding the traffic)	each	387.20

## Chapter – 9

### PIPE CULVERTS

**Preamble:**

- 1 Pipe culverts of sizes 1000 mm and 1200 mm dia in single row and double row which are generally used on roads, have been included. Providing and laying of pipe has been included in the rate analysis. Items of auxiliary works such as excavation, bedding, backfilling, concrete and masonry shall be analysed, as provided under the respective sections and paid for separately.
- 2 Analysis has been given separately for NP2 pipes for ease of adoption.
- 3 Cost of any river training and protection work like stone pitching, apron, curtain wall etc. may be analysed under the respective item included in Chapter 16.
- 4 The joining of pipes is proposed by collar joints.
- 5 Chain & pulley for lifting the pipes is considered part of overheads.
- 6 The thickness of first class bedding has been taken as 150 mm. The height of bedding has been taken as 1/10th of overall height of pipe in the analysis. This may be modified as per thickness indicated in the approved drawing.

**CHAPTER-9**  
**PIPE CULVERTS**

9.1	<i>PCC 1:3:6 in Foundation (Plain cement concrete 1:3:6 mix with crushed stone aggregate 40 mm nominal size mechanically mixed, placed in foundation and compacted by vibration including curing for 14 days.)</i>	cum	3812.60
9.2	<i>Laying Reinforced Cement Concrete Pipe NP2/prestrssed concrete pipe on first class bedding in single row . (Laying Reinforced cement concrete pipe NP2/prestrssed concrete pipe for culverts on first class bedding of granular material in single row including fixing collar with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets . )</i>		
<i>A</i>	<i>1000 mm dia</i>	metre	1224.15
<i>B</i>	<i>1200 mm dia</i>	metre	1645.45
9.3	<i>Laying Reinforced Cement Concrete Pipe NP 2 /prestrssed concrete pipe on first class bedding in double row . (Laying Reinforced cement concrete pipe NP2 /prestrssed concrete pipe for culverts on first class bedding of granular material in double row including fixing collar with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets . )</i>		
<i>A</i>	<i>1000 mm dia</i>	metre	2563.50
<i>B</i>	<i>1200 mm dia</i>	metre	3414.30

## Chapter – 10

### MAINTENANCE OF ROADS

#### Preamble:

- 1 In the case of rain cuts, it has been assumed that some material cut by rain, approximately 25 per cent will be available at site which can be retrieved and re-used and the balance 75 per cent is required to be provided as fresh material.
- 2 For making up earthen shoulders, it has been assumed that on an average 150 mm filling will be required. Similarly, for stripping of excess soil from shoulder, an average depth of 75 mm has been assumed.
- 3 In the case of chocking of drain, it has been assumed that half the depth of drain has been filled with earth/debris, which requires clearance.
- 4 During the process of landslide clearance on hill roads, it has been assumed that earth will be disposed off by dozer on the valley side. In case there is any objection to this arrangement due to particular site conditions, resources like loader and tipper will have to be provided for disposal of earth/debris for the lead involved.
- 5 The item like slurry seal, fog spray, crack prevention courses, surface dressing for maintenance works have already been included in chapter 5 and are not being repeated in this chapter.
- 6 The cost of other items like repair of ruts and undulation maintenance of earthen shoulders, cross drainage works, minor and major bridges and miscellaneous items like turfing and arboriculture, painting and lettering on km stones, repair to signage, repair to footpath, street lighting, railing dividers, separators and under passes for pedestains has been given in the "Report of the Committee on Norms for Maintenance of Roads In India" Published by IRC in January 2001 which may be referred for guidance.
- 7 The repair items related to bridges have been given in chapter 16

**CHAPTER-10**  
**MAINTENANCE OF ROADS**

10.1	<b>Restoration of Rain Cuts</b> (Restoration of rain cuts with soil, moorum, gravel or a mixture of these, clearing the loose soil, benching for 300 mm width, laying fresh material in layers not exceeding 250 mm and compacting with plate compactor or power rammers to restore the original alignment, levels and slopes)	cum	195.35
10.2	<b>Maintenance of Earthen Shoulder (filling with fresh soil)</b> (Making up loss of material/ irregularities on shoulder to the design level by adding fresh approved soil and compacting it with appropriate equipment.)	sqm	76.75
10.3	<b>Maintenance of Earth Shoulder (stripping excess soil)</b> (Stripping excess soil from the shoulder surface to achieve the approved level and compacting with plate compactor)	sqm	19.65
10.4	<b>Filling Pot- holes and Patch Repairs with open - graded Premix surfacing, 20mm.</b> (Removal of all failed material, trimming of completed excavation to provide firm vertical faces, cleaning of surface, painting of tack coat on the sides and base of excavation as per clause 503, back filling the pot holes with hot bituminous material as per clause 511, compacting, trimming and finishing the surface to form a smooth continuous surface, all as per clause 3004.2)	sqm	135.70
10.5	<b>Filling Pot- holes and Patch Repairs with - Bituminous concrete, 40mm.</b> (Removal of all failed material, trimming of completed excavation to provide firm vertical faces, cleaning of surface, painting of tack coat on the sides and base of excavation as per clause 503, back filling the pot holes with hot bituminous material as per clause 504, compacting, trimming and finishing the surface to form a smooth continuous surface, all as per clause 3004.2)		
(i)	<b>for grading I Material</b>	sqm	305.05
(ii)	<b>for grading II Material</b>	sqm	335.15

10.6	<b>Crack Filling</b> (Filling of crack using slow - curing bitumen emulsion and applying crusher dust in case crack are wider than 3mm.)	metre	3.35
10.7	<b>Dusting</b> (Applying crusher dust to areas of road where bleeding of excess bitumen has occurred.)	sqm	1.15
10.8 A	<b>Fog Seal</b> (ref item 5.17)	sqm	
<b>B</b>	<b>Crack Prevention courses.</b> (ref item 5.21)		
(i)	<b>Stress Absorbing Membrane (SAM) crack width less than 6 mm</b>	sqm	
(ii)	<b>Stress Absorbing Membrane (SAM) with crack width 6 mm to 9 mm</b>	sqm	
(iii)	<b>Stress Absorbing Membrane (SAM) crack width above 9 mm and cracked area above 50 %</b>	sqm	
(iv)	<b>Bitumen Impregnated Geotextile</b>	sqm	
<b>C</b>	<b>Slurry Seal</b> (ref item 5.15)		
(i)	<b>5 mm thickness</b>	sqm	
(ii)	<b>3 mm thickness</b>	sqm	
(iii)	<b>1.5 mm thickness</b>	sqm	
<b>D</b>	<b>Surface Dressing for maintenance works.</b> (ref item 5.9)		
(i)	<b>19 mm nominal chipping size</b>	sqm	
(ii)	<b>13 mm nominal size chipping</b>	sqm	
	The above mentioned items have already been included in Chapter 5.		
10.9	<b>Repair of joint Grooves with Epoxy Mortar</b> Repair of spalled joint grooves of contraction joints, longitudinal joints and expansion joints in concrete pavements using epoxy mortar or epoxy concrete)	metre	306.55
10.10	<b>Repair of old Joints Sealant</b> (Removal of existing sealant and re sealing of contraction, longitudinal or expansion joints in concrete pavement with fresh sealant material)	metre	54.10
10.11	<b>Hill Side Drain Clearance</b> (Removal of earth from the choked hill side drain and disposing it on the valley side manually)	metre	26.60

<b>10.12</b>	<b>Land Slide Clearance in soil</b>		
(i)	Clearance of land slides in soil and ordinary rock by a bull-dozer D 80 A-12, 180 HP and disposal of the same on the valley side	cum	68.95
(ii)	Clearance of land slides in soil and ordinary rock by a bull-dozer D 50 A-15 and disposal of the same on the valley side	cum	50.90
<b>10.13</b>	<b>Land slide Clearance in Hard Rock Requiring Blasting</b> (Clearing of land slide in hard rock requiring blasting for 50% of the boulders and disposal of the same on the valley side with Bulldozer D 50)	cum	105.15
<b>10.14</b>	<b>Snow Clearance on Roads with Dozer</b> (Snow clearance from road surface by a bull- dozer 165 Hp and disposing it on the valley side)	cum	3.50
<b>10.15</b>	<b>Maintenance of WBM Road</b> (Maintenance of WBM road including filling up of pot holes, ruts and rectifying corrugated surface, damaged edges and ravelling as per technical specification clause 1906).	sqm	109.55
<b>10.16</b>	<b>Maintenance of Hume Pipe</b> (Maintenance of Hume Pipe Culvert by way of Cleaning, Clearing, Erosion repair, repairs to cracks, parapet wall and protection work as per drawing and technical specification Clause 1908)	each	937.75
<b>10.17</b>	<b>Maintenance of Culverts Slab type</b> (Maintenance of Slab type Culvert by way of Cleaning, Clearing, Erosion repair, repairs to cracks, parapet wall and protection work as per drawing and technical specification Clause 1908).	each	1936.00
<b>10.18</b>	<b>Maintenance of Causeway</b> (Maintenance of Causeway by way of minor Surface repairs, replacing Guide Posts, repair of flood gauges, removal of debris, providing boulders and protection work and painting as per technical specifications Clause 1909).	metre	50.10
<b>10.19</b>	<b>Maintenance of Road signs</b> (Maintenance of Road signs by way of cleaning and repainting of mandatory/regulatory/cautionary/informatory and place identifications sign board as per drawings and technical specifications Clause 1910).	km	919.60

<b>10.20</b>	<b><i>Cutting of branches of trees shrubs and trimming of grass and weeds</i></b>		
	<i>(i) Cutting of branches of tress and shrubs from the road way or with in R.O.W. including disposal of wood and leaves to suitable location as per technical specification Clause 1914.</i>	per tree	88.35
	<i>(ii) Cutting of shrubs from the road way or with in R.O.W. and disposal of shrubs to suitable location as per technical specification Clause 1914.</i>	per shrub	5.10
	<i>(iii) Trimming of grass and weeds from the shoulders/berms and disposing off the same to suitable locations as per technical specifications Clause 1914.</i>	sqm	1.70
<b>10.21</b>	<b><i>White washing of parapet walls of CD work and tree trunks (White washing two coats on parapet walls and tree trunks including preparation of surface by cleaning scraping etc. as per technical specifications Clause 1915)</i></b>	sqm	16.25

## Chapter – 11 HORTICULTURE

### Preamble:

1. The items of turfing with sods and seeding and mulching have been included in the chapter of earthwork.
2. The rates for grassing of lawns and hedges has been included, as the same may be needed for resting places on highways.
3. Five types of tree guards as under have been provided -
  - a) Half brick circular type
  - b) Tree guards made from empty bitumen drums 1.30 m high.
  - c) Tree guards made from empty bitumen drums 2.00 m high.
  - d) Tree guards with MS flat iron.
  - e) Tree guards with MS angle and 3 mm steel wire welded on MS flat and bolted to angle iron posts.
4. Selection from above may be made as per actual situation and design.
5. Rates for wrought iron and mild welded work has been included to cater for any miscellaneous work in connection with horticulture, fencing and traffic sign.
6. Though the estimate for compensatory afforestation is made by the forest department, the rate for this item has been analysed and included for the purpose of estimation.
7. As grass and plantation need more care, one mate has been provided for every 10 mazdoors in case of horticulture.

