GOVERNMENT OF ASSAM

PUBLIC WORKS (ROADS) DEPARTMENT

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SCHEDULE OF RATES FOR ROADS, BRIDGE AND CULVERT WORKS FOR STATE HIGHWAYS & MAJOR DISTRICT ROADS UNDER ASSAM P.W. (R) DEPARTMENT, FOR THE YEAR 2018-19

Published by:

PUBLIC WORKS ROADS DEPARTMENT

ASSAM

FOREWORD

The Roads Wing of the Assam PWD is associated with the development of the state from its inception. Being the life line of the state, all the State Highways & Major district Roads need to be developed in conformity with up-gradation and modern innovative design techniques and construction materials. As new technologies, materials, concepts and practices are introduced time to time, revision of Schedule of Rates has become necessary for variation of price or introduction of new items.

Necessity was felt by the Highway Engineers of Assam P W D for the revision of SOR for Roads, Bridge and Culverts for the year 2018-19 due to variation in price of materials and labours as stated above and accordingly the revision of the same for the year 2018-19 has been made. This revised **Schedule of Rates for Roads, Bridge and Culverts for State Highways & Major district Roads Works for the year 2018-19** has been prepared on the basis of Standard Data book published by IRC.

I am extremely happy to be associated with this edition of SOR for Roads, Bridge and Culverts for State Highways & Major district Roads Works for 2018-19. It is a glorious moment for the Department of Public Works (Roads) that with sincere efforts of group of Engineers and Officials, preparation of this edition of revised SOR could be made timely. This document contains all relevant items for State Highways & Major district, Roads and Bridge works including many new items of modern construction technology.

The revised Schedule is modeled as a schedule for finished item rates and the rate for the basic materials, obtained from various Govt. agencies have been adopted for computation. Importance has been given on specifications, cost effective design, efficient procurement and strict quality control of works involved in construction of Roads & bridges under various programme.

Efforts have also been made to collect up-to-date market inputs from different sources and incorporate the same in the present Schedule of Rates. Every possible step has been made to make this edition of SOR free of errors. In spite of that if any error/omission is noticed the same may kindly be brought to the notice of the department for rectification.

I would like to place on record my appreciation to the sincere efforts made by Sri H. Sen, Chief Engineer, PWD, Roads, Assam; Sri D. Saharia, Chief Engineer, PWD, Border Roads, Assam; Sri Chandan Sarma, Executive Engineer, PWRD, Overall in-Charge, Schedule

Preparation Committee and other Officials of the Schedule Preparation Committee, PWRD in bringing this document into reality.

I congratulate PWRD, Assam for the excellent effort and wish this SOR will benefit all associated with State Highways & Major district Works.

(Rajesh Kemprai)
Commissioner & Special Secretary
Public Works Roads Department
Govt. of Assam, Dispur, Guwahati-6

PREFACE

The Schedule of Rates for Roads, Bridge and Culvert works for all Divisions under PWRD, Assam was last revised in the year 2013-14. Since then the cost of all materials used in Road & Bridge construction works have been increasing considerably making the schedule of rate practically unworkable. As such, the revision of the schedule of rates for 2013-14 has become necessary to make the S.O.R. workable at the present stage.

Accordingly, the revision of S.O.R. was carried out considering the present prices of construction materials during the year 2018. The wages of skilled & unskilled labourers are based on the rates fixed by Labour Commissioner, Govt. of Assam.

The rates of the S.O.R. will apply to any category of work that may arise in the construction and maintenance of State Highways & Major district works undertaken by the PWRD, Assam throughout the state of Assam. However, the premium as indicated below may be allowed over the rates of this schedule for preparation of estimates for works to be executed in the following areas to cater for the probable extra cost involved due to the remoteness of these places from the marketing centers of construction materials and difficulties in transportation of materials and dearth of skilled labourers.

Sl. No.	District/Sub-Division	Percentage Increase to be allowed over the present Schedule of Rates	Ramarks
1	Dhemaji District	5% (Five percent)	1. These premiums are applicable for preparation of estimates only. 2. These premiums are not applicable for tendering and billing purposes.
2	Karbi Anglong District	10% (Ten percent)	
3	Dima Hasau District	10% (Ten percent)	
4	Majuli Sub-Division	10% (Ten percent)	
5	City Areas involving emergency night works	2% (Ten percent)	

The detailed analysis of rate for all items covered by this schedule of rates has been carried out on the basis of standard Data Book published by IRC.

The items in this S.O.R. will cover both original & repair/rehabilitation works involved in Roads & Bridge works for State Highways & Major district Roads and are likely to cover almost all aspects of work, which may arise. The specification in this S.O.R. is prepared in consultation with MoRT&H. specification (4th Revision).

A number of new items have been incorporated in this S.O.R. (18-19) taking into consideration the present demand and requirements of modern construction materials that have been introduced in the market.

The chapter for bituminous works has been expanded to include various types of binders such as

(I) Paving bitumen of 60/70 or VG-30 grades

(II) Bituminous emulsion such as CSS-I, CSS-1h, CSS-2, CRS-1, CRS-2 & CMS & Polymer Modified Emulsion (grade zCSS-015 as per IS:8887:2004)

(III) Modified bitumen such as PMB-70, CRMB-55.

In RCC works the reinforcement is brought in 2 categories considering differential cost.

1) From Primary Sources: TATA/SAIL/Esser Steel/ Jindal steel/Shyam steel make

2) From Secondary Sources: Other ISI approved TMT reinforcement steel make

Every endeavour has been made to make this S.O.R. comprehensive and expressive in all respect. If however, there is any error or omission, the same may kindly be brought to the notice of the Chief Engineer, PWD, (NH Works), Assam.

The S.O.R. (18-19) will be effective for all Roads Divisions under Assam PWRD from the date of its publication.

In this context, the valuable contribution and support extended by the following officers deserve special thanks. I convey my thanks to:

1. Shi Chandan Sarma, Executive Engineer, PWD, Statistics Cell, O/o the C.E, PWD (Roads), Assam, Chandmari, Guwahati-3

2. Shi Alok Jyoti Das, Executive Engineer, PWD, State Bridge, O/o the C.E, PWD (Roads), Assam, Chandmari, Guwahati-3

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11. Sri Diganta Gogoi, Assistant Engineer, PWRD, O/o the E.E, Guwahati NEC Division, PWRD, Assam, Chandmari, Guwahati-3

I am thankful to all the Officers/ Staff of the SOR Preparation Committee, who have actively associated them in preparing the S.O.R. (18-19) successfully.

The draft copy of S.O.R. (18-19) has been approved by the Commissioner and Special Secretary to the Govt. of Assam, PWRD, Dispur, Guwahati-6 and communicated to this office vide DA5R 84/2018/209 dtd. 02-07-2018.

(H. Sen)
Chief Engineer, PWD, (Roads),
Assam, Chandmari, Guwahati-3

CERTIFICATE

Certified that the Schedule of Rates for Roads, Bridge and culvert works for National Highways under Assam PWD, for the year 2018-19, has been prepared on the basis of Standard Data Book for Analysis of Rates for National highways published by Indian Roads Congress on behalf of the Ministry of Road Transport and Highways, Govt. of India, New Delhi, and also latest technologies available in roads and bridge construction.

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CONTENTS

PART-A

ROAD WORKS

A. Roads Works

BASIC NOTES

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

1. Description of items:

The description of items is given briefly and linked with the relevant clause of the MoRT&H Specification for Road and Bridge works (4th revision), which may be referred for detailed description, provision and interpretation.

2. Mechanical Means:

Due to mechanization of construction works, rate of 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 accommodation, setting up plants, access road, water supply, electricity and general site arrangements.

II. Office furniture, equipments and accommodations.

III. Expenditure on

a) Corporate Office of Contractor.

b) Site supervision

c) Documentation and “as built” drawings

IV. Mobilization / demobilization of resources.

V. Labour camps with minimum amenities and transportation to work site.

VI. Light vehicle for site supervision including administrative and managerial requirements.

VII. Laboratory equipments and quality control including filed 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. A 10 (Ten) percent overhead charge has been considered in the schedule of rates.

4. Contractor Profit:

10 (Ten) percent of cost of works as Contractor's profit is also added on overhead charges.

5 GST, Labour Welfare Cess, Swatch Bharat etc.

i. GST is not considered in the Analysis of Rates. GST applicable is to be provided separately in the Estimates/ Abstract of Costs.

ii. Assam building and other construction workers welfare cess is not considered in the Analysis of Rates and to be provided separately in the Estimates/ Abstract of Costs.

iii. Swatch Bharat cess is not considered in the Analysis of Rates and to be provided separately in the Estimates/ Abstract of Costs.

6. 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.

7. Plants and equipment.

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

7.2 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.

7.3 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.

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

7.5 The usage charge 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.

8. Materials.

8.1 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.

8.2 The basic rates of material include basic at locations of stone crushers, loading, unloading, cost for carriage and stacking at plant sites as the case may be.

8.3 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.

8.4 The binder shall be an appropriate type of bituminous material complying with relevant Indian Standard. Various type of Bitumen are used for different bituminous courses such as

(a) Prime Cost – CSS-I & CSS-Ih (IS: 8887-2004)

(b) Tack Coat – CSS-I, CSS-Ih & CRS-I.

(c) Bituminous Macadam- 60/70 or VG-30 grade paving bitumen, Polymer Modified Bitumen 70 and with anti stripping agent as per IS 14982.

(d) BUSG-60/70 or VG-30 grade bitumen, PMB-70 & anti stripping agent.

(e) Dense Bituminous Macadam – 60/70 grade paving bitumen and PMB-70.

(f) SDBC-60/70 VG-30 grade paving bitumen, PMB-70 & CRMB 55.

(g) Bituminous concrete-60/70 VG-30 grade paving Bitumen & PMB-70.

(h) Surface Dressing-60/70 VG-30 grade paving Bitumen and Bituminous Emulsion CRS-2.

(i) Open Graded Premix Surfacing-Penetration grade Bitumen, Cationic Bitumen Emulsion CMS and anti stripping agent.

(j) Seal Coat- 60/70-grade paving Bitumen & Anti stripping agent.

(k) Slurry Seal Bitumen emulsion CSS-2.

(l) Bitumen cold mix- CSS I/CSS I-h.

(m) Crack prevention courses-PMB 70.

8.5. The specification of materials shall be government by section 1000 of MoRT&H Specifications for Road and Bridge Works.

9. Labour

9.1 The labour wages are as per rates fixed by the government.

9.2. One mate has been provided for 25 labours.

10. Carriage of materials.

10.1 The unit for vehicle for carriage has been takes as under:

a) In hours where lead is defined including time required for loading and unloading.

b) In tone-Km where lead is variable. The loading and unloading for such cases have been provided separately.

c) A basic lead of 5 Km has been considered for the stone aggregates in order to work out the initial finished rates of WBM and Granular Sub-base/base items.

d) In case of Hot Mix plants the basic lead of the stone aggregates and an initial lead of 10 Km. between the plant and site of work have been considered.

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

11. General:

11.1. The clauses numbers refer to MoRT&H Specifications for Roads and Bridge works.

11.2. Assumption made have been indicated in the respective chapter in the form of notes, where required.

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

11.4. Arrangement for traffic during construction shall be as per clause 112 of MoRT&H Specifications for Road and Bridge works.

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

11.6 Credit for the dismantled materials should be examined and realistic assessment made for such materials, which can be utilized for works and to be reflected in the estimate.

11.7. The sources of material and sample are required to be approved by the Executive Engineer before start of any work.

11.8. The rate of item includes testing of soils, materials and works.

11.9. The use of surface by construction vehicles shall be governed by the clause no. 119 of MoRT&H specification.

11.10. The contractor shall arrange to provide and maintain an adequately equipped filed laboratory as per clause121.

11.11. Quality control works shall be governed by section 900 of MoRT&H Specifications.

11.12. The various activities of works shall also be documented by photograph and videocassettes as per clause 125 & 126 of MoRT&H Specifications.

11.13. The classification of soil shall be as per clause 301.2 of MoRT&H Specifications.

11.14. The excavated earth from the foundation shall be considered to be backfilled and balance utilized locally for roadwork except in the case pf marshy soil.

11.15. The rate for removal of unutilized soil does not provide for replacement by suitable soil, which will have to be paid separately.

11.16. Item for hilly terrain have been analyzed separately.

11.17. The hire charge rates for machinery and equipments are taken from standard data book and prevailing market rate.

11.18.10 (Ten) percent extra cement has been provided for concreting underwater where required.

11.19. Grade of cement may be adopted as per mix design.

11.20. Quantities of cement in various grade of cement concrete have been as per IRC: 21-2000 and IRC: 18-2000.

11.21. The coarse and fine aggregate shall conform to IS:383.

11.22. For pricing of RCC slab culverts, the items given in the respective chapters in the bridge section may be referred.

11.23. Some major steel producing firms have evolved thermo mechanically treated (TMT) steel which has enhanced strength, better corrosion resistant, ductility, weld ability at the high temperature, thermal resistance. Enquiries from these are made on technical specifications and use of such products considered in works based on performance of works where these have already been used.

11.24. In case it is decided to include the following items and there 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 other his staff
122	-	Site residential accommodation for Engineer and other supervisory staff.
124	-	Providing and maintaining vehicle for the Engineer.

CHAPTER-1

CARRIAGE OF MATERIALS

Preamble:

1. The provision of tripper has been made in hours where lead is known like disposal of materials up to 1000m. In case where lead is variable like carriage of hot mix or concrete mix from plants or earth from borrow areas, provision has been made in terms of tonne-kilometer (t-km), which can be adopted as per actual conditions.

2. Provision has been made for a tractor trolley instead of tripper where dismantled materials of sorts or material having more volume as compared with weight are required to be transported. This arrangement will be economical.

3. The cost of carriage will vary depending upon the riding surfaces of the road. Provision has accordingly been made considering surface roads, un-surfaced graveled roads and katcha tracks.

4. Rates for loading has been derived both for manually and mechanical means for adoption as per actual situations.

CHAPTER-1
CARRIAGE OF MATERIALS

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
1.1		**Loading and unloading by mechanical means** (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)		
	A	**Boulders**	cum	159.00
	B	**Stone aggregates**	cum	164.00
	C	**Sand/Moorum/flyash**	cum	154.00
1.2		**Loading and Unloading by Manual Means**		
	A	**Boulders**	cum	214.00
	B	**Stone aggregates**	cum	213.00
	C	**Sand/Moorum/flyash**	cum	184.00
1.3		Loading and Unloading of Cement or Steel by Manual Means and stacking.	tonne	575.00
1.4		Cost of Haulage Excluding Loading and Unloading		
(i)		Surfaced Road	tonne.km	8.80
			cum/km	16.00
(ii)		Unsurfaced Gravelled Road	tonne.km	11.00
			cum/km	20.00
(iii)		Katcha Track and Track in river bed / nallah bed and choe bed.	tonne.km	17.20
			cum/km	31.30

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 up to 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 tones capacity with manual loading and unloading @ 2 trips per hour within a lead of 1000m. This will be economical for such works as compared with a tipper.

4. Where only grass/wild growth is met with, rate of item No. 2.1, i.e., clearing grass and removal of rubbish can be applied. As regards wild growth disposal of grass, the same can be dried and burnt.

5. 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.

6. Rate analysis for removing of staps and roots has also been provided separately.

7. 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.

8. For dismantling of structures, which remain submerged in water, the cost may be enhanced by 50 percent.

9. 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.

10. 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. These items are required to be priced separately based on actual quantities at site and nature of work.

11. The dismantled materials should be examined and a realistic assessment and provision should be made after due process for the credit of such materials, which can be utilized for works or auctioned.

12. In case where lead for disposal is more than 1000m, extra cost of carriage is required to be added based on tone-kilometerage.

13. All Minor Tools & Plants (T&P) items required or dismantling have been considered to have been included in overhead charges.

14. For dismantling of utility services like water pipe lines, electric and telephone lines, prior information should be given to the users.

CHAPTER-2
SITE CLEARANCE

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
2.1	201	**Cutting of Trees, including Cutting of Trunks, Branches and Removal** (Cutting of trees, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all lifts and up to a lead of 1000 mtrs and earth filling in the depression/pit.		
(i)		Girth from 300 mm to 600 mm	each	225.00
(ii)		Girth from 600 mm to 900 mm	each	401.00
(iii)		Girth from 900 mm to 1800 mm	each	783.00
(iv)		Girth above 1800 mm	each	1487.00
2.2	201	**Clearing Grass and Removal of Rubbish** (clearing grasss and removal of rubbish upto a distance of 50m outside the periphery of the area.)	hectare	15659.00
2.3	201	**Clearing and Grubbing Road Land .**(Clearing and grubbing road land including uprooting rank vegetation, grass, bushes, shrubs, saplings and trees girth up to 300 mm, removal of stumps of trees cut earlier and disposal of unserviceable materials and stacking of serviceable materials to beused or auctioned up to lead of 1000metres including removal and disposal of top organic soil not exceeding 150mm thickness.		
(i)		**By Manual Means:-**		
A		In area of light jungle	hectare	47368.00
B		In area of thorny jungle	hectare	63418.00
(ii)		**By Mechanical Means**		
A		In area of light jungle	hectare	40291.00
B		In area of thorny jungle	hectare	48842.00
2.4	202	**Dismantling of Structures** (Dismantling of existing structures like culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		dismantled material,disposal of unserviceable material and stacking the serviceable material with all lift and lead of 1000 metres)		
(i)		**Lime /Cement Concrete**		
I		**By Manual Means**		
A		Lime Concrete, cement concrete grade M-10 and below	cum	335.00
B		Cement Concrete Grade M-15 & M-20	cum	398.00
C		Prestressed / Reinforced cement concrete grade M-20 & above	cum	1076.00
II		**By Mechanical Means for items No. 202(b)&(c)**		
A		Cement Concrete Grade M-15 & M-20	cum	519.00
B		Prestressed / Reinforced cement concrete grade M-20 & above	cum	875.00
(ii)		**Dismantling Brick / Tile work**		
A		In lime mortar	cum	210.00
B		In cement mortar	cum	272.00
C		In mud mortar	cum	185.00
D		Dry brick pitching or brick soling	cum	172.00
(iii)		**Dismantling Stone Masonry**		
A		Rubble stone masonry in lime mortar	cum	235.00
B		Rubble stone masonry in cement mortar.	cum	272.00
C		Rubble Stone Masonry in mud mortar.	cum	210.00
D		Dry rubble masonry	cum	197.00
E		Dismantling stone pitching/ dry stone spalls.	cum	185.00
F		Dismantling boulders laid in wire crates including opening of crates and stacking dismantled materials.	cum	216.00
(iv)		Wood work wrought framed and fixed in frames of trusses upto a height of 5 m above plinth level	cum	564.00
(v)		**Steel work in all types of sections upto a height of 5 m above plinth level excluding cutting of rivet.**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
A		Including dismembering	tonne	1455.00
B		Excluding dismembering.	tonne	1055.00
C		Extra over item No(V) A and(V) B for cutting rivets.	tonne	11.00
(vi)		**Scraping of bricks dismantled from brick work including stacking.**		
A		In lime/Cement mortar	1000 numbers	1096.00
B		In mud mortar	1000 numbers	391.00
(vii)		**Scraping of Stone from dismantled stone masonry**		
A		In cement and lime mortar	cum	440.00
B		In Mud mortar	cum	93.00
(viii)		Scarping plaster in lime or cement mortar from brick/ stone masonry	sqm	17.00
(ix)		**Removing all type of hume pipes and stacking within a lead of 1000 metres including earthwork and dismantling of masonry works.**		
A		Up to 600 mm dia	metre	163.00
B		Above 600 mm to 900 mm dia	metre	220.00
C		Above 900 mm	metre	377.00
2.5	202	**Dismantling of Flexible Pavements** (Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately)		
I		**By Manual Means**		
A		Bituminous courses	cum	618.00
B		Granular courses	cum	442.00
II		**By Mechanical Means**		
A		Bituminous course	cum	251.00
2.6	202	**Dismantling of Cement Concrete Pavement** (Dismantling of cement concrete pavement by mechanical means using pneumatic tools, breaking	cum	1198.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		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 1000metres ,stacking serviceable materials and unserviceable materials separately.)		
2.7	**202**	**Dismantling Guard Rails** (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	67.00
2.8	**202**	**Dismantling Kerb Stone** (Dismantling kerb stone by manual means and disposal of dismantled material with all lifts and up to a lead of 1000 metre)	metre	13.00
2.9	**202**	**Dismantling Kerb Stone channel** (Dismantling kerb stone channel by manual means and disposal of dismantled material with all lifts and up to a lead of 1000 metre)	metre	19.00
2.10	**202**	**Dismantling Kilometre Stone** (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.)		
A		5th KM stone	each	337.00
B		Ordinary KM Stone	each	196.00
C		Hectometre Stone/200-M stone	each	42.00
2.11	**202**	**Dismantling of Fencing** (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 materials and unserviceable materials separately.)	metre	48.00
2.12	**202**	**Dismantling of CI Water Pipe Line** (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	118.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
2.13	202	**Removal of Cement Concrete Pipe of Sewer Gutter** (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 materials separatelyb but excluding earth excavation and dismantling of masonry works.)	metre	191.00
2.14	202	**Removal of Telephone / Electric Poles and Lines** (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 serviceable materials and unserviceable materials separately.)	each	164.00

CHAPTER-3

EARTHWORK, EROSION CONTROL AND DRAINAGE

Preamble:

1. The rates have been analyzed 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 rates analysis of earthwork, only compacted volume of earth has been considered.
3. Rates have been analyzed for average working conditions.