**CHAPTER-11**  
**HORTICULTURE**

11.1	<b>Spreading of Sludge Farm Yard Manure or/and good Earth</b> (Spreading of sludge farm yard manure or/ and good earth in required thickness (cost of sludge, farm- yard manure or/and good earth to be paid for separately))	cum	16.95
11.2	<b>Grassing with ' Doobs' Grass</b> (Grassing with 'Doobs' grass including watering and maintenance of the lawn for 30 days or more till the grass forms a thick lawn free from weeds and fit for moving including supplying good earth if needed)		
(i)	<b>In rows 15 cm apart in either direction</b>	sqm	21.95
(ii)	<b>In rows 7.5 cm apart in either direction</b>	sqm	39.20
11.3	<b>Making Lawns including Ploughing and Dragging with 'Swagha' Breaking of Clod</b> (Making lawns including ploughing and breaking of clod, removal of rubbish, dressing and supplying doobs grass roots and planting at 15 cm apart, including supplying and spreading of farm yard manure at rate of 0.18 cum per 100 sqm)	sqm	22.20
11.4	<b>Maintenance of Lawns or Turfing of Slopes</b> (Maintenance of lawns or Turfing of slopes (rough grassing) for a period of one year including watering etc)	sqm	170.75
11.5	<b>Turfing Lawns with Fine Grassing including Ploughing, Dressing</b> (Turfing lawns with fine grassing including ploughing, dressing including breaking of clods, removal of rubbish, dressing and supplying doobs grass roots at 10 cm apart, including supplying and spreading of farm yard manure at rate of 0.6 cum per 100 sqm)	sqm	25.75
11.6	<b>Maintenance of Lawns with Fine Grassing for the First Year</b>	sqm	177.65
11.7	<b>a) Planting Permanent Hedges including Digging of Trenches</b> (Planting permanent hedges including digging of trenches, 60 cm wide and 45 cm deep, refilling the excavated earth mixed with farmyard manure, supplied at the rate of 4.65 cum per 100 metres and supplying and planting hedge plants at 30 cm apart)	metre	107.45
(b)	<b>Maintenance of Hedge for one year</b>	metre	138.60

11.8	a) <i>Planting Flowering Plants and Shrubs in Central Verge</i>	km	30110.10
(b)	<i>Maintenance of Flowering Plants and Shrubs in Central Verge for one Year</i>	km	162648.20
11.9	<i>Planting of Trees and their Maintenance for one Year (Planting of trees by the road side (Avenue trees) in 0.60 m dia holes, 1 m deep dug in the ground, mixing the soil with decayed farm yard/sludge manure, planting the saplings, backfilling the trench, watering, fixing the tree guard and maintaining the plants for one year)</i>	each	2280.65
11.10	<i>Renovation Lawns including, Weeding, Forking the Ground, Top Dressing with Forked Soil (Renovation lawns including, weeding, forking the ground, top dressing with forked soil, watering and maintenance the lawns, for 30 days or more, till the grass forms a thick lawn, free from weeds, and fit for moving and disposal of rubbish as directed, including supplying good earth, if needed but excluding the cost of well decayed farm yard manure)</i>	sqm	12.30
11.11	<i>Supply at Site Well Decayed Farm Yard Manure (Supply at site of work well decayed farm yard manure, from any available source, approved by the engineer in charge including screening and stacking)</i>	cum	133.10
11.14	<i>Half Brick Circular Tree Guard, in 2nd class Brick, internal diametre 1.25 metres, and height 1.2 metres, above ground and 0.20 metre below ground (Half brick circular tree guard, in 2nd class brick, internal diametre 1.25 metres, and height 1.2 metres, above ground and 0.20 metre below ground, bottom two courses laid dry, and top three courses in cement mortar 1:6 (1 cement 6 sand) and the intermediate courses being in dry honey comb masonry, as per design complete)</i>	each	2070.50
11.15	<i>Edging with 2nd class Bricks, laid dry lengthwise (Edging with 2nd class bricks, laid dry lengthwise, including excavation, refilling, consolidation, with a hand packing and spreading nearly surplus earth within a lead of 50 metres)</i>	metre	42.40
11.16	<i>Making Tree Guard 53 cm dia and 1.3 m high as per design from empty bitumen drum (Making tree guard 53 cm dia and 1.3 m high as per design from empty bitumen drum, slit suitably to permit sun and air, (supplied by the department at stock issue rate) including providing and fixing 2 nos MS sheet rings 50 x 0.5 mm with rivets, complete in all respect)</i>	each	200.85

11.17	<i><b>Making Tree Guard 53 cm dia and 2 metres high as per design from empty bitumen drums</b> (Making tree guard 53 cm dia and 2 metres high as per design from empty bitumen drums, slit suitably to permit sun and air, ( supplied by the department at stock issue rate) including providing and fixing four legs 40 cm long of 30 x 3 mm MS riveted to tree guard and providing and fixing 2 nos MS sheet rings 50 x 0.5 mm with rivets complete in all respects)</i>	each	388.00
11.18	<i><b>Wrought Iron and Mild Steel Welded Work (Wrought iron and mild steel welded work)</b> (using angles, square bars, tees and channel grills, grating frames, gates and tree guards of any size and design etc. including cost of screens and welding rods or bolt and nuts complete fixed in position but without the cost of excavation and concrete for fixing which will be paid separately)</i>	quintal	7403.70
11.19	<i><b>Tree Guard with MS Iron</b> (Providing and fixing MS iron tree guard 60 cm dia and 2 metre high above ground level formed of 4 Nos (25 x 6 mm) and 8 Nos (25 x 3 mm) vertical MS riveted to 3 Nos (25 x 6 mm) iron rings in two halves, bolted together with 8 mm dia and 30 mm long bolts including painting two coats with paint of approved brand over a coat of priming, complete in all respects.)</i>	each tree guard	1854.75
11.20	<i><b>Tree Guard with MS Angle Iron and Steel Wire</b> (Providing and fixing tree guard 0.60 metre square, 2.00 metre high fabricated with MS angle iron 30 x 30 x 3 mm, MS iron 25 x 3 mm and steel wire 3 mm dia welded and fabricated as per design in two halves bolted together)</i>	each tree guard	3171.35
11.21	<i><b>Compensatory Afforestation</b> (Planting trees as compensatory afforestation at the rate of 290 trees per hectare at a spacing of 6 m by grubbing and leveling the ground upto a depth of 150 mm, digging holes 0.9 m dia, 1 m deep, mixing farm yard/sludge manure with soil, planting of sapling 2 m high with 25 cm dia stem, backfilling the hole and watering)</i>	hectare	99633.80

## Chapter – 12

### FOUNDATION

#### Preamble:

- 1 Excavation for structures has been provided both by manual and mechanical means.
- 2 The earth excavated from foundation has been proposed to be backfilled and balance quantity utilised for road works locally except for marshy soil where disposal has been provided.
- 3 In case of rocks, excavation has been considered upto a depth of 3 m only.
- 4 Embedment of foundation in soft and hard rocks has been provided as required by the specifications.
- 5 Dewatering has been provided in excavation for foundation on percentage basis. In case less dewatering is required or is not required at all for a particular site condition, the same may be reduced/omitted.
- 6 Mixing of cement concrete has been considered by using concrete mixer and batching plant. The rate can be adopted depending upon availability of equipment and as approved by the Engineer.
- 7 Concrete batching plant is considered to be placed within 10 (ten) km of the bridge site.
- 8 The coarse and fine aggregate for cement concrete shall be as per IS:383.
- 9 Description of items has been given very briefly. Relevant Clause of MoRT&H Specifications have to be referred for detailed specification.
- 10 The rate for well foundation has been included for diameter varying from 6 m to 12 m. Well for twin D type has also been included.
- 11 Pneumatic sinking is a specialised job. All safety precautions as per IS:4138 are required to be taken. Medical supervision for such works is considered very essential. Depth of Pneumatic sinking has been restricted to 30 m below normal water level.
- 12 Rates for various type of piles like bored cast-in-situ, driven precast RCC pile and driven steel piles of H section have been included. If the steel casting in case of driven pile is required to be retained the same is required to be priced separately.
- 13 Pile driving rigs including vibratory hammers are considered to be self contained with power units and necessary accessories required for driving.
- 14 The quantity of concrete which is required to be stripped off upto a minimum height of 600 mm above the designed top level of the pile has been taken into account in the rate.
- 15 The levelling course below the pile cap is proposed with M 15 grade concrete.
- 16 Rates for Steel reinforcement for cement concrete works are provided separately.
- 17 Appendix-4 of IRC:78-2000 has to be referred regarding precautions to be taken during sinking of wells.

- 18 In case of blasting during sinking of wells the inner face of the curb is required to be protected with the steel plates of thickness not less than 10 mm upto top level of well curb. For height above top of curb, the thickness of steel plate may be reduced to 6 mm. This extra height of steel lining should be limited to 3 m.
- 19 The concrete mix used in bottom plug shall have a minimum cement content of 330 kg/cum and a slump of about 150 mm to permit easy flow of concrete through tremie to fill-up all cavities.
- 20 Necessary safety precautions shall be taken for excavation on open foundations for which guidance may be taken from IS:3764.
- 21 A levelling course of 100 mm thickness in M 10 (1:3:6) shall be provided before laying open foundations.
- 22 In the case of open foundation, dewatering shall not be permitted from the time of placing of concrete upto 24 hours after placement.
- 23 In case of open foundations in rock, the trenches around the footing shall be filled-up with concrete of M 15 grade upto a level of 0.6 m for hard rock and 1.5 m for soft rock above the foundation level. The portion above this shall be filled by boulders grouted with cement.
- 24 When there are two or more compartments in a well, the lower edge of the cutting edge of the middle stems of such wells shall be kept about 300 mm above that of outer stems to prevent rocking.
- 25 The well curb shall be in RCC of mix not leaner than M 25 grade with minimum steel reinforcement of 72 kg/cum excluding bond rods.
- 26 The top of bottom plug shall be atleast 300 mm above top of curb.
- 27 No dewatering shall be carried out within 7 days of casting of bottom plug.
- 28 In case of cement concrete piles, the minimum grade of concrete shall be M 35 with minimum cement content of 400 kg/cum.
- 29 The top of the pile shall project 50 mm into the pile cap and reinforcement of pile shall be fully anchored in pile cap.
- 30 The minimum thickness of pile cap should be atleast 0.6 m or 1.5 times the diameter of the pile whichever is more.
- 31 Guidance for piles is to be obtained from IS:2911.
- 32 Concrete in driven cast-in-situ piles shall be cast upto a minimum height of 600 mm above the designed top level of pile, which shall be stripped off to obtain sound concrete either before final set or after 3 days.
- 33 In remote areas, for isolated slab culvert/box culvert upto 2 m span, concrete can be hand mixed in accordance with Clause 806 of MORD Specifications. Therefore, in the analysis, for items of concrete, the alternative of hand mixing has also been considered.

**CHAPTER-12**  
**FOUNDATIONS**

12.1	<b>Excavation for Structures</b> (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.)		
<b>I</b>	<b>Ordinary soil</b>		
<b>A</b>	<b>Manual Means</b>		
(i)	upto 3 m depth	cum	97.00
(ii)	3 m to 6 m depth	cum	124.75
(iii)	Above 6 m depth	cum	166.30
<b>B</b>	<b>Mechanical Means</b>		
(i)	Depth upto 3 m	cum	56.35
(ii)	Depth 3 m to 6 m	cum	64.40
(iii)	Depth above 6m	cum	78.25
<b>II</b>	<b>Ordinary rock (not requiring blasting)</b>		
<b>A</b>	<b>Manual Means</b>		
(i)	Depth upto 3 m	cum	138.60
<b>B</b>	<b>Mechanical Means</b>	cum	72.05
<b>III</b>	<b>Hard rock (requiring blasting)</b>		
<b>A</b>	<b>Manual Means</b>	cum	388.40
<b>IV</b>	<b>Hard rock (blasting prohibited)</b>		
<b>A</b>	<b>Mechanical Means</b>	cum	510.05
<b>V</b>	<b>Marshy soil</b>		
(i)	upto 3 m depth		
<b>A</b>	<b>Manual means</b>	cum	413.95
<b>B</b>	<b>Mechanical Means</b>	cum	120.40
<b>VI</b>	<b>Back Filling in Marshy Foundation Pits</b>	cum	309.30
12.2	<b>Filling Annular Space Around Footing in Rock</b> (Lean cement concrete 1:3:6 nominal mix. Rate may be taken as per items 13.4.)		
12.3	<b>Sand Filling in Foundation Trenches as per Drawing &amp; Technical Specification</b>	cum	858.65
12.4	<b>PCC 1:3:6 in Foundation</b> (Plain cement concrete 1:3:6 nominal mix in foundation with crushed stone aggregate 40 mm nominal size mechanically mixed, placed in foundation and compacted by vibration including curing for 14 days.)	cum	4203.45
12.5	<b>Brick masonry work in cement mortar 1:3 in foundation complete excluding pointing and plastering, as per drawing and technical specifications</b>	cum	6574.85
12.6 A	<b>Cement mortar 1:3 (1cement :3 sand)</b>	cum	4779.00
<b>B</b>	<b>Cement mortar 1:2 (1cement :2 sand)</b>	cum	6014.00
<b>C</b>	<b>Cement mortar 1:4 (1cement :4 sand)</b>	cum	3960.00

<i>D</i>	<i>Cement mortar 1:6 (1cement :6 sand)</i>	cum	3146.00
12.7	<i>Stone masonry work in cement mortar 1:3 in foundation complete as per drawing and Technical Specification</i>		
<i>(a)</i>	<i>Square Rubble Coursed rubble masonry( first sort )</i>	cum	3798.55
<i>(b)</i>	<i>Random Rubble Masonry</i>	cum	3740.20
12.8	<i>Plain/Reinforced cement concrete in open foundation complete as per drawing and technical specifications</i>		
<i>A</i>	<i>PCC Grade M15</i>	cum	5055.20
<i>B</i>	<i>PCC Grade M20</i>	cum	5886.45
<i>C</i>	<i>RCC Grade M20</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	6217.55
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	5848.65
<i>D</i>	<i>PCC Grade M25</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	6477.70
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6141.85
<i>E</i>	<i>RCC Grade M25</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	6814.30
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6557.70
<i>F</i>	<i>PCC Grade M30</i>		
<i>Case I</i>	<i>Using Concrete Mixer</i>	cum	6527.60
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6186.15
<i>G</i>	<i>RCC Grade M30</i>		
<i>Case I</i>	<i>Using Concrete Mixer</i>	cum	6834.30
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6469.95
<i>H</i>	<i>RCC Grade M35</i>		
<i>Case I</i>	<i>Using Concrete Mixer</i>	cum	6967.80
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6605.20
12.9	<i>Providing and constructing temporary island 16 m diameter for construction of well foundation for 8m dia. Well.</i>		
<i>A</i>	<i>Assuming depth of water 1.0 m and height of island to be 1.25m.</i>	each	34931.80
<i>B</i>	<i>Assuming depth of water 4.0 m and height of island 4.5 m.</i>	each	228859.95
<i>C</i>	<i>Providing and constructing one span service road to reach island location from one pier location to another pier location</i>	metre	2196.70

12.10	<i>Providing and laying cutting edge of mild steel weighing 40 kg per metre for well foundation complete as per drawing and technical specification.</i>	tonne	81718.50
12.11	<i>Plain/Reinforced cement concrete, in well foundation complete as per drawing and technical specification</i>		
<i>A</i>	<i>Well curb</i>		
<i>(i)</i>	<i>RCC M20 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	7173.95
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6749.40
<i>(ii)</i>	<i>RCC M25 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	7882.00
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7585.80
<i>(iii)</i>	<i>RCC M35 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	8118.00
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7783.80
<i>B</i>	<i>Well steining</i>		
<i>(i)</i>	<i>PCC M15 Grade</i>	cum	5347.70
<i>(ii)</i>	<i>PCC M20 Grade</i>	cum	6226.20
<i>(iii)</i>	<i>RCC M20 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	6576.10
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6186.95
<i>(iv)</i>	<i>PCC M25 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	6628.40
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6512.20
<i>(v)</i>	<i>RCC M25 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	7225.15
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6953.65
<i>(vi)</i>	<i>PCC M30 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	6937.65
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6574.65
<i>(vii)</i>	<i>RCC M30 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	7264.35
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6876.65
<i>(viii)</i>	<i>RCC M35 Grade</i>		
<i>Case I</i>	<i>Using concrete mixer</i>	cum	7441.50
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7135.15
<i>(ix)</i>	<i>RCC M40 Grade</i>		7271.55

<b>C</b>	<b>Bottom Plug</b>		
<b>(i)</b>	<b>PCC Grade M20</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	6489.15
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	6221.90
<b>(ii)</b>	<b>PCC Grade M25</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	6827.80
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	6556.90
<b>(iii)</b>	<b>PCC Grade M30</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	6894.25
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	6627.00
<b>(iv)</b>	<b>PCC Grade M35</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	7049.25
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	6778.35
<b>D</b>	<b>Intermediate plug</b>		
<b>(i)</b>	<b>Grade M20 PCC</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	6204.00
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	5946.60
<b>(ii)</b>	<b>Grade M25 PCC</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	6527.40
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	6266.05
<b>(iii)</b>	<b>Grade M30 PCC</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	6590.75
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	6333.35
<b>E</b>	<b>Top plug</b>		
<b>(i)</b>	<b>Grade M15 PCC</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	4861.55
<b>(ii)</b>	<b>Grade M20 PCC</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	5660.15
<b>(iii)</b>	<b>Grade M25 PCC</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	6025.80
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	5920.20
<b>(iv)</b>	<b>Grade M30 PCC</b>		
<b>Case I</b>	<b>Using Concrete Mixer</b>	cum	6306.95
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Crane/concrete pump</b>	cum	5976.95
<b>F</b>	<b>Well cap</b>		
<b>(i)</b>	<b>RCC Grade M20</b>		
<b>Case I</b>	<b>Using concrete Mixer</b>	cum	6150.75
<b>Case II</b>	<b>Using Batching Plant, Transit Mixer and Concrete Pump</b>	cum	5781.00