4. Average achievable outputs of machines have been considered taking into account job and management factors.

5. Cutting by dozer has been proposed where the cut earth can be utilized for embankment within a lead up to 100 m. A dozer can economically push the earth up to a distance of 100m.

6. Where lead for transporting earth is more than 100 m, excavator and tipper have been provided.

7. A water tanker of 6 KL capacity, which is commonly used at construction sites, has been considered.

8. The rate caters for disposal of unsuitable soil only up to a distance of 1 km. The cost of transportation beyond the initial lead of 1 km will paid separately based on ton kilometerage.

9. The replacement of unsuitable soil by suitable soil shall be provided separately in the estimate.

10. In case where embankment is constructed with earth taken from roadway, the cost of depositing earth at the site of embankment is already included in the disposal of excavated earth.

11. For narrow and restricted areas, plate compactor has proposed for compaction to achieve the desire density.

12. For small jobs where loading and unloading is required to be done manually, tractor-trolley has been proposed for carriage of a tipper.

13. In case excavated rock is found suitable for incorporation in works, suitable credit for the available rock shall be given.

14. 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.

15. In case of hill roads, the cut earth can be pushed down the valley in case there is not objection. In that case, cost of disposal is not required to be provided.

16. 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 accordingly been made.

17. Any work involved for water courses at culverts (Clause 312) will be priced under respective items, like, excavation, grubbing, clearing, etc. for which rate analysis have separately been involved.

18. Earth excavated from drains can be used in roadway berms. Hence carriage for disposal of it is not provided.

19. In case of rock fill embankment, it is assumed that material is available at site from rock cutting.

20. The item of preparation and surface treatment of formation (Clause 310) is required to be added in the cost estimate only if there is substantial time lag between completion of sub-grade and lying of sub-base. As this is incident to works, it is not required to be included in BOQ.

21. The items filling behind abutment and wing wall and provision of filter media has been included in chapter - 15.

22. Excavation for structures beyond the depth of 3 m has been included in chapter - 12.

Item for slope protection of Highway embankment by plantation and maintenance of Vetiver Plant has been included.

TABLE 300.1 DENSITY REQUIREMENTS OF EMBANKMENT AND SUBGRADE MATERIALS

Sl. No.	Type of Work	Maximum laboratory dry unit weight When tested as per IS: 2720 (Part 8)
1.	Embankments up to 3 metres height, not subjected to extensive flooding.	Not less than 15.2 KN/Cum
2	Embankments exceeding 3 meters height or embankments of any height s ubjectto long periods of inundation	Not less than 16.0 KN/Cum
3.	Sub-grade and earthen shoulders/ verges/backfill	Not less than 17.5 KN/Cum

Notes:

(1) This Table is not applicable for lightweight fill material e.g. cinder, fly ash etc.

(2) The Engineer may relax these requirements at his discretion taking into account the availability of materials for construction and other relevant factors.

(3) The material to be used in Subgrade should also satisfy design CBR at the dry unit weight applicable as per Table 300-2

TABLE 300.2 COMPACTION REQUIREMENTS FOR EMBANKMENT AND SUBGRADE

Sl. No.	Type of Work/ material of max laboratory dry density as per IS: 2720 (Part 8)	Relative compaction as percentage
1.	Subgrade and earthen shoulders	Not less than 97
2.	Embankment	Not less, than 95
3.	Expansive Clays	
	a) Subgrade and 500 mm portion just below the Subgrade	Not allowed
	b) Remaining portion of embankment	Not less than 90

The Contractor shall at least 7 working days before cornmencement of compaction submit the following to the Engineer for approval:

(I) The values of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (pan 7) or (pan 8), as the case may be, appropriate for each of the fill materials he intends to use.

(II) A graph of density plotted against moisture content from which each of the values in (i) above of maximum dry density and optimum moisture content were determined.

(III) The Dry density-moisture content -CBR relationships for light, intermediate and heavy compactive efforts (light corresponding to IS: 2720 (Part 7), heavy COI responding to IS: 2720 (Part 8) and intermediate in-between the two) for each of fill materials he intends to use in the Subgrade.

Once the above information has been approved by the Engineer, it shall form the basis for compaction.

Table 300.3 GRADING REQUIREMENTS FOR FILTER MATERIAL

Sieve Designation	Percent passing by weight		
	Class I	Class II	Class III
53mm	-	-	100
45mm	-	-	97-100
26.5 mm	-	100	-
22.4 mm	-	95-100	58-100
11.2 mm	100	48-100	20-60
5.6mm	92-100	28- 54	4-32
2.8mm	83w 100	20-35	0-10
1.4 mm	59-96	-	0-5
710 micron	35-80	6-18	-
355 micron	14-40	2-9	-
180 micron	3-15	-	-
90 micron	0-5	0-4	0-3

Table 300.4 GRADING REQUIREMENTS FOR AGGREGATE DRAINS

Sieve Size	Per cent passing by weight	
	Type A	Type B
63 mm	-	100
37.5 mm	100	85-100
19mm	-	0-20
9.5mm	45-100	0-5
3.35 mm	25-80	-
600 micron	8-45	-
150 micron	0-10	-
75 micron	0-5	-

CHAPTER-3
EARTH WORK, EROSION CONTROL AND DRAINAGE

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
3.1	301	**Excavation in Soil by Manual Means.** **(a)** (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 upto1000 metres.)	cum	190.00
		(b) (Excavation for roadway in soil using manual means using cut earth to embankment in the immediate vicinity.)	cum	117.00
3.2	301	**Excavation in ordinary rock by manual means** **(a)** (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)	cum	255.00
		(b) (Excavation in ordinary rock using manual means, where there is a situation where the cross-section is of cut and fill and cut earth is required to be used in embankment in the immediate vicinity.	cum	183.00
3.3		**Excavation in Soil with Dozer with lead upto 100 metres (**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 lead50 metres), including trimming bottom and side slopes in accordance with requirements of lines,grades and cross sections.	cum	132.00
3.4	301	**Excavation in Ordinary Rock with Dozer with lead upto 100 metres** (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 including trimming bottom and side slopes in accordance with requirements of lines,grades and cross sections.)	cum	223.00
3.5	301	**Excavation in Hard Rock (requiring blasting) with disposal upto 1000 metres** (Excavation for roadway in hard rock (requiring blasting) by drilling,	cum	251.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		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)		
3.6	301	**Excavation in Soil using Hydraulic Excavator CK 90 and Tippers with disposal upto 1000 metres.** (Excavation for roadwork in soil with hydraulic excavator of0.9 cum bucket capacity including cutting and loading in tippers, trimming bottom and side slopes,in accordance with requirements of lines, grades and cross sections,loading and disposal of cut road with in all lifts and leads upto 1000 metres)	cum	84.00
3.7	301	**Excavation in Ordinary Rock using Hydraulic Excavator CK-90 and Tippers with disposal upto 1000 metres.** (Excavation for roadway in ordinary rock with hydraulic excavator of 0.9 cum bucket capacity including cutting and loading in tippers, transporting to embankment site within all lift and lead up to 1000metres, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections.)	cum	105.00
3.8	301	**Excavation in Hard Rock (blasting prohibited)** (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 of bottom and side slopes in accordance with requirements of lines, grades and cross sections.)		
A		**Mechanised**	cum	642.00
B		**Manual Method**	cum	967.00
3.9	301	**Excavation in Hard Rock (controlled blasting) with disposal upto 1000 metres** (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	332.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
3.10	301	**Excavation in Marshy Soil** (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	93.00
3.11	301	**Removal of Unserviceable Soil with Disposal upto 1000 metres** (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	86.00
3.12	303	**Pre-splitting of Rock Excavation Slopes** (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 a tipper by a front enf loader and disposing of material with all lift and lead up to 1000metres all in specified as cl. no. 303.	sqm	159.00
3.13	304	**Excavation for Structures** (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom,backfilling the excavated earth to the extent required and utilising theremaining earth locally for road work.)		
(i)		**Ordinary soil**		
A		Manual Means (Depth upto 3 m) (Without dewatering)	cum	251.00
		Manual Means (Depth upto 3 m)(With dewatering)	cum	273.00
B		Mechanical Means (Depth upto 3 m) (Without dewatering)	cum	53.00
		Mechanical Means (Depth upto 3 m) (With dewatering)	cum	55.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(ii)		**Ordinary rock (not requiring blasting)**		
A		Manual Means (Depth upto 3 m) (Without dewatering)	cum	313.00
		Manual Means (Depth upto 3 m)(With dewatering)	cum	342.00
B		Mechanical Means (Depth upto 3 m) (Without dewatering)	cum	70.00
		Mechanical Means (Depth upto 3 m) (With dewatering)	cum	74.00
(iii)		**Hard rock (requiring blasting)**		
A		Manual Means (Without dewatering)	cum	522.00
		Manual Means (With dewatering)		562.00
(iv)		Hard rock (blasting prohibited)		
A		Mechanical Means (Without dewatering)	cum	683.00
		Mechanical Means (With dewatering)	cum	714.00
(v)		**Marshy soil**		
A		Manual means (upto 3 m depth) (without dewatering)	cum	517.00
		Manual means (upto 3 m depth)(with dewatering)	cum	603.00
B		Mechanical means (upto 3 m depth) (without dewatering)	cum	247.00
		Mechanical means (upto 3 m depth) (with dewatering)	cum	264.00
3.14	305.4.3	**Scarifying Existing Granular Surface to a Depth of 50 mm by Manual Means** (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	22.00
3.15	305.4.3	**Scarifying existing bituminous surface to a depth of 50 mm by mechanical means** (Scarifying the existing bituminous road surface to a depth of 50 mm and disposal of scarified material with in all lifts and lead upto 1000 metres.)	sqm	11.00
3.16	305	**Embankment Construction with Material Obtained from Borrow Pits** (Construction of		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		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 requirment of table 300-2 (Including cost of testing of materials at site and laboratory as directed by the deptt.)		
		(a) from private land	cum	238.00
		(b)(from Govt land)	cum	238.00
		Extra lead beyond initial lead of 3.0 Km.	cum/km	7.74
3.17	**305**	**Construction of Embankment with Material Deposited from Roadway Cutting** (Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2)	cum	103.00
3.18	**305**	**Construction of Subgrade and Earthen Shoulders** (Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table (300-2) (a), (Including cost of testing of materials at site and laboratory as directed by the deptt.)		
		(a) from private land	cum	290.00
		(b) from Govt land	cum	290.00
		Extra lead beyond initial lead of 3.0 Km.	cum/km	8.46
3.19	**305.3.4**	**Compacting Original Ground**		
Case-I		**Compacting original ground supporting subgrade** (Loosening of the ground upto a level of500 mm below the subgrade level, watered, graded and compacted in layers to meet requirement of table 300-2 for subgrade construction.)	cum	75.00
Case-II		**:Compacting original ground supporting embankment**	cum	38.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
3.20	305	**Stripping and Storing Top Soil** (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	195.00
3.21		**Stripping, storing and re-laying top soil from borrow areas in agriculture fields.** (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 agricultural field,finishing it to the reqd. levels and satisfaction of the farmer.)	cum	115.00
3.22	307	**Turfing with Sods** (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	31.00
3.23		**Seeding and Mulching** (Preparation of seed bed on previously laid top soil, furnishing and placing of seeds, fertilizer, mulching material, applying bituminous emulsion at the rate of0.23 litres per sqm and laying and fixing jute netting, including watering)	sqm	127.00
3.24	309	**Surface Drains in Soil** (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 50m (Average lead 25m)		
A		**Mechanical means**	metre	81.00
B		**Manual Means**	metre	63.00
3.25	309	**Surface Drains in Ordinary Rock** (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 to be used in embankment at site.)		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
A		**Mechanical Means**	metre	165.00
B		**Manual Means**	metre	94.00
3.26	309	**Surface Drains in Hard Rock** (Rate per metre may be worked out based on quantity of hard rock as per design.)	metre	
3.27	309	**Sub Surface Drains with Perforated Pipe** (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 150mm bedding below the pipe and 300mm cushion above the pipe,cross section of excavation 450mmx550mm. excavated material to be utilised in road way at site.)	metre	470.00
3.28	309	**Aggregate Sub- Surface Drains** (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)	metre	211.00
3.29	309	**Underground Drain at Edge of Pavement** (Construction of an underground drain 1 m x 1 m (inside dimensions) lined with RCC-20 cm thick and covered with RCC slab10 cm in thickness on urban roads)	metre	4546.00
3.31	313	**Construction of Rock fill Embankment** (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 vibratory road roller,complete as per cl. 313.)	cum	62.00
3.32	301	**Excavation in Hill Area in Soil by Mechanical Means** (Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes		
		(a) Disposing of excavated earth with all lifts and lead upto 1000 metres)	cum	181.00
		(b) Disposing of excavated earth on the barren valley side.)	cum	96.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
3.33	301	**Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting.** (Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes (a) Disposal of cut material with all lift and lead up to 1000m.)	cum	260.00
		(b) Disposal of cut material on the barren valley side.	cum	151.00
3.34	301	**Excavation in Hilly Areas in Hard Rock Requiring Blasting** (Excavation in hilly areas in hard rock requiring blasting, by mechanical means including trimming of slopes (a) disposal of cut material with all lifts and lead upto 1000 metres.)	cum	339.00
		(b) Disposal of cut material on the barren valley side.	cum	209.00
3.36		**Embankment Construction with Fly ash/Pond ash available from coal or lignite burning Thermal Plants as waste material.** (Construction of embankment with fly ash conforming to table 1 of IRC: SP: 58 - 2001 obtained from coal or lignite burning thermal power stations as waste materials,spread and compacted in layers of 200mm thickness each at OMC,as specified in IRC:SP:58-2001 and as per approved plans (with an initial lead of 5 Km.)	cum	202.00

CHAPTER - 4

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

Preamble:

1. Quantities of materials provided are approximate and are meant for 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
   a. Mix in place method
   b. Plant mix method

3. 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.

4. In the case of medians, separators and footpaths, plate compactor has been catered for compaction due to restricted space.

5. While providing for the rate of materials, detailed local enquiries are made and prevailing market rates ascertained from concerned suppliers in the area keeping in view the location of crushing plants and lead involved.

6. Rates are derived considering an initial lead of 5.00 km from quarry for quarry materials.

7. In works where mixing plants are used, rates are inclusive of an initial lead of 10.00 km. from mixing plant to work site.

Table 400.1 GRADING FOR CLOSE-GRADED GRANULAR SUB-BASE MATERIALS

IS Sieve	Per cent weight passing the IS sieve		
Designation	**Grading I**	**Grading II**	**Grading III**
75.0 mm	100	-	-
53.0 mm	80-100	100	-
26.5 mm	55-90	70-100	100
9.50 mm	35-65	50-80	65-95
4.75 mm	25-55	40-65	50-80
2.36 mm	20-40	30-50	40-65
0.425 mm	10-25	15-25	20-35
0.075 mm	3-10	3-10	3-10
CBR Value (Minimum)	30	25	20

Table 400.2 GRADING FOR COARSE-GRADED GRANULAR SUB-BASE MATERIALS

IS Sieve	Per cent weight passing the IS sieve		
Designation	**Grading I**	**Grading II**	**Grading III**
75.0 mm	100	-	-
53.0 mm		100	
26.5 mm	55-75	50-80	100
9.50 mm			
4.75mm	10-30	15-35	25-45
2.36 mm			
0.425 mm			
0.075 mm	<10	<10	<10
CB,R Value (Minimum)	30	25	20

Note: The material passing 425 micron (0.425 mm) sieve for all the three grading when tested according to IS : 2720 (Part 5) shall have liquid limit and plasticity index not more than 25 and 6 per cent respectively

TABLE 400.3 SOIL PULVERISATION REQUIREMENTS FOR LIME STABILISATION

IS Sieve designation	**Minimum per cent by weight passing the IS Sieve**
26.5 mm	100
5.6 mm	80

Table 400.4 GRADING LIMITS OF MATERIAL FOR STABILISATION WITH CEMENT

IS Sieve size	Percentage by mass passing	
	Sub-base	Base
	Finer than	Within the range
53.0 mm	100	100
37.5mm	95	95-100
19.0 mm	45	45-100
9.5mm	35	35-100
4.75 mm	25	25-100
600 micron	8	8-65
300 micron	5	5-40
75 micron	0	0-10

TABLE 400.5 SOIL PULVERISATION REQUIREMENTS FOR CEMENT STABIUSATION

IS Sieve designation	Minimum per cent *by* weight passing the IS sieve
26.5 mm	100
5.6mm	80

TABLE 400.6 PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR WATER BOUND MACADAM FOR SUB-BASE/BASE COURSES

	Test	Test Method	Requirements
	* Los Angeles Abrasion value Or	IS : 2386 (Part-4)	40 per cent (Max)
	* Aggregate Impact value IS: 5640**	IS : 2386 (Part-4)	30 per cent (Max)
	Combined Flakiness and Elongation Indices (Total) ***	IS : 2386 (Part-1)30	per cent (Max)

* Aggregate may satisfy requirements of either of the tow tests.