<i>(ii)</i>	<i>RCC Grade M25</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	6814.30
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6449.10
<i>(iii)</i>	<i>RCC Grade M30</i>		
<i>Case I</i>	<i>Using Concrete Mixer</i>	cum	6834.30
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6469.00
<i>(iv)</i>	<i>RCC Grade M35</i>		
<i>Case I</i>	<i>Using Concrete Mixer</i>	cum	6967.80
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6605.20
<i>(v)</i>	<i>RCC M40 Grade</i>	cum	6863.10
12.12	<i>Sinking of 6 m external diameter well ( other than pneumatic method of sinking ) through all types of strata namely sandy soil, clayey soil and rock as shown against each case, complete as per drawing and technical specifications. Depth of sinking is reckoned from bed level.</i>		
<i>A</i>	<i>Sandy soil</i>		
<i>(i)</i>	<i>Depth below bed level upto 3.0 M</i>	metre	3012.25
<i>(ii)</i>	<i>Beyond 3m upto 10m depth</i>	metre	4244.45
<i>(iii)</i>	<i>Beyond 10m upto 20m</i>		
<i>a</i>	<i>Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	5606.00
<i>(iv)</i>	<i>Beyond 20m upto 30 m</i>		
<i>a</i>	<i>Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	10517.00
<i>b</i>	<i>Add 20% of cost for Kentledge including supports, loading arrangement and Labour .</i>		12620.00
<i>(v)</i>	<i>Beyond 30m upto 40 m</i>		
<i>a</i>	<i>Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	24986.00
<i>b</i>	<i>Add 20% of cost for Kentledge including supports, loading arrangement and Labour .</i>	metre	29983.00
<i>B</i>	<i>Clayey soil ( 6m dia. Well )</i>		
<i>(i)</i>	<i>Depth below bed level upto 3.0 M</i>	metre	4260.95
<i>(ii)</i>	<i>Beyond 3m upto 10m depth</i>	metre	10023.30
<i>(iii)</i>	<i>Beyond 10 m upto 20 m</i>		
<i>a</i>	<i>Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	13237.00
<i>b</i>	<i>Add for dewatering @ 5% of cost, if required.</i>	metre	13899.00
<i>(iv)</i>	<i>Beyond 20m upto 30 m</i>		

a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	24828.00
b	Add 5% of cost for dewatering of the cost, if required	metre	32587.00
c	Add 25% of cost for Kentledge including supports, loading arrangement and Labour ).	metre	31035.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	58989.00
b	Add 5% of cost for dewatering, if required	metre	74326.00
c	Add 20% of cost for Kentledge including supports, loading arrangement and Labour).	metre	70786.00
C	Soft rock (6m dia well )		
(i)	Depth of soft rock strata upto 3m	metre	15487.80
D	Hard rock (6m dia well )		
(i)	Depth of soft rock strata upto 3m	metre	14817.30
12.13	Sinking of 7 m external diameter well ( other than pneumatic method of sinking ) through all types of strata namely sandy soil, clayey soil and rock as shown against each case, complete as per drawing and technical specifications. Depth of sinking is reckoned from bed level.		
A	Sandy soil		
(i)	Depth below bed level upto 3.0 M	metre	8832.20
(ii)	Beyond 3m upto 10m depth	metre	5955.85
(iii)	Beyond 10m upto 20m		
a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	7866.00
(iv)	Beyond 20m upto 30 m		
a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	14756.00
b	Add 20% of cost for Kentledge including supports, loading arrangement and Labour) .	metre	17707.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	35059.00
b	Add 20% of cost for Kentledge including supports, loading arrangement, and Labour etc.	metre	42071.00
B	Clayey soil ( 7m dia. Well )		
(i)	Depth below bed level upto 3.0 M	metre	5955.85
(ii)	Beyond 3m upto 10m depth	metre	8522.70
(iii)	Beyond 10 m upto 20 m		

a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	11256.00
b	Add for dewatering @ 5% of cost, if required.	metre	11819.00
(iv)	Beyond 20m upto 30 m		
a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	21112.00
b	Add 5% of cost for dewatering on the cost, if required	metre	27710.00
c	Add 25% of cost for Kentledge including supports, loading arrangement and Labour ).	metre	26390.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	50159.00
b	Add 5% of cost for dewatering, if required	metre	63200.00
c	Add 20% of cost for Kentledge including supports, loading arrangement and Labour).		60190.00
C	Soft rock ( 7m dia well )		
(i)	Depth of soft rock strata upto 3m	metre	13092.50
D	Hard rock ( 7m dia well )		
(i)	Depth upto 3 m	metre	17451.40
12.14	Sinking of 8 m external diameter well ( other than pneumatic method of sinking ) through all types of strata namely sandy soil, clayey soil and rock as shown against each case, complete as per drawing and technical specifications. Depth of sinking is reckoned from bed level.		
A	Sandy soil		
(i)	Depth below bed level upto 3.0 M	metre	5476.70
(ii)	Beyond 3m upto 10m depth	metre	6722.10
(iii)	Beyond 10m upto 20m		
a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	8878.00
(iv)	Beyond 20m upto 30 m		
a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	16652.00
b	Add 20% of cost for Kentledge including supports, loading arrangement and Labour .	metre	19983.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	5854.00
b	Add 20% of cost for Kentledge including supports, loading arrangement, and Labour etc.	metre	7024.00

<i>B</i>	<i>Clayey soil ( 8m dia. Well )</i>		
<i>(i)</i>	<i>Depth upto 3.0 M</i>	metre	7290.35
<i>(ii)</i>	<i>Beyond 3m upto 10m depth</i>	metre	10957.90
<i>(iii)</i>	<i>Beyond 10 m upto 20 m</i>		
<i>a</i>	<i>Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	14471.00
<i>b</i>	<i>Add for dewatering @ 5% of cost, if required.</i>	metre	15195.00
<i>(iv)</i>	<i>Beyond 20m upto 30 m</i>		
<i>a</i>	<i>Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	27144.00
<i>b</i>	<i>Add 5% of cost for dewatering on the cost, if required</i>	metre	35627.00
<i>c</i>	<i>Add 25% of cost for Kentledge including supports, loading arrangement and Labour ).</i>	metre	33931.00
<i>(v)</i>	<i>Beyond 30m upto 40 m</i>		
<i>a</i>	<i>Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	64493.00
<i>b</i>	<i>Add 5% of cost for dewatering, if required</i>	metre	81261.00
<i>c</i>	<i>Add 20% of cost for Kentledge including supports, loading arrangement and Labour).</i>	metre	77391.00
<i>C</i>	<i>Soft rock ( 8m dia well )</i>		
<i>(i)</i>	<i>Depth in soft rock strata upto 3m</i>	metre	14459.60
<i>D</i>	<i>Hard rock ( 8m dia well )</i>		
<i>(i)</i>	<i>Depth in hard rock strata upto 3 m</i>	metre	17888.55
<i>12.15</i>	<i>Sinking of 9 m external diameter well ( other than pneumatic method of sinking ) through all types of strata namely sandy soil, clayey soil and rock as shown against each case, complete as per drawing and technical specifications. Depth of sinking is reckoned from bed level.</i>		
<i>A</i>	<i>Sandy soil</i>		
<i>(i)</i>	<i>Depth below bed level upto 3.0 M</i>	metre	5562.50
<i>(ii)</i>	<i>Beyond 3m upto 10m depth</i>	metre	7372.85
<i>(iii)</i>	<i>Beyond 10m upto 20m</i>		
<i>a</i>	<i>Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	9738.00
<i>(iv)</i>	<i>Beyond 20m upto 30 m</i>		
<i>a</i>	<i>Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	18266.00
<i>b</i>	<i>Add 20% of cost for Kentledge including supports, loading arrangement and Labour .</i>	metre	21919.00
<i>(v)</i>	<i>Beyond 30m upto 40 m</i>		

a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	43396.00
b	Add 20% of cost for Kentledge including supports, loading arrangement, and Labour etc.	metre	52075.00
<b>B</b>	<b>Clayey soil ( 9m dia. Well )</b>		
(i)	Depth below bed level upto 3.0 M	metre	7718.05
(ii)	Beyond 3m upto 10m depth	metre	11796.35
(iii)	Beyond 10 m upto 20 m		
a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	15579.00
b	Add for dewatering @ 5% of cost, if required.	metre	16358.00
(iv)	Beyond 20m upto 30 m		
a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	29220.00
b	Add 5% of cost for dewatering on the cost, if required	metre	38352.00
c	Add 25% of cost for Kentledge including supports, loading arrangement and Labour ).	metre	36525.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	69425.00
b	Add 5% of cost for dewatering, if required	metre	87475.00
c	Add 20% of cost for Kentledge including supports, loading arrangement and Labour).	metre	83310.00
<b>C</b>	<b>Soft rock ( 9m dia well )</b>		
(i)	Depth upto 3m	metre	17778.00
<b>D</b>	<b>Hard rock ( 9m dia well )</b>		
(i)	Depth of hard rock strata upto 3 m	metre	20706.00
12.16	Sinking of 10 m external diameter well ( other than pneumatic method of sinking ) through all types of strata namely sandy soil, clayey soil and rock as shown against each case, complete as per drawing and technical specifications. Depth of sinking is reckoned from bed level.		
<b>A</b>	<b>Sandy soil</b>		
(i)	Depth below bed level upto 3.0 M	metre	6606.60
(ii)	Beyond 3m upto 10m depth	metre	7807.15
(iii)	Beyond 10m upto 20m		
a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	10310.00
(iv)	Beyond 20m upto 30 m		

a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	19339.00
b	Add 20% of cost for Kentledge including supports, loading arrangement and Labour .	metre	23207.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	45947.00
b	Add 20% of cost for Kentledge including supports, loading arrangement, and Labour etc.	metre	55136.00
B	Clayey soil (10m dia. Well )		
(i)	Depth below bed level upto 3.0 M	metre	8637.40
(ii)	Beyond 3m upto 10m depth	metre	11887.65
(iii)	Beyond 10 m upto 20 m		
a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	15699.00
b	Add for dewatering @ 5% of cost, if required.	metre	16484.00
(iv)	Beyond 20m upto 30 m		
a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	29447.00
'b	Add 5% of cost for dewatering on the cost, if required	metre	38649.00
c	Add 25% of cost for Kentledge including supports, loading arrangement and Labour ).	metre	36808.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	69962.00
b	Add 5% of cost for dewatering, if required	metre	88152.00
c	Add 20% of cost for Kentledge including supports, loading arrangement and Labour).		83954.00
C	Soft rock (10m dia well )		
(i)	Depth of soft rock strata upto 3m	metre	18095.80
D	Hard rock (10m dia well )		
(i)	Depth of hard rock strata upto 3 m	metre	23390.35
12.17	Sinking of 11 m external diameter well ( other than pneumatic method of sinking ) through all types of strata namely sandy soil, clayey soil and rock as shown against each case, complete as per drawing and technical specifications. Depth of sinking is reckoned from bed level.		
A	Sandy soil		
(i)	Depth from bed level upto 3.0 M	metre	15004.45
(ii)	Beyond 3m upto 10m depth	metre	12431.75
(iii)	Beyond 10m upto 20m		

a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	16419.00
(iv)	Beyond 20m upto 30 m		
a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	30797.00
b	Add 20% of cost for Kentledge including supports, loading arrangement and Labour .	metre	36956.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	73170.00
b	Add 20% of cost for Kentledge including supports, loading arrangement, and Labour etc.	metre	87804.00
B	Clayey soil (11 m dia. Well)		
(i)	Depth from bed level upto 3.0 M	metre	14374.80
(ii)	Beyond 3m upto 10m depth	metre	24731.45
(iii)	Beyond 10 m upto 20 m		
a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	32661.00
b	Add for dewatering @ 5% of cost, if required.	metre	34294.00
(iv)	Beyond 20m upto 30 m		
a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	61262.00
b	Add 5% of cost for dewatering on the cost, if required	metre	80407.00
c	Add 25% of cost for Kentledge including supports, loading arrangement and Labour ).	metre	76578.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	145549.00
b	Add 5% of cost for dewatering, if required	metre	183392.00
c	Add 20% of cost for Kentledge including supports, loading arrangement and Labour).	metre	174659.00
C	Soft rock (11m dia well)		
(i)	Depth of soft rock strata upto 3m	metre	40254.75
D	Hard rock (11m dia well)		
(i)	Depth of hard rock upto 3 m	metre	52147.70
12.18	Sinking of 12 m external diameter well ( other than pneumatic method of sinking ) through all types of strata namely sandy soil, clayey soil and rock as shown against each case, complete as per drawing and technical specifications. Depth of sinking is reckoned from bed level.		

<b>A</b>	<b>Sandy soil</b>		
(i)	<i>I) Depth below bed level upto 3.0 M</i>	metre	31342.10
(ii)	<i>Beyond 3m upto 10m depth</i>	metre	35634.70
(iii)	<i>Beyond 10m upto 20m</i>		
a	<i>Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	47062.00
(iv)	<i>Beyond 20m upto 30 m</i>		
a	<i>Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	88276.00
b	<i>Add 20% of cost for Kentledge including supports, loading arrangement and Labour .</i>	metre	105931.00
(v)	<i>Beyond 30m upto 40 m</i>		
a	<i>Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	209732.00
b	<i>Add 20% of cost for Kentledge including supports, loading arrangement, and Labour etc.</i>	metre	251679.00
<b>B</b>	<b>Clayey soil (12 m dia. Well )</b>		
(i)	<i>Depth below bed level upto 3.0 M</i>	metre	35046.00
(ii)	<i>Beyond 3m upto 10m depth</i>	metre	59937.15
(iii)	<i>Beyond 10 m upto 20 m</i>		
a	<i>Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	79158.00
b	<i>Add for dewatering @ 5% of cost, if required.</i>	metre	83116.00
(iv)	<i>Beyond 20m upto 30 m</i>		
a	<i>Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	148480.00
b	<i>Add 5% of cost for dewatering on the cost, if required</i>	metre	194880.00
c	<i>Add 25% of cost for Kentledge including supports, loading arrangement and Labour ).</i>	metre	185600.00
(v)	<i>Beyond 30m upto 40 m</i>		
a	<i>Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	352768.00
b	<i>Add 5% of cost for dewatering, if required</i>	metre	444487.00
c	<i>Add 20% of cost for Kentledge including supports, loading arrangement and Labour).</i>	metre	423321.00
<b>C</b>	<b>Soft rock (12m dia well )</b>		
(i)	<i>Depth of soft rock strata upto 3m</i>	metre	92924.80
<b>D</b>	<b>Hard rock (12m dia well )</b>		
(i)	<i>Depth of hard rock strata upto 3 m</i>	metre	117130.40

12.19	<i>Sinking of Twin D Type well ( other than pneumatic method of sinking ) through all types of strata namely sandy soil, clayey soil and rock as shown against each case, complete as per drawing and technical specifications. Depth of sinking is reckoned from bed level.</i>		
<i>A</i>	<i>Sandy soil</i>		
<i>(i)</i>	<i>Depth from bed level upto 3.0 M</i>	metre	7069.25
<i>(ii)</i>	<i>Beyond 3m upto 10m depth</i>	metre	7647.90
<i>(iii)</i>	<i>Beyond 10m upto 20m</i>		
<i>a</i>	<i>Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter</i>	metre	10101.00
<i>(iv)</i>	<i>Beyond 20m upto 30 m</i>		

a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	18947.00
b	Add 20% of cost for Kentledge including supports, loading arrangement and Labour .	metre	22736.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	45014.00
b	Add 20% of cost for Kentledge including supports, loading arrangement, and Labour etc.	metre	54017.00
B	Clayey soil (Twin D Type Well )		
(i)	Depth below bed level upto 3.0 M	metre	8385.30
(ii)	Beyond 3m upto 10m depth	metre	13185.55
(iii)	Beyond 10 m upto 20 m		
a	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	17413.00
b	Add for dewatering @ 5% of cost, if required.	metre	18284.00
(iv)	Beyond 20m upto 30 m		
a	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	32664.00
b	Add 5% of cost for dewatering on the cost, if required	metre	42871.00
c	Add 25% of cost for Kentledge including supports, loading arrangement and Labour ).	metre	40830.00
(v)	Beyond 30m upto 40 m		
a	Add 10% for every additional meter depth of sinking over the rate of sinking for the previous meter	metre	77604.00
b	Add 5% of cost for dewatering, if required	metre	97781.00
c	Add 20% of cost for Kentledge including supports, loading arrangement and Labour).	metre	93124.00
C	Soft rock (Twin D Type well )		
(i)	Depth of soft rock strata upto 3m	metre	20721.05

<i>D</i>	<i>Hard rock (Twin D Type well)</i>		
<i>(i)</i>	<i>Depth of hard rock strata upto 3 m</i>	metre	24672.65
12.21	<i>Sand filling in wells complete as per drawing and technical specifications</i>	cum	858.65
12.22	<i>Providing steel liner 10 mm thick for curbs and 6mm thick for steining of wells including fabricating and setting out as per detailed drawing</i>	tonne	74862.40
12.23	<i>Bored cast-in-situ M35 grade R.C.C. pile excluding reinforcement complete as per drawing and technical specifications and removal of excavated earth with all lifts and lead upto 1000 m. (Pile diameter-750 mm)</i>	metre	6042.20
12.24	<i>Bored cast-in-situ M35 grade R.C.C. pile excluding reinforcement complete as per drawing and technical specifications and removal of excavated earth with all lifts and lead upto 1000 m. (Pile diameter-1000 mm)</i>	metre	9948.10
12.25	<i>Bored cast-in-situ M35 grade R.C.C. pile excluding reinforcement complete as per drawing and technical specifications and removal of excavated earth with all lifts and lead upto 1000 m. (Pile diameter-1200 mm)</i>	metre	12852.40
12.26	<i>Driven cast-in-place vertical M35 grade R.C.C. pile excluding reinforcement complete as per drawing and &amp; Technical Specification (Pile diameter - 750 mm)</i>	metre	5096.45
12.27	<i>Driven cast-in-place vertical M35 grade R.C.C. piles excluding reinforcement complete as per drawing and &amp; Technical Specification (Pile diameter - 1000 mm)</i>	metre	8143.05
12.28	<i>Driven cast-in-place vertical M35 grade R.C.C. piles excluding reinforcement complete as per drawing and &amp; Technical Specification (Pile diameter - 1200 mm)</i>	metre	11891.25
12.37	<i>Pile load test on single vertical pile in accordance with IS:2911(Part-IV)</i>		
	<i>(a) Initial and routine load test</i>	tonne	300.00
	<i>(b) Lateral load test</i>	tonne	5000.00

12.38	<i>Cement concrete for reinforced concrete in pile cap complete as per drawing and Technical Specification</i>		
<b>A</b>	<b><i>RCC Grade M20</i></b>		
(i)	<i>Using Concrete Mixer</i>	cum	6163.10
(ii)	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	5817.75
<b>B</b>	<b><i>RCC Grade M25</i></b>		
(i)	<i>Using concrete mixer.</i>	cum	6799.20
(ii)	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6455.35
<b>C</b>	<b><i>RCC Grade M30</i></b>		
(i)	<i>Using concrete mixer.</i>	cum	6879.65
(ii)	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6534.30
<b>D</b>	<b><i>RCC Grade M35</i></b>		
(i)	<i>Using concrete mixer.</i>	cum	7047.80
(ii)	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6703.95
12.39	<i>Levelling course for Pile cap</i>	cum	4788.20
12.40	<i>Supplying, fitting and placing un-coated HYSD bar reinforcement in foundation complete as per drawing and technical specifications</i>	tonne	<b>55176.00</b>
12.41	<i>Supplying, fitting and placing un-coated Mild steel reinforcement complete in foundation as per drawing and technical specification</i>	tonne	56274.85

## Chapter – 13

### SUBSTRUCTURE

**Preamble:**

- 1 Although, substructure are generally constructed in cement concrete, the rate for brick and stone masonry in CM 1:3 have also been included which can be adopted permitted by design.
- 2 The cost of formwork will vary with the height and cross-section of the substructure. Provision has been made accordingly.
- 3 Bridge bearing, being commercial item produced by specialised firms with imported technology and parts, the rates for the same are ascertained by quotation from the market for the approved design and technical specifications.
- 4 Filter media and backfilling behind abutment are required to be provided as per guidelines in IRC:78- 2000.
- 5 Weep holes shall be provided as per specifications.
- 6 In case of roller-cum-rocker bearings, only full circular rollers are to be provided.
- 7 Bearing shall be set truly level so as to have full and even seating.
- 8 For elastomeric bearings, the concrete surface shall be leveled such that the variation is not more than 1.5 mm from a straight edge placed in any direction across the area.
- 9 The bearing should be procured only from those manufacturers who have been prequalified by the Ministry of Road Transport and Highways.
- 10 The bottoms of girders resting on the bearing shall be plane and truly horizontal.
- 11 For spans in garde, the bearing shall be placed horizontal by using sole plates for suitbly designed RCC pedestals.