** Aggregates like brick metal, kankar, laterite etc. which get softened in presence of water shall be tested for Impact value under wet conditions in accordance with IS: 5640.

*** The requirement of flakiness index and elongation index shall be enforced only in the case of crushed broken stone and crushed slag.

TABLE 400.7 GRADING EQUIREMENTS OF COARSE AGGREGATES

Grading Size	Range Designation	IS Sieve	Per cent by weight passing
1.	90 mm to 45 mm	125 mm	100
		90mm	90-100
		63mm	25-60
		45mm	0-15
		22.4 mm	0-5
2.	63 mm to 45 mm	90mm	100
		63mm	90-100
		53mm	25-75
		45mm	0-15
		22.4 mm	0-5
3.	53 mm to 22.4 mm	63mm	100
		53mm	95-100
		45mm	65-100
		22.4 mm	0-10
		11.2 mm	0-5

Note: The compacted thickness for a layer with Grading 1 shall be 100 mm while for layer with other Grading i.e. 2 & 3, it shall be 75 mm.

TABLE 400.8 GRADING FOR SCREENINGS

Grading' Classification	Size of Screenings	IS Sieve Designation	Per cent by weight passing the IS Sieve
A	13.2 mm	13.2 mm 11.2 mm 5.6mm 180 micron	100 95-100 15-35 0-10
B	11.2 mm	11.2 mm 5.6mm 180 micron	100 90-100 15-35

TABLE 400-9 APPROXIMATE QUANTITIES OF COARSE AGGREGATES AND SCREENINGS REQUIRED FOR 100/75 COMPACTED THICKNESS OF WATER BOUND MACADAM (WBM) SUB-BASE/ BASE COURSE FOR LOW AREA

Classification	Size Range	Compected Thickness	Loose Qty.	Grading for WBM			
				Stone Screening		Crushable type such as Moorum of gravel	
				Classification & size	Sub-base/ base coarse (loose quantity)	Classification & size	Loose Qty
Grading 1	90mm to 45mm	100 mm	1.21 to 1.43 m3	Type A 13.2 mm	0.27 to 0.30 m3	Not uniform	0.30 to .032 m3
Grading 2	63mm to 45 mm	75 mm	0.91 to 1.07m3	Type A 13.2 mm	0.12 to 0.15 m3	-do-	0.22 to 0.24 m3
				Type B 11.2 mm	0.20 to 0.22 m3	-do-	-do-
Grading 3	53mm to 22.40	75 mm	-do-	-do-	0.18 to 0.21 m3	-do-	-do-

TABLE 400.10 PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR WET MIX MACADAM FOR SUB-BASE/BASE COURSES

	Test	Test Method	Requirements
1	* Los Angeles Abrasion value Or	IS : 2386 (Part-4)	40 per cent (Max)
	* Aggregate Impact value IS: 5640	IS : 2386 (Part-4)	30 per cent (Max)
2	Combined Flakiness and Elongation Indices (Total) **	IS : 2386 (Part-1)	30 per cent (Max)

* Aggregate may satisfy requirements of either of the tow tests.

** To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles be separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total non-flaky particles. The value of flakiness index and elongation index so found are added up.

If the water absorption value of the coarse aggregate is greater than 2 percent, the soundness test shall be carried out on the material delivered to site as per IS: 2386 (Part-5)

TABLE 400-11 GRADING REQUIREMENTS OF AGGREGATES FOR WET MIX MACADAM

Is Sieve Designation	Percent by weight passing the IS Sieve
53.00 mm	100
45.00 mm	95-100
26.50 mm	-
22.40 mm	60-80
11.20 mm	40-60
4.75 mm	25-40
2.36 mm	15-30
600.00 micron	8-22
75.00 micron	0-8

Materials finer than 425 micron shall have Plasticity Index (PI) not exceeding 6. The final gradation approved within these limits shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa.

TABLE 400-12 AGGREGATE GRADING REQUIREMENTS

Sieve Size	Percent passing by weight	
	53 mm max. size	37.5 max. size
63 mm	100	
45 mm	87-100	100
22.4 mm	50-85	90-100
5.6 mm	25-45	35-55
710 mm	10-25	10-30
90 micron	2-9	2-9

TABLE 400-13 PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR

CRUSHER-RUN MACADAM BASE

	Test	Test Method	Requirements
1.	* Los Angeles Abrasion value or * Aggregate	IS : 2386 (Part-4) IS : 2386 (Part-4) or IS : 5640	40 maximum 30 maximum
2.	Combined Flakiness and Elongation Indices (Total)	IS : 2386 (Part-1)	30 maximum***
3.	**Water absorption	IS : 2386 (Part-3)	2percent Maximum
4.	Liquid Limit of material passing 425 micron	IS : 2720 (Part-5)	Not more than 25
5.	Plasticity Index of material passing 425 micron	IS : 2720 (Part-5)	Not more than 6

* Aggregate may satisfy requirements of either of the two tests.

** If the water absorption is more than 2 per cent, soundness test shall be carried out as per 18:2386 (Part-5).

*** To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles be separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total non-flaky particles. The value of flakiness Index and elongation index so found are added up.

CHAPTER-4

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

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
4.1	**401**	**Granular Sub-base with Close Graded Material (Table:- 400-1)**		
A		**Plant Mix Method** (Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density,complete as per cl. 401(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
(i)		for grading- I Material	cum	1926.00
(ii)		for grading- II Material	cum	1849.00
(iii)		for grading-III Material	cum	1773.00
B		**By Mix in Place Method** (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 cl. 401(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
(i)		**for grading- I Material**	cum	1648.00
(ii)		**for grading- II Material**	cum	1570.00
(iii)		**for grading-III Material**	cum	1495.00
4.2	**401**	**Granular Sub-Base with Coarse Graded Material (Table:- 400- 2)** (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 cl. 401		
(i)		**for grading- I Material**	cum	1699.00
(ii)		**for grading- II Material**	cum	1650.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(iii)		**for grading-III Material**	cum	1593.00
4.3	402	**Lime Stabilisation for Improving Subgrade** (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 road roller at OMC to achieve the desired density to form a layer of improved sub grade		
A		**By Mechanical Means**	cum	521.00
B		**By Manual Means**	cum	525.00
4.4	402	**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 road at OMC to achieve at least 98% of the maximum dry density to form a layer of sub base .	cum	644.00
4.5	403	**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.)	cum	842.00
4.6		**Cement Treated Crushed Rock or combination as per clause 403.2 and table 400.4in Sub base/ Base** (Providing, laying and spreading Material on a prepared sub grade, adding the designed quantity of cement to the spread Material, mixing in place with rotavator grading with motor grader and compacting with road roller at OMC to achieve desired unconfined compressive strength and to form a layer of sub base / base.)		
(i)		**For Sub-Base course**	cum	2550.00
(ii)		**For Base course**	cum	2169.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
4.7	404.3.1	**Making 50 mm x 50 mm Furrows** (Making 50 mm x 50 mm furrows, 25mm deep, 450 to the center line of the road and at one metre interval in the existing thin bituminous wearing coarse including sweeping and disposal of excavated material within 1000 metres lead.)	sqm	7.00
4.8	404.3.2	**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)	cum	1465.00
4.9	404	**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 material to fillup the interstices of coarse aggregate,watering and compacting to the reqd. density (with an initial lead of 5.0 km.)		
A		**By Manual Means**		
(i)		**Grading I**		
(a)		Using Screening Crushable type such as Moorum or Gravel	cum	2749.00
(b)		Using Screening Type-A (13.2mm Agg.)	cum	2717.00
(ii)		**Grading- II**		
(a)		Using Screening Crushable type such as Moorum or Gravel	cum	2770.00
(b)		Using Screening Type-A (13.2mm Agg.)	cum	2724.00
(c)		Using Screening Type-B (11.2mm Agg.)	cum	2780.00
(iii)		**Grading- III**		
(a)		Using Screening Crushable type such as Moorum or Gravel	cum	2935.00
(b)		Using Screening Type-B (11.2mm Agg.)	cum	2945.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
B		**By Mechanical Means:**		
(i)		**Grading- I**		
(a)		Using Screening Crushable type such as Moorum or Gravel	cum	2523.00
(b)		Using Screening Type-A (13.2mm Agg.)	cum	2565.00
(ii)		**Grading- II**		
(a)		Using Screening Crushable type such as Moorum or Gravel	cum	2619.00
(b)		Using Screening Type-A (13.2mm Agg.)	cum	2574.00
(c)		Using Screening Type-B (11.2mm Agg.)	cum	2629.00
(iii)		**Grading- III**		
(a)		Using Screening Crushable type such as Moorum or Gravel	cum	2785.00
(b)		Using Screening Type-B (11.2mm Agg.)	cum	2795.00
4.10	**405**	**Crushed Cement Concrete Sub-base / Base** (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 concre slabs at a lead of 10km,laying and compacting the same as sub base/ base course,constructed as WBM to cl. 404 except the use of screening or binding material	cum	319.00
4.11	**405.2**	**Penetration Coat Over Top Layer of Crushed Cement Concrete Base** (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 506.3.8	sqm	39.00
4.12	**406**	**Wet Mix Macadam** (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sb-base/base course	cum	2429.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		on well prepared surface and compacting with vibratory roller to achieve the desired density (including carriage of mixed materials up to 10.0 Km initial lead from mixing plant)		
4.13	**407**	**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 cl. 407.0	cum	206.00
4.14	**407**	**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)	cum	264.00
4.15		**Construction of Shoulders** (A. Earthen Shoulders)		
4.16		**Footpaths and Separators** (Construction of footpath/separator by providing a 150 mm compacted granular sub base as per clause 401 and 25 mm thick cement concrete grade M15, over laid with precast concrete tiles in cement mortar 1:3 including provision of all drainage arrangement.	sqm	1285.00
4.17	**410**	**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)		
A		**By Mix in Place Method**		
(i)		For 53 mm maximum size	cum	2271.00
(ii)		For 45 mm maximum size	cum	2196.00
B		**By Mixing Plant :**		
(i)		For 53 mm maximum size	cum	2550.00
(ii)		For 45 mm maximum size	cum	1550.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
4.18		**Lime, Fly ash stabilized soil sub-base** (Construction of Sub-base using lime - fly ash admixture with granular soil, free from organic matter/ deleterious material or clayey silts and low plasticity clays having PI between 5 and 20 and liquid limit less than 25 and commercial dry lime,slaked at site or pre slaked with CaO content not less than 50%,fly ash to conform to gradation as per cl. 4.3 of IRC:88-1984,lime + fly ash content ranging between 10 to 30%,the minimum unconfined compressive strength and CBR value after 28 days curing and 4 days soaking to be 7.5 kg per sq.cm. and 25% respectively all as specified in IRC:88-1984.	cum	619.00

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 Clauses of MoRT&H Specifications, which have been mentioned for each item, may be referred to detailed specifications and construction procedure. The rate analyses mention only brief description.

3. The machinery and equipment included in various analyses are as per various specifications of (MoRT&H and are mandatory. As per present trend, contractors are procuring machinery and equipment of higher capacity. Provision has accordingly been made.

4. The outputs considered for construction equipment are for compacted quantities of relevant items and not for loose quantities.

5. In case of prime coat and tack coat, average quantities of binder indicated in specifications have been taken.

Binders:

Paving Bitumen of 60/70 grades or VG-30grade.

Bitumen emulsion of grade and type as follows:

-CSS-1h, CSS1, CSS2, CRS1, and CRS2, CMS (ASTM)

(C-indicate cationic).& Polymer Modified Emulsion(zcss-015 as per IS:8887:2004

Modified bitumen - Ref. IRC: SP: 53-2002.

1. Polymer Modified bitumen grade 70.

2. CRMB-55.

6. The items of bituminous works required under maintenance have been added in the chapter on Maintenance.

7. Tack coat and prime coat, wherever provided, are required to be measured and paid separately.

8. 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.

9. It is presumed that tack coat, where required, will be provided immediately preceding the bituminous layer.

10. Rolling of bituminous courses is required to be done as per Clause 501.6 of MoRT&H Specifications and provision 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 numbers of road rollers as per provision in the Data Book are to deploy at site.

11. Spreading of bituminous materials shall be done by mechanical means except in areas where a mechanical paver cannot have access.

12. The source of all materials to be used on the project must be tested and expressly approved by the Engineer.

13. Choice of grade of bitumen shall be made as per the guidelines given in Appendix -4 of MoRT&H specifications.

14. The specification and requirements for modified binder with various type of modifiers have been laid down in clause 521 of MoRT&H specifications and mc SP: 53-2002 which shall be followed.

15. The guidelines given- vide Annexure - A to Clause 501 of MoRT&H Specifications in ‘regard to protection of environment shall be followed for a particular situation.

16. The quantities taken as output of the item in the rate are the compacted quantities.

17. The approximate proportions by weight of different aggregates and bitumen (or by volume in unavoidable cases) necessary to produce the intended mix satisfying the job

requirements and meeting the designated specifications are for estimating purpose only. The actual quantities should be worked out on the basis of job formula adopted for the job after working out the same in the laboratory for particular aggregates and bitumen approved by the engineer.

18. Rates are derived considering an initial lead of 5.00 km from quarry materials.

19. In works where mixing plants are used, rates are inclusive of a lead 10.00 km from mixing plant to work site.

20. Item for inter locking concrete block pavement (ICBP) has been introduced.

21. Item of Micro surfacing with Polymer modified Emulsion has been introduced

TABLE 500-1
VISCOSITY REQUIREMENT AND QUANTITY OF LIQUID BITMINOUS PRIMER

Type of Surface	Kinematic Viscosity Primer at 60^0C	Quantity of Liquid Bituminous of Material per 10 Sq. m.
	(Centistokes)	(kg)
Low porosity	30-60	6 to 9
Medium porosity	70-140	9 to 12
High porosity	250-500	12 to 15

TABLE 500-2
RATE OF APPICATION OF TACK COAT

	Type of Surface Kg per sq. m. area	Quantity of liquid bituminous material in
i)	Normal bituminous surfaces	0.20 to 0.25
Ii)	Dry and hungry bituminous surfaces	0.25 to 0.30
iii)	Granular surfaces treated with primer	0.25 to 0.30
Iv)	Non bituminous surfaces	
	a) Granular base (not primed)	0.35 to 0040
	b) Cement concrete pavement	0.30 to 0.35

Temperature for a bituminous emulsion shall be 20°C to 70°C and for a cutback, 50°C to 80°C If RC-70IMC- 70 is used. Where a Geo-synthetic is proposed for use, the provisions of Clauses 703.3.2 and 7034...1-shall apply. The method of application of the tack-coat will depend on the type of equipment to be used, size of nozzles, pressure at the spray bar, and speed of forward movement. The Contractor shall demonstrate at a spraying trial, that the equipment and method to be used is capable of producing a uniform spray, within the tolerances specified.

Where a fresh bituminous layer is to be laid on the surface that has not been subjected to traffic, or contaminated by dust, a tack coat is not mandatory where the overlay is, completed within two days.

TABLE 500-3 PHYSICAL REQIREMENTS FOR COARSE AGGREGATES FOR BITUMINOUS MACADAM

Property	Test	Specification
Cleanliness	Grain size analysis	Max 5% passing 0.075 mm sieve
Particle shape	Flakiness and Elongation Index (Combined)2	Max 30%
Strength	Los Angeles Abrasion Value3	Max 40%
	Aggregate Impact Value3	Max 30%
Durability	Soundness4	-
	Sodium Sulphate	Max 12%
	Magnesium Sulphate	Max 18%
Water Absorption	Water absorption5	Max 2%
Stripping	Coating and Stripping of Bitumen	Minimum retained coating
	Aggregate Mixtures6	95%
Water Sensitivity 7	Retained Tensile Strength	Min 80%

Notes: 1. IS: 2386 Part I 4. IS: 2386 Part 5

2. IS: 2386 Part I 5. IS: 2386 Part

(the elongation test to be done only on non-flaky aggregates in the sample)

3. IS: 2386 Part 4* 6. IS: 6241

7. The water sensitivity test is only to be carried out if the minimum retained coating in the stripping test is less than 95%.

* Aggregate may satisfy requirements of either of these two tests.

TABLE 500-4. COMPOSITION OF BITUMINOUS MACADAM

Mix designation	Grading I	Grading 2
Nominal aggregate size	40mm	19mm
Layer thickness	80-100 mm	50-75 mm
IS Sieve (mm)	Cumulative % by weight of total aggregate passing	
45	100	
37.5	90-100	
26.5	75-100	100
19	-	90-100
13.2	35-61	56-88
4.75	13-22	16-36
2.36	4-19	4-19
0.3	2-10	2-10
0.075'	0-8	0-8
Bitumen content, % by	3.1-3.4	3.3-3.5
weight of total mixture1		
Bitumen grade	35 to 90	35 to 90

Notes: Appropriate bitumen contents for conditions in cooler areas of India may be up to 0.5% higher subject to the approval of the Engineer.

TABLE 500-5. MANUFACTURING AND ROLLING TEMPERATURES

Bitumen Penetration	Bitumen Mixing (OC)	Aggregate Mixing (OC)	Mixed Material (OC)	Rolling (OC)	Laying (OC)
35	160-170	160-175	170 Maximum	100 Minimum	130 Minimum
65	150-165	150-170	165 Maximum	90 Minimum	125 Minimum
90	140-160	140-165	155 Maxini1um	80 Minimum	115 Minimum

TABLE 500-6. COMPOSITION OF PENETRATION MACADAM

Cumulative per cent by weight of total aggregate passing				
	For 50 mm compacted Thickness		For 75 mm compacted	
IS Sieve Designation (mm)	Coarse Aggregate	Key Aggregate	Coarse Aggregate	Key Aggregate
63	-	-	100	-
45	100	-	58-82	-
26.5 --	37-72	-	-	100
22.4,	-	100	5-27	50-75
13.2	2-20	50-75	-	-
11.2	-	-	-	5-25
5.6	-	5-25	-	-
2.8	0-5	0-5	0-5	0-5
Approx Loose				
aggregate quantities cu.m/m2	0.06	0.015	0.09	0.018
Binder quantity				-
(penetration grade)(1)(kg/m2)	5		6.8	

Note: (I) If cutback bitumen is used, adjust binder quantity such that the residual bitumen is equal to the values in this table:

TABLE 500-7. GRADING REQUIREMENTS FOR COARSE AND KEY AGGREGATES FOR BUILT-UP SPRAY GROUT

IS Sieve	Cumulative per cent by weight of total aggregate passing	
Designation (mm)	Coarse Aggregate	Key Aggregate
53.0	100	-
26.5	40- 75	-
22.4	-	100
13.2	0-20	40- 75
5.6	-	0-20
2.8	0-5	0-5

TABLE 500-8. PHYSICAL REQUIREMENTS FORCOARSTS AGGREGATE FOR DENSE GRADED BITUMINOUS MACADAM

Property	Test	Specification
Cleanliness (dust)	Grain size analysis1	Max 5% passing 0.075 mm sieve
Particle shape	Flakiness and Elongation Index (combined)2	Max 30%
Strength*	Los Angeles Abrasion Value3	Max 35%
	Aggregate Impact Value4	Max 27%
Durability	soundness5	
	Sodium Sulphate	Max 12%
	Magnesium Sulphate	Max 18%
Water Absorption	Water absorption6	Max 2%
Stripping	Coating and Stripping of Bitumen	Minimum retained
	Aggregate Mixtures7	coating 95%
Water Sensitivity**	Retained Tensile Strength	Min 80%

1. IS: 2386 Part 1 5. IS: 2386 Part 5
2. IS: 2386 Part 1 6. IS: 2386 Part 3

(die elongation test to be done only on non-flaky aggregates in the sample)

3. IS: 2386 Part 4* 7. IS: 6241
4. IS: 2386 Part 4* 8. AASHTO T283**

* Aggregate may satisfy requirements of either of these two tests.

** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95%.

TABLE 500-9 GRADING REQUIREMENTS FOR MINERAL FILLER

IS Sieve (mm)	Cumulative per cent passing by weight of total aggregate
0.6	100
0.3	95 - 100
0.075	89 - 100

The filler shall be free from organic impurities and have a Plasticity Index not greater than 4. The Plasticity Index requirement shall not apply if filler is cement or lime. When (he coarse aggregate is gravel, 2 per cent by weight of total aggregate, shall be Portland cement or hydrated lime and the percentage of fine aggregate reduced accordingly. Cement or hydrated lime is not required when the limestone aggregate is used. Where the aggregates fail to meet the requirements of the water sensitivity test in. Table 500-8, then 2 per cent by total weight of aggregate, of hydrated lime shall be added without additional cost.

TABLE 500-10. COMPOSITION OF DENSE GRADED BITUMINOUS MACADAM PAVEMENT LAYERS

Grading	1	2
Nominal aggregate size	40mm	25mm
Layer Thickness	80-100 mm	50- 70 mm
IS Sieve1 (mm)	Cumulative % by Weight of total aggregate passing	
45	100	
37.5	95 - 100	100
26.5	63 - 93	90 - 100
19	-	71-95
13.2	55 - 75	56 - 80
9.5	-	-
4.75	38 - 54	38 - 54
2.36	28 - 42	28 - 42
1.18	-	-
0.6	-	-
0.3	7 - 21	7 - 21
0.15	-	-
0.075	2 - 8	2 - 8
Bitumen content % by		
mass to total mix2	Min 4.0	Min 4.5
Bitumen grade (pen)	65 or 90	65 or 90

Notes: 1. The combined aggregate grading shall not vary form the low limit on one sieve to the high limit on the adjacent sieve.

2. Determined by the Marshall method.

TABLE 500-11. REQUIREMENTS FOR DENSE GRADED BITUMINOUS MACADAM

Minimum stability (KN at 600C)	9.0
Minimum flow (mm)	2
Maximum flow (mm)	4
Compaction level (Number of blows)	75 blows on each of the two faces of the specimen
Per cent air voids	3 - 6
Per cent voids in mineral aggregate (VMA)	See Table 500-12 below.
Per cent voids filled with bitumen (VFB)	65-75

The requirements for minimum per cent voids in mineral aggregate (VMA) are set out in Table 500-12.

TABLE 500-12. MINIMUM PER CENT VOIDS IN MINERAL AGGREGATE (VMA)

Nominal Particle Size1 (mm)	Maximum ,Minimum VMA, Per cent Related to Design Air Voids, Per cent2		
	3.0	4.0	5.0
9.5	14.0	15.0	16.0
12.5	13.0	14.0	15.0
19.0	12.0	13.0	14.0
25.0	11.0	12.0	13.0
37.5	10.0	11.0	12.0

Notes: 1. The nominal maximum particle size is one size larger than the first sieve to retain more than 10 per cent.

2. Interpolate minimum voids in the mineral aggregate (VMA) for design air voids values between those listed.

TABLE 500-13. PERMISSIBLE VARIATIONS FROM THE JOB MIX FORMULA

Description	Permissible variation	
	Base/binder course	Wearing course
Aggregate passing 19 mm sieve or larger	+ 8%	+ 7%
Aggregate passing 13.2 mm, 9.5 mm	+ 7%	+ 6%
Aggregate passing 4.75 mm	+ 6%	+ 5%
Aggregate passing 2.36mm, 1.18mm, 0.6mm	+ 5%	+ 4%
Aggregate passing 0.3 mm, 0.15 mm	+ 4%	+ 3%
Aggregate passing 0.075 mm	+ 2%	+ 1.5%
Binder content	+ 0.3%	+ 0.3%
Mixing temperature	+ 100C	+ 100C

TABLE 500-14. PHYSICAL REQUIREMENTS FOR COARSE AGGREGATE FOR SEMI DENSE BITUMINOUS CONCRETE PAVEMENT LAYERS

Property	Test	Specification
Cleanliness (dust)	Grain size analysis1	Max 5% passing 0.075 mm sieve
Particle shape	Flakiness and Elongation Index (4.0combined)2	Max 30%
Strength*	Los Angeles Abrasion Value3	Max 35%
	Aggregate Impact Value4	Max 27%
Polishing	Polished Stone Value5	Min 55
Durability	Soundness6	
	Sodium Sulphate	Max 12%
	Magnesium Sulphate	Max 18%
Water Absorption	Water absorption8	Max 2%
Stripping	Coating and Stripping of Bitumen	Minimum retained
	Aggregate Mixtures9	coating 95%
Water Sensitivity**	Retained Tensile Strength8	Min 80%

lotes: 1 IS: 2386 Part 1 6. IS: 2386 Part 5
2. IS: 2386 Part 7. IS: 2386 Part 3
(The elongation test may e done only on non-flaky aggregates in the sample)

3. IS: 2386 Part 4* 8. AASHTO T283**
4. IS: 2386 Part 4* 9. IS: 6241
5. BS: 812 Part 114
* Aggregate may satisfy requirements of either of these two tests.
** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95%.

The requirements for minimum per can voids in mineral aggregate (VMA) are set out in table 500-12.

TABLE 500-15 COMPOSITION OF SEMI DENSE BITUMINOUS CONCRETE PAVEMENT LAYERS

Grading	1	1
Nominal aggregate size	13mn	10mm
Layer Thickness	35-40 mm	25-30mm
IS Sieve 1 (mm)	Cumulative % y weigh to total aggregate passing	45
37.5		
26.5		
19		
13.2	100	100
9.5	70-90	90-100
4.75	35-51	35-51
2.36	24-39	24-39
1.18	15-30	15-30
0.6	-	-
0.3	9-19	9-19
0.15	-	-
0.075	3-8	3-8
Bitumen content % by mass of total mix 2	Min 4.5	Min 5.0
Bitumen grade	65*	65*

Notes: 1. The combined aggregate grading shall no vary from the low limit on one sieve to the high limit on the adjacent sieve.

2. Determined by the Marshall method.

* Only in exceptional circumstances, 80/100 penetration grade may be used, as approved by the engineer.

TABLE 500-16 REQUIREMENT FOR SEMI DENSE BITUMINOUS PAVEMENT LAYERS

Minimum stability (KN at 600C)	8.2
Minimum flow (mm)	2
Maximum flow (Number of blows)	75 blows on each of the two faces of the specimen.
Per cent air voids	3 – 5
Per cent voids in mineral aggregate (VMA)	See Table 500-12
Per cent voids filled with bitumen (VFB)	65-78

TABLE 500-17. PHYSICAL REQUIREMENTS FOR COARSE AGQREGATE FOR BITUMINOUS CONCRETE PAVEMENT LAYERS

Property	Test	Specification
Cleanliness (dust)	Grain size analysis 1	Max 5% passing 0.075 mm sieve
Particle shape	Flakiness and Elongation Index	Max 30%
		(Combined) 2
Strength*	Los Angeles Abrasion Value 3	Max 30%
	Aggregate Impact Value 4	Max 24%
Polishing	Polished Stone Values	Min 55
Durability	Soundness 6	
	Sodium Sulphate	Max 12%
	Magnesium Sulphate	Max 18 %
Water Absorption	Water absorption7	Max 2%
Stripping	Coating and stripping of bitumen	Minimum retained
	Aggregate Mixtures 9	Coating 95%
Water Sensitivity	Retained Tensile Strengh8	Min 80%

Notes: 1 IS: 2386 Part 1 6. IS: 2386 Part 5
2. IS: 2386 Part 7. IS: 2386 Part 3
(The elongation test may e done only on non-flaky aggregates in the sample)
3. IS: 2386 Part 4* 8. AASHTO T283**
4. IS: 2386 Part 4* 9. IS: 6241
5. BS: 812 Part 114
* Aggregate may satisfy requirements of either of these two tests.
** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95%.

Mix formula shall be generally as specified in clause 507.3.3 and the results of tests enumerated in table 500-19 as obtained by the contractors.

TABLE 500-18 COMPOSITION OF BITUMINOUS CONCRETE PAVEMENT LAYERS

Grading	1	2
Nominal aggregate size	19mn	13mm
Layer Thickness	50-65 mm	30-45mm
IS Sieve 1 (mm)	Cumulative % y weigh to total aggregate passing	
37.5	100	-
26.5	79-100	100
19	59-79	79-100
13.2	52-72	70-88
9.5	35-55	53-71
4.75	28-44	42-58
2.36	20-34	42-58
1.18	20-34	34-48
0.6	15-27	26-38
0.3	10-20	18-28
0.15	5-13	12-20
0.075	2-8	4-7
Bitumen content % by mass of total mix 2	5.0-6.0	5.0-7.0
Bitumen grade	65	65

Notes: 1. The combined aggregate grading shall no vary from the low limit on one sieve to the high limit on the adjacent sieve.

2. Determined by the Marshall method.

TABLE 500-19 REQUIREMENT FOR BITUMINOUS PAVEMENT LAYERS

Minimum stability (KN at 600C)	9.0
Minimum flow (mm)	2
Maximum flow (Number of blows)	75 blows on each of the two faces of the specimen.
Per cent air voids	3 – 6
Per cent voids in mineral aggregate (VMA)	See Table 500-12
Per cent voids filled with bitumen (VFB)	65-75
Loss of stability on immersion in water at 600C (ASTM D 1075)	Min. 75 per cent retained strength

TABLE 500-20. NOMINAL RATES OF SPREAD FOR BINDER AND CHIPPINGS

Nominal Chipping Size mm	Binder (penetration grade bitumen)Kg/m2	Chips Cum/m2
19	1.2	0.015
13	1.0	0.010
10	0.9	0.008
6	0.75	0.004

Note : (1) These rates of spread are for pricing purposes – see clause 510.2.3 and clause 510.8.
(2) For emulsion, these rates of spread are for the residual bitumen and appropriate adjustment must be made to determine the total quantity.
(3) Refer to manual for construction and supervision of bituminous works for the procedure of determining the rate of spread of binder and chips.

TALE 500-21 GRADING REQUIREMENTS FOR CHIPS FOR SURFACE DRESSING

IS Sieve Designation mm	Cumulative per cent weight of total aggregate passing for the following nominal sizes (mm)			
	19	13	10	6
26.5	100	-	-	-
19.0	85-100	100	-	-
13.2	0-40	85-100	100	-
9.5	0-7	0-40	85-100	100
6.3	-	0-7	0-35	85-100
4.75	-	-	0-10	-
3.35	-	-	-	0-35
2.36	0-2	0-2	0-2	0-2
0.60	-	-	-	0-2
0.075	0-1.5	0-1.5	0-1.5	01.5
Minimum 65% by weight of aggregate	Passing 19mm retained 13.2 mm	Passing 13.2 mm retained 9.5 mm	Passing 9.5 mm, retained 6.3 mm	Passing 6.3 mm retained 3.35 mm

TABLE 500-22 SPRAYING TEMPERATURES FOR BINDERS

Binder grades	Whirling spray jets		Slot jets	
Penetration Grade	Min 0C	Max 0C	Min0C	Min0C
400/500	160	170	140	150
280/320	165	175	150	160
180/200	170	190	155	165
80/100	180	200	165	175

CHAPTER-5

BASES AND SURFACE COURSES (BITUMINOUS) With cold mix Binder (as per IRC:SP:100-2014)