**CHAPTER-13**  
**SUB-STRUCTURE**

13.1	<i>Brick masonry work in 1:3 in sub-structure complete excluding pointing and plastering, as per drawing and technical specifications</i>	cum	6669.40
13.2	<i>Pointing with cement mortar (1:3) on brick work in substructure as per Technical specifications</i>	sqm	53.20
13.3	<i>Plastering with cement mortar (1:3) on brick work in sub-structure as per Technical specifications</i>	sqm	125.20
13.4	<i>Stone masonry work in cement mortar 1:3 for substructure complete as per drawing and Technical Specifications</i>		
A	<i>Random Rubble Masonry</i>	cum	3819.90
B	<i>Coursed rubble masonry (first sort )</i>	cum	3901.15
C	<i>Ashlar masonry ( first sort )</i>	cum	4827.10
13.5	<i>Plain/Reinforced cement concrete in sub-structure complete as per drawing and technical specifications</i>		
A	<i>PCC Grade M15</i>		
(p)	<i>Height upto 5m</i>	cum	5347.70
B	<i>PCC Grade M20</i>		
(p)	<i>Height upto 5m</i>	cum	6226.20
C	<i>PCC Grade M25</i>		
(p)	<i>Height upto 5m</i>		
Case I	<i>Using concrete Mixer</i>	cum	6628.40
Case II	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6512.20
(q)	<i>Height 5m to 10m</i>		
Case I	<i>Using concrete Mixer</i>	cum	6869.40
Case II	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6749.05
(r)	<i>Height above 10m</i>		
Case I	<i>Using concrete Mixer</i>	cum	7171.70
Case II	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7045.05
D	<i>PCC Grade M30</i>		
(p)	<i>Height upto 5m</i>		
Case I	<i>Using concrete Mixer</i>	cum	6937.65
Case II	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6574.65
(q)	<i>Height 5m to 10m</i>		
Case I	<i>Using concrete Mixer</i>	cum	7190.95
Case II	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6813.75
(r)	<i>Height above 10m</i>		

<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7505.30
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7112.60
<i>E</i>	<i>RCC Grade M20</i>		
<i>(p)</i>	<i>Height upto 5m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	6576.10
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6186.95
<i>(q)</i>	<i>Height 5m to 10m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	6815.25
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6411.95
<i>(r)</i>	<i>Height above 10m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7114.15
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6693.20
<i>F</i>	<i>RCC Grade M25</i>		
<i>(p)</i>	<i>Height upto 5m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7225.15
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6953.60
<i>(q)</i>	<i>Height 5m to 10m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7461.60
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7181.20
<i>(r)</i>	<i>Height above 10m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7816.30
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7522.55
<i>G</i>	<i>RCC Grade M30</i>		
<i>(p)</i>	<i>Height upto 5m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7264.35
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	6876.65
<i>(q)</i>	<i>Height 5m to 10m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7469.10
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7070.45
<i>(r)</i>	<i>Height above 10m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7759.65
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7345.55
<i>H</i>	<i>RCC Grade M35</i>		
<i>(p)</i>	<i>Height upto 5m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7441.50

<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7135.15
<i>(q)</i>	<i>Height 5m to 10m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7603.85
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7290.80
<i>(r)</i>	<i>Height above 10m</i>		
<i>Case I</i>	<i>Using concrete Mixer</i>	cum	7847.40
<i>Case II</i>	<i>With Batching Plant, Transit Mixer and Concrete Pump</i>	cum	7524.30
13.6	<i>Supplying, fitting and placing HYSD bar reinforcement in sub-structure complete as per drawing and technical specifications</i>	tonne	56146.15
13.7	<i>Supplying, fitting and placing Mild steel reinforcement complete in sub-structure as per drawing and technical specification</i>	tonne	55664.35
13.8	<i>Providing weep holes in Brick masonry/Plain/Reinforced concrete abutment, wing wall/return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V :20H towards drawing face. Complete as per drawing and Technical specifications</i>	each	125.70
13.9	<i>Back filling behind abutment, wing wall and return wall complete as per drawing and Technical specification</i>		
<i>A</i>	<i>Granular material</i>	cum	826.30
<i>B</i>	<i>Sandy material</i>	cum	1064.45
13.10	<i>Providing and laying of Filter media with granular materials/stone crushed aggregates satisfying the requirements laid down in clause 2504.2.2. of MoRTH specifications to a thickness of not less than 600 mm with smaller size towards the soil and bigger size towards the soil and bigger size towards the wall and provided over the entire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and technical specification</i>	cum	1754.35
13.11	<i>Supplying, fitting and fixing in position true to line and level cast steel rocker bearing conforming to IRC: 83(Pt.-1) section IX and clause 2003 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications.</i>	tonne capacity	1468.45

13.12	<i>Supplying, fitting and fixing in position true to line and level forged steel roller bearing conforming to IRC: 83(Pt.-1) section IX and clause 2003 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications.</i>	tonne capacity	1292.45
13.13	<i>Supplying, fitting and fixing in position true to line and level sliding plate bearing with PTFE surface sliding on stainless steel complete including all accessories as per drawing and Technical Specifications and BS: 5400, section 9.1 &amp; 9.2 (for PTFE) and clause 2004 of MoRTH Specifications.</i>	tonne capacity	2755.75
13.14	<i>Supplying, fitting and fixing in position true to line and level elastomeric bearing conforming to IRC: 83 (Part-II) section IX and clause 2005 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications.</i>	cubic centimetre	0.95
13.15	<i>Supplying, fitting and fixing in position true to line and level sliding plate bearing with stainless steel plate sliding on stainless steel plate with mild steel matrix complete including all accessories as per drawing and Technical Specifications.</i>	tonne capacity	224.35
13.16	<i>Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, complete assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC: 83 part-I &amp; II respectively and other parts conforming to BS: 5400, section 9.1 &amp; 9.2 and clause 2006 of MoRTH Specifications complete as per drawing and approved technical specifications.</i>	tonne capacity	295.80

## Chapter – 14

### SUPERSTRUCTURE

#### Preamble:

- 1 The rate for the wearing coat has been analysed as under in accordance with the provisions of MORD Specifications:
  - a. Cement concrete wearing coat
  - b. Ashphaltic concrete wearing coat
  - c. Bitumen mastic wearing coat

The item may be selected as per approved design
- 2 The rates are provided for both RCC Railing and M. S. Railing, which can be adopted as per approved design.
- 3 The length of drainage spout has been provided in such a way that it is connected to the drainage system on the ground in case of flyovers and there is no splashing of water on the structure in case of bridges.
- 4 The rate for anti-corrosive treatment is ascertained from firms specialised in this work. In this connection Circular No. RW/NH-34041/44/91-S&R dated 21.03.2000 of Ministry of Road Transport and Highways may be referred for further details
- 5 Expansion joints involving movements exceeding 40 mm are specialised readymade items commercially produced by reputed firms with imported technology and parts. The rates for such joints are ascertained from the firms pre-qualified by the Ministry.
- 6 The Rates for pre-cast and pre-tensioned girders has also been included.
- 7 MoRT&H letter No. RW/NH-34059/1/96 S&R dated 30-11-2000 and subsequent corrigendum dated 25-01-2001 may be referred for detailed specifications and provisions for various types of expansion joints.
- 8 For bridges having wide deck/span length of more than 120 m or/and involving complex movements/rotations in different directions/planes, provision of special type of modular expansion joints such as swivel joists joint are required for which firms specialised in this field may be consulted. Such cases will require prior approval of Ministry.

**CHAPTER-14**  
**SUPER-STRUCTURE**

14.1	<i>Furnishing and Placing Reinforced/Prestressed cement concrete in super-structure as per drawing and Technical Specification</i>		
<b>A</b>	<b>RCC Grade M20</b>		
<i>Case I</i>	<i>Using Concrete Mixer</i>		
<i>(i)</i>	<i>For solid slab super-structure, 20-30% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7097.05
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	7392.75
<i>(r)</i>	<i>Height above 10m</i>	cum	7688.50
<i>(ii)</i>	<i>For T-beam &amp; slab, 25-35% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7392.75
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	7688.50
<i>(r)</i>	<i>Height above 10m</i>	cum	7984.20
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>		
<i>(i)</i>	<i>For solid slab super-structure, 20-30% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	6670.40
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	6948.30
<i>(r)</i>	<i>Height above 10m</i>	cum	7226.25
<i>(ii)</i>	<i>For T-beam &amp; slab, 25-35% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	6948.30
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	7226.25
<i>(r)</i>	<i>Height above 10m</i>	cum	7504.20
<b>B</b>	<b>RCC Grade M25</b>		
<i>Case I</i>	<i>Using Concrete Mixer</i>		
<i>(i)</i>	<i>For solid slab super-structure, 20-30% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7813.10
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8157.40
<i>(r)</i>	<i>Height above 10m</i>	cum	8483.70
<i>(ii)</i>	<i>For T-beam &amp; slab, 25-35% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	8157.40
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8483.70
<i>(r)</i>	<i>Height above 10m</i>	cum	8809.95
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>		
<i>(i)</i>	<i>For solid slab super-structure, 20-30% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7413.05
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	7721.90
<i>(r)</i>	<i>Height above 10m</i>	cum	8030.80
<i>(ii)</i>	<i>For T-beam &amp; slab, 25-35% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7721.90
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8030.80
<i>(r)</i>	<i>Height above 10m</i>	cum	8339.65
<b>C</b>	<b>RCC Grade M 30</b>		

<i>Case I</i>	<i>Using Concrete Mixer</i>		
<i>(i)</i>	<i>For solid slab super-structure, 20-30% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7946.00
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8277.05
<i>(r)</i>	<i>Height above 10m</i>	cum	8608.15
<i>(ii)</i>	<i>For T-beam &amp; slab, 25-35% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	8277.05
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8608.15
<i>(r)</i>	<i>Height above 10m</i>	cum	8939.20
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump.</i>		
<i>(i)</i>	<i>For solid slab super-structure, 20-30% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7506.95
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	7819.75
<i>(r)</i>	<i>Height above 10m</i>	cum	8132.55
<i>(ii)</i>	<i>For T-beam &amp; slab, 25-35% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7819.75
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8132.55
<i>(r)</i>	<i>Height above 10m</i>	cum	8445.35
<i>D</i>	<i>RCC/PSC Grade M35</i>		
<i>Case 1</i>	<i>Using concrete mixer.</i>		
<i>(i)</i>	<i>For solid slab super-structure, 18-28% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	8004.40
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8343.55
<i>(r)</i>	<i>Height above 10m</i>	cum	8682.75
<i>(ii)</i>	<i>For T-beam &amp; slab, 23-33% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	8343.55
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8682.75
<i>(r)</i>	<i>Height above 10m</i>	cum	9021.90
<i>(iii)</i>	<i>For box girder and balanced cantilever, 38-58% of cost of concrete.</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	9361.10
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	10039.45
<i>(r)</i>	<i>Height above 10m</i>	cum	10717.75
<i>Case II</i>	<i>Using Batching Plant, Transit Mixer and Concrete Pump</i>		
<i>(i)</i>	<i>For solid slab super-structure, 18-28% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7569.85
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	7890.65
<i>(r)</i>	<i>Height above 10m</i>	cum	8211.40
<i>(ii)</i>	<i>For T-beam &amp; slab, 23-33% of (a+b+c)</i>		
<i>(p)</i>	<i>Height upto 5m</i>	cum	7890.65
<i>(q)</i>	<i>Height 5m to 10m</i>	cum	8211.40
<i>(r)</i>	<i>Height above 10m</i>	cum	8532.15
<i>(iii)</i>	<i>For box girder and balanced cantilever, 38-58% of cost of concrete.</i>		

(p)	Height upto 5m	cum	8852.90
(q)	Height 5m to 10m	cum	9494.40
(r)	Height above 10m	cum	10135.95
E	PSC Grade M-40		
Case 1	Using concrete mixer.		
(i)	For solid slab super-structure, 20-30% of (a+b+c)		
(p)	Height upto 5m	cum	8416.10
(q)	Height 5m to 10m	cum	8766.80
(r)	Height above 10m	cum	9117.45
(ii)	For T-beam & slab, 25-35% of (a+b+c)		
(p)	Height upto 5m	cum	8766.80
(q)	Height 5m to 10m	cum	9117.45
(r)	Height above 10m	cum	9468.10
Case II	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	For solid slab super-structure, 18-28% of (a+b+c)		
(p)	Height upto 5m	cum	7808.10
(q)	Height 5m to 10m	cum	8138.95
(r)	Height above 10m	cum	8469.80
(ii)	For T-beam & slab, 23-33% of (a+b+c)		
(p)	Height upto 5m	cum	8138.95
(q)	Height 5m to 10m	cum	8469.80
(r)	Height above 10m	cum	8800.70
(iii)	For box girder and balanced cantilever, 38-58% of cost of concrete.		
(p)	Height upto 5m	cum	9131.55
(q)	Height 5m to 10m	cum	9793.25
(r)	Height above 10m	cum	10454.95
F	PSC Grade M-45		
(i)	For solid slab/voided slab super-structure, 16-26% of cost of concrete (a+b+c)		
(p)	Height upto 5m	cum	8114.65
(q)	Height 5m to 10m	cum	8464.40
(r)	Height above 10m	cum	8814.20
(ii)	For I-beam & slab including launching of precast girders by launching truss upto 40 m span, 21-31% of cost of concrete.		
(p)	Height upto 5m	cum	8464.40
(q)	Height 5m to 10m	cum	8814.20
®	Height above 10m	cum	9163.95
(iii)	For cast-in-situ box girder, segmental construction and balanced cantilever, 36-56% of cost of concrete.		
(p)	Height upto 5m	cum	9513.70
(q)	Height 5m to 10m	cum	10213.25
(r)	Height above 10m	cum	10912.80

<b>G</b>	<b>PSC Grade M-50</b>		
<b>(i)</b>	<b>For cast-in-situ box girder, segmental construction and balanced cantilever, 35-55% of cost of concrete</b>		
<b>(p)</b>	<b>Height upto 5m</b>	cum	9808.60
<b>(q)</b>	<b>Height 5m to 10m</b>	cum	10535.15
<b>(r)</b>	<b>Height above 10m</b>	cum	11261.70
<b>H</b>	<b>PSC Grade M- 55</b>		
<b>(i)</b>	<b>For cast-in-situ box girder, segmental construction and balanced cantilever, 35-55% of cost of concrete</b>		
<b>(p)</b>	<b>Height upto 5m</b>	cum	10380.15
<b>(q)</b>	<b>Height 5m to 10m</b>	cum	11149.05
<b>(r)</b>	<b>Height above 10m</b>	cum	11917.95
14.2	a) Supplying, fitting and placing HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	tonne	57155.95
14.3	High tensile steel wires/strands including all accessories for stressing, stressing operations and grouting complete as per drawing and Technical Specifications	tonne	108152.95
14.4	Providing and laying Cement concrete wearing coat M-30 grade including reinforcement complete as per drawing and Technical Specifications	cum	10581.80
14.5	Mastic Asphalt (Providing and laying 12 mm thick mastic asphalt wearing course on top of deck slab excluding prime coat with paving grade bitumen meeting the requirements given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 9.5 mm nominal size at the rate of 0.005cum per 10 sqm and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces not less than 100 deg. C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 515.)	sqm	312.45
14.6	Construction of precast RCC railing of M30 Grade, aggregate size not exceeding 12 mm, true to line and grade, tolerance of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications.	metre	1669.45

14.7	<i>Construction of RCC railing of M30 Grade in-situ with 20 mm nominal size aggregate, true to line and grade, tolerance of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications.</i>	metre	1627.25
14.8	<i>Providing, fitting and fixing mild steel railing complete as per drawing and Technical Specification</i>	metre	2982.40
14.9	<i>Drainage Spouts complete as per drawing and Technical specification</i>	each	691.15
14.10	<i>PCC M15 Grade leveling course below approach slab complete as per drawing and Technical specification</i>	cum	4862.00
14.11	<i>Reinforced cement concrete approach slab including reinforcement and formwork complete as per drawing and Technical specification</i>	cum	9234.35
14.15	<i>Crash Barriers (The rate analysis for rigid crash barrier in reinforced cement concrete, semi-rigid crash barrier with metal beam and flexible crash barrier with wire ropes have been made and included in chapter-8 on Traffic and Transportation.)</i>		
14.16	<i>Painting on concrete surface (Providing and applying 2 coats of water based cement paint to unplastered concrete surface after cleaning the surface of dirt, dust, oil, grease, efflorescence and applying paint @ of 1 litre for 2 Sq.m. )</i>	metre	66.35
14.17	<i>Burried Joint (Providing and laying a burried expansion joint, expansion gap being 20 mm, covered with 12 mm thick, 200 mm wide galvanised weldable structural steel plate as per IS: 2062, placed symmetrical to centre line of the joint, resting freely over the top surface of the deck concrete, welding of 8 mm dia. 100 mm long galvanised nails spaced 300 mm c/c along the centre line of the plate, all as specified in clause 2604.)</i>	metre	1031.80

14.18	<b>Filler joint</b>		
(i)	<i>Providing &amp; fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing &amp; Technical Specification.</i>	metre	3658.60
(ii)	<i>Providing &amp; fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing &amp; Technical Specification.</i>	metre	210.35
(iii)	<i>Providing and fixing in position 20 mm thick premoulded joint filler in expansion joint for fixed ends of simply supported spans not exceeding 10 m to cater for a horizontal movement upto 20 mm, covered with sealant complete as per drawing and technical specifications.</i>	metre	206.00
(iv)	<i>Providing and filling joint sealing compound as per drawings and technical specifications with coarse sand and 6% bitumen by weight</i>	metre	19.55
14.19	<b>Asphaltic Plug joint</b> (Providing and laying of asphaltic plug joint to provide for horizontal movement of 25 mm and vertical movement of 2 mm, depth of joint varying from 75 mm to 100 mm, width varying from 500 mm to 750 mm (in traffic direction), covered with a closure plate of 200mm x 6mm of weldable structural steel conforming to IS: 2062, asphaltic plug to consist of polymer modified bitumen binder, carefully selected single size aggregate of 12.5 mm nominal size and a heat resistant foam caulking/backer rod, all as per approved drawings and specifications.)	metre	2760.55
14.20	<b>Elastomeric Slab Steel Expansion Joint</b> (Providing and laying of an elastomeric slab steel expansion joint, catering to right or skew (less than 20 deg., moderately curved with maximum horizontal movement upto 50 mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation and clause 2606 of MoRTH specifications for road & bridge works.)	metre	12514.15