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
5.1 A	**502**	**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.)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
(i)		**With bitumen emulsion-CSS-1h**	sqm	30.00
(ii)		**With bitumen emulsion-CSS-1 (IS-8887-2004)**	sqm	29.00
5.1 B		**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 1.00 kg/sqm using mechanical means.) (Including cost of testing of materials at site and laboratory as directed by the deptt.)		
(i)		**With bitumen emulsion-CSS-1h**	sqm	48.00
(ii)		**With bitumen emulsion-CSS-1 (IS-8887-2004)**	sqm	47.00
5.2	**503**	**Tack coat** 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.(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
(I)		**With Bitumen emulsion CSS-1h**		
(a)		Normal bituminous surface	sqm	11.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(b)		Dry & hungry bituminous surface	sqm	13.00
(c)		Granular surfaces treated with primer	sqm	13.00
(II)		**With Bitumen emulsion CSS-1 (IS:8887-2004)**		
(a)		Normal bituminous surface	sqm	11.00
(b)		Dry & hungry bituminous surface	sqm	13.00
(c)		Granular surfaces treated with primer	sqm	13.00
(III)		**With Bitumen emulsion CRS-1**		
(a)		Normal bituminous surface	sqm	9.00
(b)		dry & hungry bituminous surface	sqm	10.00
(c)		Granular surfaces treated with primer	sqm	10.00
5.3	**504**	**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 pr(including carriage of mixed materials up to 10.0 Km initial lead from mixing plant) (Including cost of testing of materials at site and laboratory as directed by the deptt.)		
A		Without anti stripping agent		
(I)		**with 60/70 or VG-30 grade paved bitumen**		
(i)		for Grading I (40 mm nominal size)	cum	6837.00
(ii)		for GradingII(19 mm nominal size)	cum	6747.00
5.3 B		**with Polymer modified bitumen 70**		
(i)		for Grading I (40 mm nominal size)	cum	6894.00
(ii)		for GradingII(19 mm nominal size)	cum	6804.00
B		With anti stripping agent as per IS:14982 (Refer Appendix-5 of MoSRT&H specification)		
(I)		**with 60/70 or VG-30 grade paved bitumen**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(i)		for Grading I (40 mm nominal size)	cum	7047.00
(ii)		for GradingII(19 mm nominal size)	cum	6957.00
5.3 B		**with Polymer modified bitumen 70**		
(i)		for Grading I (40 mm nominal size)	cum	7104.00
(ii)		for GradingII(19 mm nominal size)	cum	6841.00
5.5	**506**	**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(paving bitumen 60/70) after each layer,and with key agreegates placed on the top of the second layer to serve as a base conforming to the line,grades and cross section specified,the compacted layer thickness being 75mm (including carriage up to initial lead of 5.0 km from quarry) (Including cost of testing of materials at site and laboratory as directed by the deptt.)		
(a)		**Without anti stripping agent**	sqm	419.00
(b)		**With anti stripping agent as per IS:14982 (Refer Appendix-5 of MoSRT&H specification)**	sqm	429.00
5.6	**507**	**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 and filler transporting the hot miox to work site,laying with a hydrostatic paver finisher with sensor control to the reqd. grade, lavel and alignment,rolling with smooth wheeled,vibratory and tandem		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		rollers to achieve the desired compaction as per MoSRT&H cl. no. 507. complete in all respect. (including carriage of mixed materials up to 10.0 Km initial lead from mixing plant)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
		(a) With hydrated lime/cement as filler (refer table 500-9 of MoSRT&H specification)		
(A)		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading I (40 mm nominal size)	cum	7667.00
(ii)		for GradingII(19 mm nominal size)	cum	7749.00
(B)		**with Polymer modified bitumen 70**		
(i)		for Grading I (40 mm nominal size)	cum	7744.00
(ii)		for GradingII(19 mm nominal size)	cum	7827.00
		(b) With rock dust as filler (refer table 500-9 of MoSRT&H specification)		
(A)		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading I (40 mm nominal size)	cum	7397.00
(ii)		for GradingII(19 mm nominal size)	cum	7479.00
(B)		**with Polymer modified bitumen 70**		
(i)		for Grading I (40 mm nominal size)	cum	7474.00
(ii)		for GradingII(19 mm nominal size)	cum	7557.00
		(a) With hydrated lime / cement as filler (refer table 500-9 of MoSRT&H specification) & anti stripping agent as per IS:14982(Refer Appendix-5 of MoSRT&H specification)		
(A)		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading I (40 mm nominal size)	cum	7682.00
(ii)		for GradingII(19 mm nominal size)	cum	7764.00
(B)		**with Polymer modified bitumen 70**		
(i)		for Grading I (40 mm nominal size)	cum	7759.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(ii)		for GradingII(19 mm nominal size)	cum	7841.00
5.7	508	**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 reqd. grade, lavel and alignment,rolling with smooth wheeled,vibratory and tandem rollers to achieve the desired compaction as per MoSRT&H cl. no.508. complete in all respect. (including carriage of mixed materials up to 10.0 Km initial lead from mixing plant)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
A		**With hydrated lime/cement as filler (refer table 500-9 of MoSRT&H specification)**		
I		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading I (13 mm nominal size)	cum	7832.00
(ii)		for GradingII(10 mm nominal size)	cum	8236.00
II		**with Polymer modified bitumen 70**		
(i)		for Grading I (13 mm nominal size)	cum	7914.00
(ii)		for GradingII(10 mm nominal size)	cum	8328.00
III		**with CRMB 55**		
(i)		for Grading I (13 mm nominal size)	cum	7747.00
(ii)		for GradingII(10 mm nominal size)	cum	8142.00
B		**With rockdust as filler (refer table 500-9 of MoSRT&H specification)**		
I		**with 60/70 or VG-30 grade bitumen**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(i)		for Grading I (13 mm nominal size)	cum	7562.00
(ii)		for GradingII (10 mm nominal size)	cum	7966.00
II		**with Polymer modified bitumen 70**		
(i)		for Grading I (13 mm nominal size)	cum	7644.00
(ii)		for GradingII (10 mm nominal size)	cum	8058.00
III		**with CRMB 55**		
(i)		for Grading I (13 mm nominal size)	cum	7477.00
(ii)		for GradingII(10 mm nominal size)	cum	7872.00
C		**With hydrated lime / cement as filler (refer table 500-9 of MoSRT&H specification) & anti stripping agent as per IS:14982 (Refer Appendix-5 of MoSRT&H specification)**		
I		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading I (13 mm nominal size)	cum	8134.00
(ii)		for GradingII(10 mm nominal size)	cum	8572.00
II		**with Polymer modified bitumen 70**		
(i)		for Grading I (13 mm nominal size)	cum	8216.00
(ii)		for GradingII(10 mm nominal size)	cum	8663.00
III		**with CRMB 55**		
(i)		for Grading I (13 mm nominal size)	cum	8049.00
(ii)		for GradingII(10 mm nominal size)	cum	8477.00
D		With rock dust as filler (refer table 500-9 of MoSRT&H specification) & anti stripping agent as per IS:14982(Refer Appendix-5 of MoSRT&H specification)		
I		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading I (13 mm nominal size)	cum	7864.00
(ii)		for GradingII(10 mm nominal size)	cum	8301.00
II		**with Polymer modified bitumen 70**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(i)		for Grading I (13 mm nominal size)	cum	7946.00
(ii)		for GradingII(10 mm nominal size)	cum	8393.00
III		**with CRMB 55**		
(i)		for Grading I (13 mm nominal size)	cum	7812.00
(ii)		for GradingII(10 mm nominal size)	cum	8207.00
E		**Using cold mix Binder SS-2 (as per IRC:SP:100-2014)**		
(i)		for Grading I (13 mm nominal size)	cum	8698.00
(ii)		for GradingII(10 mm nominal size)	cum	8651.00
5.8	509	**Bituminous Concrete** (Providing and laying bituminous concrete with 100-120 TPH batch type hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.4 to 5.6 % of mix and filler transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the reqd. grade, lavel and alignment,rolling with smooth wheeled,vibratory and tandem rollers to achieve the desired compaction as per MoSRT&H cl. no.509. complete in all respect. (including carriage of mixed materials up to 10.0 Km initial lead from mixing plant)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
A		**With hydrated lime/cement as filler (refer table 500-9 of MoSRT&H specification)**		
I		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading-I (19 mm nominal size)	cum	8579.00
(ii)		for Grading-II(13 mm nominal size)	cum	8465.00
II		**with Polymer modified bitumen 70**		
(i)		for Grading-I (19 mm nominal size)	cum	8778.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(ii)		for Grading-II(13 mm nominal size)	cum	8664.00
B		**With rock dust as filler (refer table 500-9 of MoSRT&H specification)**		
I		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading-I (19 mm nominal size)	cum	8303.00
(ii)		for Grading-II(13 mm nominal size)	cum	8190.00
II		**with Polymer modified bitumen 70**		
(i)		for Grading-I (19 mm nominal size)	cum	8502.00
(ii)		for Grading-II(13 mm nominal size)	cum	8389.00
C		With hydrated lime / cement as filler (refer table 500-9 of MoSRT&H specification) & anti stripping agent as per IS:14982(Refer Appendix-5 of MoSRT&H specification)		
I		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading-I (19 mm nominal size)	cum	8917.00
(ii)		for Grading-II(13 mm nominal size)	cum	8803.00
II		**with Polymer modified bitumen 70**		
(i)		for Grading-I (19 mm nominal size)	cum	9116.00
(ii)		for Grading-II(13 mm nominal size)	cum	9002.00
D		With rock dust as filler (refer table 500-9 of MoSRT&H specification) & anti stripping agent as per IS:14982(Refer Appendix-5 of MoSRT&H specification)		
I		**with 60/70 or VG-30 grade bitumen**		
(i)		for Grading-I (19 mm nominal size)	cum	8641.00
(ii)		for Grading-II(13 mm nominal size)	cum	8528.00
II		**with Polymer modified bitumen 70**		
(i)		for Grading-I (19 mm nominal size)	cum	8840.00
(ii)		for Grading-II (13 mm nominal size)	cum	8727.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
5.9	510	**Surface Dressing** (Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder laid on prepared surface and rolling with 8-10 tonne smooth wheeled steel roller)(including carriage up to initial lead of 5.0 km) (The penetration grade bitumen shall have kinematic viscisity lying in the range $1x10^4$ to $7x10^5$ centistokes)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
A		**Without anti stripping agent**		
I		Paving bitumen 60/70 or VG-30 grade		
Case -1		9 mm nominal chipping size	sqm	86.00
Case - 2		13 mm nominal size chipping	sqm	69.00
II		**with bitumen emulsion(CRS-2)**		
Case -1		19 mm nominal chipping size	sqm	86.00
Case - 2		13 mm nominal size chipping	sqm	65.00
B		With anti stripping agent as per IS:14982 (Refer Appendix-5 of MoSRT&H specification)		
I		**Paving bitumen 60/70 or VG-30 grade**		
Case -1		19 mm nominal chipping size	sqm	89.00
Case -2		13 mm nominal size chipping	sqm	68.00
5.10	511	**Open - Graded Premix Surfacing** (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 to required line, grade and level to serve as wearingcoarse on a previously prepared base, including mixing in a suitable plant laying and rolling with a smooth wheeled roller 8-10 T capacity to yhe		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		reqd. level and grade. (including carriage of mixed materials up to 10.0 Km initial lead from mixing plant)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
A		Without anti stripping agent		
(i)		Mechanical method using Penetration grade Bitumen (60/70 or VG-30 grade) and HMP of appropriate capacity not less than 75 tonnes / hour.	sqm	137.00
(ii)		Mechanical method using CRMB 55 and HMP of appropriate capacity not less than 75 tonnes / hour.	sqm	140.00
(iii)		Mechanical method using PMB and HMP of appropriate capacity not less than 75 tonnes / hour.	sqm	140.00
(iv)		**Open-Graded Premix Surfacing using cold mix Binder (as per IRC : SP : 100 : 2014 cationic Bitumen Emulsion CMS)**	sqm	141.00
B		With anti stripping agent as per IS:14982(Refer Appendix-5 of MoSRT&H specification)		
(i)		Mechanical method using Penetration grade Bitumen (60/70 or VG-30Garde)and HMP of appropriate capacity not less than 75 tonnes / hour .	sqm	137.00
(ii)		Mechanical method using crumb rubber modified bitumen (CRMB) 55 and HMP of appropriate capacity not less than 75 tonnes / hour.	sqm	136.00
(iii)		Mechanical method using polymer modified bitumen (PMB) and HMP of appropriate capacity not less than 75 tonnes / hour.	sqm	138.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
5.11	**512**	**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 13.2mm to 0.09mm (Type-B) aggregate using penetration grade bitumen (60/ 70 or VG-30 grade) to required line, grade and level to serve as wearing coarse on a previously prepared base, including mixing in a suitable plant laying and rolling with a smooth wheeled roller 8-10 T capacity to yhe reqd. level and grade. (including carriage of mixed materials up to 10.0 Km initial lead from mixing plant)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
A		**Without anti stripping agent**		
(i)		Type-A	sqm	161.00
(ii)		Type-B	sqm	152.00
B		**With anti stripping agent as per IS:14982 (Refer Appendix-5 of MoSRT&H specification)**		
(i)		Type-A	sqm	160.00
(ii)		Type-B		156.00
5.12	**513**	**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) (Including cost of testing of materials at site and laboratory as directed by the deptt.)		
A		Without anti stripping agent		
Case - 1		Type A (Providing and laying liquid seal coat comprising of a layer of bituminous	sqm	65.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (17-18)
		binder (paving bitumen 60/70 or VG-30 grade, followed by a cover of crushed stone chipping of specified grade.		
Case-2		Type B (Providing and laying of premix 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 60/70 or VG-30 grade.)	sqm	48.00
5.13		**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		
A		With anti stripping agent as per IS:14982(Refer Appendix-5 of MoSRT&H specification)		
Case-1		Type A (Providing and laying liquid seal coat comprising of a layer of bituminous binder (paving bitumen 60/70 or VG-30 grade, followed by a cover of crushed stone chipping of specified grade.	sqm	64.00
Case-2		Type B (Providing and laying of premix 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 60/70 or VG-30 grade.)	sqm	48.00
5.14	**515**	**Mastic Asphalt** (Providing and laying 25 mm thick mastic asphalt wearing course with paving grade bitumen meeting the requirements given in table 500-29(binder having penetration as (15+/- 5) at 25 deg. centrigrade), prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing anti skid surface with bitumen pre coated fine grained hard stone ships of	sqm	1366.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		13.2mm nominal size at the rate of .005cum per 10 sqm. and at an approximate spacing of 10 cm center tpo center in both direction , pressed into surface when the temperature of surfaces not less than 1000C, protuding 1mm to 4mm over mastic surface , all complete as per clause 515.		
5.15	**516**	**Slurry Seal** Providing and laying slurry seal consisting of a mixture of fine aggregates, portland cement filler, bituminous emulsion (CSS-2) 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)		5 mm thickness	sqm	73.00
(ii)		3 mm thickness	sqm	48.00
(iii)		1.5 mm thickness	sqm	30.00
5.16	**517**	**Recycling of Bituminous Pavement with Central Recycling Plant** (Recycling pavement by cold milling of exiting bituminous layers, planning the surface after cold milling, reclaiming excavated material to the extent of 30 % of the required quantity, hauling and stockpilling the reclamed material near the central recycling plnt after carryingput necessary checks and evaluation, adding fresh materials includind rejuvenators as required, mixing in a hot mix plant, tranporting and laying at site and compacting to the required grade, level and thickness, all as specified in clause 517	cum	6426.00
5.17	**518**	**Fog Spray Providing and applying low viscosity bitumen emulsion (CSS-1/CSS-1h)** for sealing crack less than 3mm wide on incipient frepping for dis integration in existing surfacing.		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
I		**With Bitumen emulsion CSS-1 (IS:8887-2004)**		
(i)		without blinding	sqm	35.00
(ii)		Extra for blinding the fox spray	sqm	5.00
II		**With bitumen emulsion-CSS-1h**		
(i)		without blinding	sqm	37.00
(ii)		Extra for blinding the fox spray	sqm	6.00
5.18	**519**	**Bituminous Cold Mix** (Including Gravel Emulsion)with cold mix Binder(Tailor made as per IRC:SP:100-2014. (Providing, laying and rolling of bituminous cold mix on prepared base consisting of a mixture of unheated mineral aggregate and emulsified bitumen(CSS-1/ CSS-1h), including mixing in a plant of suitable type and capacity, transporting, laying, compacting and finishing to specified grades and levels.(including carriage of mixed materials up to 10.0 Km initial lead from mixing plant)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
I		**With Bitumen emulsion CSS-1 (IS:8887-2004)**		
(i)		Using bitumen emulsion and 9.5 mm or 13.2 mm nominal size aggregate	cum	10853.00
(ii)		Using bitumen emulsion and 19 mm or 26.5 mm nominal size aggregate	cum	10610.00
II		**With bitumen emulsion-CSS-1h**		
(i)		Using bitumen emulsion and 9.5 mm or 13.2 mm nominal size aggregate	cum	8239.00
(ii)		Using bitumen emulsion and 19 mm or 26.5 mm nominal size aggregate	cum	7934.00
5.19	**520**	**Sand Asphalt Base Course** (Providing, laying and rolling sand-asphalt base course	cum	7257.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		composed of sand, mineral filler and bituminous binder (paving bitumen of 60/70 or VG-30 grade) on a prepared sub-grade or sub-base to the lines, levels, grades and cross sections as per the drawings including mixing in a plant of suitable type and capacity,transporting,laying and compacting and finishing.)(Including cost of testing of materials at site and laboratory as directed by the deptt.)		
5.21	**522**	**Crack Prevention Courses**		
(i)		**Stress Absorbing Membrane (SAM) crack width less than 6 mm** (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(PMB-70) complying with clause 521 sprayed @ 9kg per 10 sqm spreading 5.6mm crushed stone agreegate @ 0.11 cum per 10 sqm. with hydraulic chipps grader sweeping the surface for uniform spread of agreegates and surface finished to conform to cl. no. 902.(Including cost of testing of materials at site and laboratory as directed by the deptt.)	sqm	62.00
(ii)		**Stress Absorbing Membrane (SAM) with crack width 6 mm to 9 mm** (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(PMB-70) complying with clause 521 sprayed @ 11kg per 10 sqm and spreading 11.5mm crushed stone agreegate @ 0.12 cum per 10 sqm. sweeping the surface for uniform spread of agreegates and surface finished to conform to cl. no. 902.(Including cost of testing of materials at site and laboratory as directed by the deptt.)	sqm	71.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(iii)		**Stress Absorbing Membrane (SAM) crack width above 9 mm and cracked area above 50 %** (Providing and laying of a stress absorbing membrane over a cracked road surface, with crack width above 9mm and cracked area above 50% after cleaning with a mechanical broom, using modified binder(PMB-70) complying with clause 521 sprayed @ 15kg per 10 sqm spreading 11.2mm crushed stone agreegate @ 0.12 cum per 10 sqm. with hydraulic chipps grader sweeping the surface for uniform spread of agreegates and surface finished to conform to cl. no. 902.(Including cost of testing of materials at site and laboratory as directed by the deptt.)	sqm	92.00

CHAPTER – 6

CEMENT CONCRETE PAVEMENT

Preamble:

1. High capacities batch mix plants of 75cum/hour (effective out put) has been considered in the rate analysis of cement concrete pavement works.

2. While trippers have been provided for transportation of dry cement concrete and rolled cement concrete, transit truck mixers have been considered for the cement concrete pavement.

3. Super plasticizer admixture (such as “RECRON” of Reliance or its equivalents) has been provided to improve workability with reduced water cement ratio.

4. Cement 43 grades have 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 grades may be preferred.

5. While a slip from paver has been catered for the top layer of concrete pavement, a mechanical paver has been provided for dry lean and rolled cement concrete.

6. Materials provided in the rate analysis are for estimating purpose. Exact quantity of materials will be determined from the job mix formula.

7. Rates are derived considering an initial lead of 5.00 km from quarry materials.

8. In works where mixing plants are used, rates are inclusive of an initial lead of 10.00 km from mixing plant to work site.

CHAPTER-6

CEMENT CONCRETE PAVEMENTS

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
6.1	601	**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 concrete not to be less than 150kg/cum, optimum moisture content to be determined during the trial length construction, concrete strength not to be less than 10Mpa at 7 days, mixed in a batching plant, transported to the site, laid with a paver with electronic sensor, compacting with 8-10 tonnes vibratory roller, finishing and curing.) (Including carriage of mixed materials up to 10.0 Km initial lead from mixing plant.)	cum	3952.00
6.2 A	602	**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 mixed design, transported to the site, laid with a fixed form or slip form paver, spread , compacted and finished in a continuous operation includuing provision of contraction, expansion, construction and longitudinal joints, joint filler, seperation membrane, sealent primer, sealent joint , debonding strips dowel bar, tie rod, admixured as approved, curing compopund, finishing to lines and grades as	cum	8306.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		per drawing. (Including carriage of mixed materials up to 10.0 Km initial lead from mixing plant.)		
'6.2 B		**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 with Recron 3S fibre of Reliance Industries Ltd. or its equivalent @ 0.125 Kg. per bag of cement mixed in a batching and mixing plant as per approved mixed design, transported to the site, laid with a fixed form or slip form paver, spread , compacted and finished in a continuous operation includuing provision of contraction, expansion, construction and longitudinal joints, joint filler, seperation membrane, sealent primer, sealent joint , debonding strips dowel bar, tie rod, admixured as approved, curing compopund, finishing to lines and grades as per drawing. (Including carriage of mixed materials up to 10.0 Km initial lead from mixing plant.) as diected by the Department complete at all levels.	cum	8595.00
6.3A	**603**	**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 Kgs/cum, aggregate gradation as per table 600-4 after blending, mixing in a batching plant at optimum moisture content, transporting to site, laying with a paver with electronic sensor, compacting with 8-10	cum	4389.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		tonnes smooth wheeled vibratory roller to achive the designed flexure strength, finishing and curing.		
6.3B		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 Kgs/cum, aggregate gradation as per table 600-4 after blending,mixed with Recron 3S fibre of Reliance Industries Ltd. or its equivalent @ 0.125 Kg. per bag of cement mixing in a 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 achive the designed flexure strength, finishing and curing as diected by the Department complete at all levels.	cum	4467.00
6.4		**Construction of Base/Sub-base of pavement with lean concrete - fly ash.** (Construction of Base/sub-base using cement, sand, fly ash and coarse aggregates proportioned as per table 4 of IRC: 74/1979 and with water content ratio, slump and compressive strength as defined in the said table , mix prepared in a batching and mixing plant and compacted with a vibratory roller 8-10 tonnes capacity within the time limit laid down vide clause 7.6.3 of IRC: 74-1979, construction joints properly formed at the end of the day's work, cured for 14 days, all as specified in IRC:74-1979 and as per approved plans.	cum	3620.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
6.5		**Cement - Fly ash concrete pavement.** (Construction reinforced-reinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with 43 grade cement, coarse and fine aggregate conforming to IS 383, maximum size of coarse aggregate not exceeding 25 mm, replacing cement by fly ash.....)	cum	8922.00

CHAPTER – 7

GEOSYNTHETICS, REINFORCED EARTH AND SOIL WATER PROOFING

Preamble:

1. The specifications for Geo-synthetics, which include Geo-textiles, Geo-grids, Geo-nets, remembrances and Geo-composites, shall be as per section 700 of MoRT&H Specifications.

2. The Geo-textile proposed for sub-surfaces drain shall satisfy the requirements given clause 702.2.3

3. Care shall e taken to ensure that the Geo-textile or core material is no exposed o dry light for more than a cumulative total of 50 hours.

4. Bitumen overlay shall follow on the same day where paving fabric is laid.

5. The size of mesh opening for gabions and mattresses laid with Geo-grids and Geo-nets shall be between 35mm and 10mm.

6. The size of boulders shall be at least 100mm or double the size of the aperture whichever is larger.

7. The boulder shall be laid in crates as per methodology given in clause 2503.3.

8. The usual size of gabions in aprons is 1m x 5m with a highest of 600mm and baffles at 1m centers.

9. The specification and construction details to be adopted shall be as per section 3100 of MoRT&H Specification.

10. Drainage arrangement shall be made as per approved design and drawings.

11. The quantity of filler media shall be calculated as per approved design and specifications and shall be priced separately. The rate for same to be adopted from chapter 15.

12. Excavation for foundation including foundation concrete and groove in the foundation for seating of bottom most facia panel and capping beam to e calculated as per design and priced separately. The rates for excavation and foundation concrete shall be taken from the chapter 12 & 13 of bridge section.

13. The earth fill to be retained is not included in this analysis. The same is to be worked out and provided separately complete as per clause 305.

14. For compaction of earthwork, attention is invited to clause 3105.5 of MoRT&H specification.

15. Length of reinforcing strips will vary with the height of wall and will be as per approved design and drawings.

16. The type of reinforcing elements to be adopted shall be as per approved design and specifications.

17. The market rate for supply of reinforcing elements and their accessories are to be ascertained from reputed firms in the field of earth reinforcement.

18. The earth fill material shall be clean, free draining, granular with high friction and low cohesion, non=corrosive, coarse grained with not 10 per cent of particles passing 75 micron sieve, free of any deleterious matter, chlorides, salts, acids, mineral oil, fungus and microbes and shall e of specified PH value.

19. Capping beam is to be priced separately as per approved design. The rate for cement concrete shall be taken from the chapter of super-structure in bridge section.

20. The cost of reinforced earth retaining wall shall include following :

a. Excavation for foundation including backfilling.

b. Foundation concrete as per approved design.

c. Cost of facial panels and their erection.

d. Cost of reinforcing elements including their fixing and joining with the facial panels.

e. Drainage arrangement including filter media as per approved design and drawings.

21. The compacted earth filling to be retained shall form part of embankment.

22. Item for Soil stabilization using RBI grade 81 and RBI additive has been included

23. Soil water proofing with Terrasil or equivalent compound has been included.

Items for Sub-grade stabilization using Geo-textile has been included and Gabian structure with Geo-synthetics has also been included.