14.21	<b>Compression Seal Joint</b> (Providing and laying of compression seal joint consisting of steel armoured nosing at two edges of the joint gap suitably anchored to the deck concrete and a preformed chloroprene elastomer or closed cell foam joint sealer compressed and fixed into the joint gap with special adhesive binder to cater for a horizontal movement upto 40 mm and vertical movement of 3 mm.)	metre	14630.45
14.22	<b>Strip Seal Expansion Joint</b> (Providing and laying of a strip seal expansion joint catering to maximum horizontal movement upto 70 mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation.)	metre	15279.20
14.23	<b>Modular Strip / Box Seal Joint</b> (Providing and laying of a modular strip Box steel expansion joint including anchorage catering to a horizontal movement beyond 70 mm and upto 140mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation.)	metre	250836.75
14.24	<b>Modular Strip / Box Seal Joint</b> (Providing and laying of a modular strip box seal expansion joint catering to a horizontal movement beyond 140mm and upto 210mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation.)	metre	277245.95

## Chapter – 15

### PROTECTION WORKS

**Preamble:**

- 1 Three types of aprons as under have been catered for:
  - a. Boulder apron laid dry
  - b. Boulder apron laid in wire crates
  - c. Apron laid in cement concrete blocks of M 15 grade
- 2 A toe wall for toe protection of pitching can be either in random rubble masonry or in nominal mix cement concrete M 10, or in brick masonry. Depending upon the design, the rates may be adopted under respective clauses.
- 3 Flooring has been proposed in dry rubble stone, rubble stone laid in cement mortar 1:3, cement concrete blocks M 15 and brick on edge laid in cement mortar (CM) 1:3.
- 4 Curtain walls proposed are of the following types:
  - b. Coursed rubble stone masonry (1st sort) is CM 1:3
  - c. Cement concrete M-15 grade
- 5 The rate analysis for gabion structures comprising of stone boulders laid in wire crates have been included. Such structures are suited as retaining structures and for erosion control in river training works especially for situations where some settlement of foundation is anticipated. These structures can adjust in minor settlements, being flexible structures, without losing their functional requirement.

**CHAPTER-15**  
**RIVER TRAINING AND PROTECTION WORKS**

15.1	<i>Providing and laying boulders apron on river bed for protection against scour with stone boulders weighing not less than 40 kg each complete as per drawing and Technical specification.</i>		
<b>A</b>	<b><i>Boulder laid dry without wire crates.</i></b>	cum	963.60
15.2	<i>Boulder apron laid in wire crates (Providing and laying of boulder apron laid in wire crates made with 4mm dia GI wire conforming to IS: 280 &amp; IS:4826 in 100mm x 100mm mesh (weaved diagonally) including 10% extra for laps and joints laid with stone boulders weighing not less than 40 kg each.)</i>	cum	1670.40
15.3	<i>Cement concrete blocks (size 0.5 x 0.5 x 0.5 m) (Providing and laying of apron with cement concrete blocks of size 0.5x0.5x0.5 m cast in-situ and made with nominal mix of M-15 grade cement concrete with a minimum cement content of 250 kg/cum as per IRC: 21-2000</i>	cum	5156.10
15.4	<i>Providing and laying Pitching on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications</i>		
<b>A</b>	<b><i>Stone/Boulder</i></b>	cum	963.60
<b>B</b>	<b><i>Cement Concrete blocks of size 0.3x0.3 x0.3 m cast in cement concrete of Grade M15</i></b>	cum	5156.10
15.5	<i>Providing and laying Filter material underneath pitching in slopes complete as per drawing and Technical specification</i>	cum	1895.40
15.7	<i>Toe protection (A toe wall for toe protection can either be in dry rubble masonry in case of dry rubble pitching or pitching with stones in wire crates or it can be in PCC M15 nominal mix if cement concrete block have been used for pitching . Rates for toe wall can be adopted from respective clauses depending upon approved design. The rate for excavation for foundation, dry rubble masonry and PCC M15 have been analysed and given in respective chapters.)</i>		
15.8	<i>Providing and laying Flooring complete as per drawing and Technical specifications laid over cement concrete bedding.</i>		
<b>A</b>	<b><i>Rubble stone laid in cement mortar 1:3</i></b>	cum	4559.25
<b>B</b>	<b><i>Cement Concrete blocks Grade M15</i></b>	cum	6790.40
15.9	<i>Dry rubble Flooring</i>	cum	1247.05

15.10	<i>Curtain wall complete as per drawing and Technical specification</i>		
<b>A</b>	<b>Stone masonry in cement mortar (1:3)</b>	cum	3799.00
<b>B</b>	<b>Cement concrete Grade M15</b>	cum	5055.00
15.11	<i>Flexible Apron :Construction of flexible apron 1 m thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.</i>	cum	1003.25
15.12	<i><b>Gabian Structure for Retaining Earth</b> (Providing and construction of a gabain structure for retaining earth with segments of wire crates of size 7 m x 3 m x 0.6 m each divided into 1.5 m compartments by cross netting, made from 4 mm galvanised steel wire @ 32 kg per 10 sqm having minimum tensile strength of 300 Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into mesh with double twist, mesh size not exceeding 100 x 100 mm, filled with boulders with least dimension of 200 mm, all loose ends to be tied with 4 mm galvanised steel wire)</i>	cum	1779.30
15.13	<i><b>Gabian Structure for Erosion Control, River Training Works and Protection works</b> (Providing and constructing gabain structures for erosion control, river training works and protection works with wire crates of size 2 m x 1 m x 0.3 m each divided into 1m compartments by cross netting, made from 4 mm galvanised steel wire @ 32 kg per 10 sqm having minimum tensile strength of 300 Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into mesh with double twist, mesh size not exceeding 100 mm x 100 mm, filled with boulders with least dimension of 200 mm, all loose ends to be securely tied with 4 mm galvanised steel wire.)</i>	cum	3014.00

## Chapter – 16

### REPAIR AND REHABILITATION

#### Preamble:

- 1 Removal of cement concrete wearing coat and asphaltic wearing coat has been proposed with pneumatic breakers.
- 2 The rate for external prestressing has been analysed for three different spans of 25, 50 and 100 m.
- 3 Sealing of cracks has been proposed with cement grout, cement mortar (1:1) grout and epoxy grout by injecting with grout pump through nipples.
- 4 Bonding of new concrete with old concrete is proposed with epoxy resin.
- 5 The repair and replacement of following structures has been included -
  - a) Bridge Bearings
  - b) Expansion Joints
  - c) Concrete Railing
  - d) Mild Steel Railing
  - e) Crash Barrier

**CHAPTER-16**  
**REPAIR AND REHABILITATION**

16.1	<i>Removal of existing cement concrete wearing coat including its disposal complete as per Technical specification without causing any detrimental effect to any part of the bridge structure and removal of dismantled material with all lifts and lead upto 1000m(Thickness 75 mm)</i>	sqm	106.25
16.2	<i>Removal of existing asphaltic wearing coat comprising of 50 mm thick asphaltic concrete laid over 12 mm thick mastic asphalt including disposal with all lift and lead upto 1000m.</i>	sqm	80.40
16.3	<i>Guniting concrete surface with cement mortar applied with compressor after cleaning surface and spraying with epoxy complete as per Technical specification</i>	sqm	843.95
16.4	<i>Providing and inserting nipples with approved fixing compound after drilling holes for grouting as per Technical specifications including subsequent cutting/removal and sealing of the hole as necessary of nipples after completion of grouting with Cement/Epoxy</i>	each	112.65
16.5	<i>Sealing of cracks/porous concrete by injection process through nipples/Grouting complete as per Technical specification.</i>		
<b>A</b>	<b>Cement Grout</b>	kg	35.05
<b>B</b>	<b>Cement mortar (1:1) Grouting</b>	kg	109.45
16.6	<i>Patching of damaged concrete surface with polymer concrete and curing compounds, initiator and promoter, available in present formulations, to be applied as per instructions of manufacturer and as approved by the Engineer.</i>	sqm	1226.95
16.7	<i>Sealing of crack / porous concrete with Epoxy Grout by injection through nipples complete as per clause 2803.1.</i>	kg	683.65

16.9	<i>Removal of defective concrete, cleaning the surface thoroughly, applying the shotcrete mixture mechanically with compressed air under pressure, comprising of cement, sand, coarse aggregates, water and quick setting compound in the proportion as per clause 2807.1., sand and coarse aggregates conforming to IS: 383 and table 1 of IS: 9012 respectively, water cement ratio ranging from 0.35 to 0.50, density of gunite not less than 2000 kg/cum, strength not less than 25 Mpa and workmanship conforming to clause 2807.6.</i>	sqm	317.70
16.10	<i>Applying pre-packed cement based polymer mortar of strength 45 Mpa at 28 days for replacement of spalled concrete</i>	sqm	95.50
16.11	<i>Epoxy bonding of new concrete to old concrete</i>	sqm	121.20
16.17	<i>Replacement of Expansion Joints complete as per drawings</i>	metre	2400.65
16.18	<i>Replacement of damaged concrete railing.</i>	metre	174.00
16.19	<i>Replacement of crash barrier.</i>	metre	301.05
16.20	<i>Replacement of damaged mild steel railing</i>	metre	148.60
16.21	<i>Repair of crash barrier (Repair of concrete crash barrier with cement concrete of M-30 grade by cutting and trimming the damaged portion to a regular shape, cleaning the area to be repaired thoroughly, applying cement concrete after erection of proper form work.)</i>	metre	196.00
16.22	<i>Repair of RCC Railing (Carrying out repair of RCC M30 railing to bring it to the original shape.)</i>	metre	118.50
16.23	<i>Repair of steel Railing (Repair of steel railing to bring it to the original shape)</i>	metre	243.00