CHAPTER-7

GEOSYNTHETICS AND REINFORCED EARTH

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
7.1		**Sub-Surface Drain with Geotextiles** : Construction of sub surface drain 200 mm dia using geotextiles treated with carbon black with physical properties as given in clause 702.2.3 formed in to a stable network and a planar geocomposite structure, joints wrapped with geotextile to prevent ingress of soil all as per clause 702 and approved drawing including excavation and back filling.	metre	1353.00
7.2		**Narrow Filter Sub-Surface Drain** : Construction of a narrow filter sub- surface drain consisting of porous or perforated pipe laid in narrow trench surrounded by a geotextile filter fabric, with a minimum of 450 mm overlap of fabric and installed as per clause 702.3 and 309.3.5 including excavation and backfilling .	metre	1065.00
7.3		**Laying Paving Fabric Beneath a Pavement Overlay** : Providing and laying paving fabric with physical requirements as per table 704-2 over a tack coat of paving grade Bitumen 80-100 penetration, laid at the rate of 1 kg per sqm over thoroughly cleaned and repaired surface to provide a water resistant membrane and crack retarding layer. Paving fabric to be free of wrinkling and folding and to be laid before cooling of tack coat, brooming and rolling of surfaces with pneumatic roller to maximise paving fabrics contact with pavement surfaces.	sqm	442.00
7.4		**Laying Boulder Apron in Crates of Synthetic Geogrids** :'Providing, preparing and laying of geogrid crated apron 1 m x 5 m, 600 mm thick including excavation and backfilling with baffles at 1 metre interval, made with geogrids having characteristics as per clause	cum	1247.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		704.2, joining sides with connectors/ring staple, top corners to be tie tensioned , placing of suitable crioss interval ties in layers of 300 mm connecting opposite side with lateral braces and tied with polymer braids to avoid bulging , constructed as per clause 704.3 filled with stone with minimum size of 200mm and specific gravity not less than 2.65, packed witkh stone spalls, keyed to the foundation recess in case of sloping ground and laid over a layer of Geotextile to prevent migration of fines , all as per clause 704 and laid as per clause 2503.3 and approved design.		
7.5		**Reinforced Earth Retaining Wall** (Reinforced earth retaining walls have four main components as under: a) Excavation for foundation, foundation concrete and cement concrete grooved seating in the foundation for facing elements (facia material). b) Facia material and its placement. 'c) Assembling, joining with facing elements and laying of the reinforcing elements.'d) Earth fill with granular material which is to be retained by the wall.		
I		**Facing elements of RCC**	sqm	2280.00
II		**Assembling, joining and laying of reinforcing elements.**		
A		**With reinforcing element of steel / Aluminium strips / polymeric strips.**		
Type 1		**1.Galvanised carbon steel strips**	metre	324.00
Type 2		**2.Copper Strips**	metre	1463.00
Type 3		**3.Aluminium Strips**	metre	634.00
Type 4		**4.Stainless steel strips**	metre	865.00
Type 5		**5.Glass reinforced polymer/fibre reinforced polymer/polymeric strips**	metre	865.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
B		**With reinforcing elements of synthetic geogrids**	sqm	503.00
7.6		**Sub-Grade Stabilization:**		
	(A)	Providing and laying one layer of Non-Woven geotextile of minimum mass per unit area of 280gms/sqm.having minimum roll width of 5.0m treated with carbon black with physical properties as given in clause no 702.2.3. over 25mm thick compacted sand layer on a prepared subgrade as a filter media with necessary overlaps as per drawing and technical specification and as directed by the Engineer in charge complete.	sqm	161.00
	(B)	Providing and laying one layer of Biaxial P.V.C. Knitted coated polyster Geogrid of unit roll width of 5.0m having minimum tensile strength of 40KN/m in both direction at a maximum elongation of 15% in th direction of the length of the roll and satisfying all requirements of IS Code/BIS code of practice and tests prescribed in ASTM or British standards or ISO on prepared subgrade as a seperator cum reinforceing agent with necessary overlaps as per drawing and technical specification and as directed by the Executive Engineer in charge complete.	sqm	236.00
7.7		**Wooven Jute Geo Textile for Road Construction and slope management purpose**		
(a)		Supplying,testing and installation of 100cm wide woven jute geotextiles(JGT) 724 gm/sq.m posseing tensile strength of 25kn/m(+10%,-5% tolerance) with a porometry around 150 to 400 microns and thickness 2 mm for application on road sub grades and embankments.. Jute fabric to be laid with	sqm	104.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		overlaps of 100mm crosswise and 300 mm longitudinally duly secured to subgrade by U shaped m.s staples(11 gauge)/round head country nail of 150mm length at an interval of 750mm as per direction of the engineer-in-charge.		
(b)		Supplying,testing and installation of 100cm wide woven jute geotextiles(JGT) 627gm/sqm posseing tensile strength of 25kn/m(+10%,-5% tolerance) with a porometry around 150 to 400 microns and thickness 2 mm for application on road sub grades and embankments.. Jute fabric to be laid with overlaps of 100mm crosswise and 300 mm longitudinally duly secured to subgrade by U shaped m.s staples(11 gauge)/round head country nail of 150mm length at an interval of 750mm as per direction of the engineer-in-charge.	sqm	122.00
(c)		Supplying,testing and installation of 100cm wide woven jute geotextiles(JGT) 500gm/sqm posseing tensile strength of 25kn/m(+10%,-5% tolerance) with a porometry around 150 to 400 microns and thickness 2 mm for application on road sub grades and embankments.. Jute fabric to be laid with overlaps of 100mm crosswise and 300 mm longitudinally duly secured to subgrade by U shaped m.s staples(11 gauge)/round head country nail of 150mm length at an interval of 750mm as per direction of the engineer-in-charge.	sqm	48.00

CHAPTER – 8

TRAFFIC SIGNS, MARKINGS AND OTHER ROAD APPURTENANCES

Preamble:

1. Rate analysis for fencing has been done for two different heights, i.e. 1.20m and 1.80m. Any of these two can be adopted depending upon a particular situation and design.

2. Kerbstone laying and road marking has been provided for lying by mechanical means.

3. Backfilling of foundation of boundary pillars has been proposed with stone spalls, tightly packed and compacted.

4. The item pertaining to road traffic signal has no been analyzed as this is a specialized work and rates can be obtained from firm having specialization for design and installation of this work.

5. Printing of letters and signs is required to be measured and paid separately. A separate for lettering has been prepared and included in this chapter for this purpose.

6. 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.

7. The traffic signs proposed are of retro-reflectorised type made of encapsulate lens type reflective sheeting fixed over aluminum sheeting as per clause 801.3 and installation.

8. The size and location of traffic signs shall be as per IRC: 67.

9. The rates for rigid, semi-rigid and flexible crash barriers have been included.

10. Provision has been made for a crane for installation of overhead signs.

11. Separate rate has been derived for Tubular steel railing with RCC posts and MS steel posts.

12. The organization and financial aspects are required to be finalized in consultation with administrative and traffic authorities.

13. 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 specialized firms.

14. The analysis for traffic impact attenuators at abutments and piers has been included.

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

16. The rate analysis for traffic Impact attenuators and piers have been included.

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

18. Items of Aluminum Backed Flexible Prismatic sheeting (AFP), Roll Sign assembly, Delineators, Retro-reflective movement marker etc have been included.

    Additional items for highway lighting have been included.

TABLE 800.1. ACCEPTABLE MINIMUM COEFFICIENT OF RETRO-REFLECTION FOR HIGH INTENSITY GRADE SHEETING (CANDELAS PER LUX PER SQUARE METRE)

Observation angle (in degrees	Entrance angle (in degrees	White	Yellow	Orange	Green/Red	Blue
0.2	-4	250	170	100	45	20
0.2	+30	150	100	60	25	11
0.5	-4	95	62	30	15	7.5
0.5	+30	65	45	25	10	5.0

When totally wet, the sheeting shall not show less than 90 per cent of he values of retro-reflectance indicated in table 800.1. At the end of 7 years, the sheeting shall retain at least 75 per cent of its original retro-reflectance.

TABLE 800.2. ACCEPTABLE MINIMUM COEFFICIENT OF RETRO-REFLECTION FOR ENGINEERING GRADE SHEETING (CANDELAS PER LUX SQUARE METRE)

Observation angle in degree	Entrance angle in degree	White	Yellow	Orange	Green	Red	Blue
0.2	-4	70	50	25	9.0	14.5	4.0
0.2	+30	30	22	7.0	3.5	6.0	1.7
0.5	-4	30	25	13.5	4.5	7.5	2.0
0.5	+30	15	13	4.0	2.2	3.0	0.8

When totally wet, the sheeting shall not show less than 90 per cent of the values, of retro-reflection indicated in Table 800-2. At the end of 5 years, the sheeting shall retain at least 50 per cent of its original retro-reflectance.

Unless otherwise specified, the general colour scheme shall be as stipulated in IS: 5 “Colour for Ready Mixed Paint”, viz

Blue – IS Colour No. 166: French Blue
Red - IS Colour No. 537: Signal Red
Green - IS Colour No. 284: India Green
Orange - IS Colour No. 591: Deep Orange

The colours shall be durable and uniform in acceptable hue when viewed in day light or under normal headlights at night.

TABLE 800-3. PROPORTIONS OF CONSTITUENTS OF MARKING MATERIAL (PERCENTAGE BY WEIGHT)

Component	White	Yellow
Binder	18.0 min	18.0 min
Glass beads	30-40	30-40
Titanium Dioxide	10.0 min	-
Calcium Carbonate and		
Inert Fillers	42.0 max	See
Yellow Pigments	-	Note

Note: Amount of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer. Provided all other requirements of this specification are met.

Table 800.4. GRADATION REQUIREMENTS FOR GLASS BEADS

Sieve size	Per cent retained	
	Type 1	Type 2
1.18 mm	0 to 3	-
850 micron	5 to 20	0 to 5
600 –do-	-	5 to 20
425 –do-	65 to 95	-
300 –do-	-	10 to 30
180 –do-	0 to 10	10 to 30
Below 180 micron	-	0 to 15

CHAPTER-8

TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
8.1	408	**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.		
A		**Using Concrete Mixer**	metre	345.00
B		**Using Concrete Batching and Mixing Plant**	metre	350.00
8.2	408	**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 manually all complete as per clause 408.)		
A		**Using Concrete Mixer**	metre	651.00
B		**Using Concrete Batching and Mixing Plant**	metre	660.00
8.3	801	**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)		**Hindi** (Matras commas and the like not to be measured and paid for Half letter shall be counted as half)	cm height per letter	1.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(ii)		**English and Roman**	cm height	0.67
8.4		**Retro reflectorised Traffic sign**: Providing and erecting of Retro-Reflectrorised cautionary, mandatory & informatory sign as per IRC: 67 made of high intensity encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick fixed on an angle iron of 25x25x4mm supported on a mild steel angle iron post 75mm x 75mm x 6mm firmly fixed to the ground by means of properly design foundation with M-15 grade Cement concrete 45cm x 45cm x 60cm, 60cm below ground level as per approved drawing and sign. (All the Steel work must be Tata/Sail/or any other approved brand)		
(i)		**90cm equilateral traingle**	each	6106.00
(ii)		**60cm equilateral traingle**	each	4052.00
(iii)		**60cm circular**	each	5397.00
(iv)		**80cmm x 60 cm rectangular**	each	7483.00
(v)		**60cmm x 45 cm rectangular**	each	5259.00
(vi)		**60cmm x 60 cm square**	each	6212.00
(vii)		**90cm high octagon**	each	9515.00
8.5	801	**Direction and place identification sign upto 0.9sqm size board.** Providing and erecting direction and place identification retro-Reflectrorised sign as per IRC:67 made of encapsulated lens type reflective sheeting vide clause 801.3 fixed over aluminium sheeting, 2mm thick with area not exceeding 0.9sqm fixed on an angle iron of 25x25x4mm supported on a mild steel angle iron post 75mm x 75mm x 6mm firmly fixed to the ground by means of properly design foundation with M-15 grade Cement concrete 45cm x 45cm x 60cm, 60cm below ground level	sqm	13243.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		as per approved drawing and sign. (All the Steel work must be Tata/Sail/or any other approved brand)		
8.6	**801**	**Direction and place identification sign more than 0.9sqm size board.** Providing and erecting direction and place identification retro-Reflectrorised sign as per IRC:67 made of encapsulated lens type reflective sheeting vide clause 801.3 fixed over aluminium sheeting, 2mm thick with area exceeding 0.9sqm fixed on an angle iron of 25x25x4mm supported on a mild steel angle iron post 75mm x 75mm x 6mm, 2 nos. firmly fixed to the ground by means of properly design foundation with M-15 grade Cement concrete 45cm x 45cm x 60cm, 60cm below ground level as per approved drawing and sign. . (All the Steel work must be Tata/Sail/or any other approved brand)	sqm	13740.00
8.7		**Over head sign:**		
A		Providing and erecting overhead signs of anti-corrosive steel tubular framed structure (all the steel work must be TATA/ SAIL/ any other approved brand) for retro reflective signage boards made of high intensity grade encapsulated lens type retro Reflective sheeting conforming to ASTMD4956 type B III specifications and having approved pattern over its entire surface bonded on to 2.00 mm thick aluminium sheet with back supporting angle iron frame of 35x35x4mm angle iron duly riveted with solid MS & aluminum rivets. The entire face of the sign shall be covered & bounded with yellow/ white/ red/ blue high intensity encapsulated lens reflective sheeting with distinctive hoed pattern on front side (no plain surface) with heat lamp vacuum applicator	tonne	86623.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		machine only. The yellow/ white/ red/ blue portion of the board shall be screen printed on the high intensity shed base including fixing the board on portal/ support/ wall/ dowel rod etc., with contractors clamps/ cleats/ bolts/ rivets/ wells including all contractors materials, labour, tools, lead & lifts etc. complete and all other incidental charges necessary for successful completion of work as per specifications and as directed. (Retro Reflective sheeting conforming to ASTMD4956 type B III specifications and Foundation Works shall be measured and paid separately)		
B.		Providing retro reflective sign board of high intensity grade reflective sheeting conforming to ASTMD4956 B-III specifications having approved pattern over its entire surface bonded on to 2 mm thick aluminium sheeting, the entire face of the sign shall be covered & bounded with yellow/ white/ red/ blue high intensity grade with distinctive nod pattern on front side with heat lamp vacuum applicator machine only.	sqm	666.00
C.		Foundation work comprises earth work in foundation trenches, Plain/ Reinforced cement concrete open foundation.		
i)		Plain /Reinforced cement in open foundation complete as per drawing & technicla specifications as MoSRT&H, 1500, 1700, 2100 PCC grade M20	cum	6128.00
ii)		Plain /Reinforced cement in open foundation complete as per drawing & technicla specifications as MoSRT&H, 1500, 1700, 2100 RCC grade M20 using concrete mixure	cum	6128.00
iii)		Earth work in excavation in foundation of structures as per drawing & techniclal specifications including setting out, construction of soring and bracing, removal of	cum	120.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		stumps and other deletarious matter, dressing of sides and bottom and backfilling with approved material as MoSRT&H 304 inordinary soil by manual means (without dewatring: upto 3M depth)		
8.8	**803**	**Painting Two Coats on New Concrete Surfaces'** Painting two coats after filling the surface with synthetic enamel paint in all shades on new plastered concrete surfaces	sqm	88.00
8.9	**803**	**Painting on Steel Surfaces** (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	77.00
8.10	**803**	**Painting on Wood Surfaces** (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	86.00
8.11	**803**	**Painting Lines, Dashes, Arrows etc on Roads in Two Coats on New Work** (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 dirts, dusts and other foreign matter, demarcation at site and traffic control.)		
(i)		Over 10 cm in width	sqm	95.00
(ii)		Up to 10 cm in width	sqm	78.00
8.12	**803**	**Painting Lines, Dashes, Arrows etc on Roads in Two Coats on Old Work** (Painting lines, dashes, arrows etc on roads in two coats on old work with ready mixed road marking paint confirming to IS: 164 on bituminous surface, including cleaning the surface of all dirts, dusts and other foreign matter, demarcation at site and traffic control.)		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(i)		Over 10 cm in width	sqm	65.00
(ii)		Up to 10 cm in width	sqm	72.00
8.13	803	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 and conforming to the MoSrt&H specifications	sqm	876.00
8.14	804	**Kilo Metre Stone** (Reinforced cement concrete M15grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)		
(i)		5th kilometre stone (precast)	each	4171.00
(ii)		Ordinary Kilometer stone (Precast)	each	2592.00
(iii)		Hectometer stone (Precast)	each	688.00
(iv)		200th meter stone (Precast) as per IRC:26-1967.	each	688.00
8.15	806	**Boundary pillar** (Reinforced cement concrete M15 grade boundary pillars of standard design as per IRC:25-1967, fixed in position including finishing and lettering but excluding painting)	each	707.00
8.16	807	**G.I Barbed wire Fencing 1.2 metre high** (Providing and fixing 1.2 metres high GI 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 piost, 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 digonals interwoven with horizontal wiers, fixed with GI staples, turn buckles etc complete as per clause 807.	metre	330.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
8.17	**807**	**G.I Barbed wire Fencing 1.8 metre high** (Providing and fixing 1.8 metres high GI 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 piost, 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 digonals interwoven with horizontal wiers, fixed with GI staples, turn buckles etc complete as per clause 807.	metre	547.00
8.18		**Fencing with welded steel wire Fabric 75 mm x 50 mm (Suggestive)** (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 fabrics of 75mmX50mm mesh or 75mmx25mm mesh and fixed to iron posts by flat iron 50mmX5mm and bolts etc. complete in all respects.)	metre	660.00
8.19	**808**	**Tubular Steel Railing on Medium Weight steel channel (ISMC series) 100 mm x 50 mm** (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, 2m center to center, complete as per approved drawings.	metre	2731.00
8.20	**808**	**Tubular Steel Railing on Precast RCC posts, 1.2 m high above ground level** (Providing, fencing and erecting 50 mm dia painted steel pipe railing in 3 rows on precast M20 grade RCC vertical posts1.8 metres high (1.2 m above GL) with 3 holes 50 mm dia for	metre	1360.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		pipe, fixed 2meters center to center, complete as per approved drawing.		
8.21	**809**	**Reinforced Cement Concrete Crash Barrier** (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 bar 25mm dia, 450mm 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 enclouser to MOST circular No. RW/NH - 33022/1/94-DO III dated June 1994 as per dimension in the approved drawing and at locations directed by the engineer, all as specified.		
(i)		**M 20 grade concrete**	metre	4781.00
8.22	**810**	**Metal Beam Crash Barrier**		
A		**Type - A, "W" : Metal Beam Crash Barrier** (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2m center to center, 1.8 m high, 1.1m below ground/road level, all steel parts and fitments to be galvanized by hot dip process, all fitting to conform to IS:1367 and IS:1364, metal beam rail to be fixedon the vertical post with a spacer of channel section 150mmX75mmX5mm, 330mm long complete as per clause 810.)	metre	3691.00
B		**Type - B, "THRIE" : Metal Beam Crash Barrier** (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 2m center	metre	5286.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		to center, 12 m high, 1.15m below ground level, all steel parts and fitments to be galvanized by hot dip process, all fitting to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150mmX75mmX5mm, 546mm long complete as per clause 810.)		
8.23		**Road Traffic Signals electrically operated** (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.		
8.24		**Flexible Crash Barrier, Wire Rope Safety Barrier** (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 , embeded in M-15 grade cement concrete 450mm X 450mm X 450mm, 1.50m center to center with 4 horizantal steel wier rope 40mm dia and anchored at terminal posts 15m apart. Terminal posts to be embeded in M15 grade cement concrete foundation 2400 X 450 X 900mm (Depth), strengthed by a strut of Rs joists 100X75mm. 2m long at 450 inclination and a tie 100 X 8mm, 1.50m long at the bottom, all embeded in foundation concrete as per approved design and drawing rate excluding excavation and cement concrete.)	metre	2847.00
8.25		**Anti - Glare Devices in Median**		
B		**Anti - Glare Screen with 25 mm steel pipe framework fixed with circular and rectangular vans** (Providing and erecting an	metre	2324.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		anti - glare screen with 25 mm dia vertical pipes fabricated and framed in the form of panels of one metre length and 1.75 mtr height fixed with circular vane 250mm dia at top and rectangular vane 600mmX300mm at the middle, made out of steel sheet of 3 mm thickness, end vertical pipes of the panel made larger for embedding in foundation concrete, applying 2 coats of paints on all exopsed surfaces, all as per approved design and drawings.		
C		**Anti - Glare Screen with Rectangular Vane of MS sheet** (Providing and erecting anti - glare screen with rectangular vanes of size 750 x 500 mm made from MS sheet, 3 mm thick and fixed on MS angle 50 x 50 x 6 mm at an angle of 450 to the direction of flow traffic, 1.5m center to center, top edge of the screen 1.75m above th ground level, vertical posts firmly embeded in cement concrete foundation 0.60 m below ground level, applying two coats of paints on the exposed faces, all complete as per approved drawing and designs.)	metre	1083.00
8.26		**Street Lighting** (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 footh path , fixed with sodium vapour lamp and fixed on the concrete foundation.		
(i)		**For Fixing in Median**	each	34769.00
(ii)		**For fixing in Footpath**	each	24650.00
8.27		**Lighting on Bridges** (Providing and fixing lighting on bridges, mounted on steel hollow circular poles of standard specifications, 5 m high fixed on parapets with cement concrete, 20 m apart and fitted with sodium vapour lamp)	each	19260.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
8.28		**Cable Duct Across the Road** (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 mm thick layer of gtranular material free of rock pieces, outer to outer distance of pipe at least half dia of pipe subject to minimum 450mm in case of double and triple row ducts, joint 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)		Single Row for one utility service	metre	4171.00
(ii)		Double Row for two utility services	metre	8096.00
(iii)		Triple Row for three utility services	metre	12040.00
8.29		**Traffic Impact Attenuators at Abutments and Piers**		
A		**With Scrap Tyres** (Provision and installation of traffic attenuators at abutment/pier of flyovers bridges using scrap tyres of size 100 x 20 retrieved from trucks laid in 2 rows and 4 tiers, one above the other and tied with 20 mm wire rope as per approved design and drawing.	sqm	1655.00
B		**Using Plastic/Steel Barrel, Filled with Sand** (Provision and installation of traffic impact attenuator at abutment/pier of flyovers bridges using plastic/steel barrels 0.60 m dia and 1.0 m in height, filled with sand in three rows and tied with 20 mm steel wire rope as per approved design and drawings.)	sqm	895.00
8.30		**Portable Barricade in Construction Zone** (Installation of a steel portable barricade with	each	3617.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		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 , 150mmin width at an angle of 450, 'A' frame painted with 2 coats of yellow paint, complete as per IRC:SP:55-2001.		
8.31		**Permanent Type Barricade in Construction Zone**		
A		**With Steel Components** (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 150mm in width at an angle of 450, complete as per IRC:SP:55-2001.	each	5735.00
B		**With Wooden Components** (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 striups, 150mm in width at an angle of 450, complete as per IRC:SP:55-2001.	each	8277.00
C		**With Bricks** (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	20765.00
8.32		**Drum Delineator in Construction Zone** (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 reflector 3 Nos of 7.5 cm dia, all as per IRC:SP:55-2001.	each	457.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
8.33		**Flagman** (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	399.00
8.34		Providing 'Sparkle Solar Road Studs, manufactured by Tata B.P. Solar India Ltd. Of size (125mm x 125mm), 90mm height (from bottom of shank to the top of stud) with detachable battery, m6LEDs-three on each side for Bi-directional studs/ 3 LEDs on one side for unidirectional studs, ultra bright LED in amber and red colour, weight per stud 700+25 gms, flash rate of 50-65 times per minute completely water resistant and weather proof with replacement warranty and free maintenance fro one year from the date of installation of stud on road-(installation should be made using adhesives and procedures recommended by manufacturer under the supervision of their competent technician).		
a)		Bi-directional Stud-	each	3199.00
b)		Uni-directional Stud-	each	3100.00
8.35		Providing spring post of 750mm height, 80mm dia with round base of 200mm dia made of poly urethane with 3 white reflective bands made of HIG retro-reflectorised sheeting and fixing to the ground as per specifications of manufacturers	each	1300.00
8.36		Tree reflector made of heigh intensity grade retro-reflectorised sheeting fixed over aluminium sheeting of 2mm/0.28mm thick firmly fixed with necessary galvanized nail.		
a)		100mm dia/100mmx100mm.	each	78.00
b)		150mm dia/150mmx150mm.	each	110.00
8.37		Providing Linear Delineator System with Diamond grade reflective sheeting of size	each	420.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (17-18)
		80cmx10cm, fixing over thin gauge crimped aluminium sheeting with single colour panels of Yellow/Red/White and fixing to the object as per specification of the manufacturer.		
8.38		Providing reflective pavement marker with Micro prismatic lens in both direction having thermoplastic body adhering to the specification and guidelines of MoSRT&H's fixed to the road surface using the adhesives and the procedures recommended by the manufacturers with three months replacement warranty and free maintenance.	each	249.00
8.39		Traffic cones: With rubber base and reflective of 7 inch sleeve, height= 750mm, bottom square: 385mm and weight 4.00 kg	each	660.00
8.40		Inter linking chain link for traffic cones.	Rm	39.00
8.41		Providing metal tubular delineator (50mm dia and 1.25mm thick) with 15cm reflector made of heigh intensity grade retro reflectorised sheeting around the pipe at top covered with wire mesh of 20cm length with two nos of similar reflective bands and bottom fastener M.S. angle including firmly fixing the delineator to the ground by means of CC(M-15) foundation of size-(25cmx25cmx25cm), 25cm below ground to the true line and level as directed by the deptt. With six months replacement warranty and free maintenance.		
a		1000mm height.	each	480.00
b		750mm height.	each	400.00
8.42		Providing and erecting of **city stud** of dimension 220x100x40 mm plastic body with		
a		One- way reflective- with 1x179 glass element	Each	1150.00
b		Two- way reflective- with 2x179 glass element	Each	1345.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
8.43		Providing and erecting city stud with shank of dimension 220x100x40 mm		
a		One- way reflective- with 1x179 glass element and 2 anchoring shanks	Each	1092.00
b		Two- way reflective- with 2x179 glass element and 2 anchoring shanks	Each	1850.00
8.44		Providing and erecting FT Marker with dimensions		
a		One- way reflective- with dimensions: Dia 100mm x 19 mm, shank length 50 mm, dia of shank 24 mm plastic body with 1 x 5 glass elements and plastic shank	Each	437.00
b		Two- way reflective- with dimensions 100mm x 19 mm, shank length 50 mm, dia of shank 24 mm plastic body with 2 x 5 glass elements and plastic shank.	Each	587.00
8.45		Providing and erecting Ministar Road studs		
a		One- way reflective(with butyl adhesive) with dimensions :68 x 34x9.8mm Plastic body with 1x8 glass elements.	Each	234.00
b		Two- way reflective(with butyl adhesive) with dimensions : 68 x 34x9.8mm Plastic body with 2x8 glass elements.	Each	320.00
8.46		Providing and fixing Reflector for Guard rails for large profile metal bracket with dimensions:		
a		One- way reflective with 1x213 glass elements.	Each	480.00
b		Two- way reflective with 2x213 glass elements.	Each	575.00
8.47		Providing and fixing Reflector for Guard rails for all profile metal bracket with dimensions:		
a		One- way reflective with 1x166 glass elements.	Each	480.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
b		Two- way reflective with 2x166 glass elements.	Each	550.00
8.48		Providing and fixing Reflector for Guard rails for B profile with dimensions		
a		One- way reflective with 1x166 glass elements.	Each	480.00
b		Two- way reflective with 2x166 glass elements.	Each	550.00
8.49		Providing and fixing Acoustic Wildlife Warning Module(WWA) on alternate roadside posts,facing away from the road, with screws and installation can be made on existing wooden, plastic or metal road side posts above the optical wildlife warning reflector.Dimension : Height 125 mm, width 81 mm	Each	1550.00
8.50		Providing and fixing Optical Wildlife Warning Reflector(WWR) with colour white or red Dimensions: height 184 mm, width 81mm	Each	1800.00
8.51		Providing and fixing metal road studs for permanent marking comply with standard EN1463 and BS 873(Part:IV) according to the CIL requirements to ASTM D 4280 standard.	Each	480.00
8.52		Providing and fixing Globemarker with dimensions120x60x16.5		
a		One- way reflective with 1x39 glass elements.	Each	412.00
b		Two- way reflective with 2x39 glass elements.	Each	560.00
8.53		Providing and fixing metal road stud with dimensions 100x100x19.8 mm Length anchoring shank:50 mm Aluminum body with		
a		One- way reflective with 1x43 glass elements	Each	460.00
b		Two- way reflective with 2x43 glass elements	Each	560.00
8.54		Providing and fixing metal road stud with dimensions 100x50x20mm Length anchoring shank:60.4 mm Aluminum body with		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
a		One- way reflective with 1x43 glass elements.	Each	371.00
b		Two- way reflective with 2x43 glass elements.	Each	504.00
8.55		Providing and fixing metal road stud with dimensions 149x149x27mm Length anchoring shank:80 mm Aluminum body with.		
a		One- way reflective with 1x28 glass elements	Each	490.00
b		Two- way reflective with 2x28 glass elements	Each	555.00
8.56		Providing and fixing Special road stud with dimensions 220x100x40 mm two anchoring shank plastic body with		
a		One- way reflective with 1x179 glass elements	Each	630.00
b		Two- way reflective with 2x179 glass elements.	Each	820.00
8.57		Providing and fixing lane divider with dimensions 220x150x285 mm base plate 25 mm high Two- way reflective with 1 or 2x128 glass elements rubber flag with 2 round glass reflectors	Each	975.00
8.58		Providing and fixing lane divider with dimensions 220x150x285 mm base plate 25 mm high Two- way reflective with 1 or 2x128 glass elements rubber flag with 2 round glass reflectors	Each	975.00
8.59		Providing and fixing reflective inserts for road studs with dimensions 112.7x18.25 mm with 76 pieces of glass elements	Each	445.00
8.60		Providing and fixing vertical marking with dia.104 mm 256 glass elements, distance between the two holes are 56 mm.	Each	435.00
8.61		Providing and fixing vertical marking with dia. 60 mm 80 glass elements, with central hole.	Each	243.00
8.62		Providing and erecting Median Markers which shall be made of tough, high impact resistant, injection-moulded, thermoplastic body with an isosceles trapezoid structure of length, width	each	720.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		and height not less than 15cm, 10cm and 10cm respectively and thickness shall not be less than 1.8 mm. The palstic used for moulding the Median Marker shall have a minimum notched izod impact strength value 600 J/m at room temparature, when tested in accordance with ASTM D256 shall retain 70% of this value when sujected to accelerated weathering for 1000 hours as per ASTM G 155. The logo of the manufacturer shall be embossed on either side of the body in the injection molding process. The median marker shall have fluroscent yellow color retro-reflective sheeting of size not les than 8.5cmX8.5cm and with fully reflective microprismatic cube corners as its retro-reflective elements and meets ASTM D 4956 type IX specification. The retro-reflective sheeting shall be on both sides of the median marker and shall be edge protected with no exposed edges which will prevent edge lifting, vandalism, sheeting damage etc. The median marker shall by a combination of epoxy adhesive and grouting as per manufacturers' recommendation completed as directed by engineer. The material should be accompanied with pre-quanlification warranty from the manufacturer.		
8.63		Providing and fixing reflectors for concrete barriers with dimensions (Wallflex Top) 146x88 mm mounting with		
a		One- way reflective with 1x188 glass elements	Each	97.00
b		Two- way reflective with 2x188 glass elements.	Each	125.00
8.64		Providing and fixing reflectors for concrete barriers with dimensions (Wallflex Side) 128x110 mm mounting with		
a		One- way reflective with 1x346 glass elements.	Each	92.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
b		Two- way reflective with 2x346 glass elements	Each	108.00
8.65		Providing and fixing signflash A630 solar flashing LED unit width 630 mm. integrated control unit and battery.(warning system for pedestrian crossing)	Each	2080.00
8.66		Providing and fixing swaroline module100 6 LEDs per side one or two way with dimensions 100x105x19 mm.	Each	2350.00

CHAPTER – 9

PIPE CULVERTS

Preamble:

1. Pipe culverts of sizes 1000 mm, 1200 mm and 1800 mm dia. in single row and double row which are generally used on roads, have been included. Only laying of pipes has been included in the rate. Auxiliary works such as excavation, bedding, backfilling, concrete and masonry shall be analyzed and paid separately, as provided under the respective clauses.

2. In case of RCC culverts, rates for various item of work involved such as excavation, back filling, masonry, cement concrete etc. have been provided under respective clauses in the chapters on foundation, substructures, superstructures and river training and protection works in bridge section of this book.

3. Any river training and protection works like stone pitching, apron, revetment, curtain wall etc. mat be provided under the respective clauses included in chapter 16 of bridge section.

4. The choice between first class bedding and cradle bedding will depend on particular situations and approved design.

5. The joining of pipes is proposed by collar joins.

6. Head wall and other ancillary works shall be costed under respective clauses.

7. The height of filling above the top of pipe shall not be less than 600mm.

Chain & pulley for lifting the pipes is considered part of overheads. Chapter-10.

CHAPTER-9

PIPE CULVERTS

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
9.1	408	**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.)	cum	5228.00
9.2	2900	Labour for laying Reinforced cement concrete pipe NP4/NP3/prestressed concrete pipe for culverts on first class bedding of granular material /cc M-15 in single row including fixing collar with cement mortar 1:2,and cost of granular bedding but excluding excavation, protection works, backfilling, concrete and masonry work in head wall and parapet,cost of pipe and cost of CC bedding.		
I		**With 1st class bedding of granular material**		
A		1000 mm dia	metre	468.00
B		1200 mm dia	metre	591.00
C		1800 mm dia	metre	591.00
II		**With 1st class bedding of cc M-15**		
A		1000 mm dia	metre	164.00
B		1200 mm dia	metre	209.00
C		1800 mm dia	metre	591.00
9.3	2900	Labour for laying Reinforced cement concrete pipe NP4/NP3/prestressed concrete pipe for culverts on first class bedding of granular material /cc M-15 in double row including fixing collar with cement mortar 1:2,and cost of granular bedding but excluding excavation, protection works, backfilling, concrete and masonry work in head wall and parapet,cost of pipe and cost of CC bedding.		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
I		**With 1st class bedding of granular material**		
A		1000 mm dia	metre	1097.00
B		1200 mm dia	metre	1720.00
II		**With 1st class bedding of cc M-15**		
A		1000 mm dia	metre	329.00
B		1200 mm dia	metre	779.00

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 percent, will be available at site, which can be retrieved and re-used and the balance 75 percent is required to be provided as fresh material.

2. For making up earthen shoulder, It has been assumed than on a average 150mm filling will be required. Similarly, for stripping of excess soil from the 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 o particular site conditions, resources like loader and tripper 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, surfaces dressing for maintenance works have already been included in chapter 5 and are not being repeated in this chapter.

6. The cost of other item like repair of ruts and undulation maintenance of earthen shoulders, cross drainage works, minor 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 pedestrians 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.

8. Rates are considering an initial lead of 5.00 km from quarry for quarry materials.

9. In works where mixing plants are used, rates are inclusive of an initial lead of 10.00 km from mixing plant to work site.

CHAPTER- 10

MAINTENANCE OF ROADS

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
10.1	3002	**Restoration of Rain Cuts** (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 rammer to restore the original alignments, levels and slopes.	cum	121.00
10.2	3003	**Maintenance of Earthen Shoulder (filling with fresh soil)** (Making up loss of material/ irregularities on shoulder(Average 150mm filling)to the design level by adding fresh approved soil and compacting it with appropriate equipment.)	sqm	55.00
10.3	3003	**Maintenance of Earth Shoulder (stripping excess soil)** (Stripping excess soil from the shoulder (Average depth of 75mm)surface to achieve the approved level and compacting with plate compactor)	sqm	18.00
10.4	3004.2	**Filling Pot- holes and Patch Repairs with open - graded Premix surfacing, 20mm.** (Removal of all failed material, trimming of completed excavation to provide firm vertical faces, cleaning of surface, painting of tack coat of bitumen emulsion on the sides and base of excavation as per clause 503, back filling the pot holes with hot bituminous material with paving bitumen 60/70 as per clause 511, compacting , trimming and finishing the surface to form a smooth continuous surface, all as per clause 3004.2.		
(i)		**using Bitumen emulsion CSS-1h as Tack coat**	sqm	148.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(ii)		**using Bitumen emulsion CSS-1 (IS:8887-2004) as Tack coat**	sqm	147.00
(iii)		**using Bitumen emulsion RS-1 as Tack coat**	sqm	144.00
10.5	3004.2	**Filling Pot- holes and Patch Repairs with - Bituminous concrete, 40mm. (**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, backfilling 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. (including carriage of mixed materials upto 10.0km. initial lead from mixing plant.)		
(i)		**for grading I Material**	sqm	325.00
(ii)		**for grading II Material**	sqm	335.00
10.6	3004.3.3	**Crack Filling** (Filling of crack using slow - curing bitumen emulsion and applying crusher dust in case crack are wider than 3mm.)	metre	4.00
10.7	3004.4	**Dusting** (Applying crusher dust to areas of road where bleeding of excess bitumen has occurred.)	sqm	1.69
10.8		**Crack Sealing**		
A	3004.3.2	**Fog Seal** (ref item 5.17)	sqm	44.00
B	3004.3.4	**Crack Prevention courses.** (ref item 5.21)		
(i)		Stress Absorbing Membrane (SAM) crack width less than 6 mm	sqm	62.00
(ii)		Stress Absorbing Membrane (SAM) with crack width 6 mm to 9 mm	sqm	71.00
(iii)		Stress Absorbing Membrane (SAM) crack	sqm	92.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		width above 9 mm and cracked area above 50 %		
C	**3004.5**	**Slurry Seal** (ref item 5.15)		
(i)		5 mm thickness	sqm	71.00
(ii)		3 mm thickness	sqm	49.00
(iii)		1.5 mm thickness	sqm	30.00
D	**3004.6**	**Surface Dressing for maintance works.** (ref item 5.9)		
(i)		19 mm nominal chipping size	sqm	86.00
(ii)		13 mm nominal size chipping	sqm	65.00
10.9	**3005.1**	**Repair of joint Grooves with Epoxy Mortar** Repair of spalled joint grooves of contraction joints, longitudinal joints and expansion joints in concrete pavements using epoxy mortar or epoxy concrete)	metre	888.00
10.10	**3005.2**	**Repair of old Joints Sealant** (Removal of existing sealant and re sealing of contraction, longitudinal or expansion joints in concrete pavement with fresh sealant material)	metre	95.00
10.11	**3000**	**Hill Side Drain Clearance** (Removal of earth from the choked hill side drain and disposing it on the valley side manually)	metre	33.00
10.12	**3000**	**Land Slide Clearance in soil** (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	68.00
10.13	**3000**	**Land slide Clearance in Hard Rock Requiring Blasting** (Clearing of land slide in hard rock requiring blasting for 50% of the boulders and disposal of the same on the valley side.)	cum	114.00
10.14		**Snow Clearance on Roads with Dozer** (Snow clearance from road surface by a bull-	cum	5.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		dozer 165 Hp and disposing it on the valley side)		
10.15		**Snow Clearance on Roads with Snow Blowers** (Snow clearance from road surface by a snow blower and disposing on the valley side.)	cum	2.00

CHAPTER – 11

HORTICULTURE

Preamble:

The item of turfing with sods and seeding and mulching has been included in the chapter of earthwork.

The rate of grassing of lawns and hedges has been included, as the same may be needed for resting places on highways.

Five types of tree guards as under have been provided:

a) Half brick circular type.

b) Tree guards made from empty bitumen drums 1.30m high.

c) Tree guards made from empty bitumen drums 2.00m high.

d) Tree guards with MS flat iron.

e) True guards with MS angle and 3mm steel wire welded on MS flat and bolted to angle iron posts.

Selection from above may be made as actual situation and design.

Rates for wrought iron and mild welded work have been included to cater for any miscellaneous work in connection with horticulture, fencing and traffic sign.

Through the forest department makes the estimate for compensatory a-forestation, the rate for this item has been analyzed and included for the purposes of estimation.

As grass and plantation need more care, one mate has been provided for every 10 mazdoors in case of horticultures.

CHAPTER-11

HORTICULTURE

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
11.1	307	**Spreading of Sludge Farm Yard Manure or/and good Earth** (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	21.00
11.2	307	**Grassing with ' Doobs' Grass** (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)		In rows 15 cm apart in either direction	sqm	30.00
(ii)		In rows 7.5 cm apart in either direction	sqm	55.00
11.3	307	**Making Lawns including Ploughing and Dragging with 'Swagha' Breaking of Clod** (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 0.18cum per 100 sqm	sqm	42.00
11.4	307	**Maintenance of Lawns or Turfing of Slopes** (Maintenance of lawns or Turfing of slopes (rough grassing) for a period of one year including watering etc)	sqm	172.00
11.5	307	**Turfing Lawns with Fine Grassing including Ploughing, Dressing** (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 a rate of 0.60 cum per 100 sqm	sqm	46.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
11.6	**307**	**Maintenance of Lawns with Fine Grassing for the First Year** Maintenance of lawns with fine grassing for the first year including watering etc.	sqm	182.00
11.7	**307**	**a) Planting Permanent Hedges including Digging of Trenches** (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 30cm apart	metre	155.00
		b) 'Maintenance of Hedge for one year	metre	159.00
11.8	**307**	a) Planting Flowering Plants and Shrubs in Central Verge	km	33267.00
		b). Maintenance of Flowering Plants and Shrubs in Central Verge for one Year	km	184815.00
11.9	**307**	**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 mannure, planting the saplings, backfilling the trenches, watering , fixing the tree guatrd and maintaining the plants for one year.	each	831.00
11.10	**308**	**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 lawns, 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.	sqm	14.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
11.11		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 course laid dry, and top tree courses in cement mortar 1:6 (1cement 6 sand) and the intermediate coursees being in dry honey comb masonry, as per design complete. (Half brick circular tree guard, in 2nd class brick, internal diametre 1.25 metres, and height 1.2 meter.)	each	2565.00
11.12		**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)	metre	53.00
11.13		**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 50mmX0.5mm with rivets, complete in all respects.	each	359.00
11.14		**Making Tree Guard 53 cm dia and 2 metres high as per design from empty bitumen drums** (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 30mmx 3mm MS riveted to tree guard and providing and fixing 2 nos. MS sheet ring 50mm with rivets complete in alll respects.	each	721.00
11.15		**Wrought Iron and Mild Steel Welded Work (Wrought iron and mild steel welded work)**	quintal	9921.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		(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 mixing which will be paid separately.		
11.16		**Tree Guard with MS Iron** (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 30mm long bolts including painting two coats with paint pf approved brand over a coat of priming , complete in alll respects.	each tree guard	2470.00
11.17		**Tree Guard with MS Angle Iron and Steel Wire** (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.	each tree guard	3250.00
11.18		**Compensatory Afforestation** (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 2m high with 25cm dia stem, backfilling the hole and watering.	hectare	103617.00

PART-B

BRIDGE WORKS

B-Bridge works

BASIC NOTES

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

1. Description of Items:

The descriptions of items is given briefly and linked with relevant clause of MoRT&H's specifications for ROAD & 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 plants, access road, water supply, electricity and general site arrangements.

ii. Office furniture, equipments and communications.

iii. Expenditure on :

   a. Corporate office of contractor

   b. Site supervision

   c. Documentation and "as built" drawings.

iv. Mobilization/de-mobilization 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 equipments 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.

A provision of 20% overhead charges has been included in this schedule of rates.

3. Contractor's Profit:

Contractor's profit has been taken uniformly as 10 percent, over the cost of items including overhead charges.

4. GST, Labour Welfare Cess, Swatch Bharat etc.

i. GST is not considered in the Analysis of Rates. GST applicable is to be provided separately in the Estimates/ Abstract of Costs.

ii. Assam building and other construction workers welfare cess is not considered in the Analysis of Rates and to be provided separately in the Estimates/ Abstract of Costs.

iii. Swatch Bharat cess is not considered in the Analysis of Rates and to be provided separately in the Estimates/ Abstract of Costs.

5. Basic Inputs:

The rates of material and labour are obtained from local authorities and as per prevailing market/ Govt. rates.

6. Plant and Equipment:

The usage/hire charges of machinery/equipment have been work out based upon present cost of equipments, repairs, POL and operational charges.

7. Materials:

The rates of material include basic cost at site of work.

8. Admixture:

For concrete works admixtures has been used to provide best solution in construction of superstructure of bridge works. Water reducing plasticizing admixture such as Masterplast PL-I or its equivalent is used for concrete works below M-25 grade concrete @ 100ml-200ml per bag of cement (50Kg per bag). However, super plasticizer such as Masterplast SPL-2 or its equivalent has been used for cement concrete above M-25 grade @ 0.2 to 1.2 lit per bag of cement o improve workability of concrete which also gives less bleeding and segregation. Use of admixture such as Plasticizer, Super Plasticizer or its equivalent etc. should be made with prior approval of the concerned executive engineer.

9. Labour:

For labour, the general classification is mazdoor for unskilled labour and mason/ fitter/black smith etc. for skilled labour.

One mate has been provided for 25 laborers.

10. General:

Bridge bearing and expansion joints are readymade items commercially produced by specialized firms and in certain cases using imported technology and parts. The rates of these items are obtained directly from different manufacture approved by the MoRT&H and adopted after comparison.

Normal method of curing has been covered in the schedule. Steam curing has been included in the items of pre-cast concrete PSC beams.

The testing of materials and finished items of work is covered under overhead charges.

Traffic arrangements during construction are covered under overhead charges, Provisions of a temporary diversion where required shall be governed by Clause 112.3

In the items for well foundation, provision for nominal island/temporary protection, deep islands/coffer-dams with wooden bellies and sheet piles have been made.

For some of the items, certain size/specifications have been assumed. If size/ specifications other than the same are adopted, corresponding modifications should be made.

The items do not cover all components of bridge projects for all situations. There may be specialized items for specific cases, which need to be analyzed keeping in view he basis approach.

11. Guide Bund:

The items for the guide bund are excavation, embankment and protection works.

12. 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 he construction materials and equipments inside water shall be made separately.

CHAPTER – 12

FOUNDATION

Preamble:

1. Excavation for structures has been provided both by manual and mechanical means.
2. The earth excavated from foundation has to be backfilled and balance quantity utilized for roadwork locally except for marshy soil where disposal has been provided.
3. In case of rocks, excavation has been considered up to a depth of 3m only.
4. Embankment of foundation in soft and hard rocks has been provided as required by the specifications.
5. Dewatering has been provided in excavation for foundation. In case dewatering is no required for a particular site condition, the same is to be omitted.
6. Mixing of cement concrete has been considered both 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 clauses of MORT&H specifications have to be referred for detailed specification.
10. The rate for well foundation has been included for diameter varying from 6m to 12m. well for twin d type has also been included. For other shapes like rectangular or any other size, the rates of sinking may be worked out on pro-rata basis.

    The lift for casting of concrete in well staining may be 2 to 2.5 m restricting the free fall of concrete of 1.5m and concreting layer to 450 mm.
11. Pneumatic sinking is a specialized job. All safety precaution 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 types of piles like bored cast-in-situ, driven pre-cast RCC pile and driven steel piles of H section have been included. If the steel casing 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 up to, a minimum height of 600 mm above the designed top level of the pile has been taken into account in the rate.

15. The leveling 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 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 up to 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 of 3 m.

19. The concrete mix used in bottom plug shall have minimum cement content of 330 kg/cum and a slump of about 150 mm to permit easy flow of concrete through termite to fill-up all cavities.

20. Necessary safety precautions shall be taken for excavation on open foundations for which guidance may be taken form IS: 3764.

21. A leveling course of 100 mm thickness in M 10 (1:3:6) shall be provided before lying open foundations.

22. In the case of open foundations, dewatering shall not be permitted from the time of placing of concrete up to 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 up to a level of 0.6 m for hard rock and 1.5 m for soft rock above the foundation level. Boulders grouted with cement shall fill he portion above this.

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 at least 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 at least 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 a minimum height of 600 mm above the designed top level of pile, which shall e stripped off to obtain sound concrete either before final set or after 3 days.

CHAPTER-12

FOUNDATIONS

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
12.1	304	**Excavation for Structures** (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.		
I		**Ordinary soil**		
A		**Manual Means**		
(a)		**Without dewatering**		
(i)		upto 3 m depth	cum	120.00
(ii)		3 m to 6 m depth	cum	158.00
(iii)		Above 6 m depth	cum	205.00
(b)		**With dewatering**		
(i)		upto 3 m depth	cum	132.00
(ii)		3 m to 6 m depth	cum	177.00
(iii)		Above 6 m depth	cum	246.00
B		**Mechanical Means**		
(a)		**Without dewatering**		
(i)		Depth upto 3 m	cum	72.00
(ii)		Depth 3 m to 6 m	cum	82.00
(iii)		Depth above 6m	cum	100.00
(b)		**With dewatering**		
(i)		Depth upto 3 m	cum	76.00
(ii)		Depth 3 m to 6 m	cum	88.00
(iii)		Depth above 6m	cum	108.00
II		**Ordinary rock (not requiring blasting)** (Depth upto 3m)		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
A		Manual Means		
(a)		Without dewatering	cum	174.00
(b)		With dewatering	cum	188.00
B		Mechanical Means	cum	
(a)		Without dewatering	cum	92.00
(b)		With dewatering	cum	100.00
III		**Hard rock (requiring blasting)**		
A		Manual Means		
(a)		Without dewatering	cum	428.00
(b)		With dewatering	cum	459.00
IV		**Hard rock (blasting prohibited)**		
A		Mechanical Means		
(a)		Without dewatering	cum	515.00
(b)		With dewatering	cum	558.00
V		**Marshy soil** (Depth upto 3 m)		
A		Manual means		
(a)		Without dewatering	cum	455.00
(b)		With dewatering	cum	541.00
B		Mechanical Means		
(a)		Without dewatering	cum	160.00
(b)		With dewatering	cum	187.00
VI		Back Filling in Marshy Foundation Pits	cum	313.00
12.2	**304**	**Filling Annular Space Around Footing in Rock** (Lean cement concrete 1:3:6 nominal mix. Rate may be taken as per items 12.4.)	cum	5644.00
12.3	**304**	Sand Filling in Foundation Trenches as per Drawing & Technical Specification	cum	1448.00
12.4	**2100**	**PCC 1:3:6 in Foundation** (Plain cement concrete 1:3:6 nominal mix in foundation with	cum	5644.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		crushed stone aggregate 40 mm nominal size mechanically mixed, placed in foundation and compacted by vibration including curing for 14 days.)		
12.5	**1300**	Brick masonry work in cement mortar 1:3 in foundation complete excluding pointing and plastering, as per drawing and technical specifications	cum	6649.00
12.6		**Cement mortar**		
A		Prop. 1:3 (1cement :3 sand)	cum	4904.00
B		Prop. 1:2 (1cement :2 sand)	cum	5956.00
C		Prop. 1:4 (1cement :4 sand)	cum	4201.00
D		Prop. 1:6 (1cement :6 sand)	cum	3578.00
12.7	**1400**	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification		
(a)		Square Rubble Coursed rubble masonry (first sort)	cum	4428.00
(b)	**1405.3**	Random Rubble Masonry	cum	4133.00
12.8	**1500,1700 & 2100**	**Plain/Reinforced cement concrete, in open foundation complete as per drawing and technical specification including steel shuttering formwork.**		
I		**Without plasticiser**		
A		PCC Grade M15	cum	6128.00
B		PCC Grade M20	cum	6893.00
C		(I)RCC Grade M20		
Case I		Using concrete mixer	cum	7097.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	8127.00
D		PCC Grade M25		
Case I		Using concrete Mixer	cum	7422.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	8453.00
E		RCC Grade M25		
Case I		Using concrete Mixer	cum	7632.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	8659.00
F		PCC Grade M30		
Case I		Using Concrete Mixer	cum	7463.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8486.00
G		RCC Grade M30		
Case I		Using Concrete Mixer	cum	7646.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8673.00
H		RCC Grade M35		
Case I		Using Concrete Mixer	cum	7760.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8781.00
II	**1500,1700 & 2100**	**With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999.**		
A		PCC Grade M15	cum	6898.00
B		PCC Grade M20	cum	7854.00
C		(I)RCC Grade M20		
Case I		Using concrete mixer	cum	8067.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9097.00
D		PCC Grade M25		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
Case I		Using concrete Mixer	cum	8546.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9578.00
E		RCC Grade M25		
Case I		Using concrete Mixer	cum	8767.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9794.00
F		PCC Grade M30		
Case I		Using Concrete Mixer	cum	8601.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	9623.00
G		RCC Grade M30		
Case I		Using Concrete Mixer	cum	8788.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	9815.00
H		RCC Grade M35		
Case I		Using Concrete Mixer	cum	8939.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	9960.00
12.9	**1200**	Providing and constructing temporary island 16 m diameter for construction of well foundation above 3m dia. well.		
A		Assuming depth of water 1.0 m and height of island to be 1.25m.	each	52351.00
B		Assuming depth of water 4.0 m and height of island 4.5 m.	each	748788.00
C		Providing and constructing one span service road to reach island location from one pier location to another pier location	metre	3573.00
12.10	**1200 &1900**	Providing and laying cutting edge of mild steel weighing 40 kg per metre for well foundation complete as per drawing and technical specification.	tonne	109285.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
12.11	**1200,1500 & 1700**	**Plain/Reinforced cement concrete, in well foundation complete as per drawing and technical specification including steel shuttering formwork.**		
I		**Without plasticiser**		
A		**Well curb**		
(i)		RCC M20 Grade		
Case I		Using concrete mixer	cum	8189.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9407.00
(ii)		RCC M25 Grade		
Case I		Using concrete mixer	cum	8828.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10046.00
(iii)		RCC M30 Grade		
Case I		Using concrete mixer	cum	8866.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10085.00
(iv)		RCC M35 Grade		
Case I		Using concrete mixer	cum	9041.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10261.00
B		**Well steining**		
(I)		PCC M15 Grade	cum	6601.00
(ii)		PCC M20 Grade	cum	7290.00
(iii)		RCC M20 Grade		
Case I		Using concrete mixer	cum	7507.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	8623.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(iv)		PCC M25 Grade		
Case I		Using concrete mixer	cum	7870.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9161.00
(v)		RCC M25 Grade		
Case I		Using concrete mixer	cum	8092.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9209.00
(vi)		PCC M30 Grade		
Case I		Using concrete mixer	cum	7932.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9046.00
(vii)		RCC M30 Grade		
Case I		Using concrete mixer	cum	8127.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9245.00
(viii)		RCC M35 Grade		
Case I		Using concrete mixer	cum	8288.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9406.00
(ix)		RCC M40 Grade (With Batching Plant, Transit Mixer and Concrete Pump)	cum	9462.00
C		**Bottom Plug**		
(i)		PCC Grade M20		
Case I		Using Concrete Mixer	cum	7374.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8348.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(ii)		PCC Grade M25		
Case I		Using Concrete Mixer	cum	7641.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8637.00
(iii)		PCC Grade M30		
Case I		Using Concrete Mixer	cum	7727.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8700.00
(iv)		PCC Grade M35		
Case I		Using Concrete Mixer	cum	7867.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8837.00
D		**Intermediate plug**		
(I)		Grade M20 PCC		
Case I		Using Concrete Mixer	cum	7045.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8032.00
(ii)		Grade M25 PCC		
Case I		Using Concrete Mixer	cum	7323.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8308.00
(iii)		Grade M30 PCC		
Case I		Using Concrete Mixer	cum	7380.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8367.00
E		**Top plug**		
(i)		Grade M15 PCC		
Case I		Using Concrete Mixer	cum	6001.00
(ii)		Grade M20 PCC		
Case I		Using Concrete Mixer	cum	6628.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(iii)		Grade M25 PCC		
Case I		Using Concrete Mixer	cum	7154.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8328.00
(iv)		Grade M30 PCC		
Case I		Using Concrete Mixer	cum	7211.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8224.00
F		**Well cap**		
(i)		RCC Grade M20		
Case I		Using concrete Mixer	cum	7038.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8066.00
(ii)		RCC Grade M25		
Case I		Using concrete Mixer	cum	7632.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8661.00
(iii)		RCC Grade M30		
Case I		Using Concrete Mixer	cum	7646.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8672.00
(iv)		RCC Grade M35		
Case I		Using Concrete Mixer	cum	7760.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8781.00
(v)		RCC M40 Grade	cum	8908.00
II	**1200,1500 & 1700**	**With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999.**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
A		**Well curb**		
(i)		RCC M20 Grade		
Case I		Using concrete mixer	cum	9197.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10413.00
(ii)		RCC M25 Grade		
Case I		Using concrete mixer	cum	9857.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	11075.00
(iii)		RCC M30 Grade		
Case I		Using concrete mixer	cum	9905.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	11123.00
(iv)		RCC M35 Grade		
Case I		Using concrete mixer	cum	10119.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	11338.00
B		**Well steining**		
(I)		PCC M15 Grade	cum	7523.00
(ii)		PCC M20 Grade	cum	8214.00
(iii)		RCC M20 Grade		
Case I		Using concrete mixer	cum	8430.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9545.00
(iv)		PCC M25 Grade		
Case I		Using concrete mixer	cum	8803.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9924.00
(v)		RCC M25 Grade		
Case I		Using concrete mixer	cum	9036.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10152.00
(vi)		PCC M30 Grade		
Case I		Using concrete mixer	cum	8880.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9994.00
(vii)		RCC M30 Grade		
Case I		Using concrete mixer	cum	9079.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10196.00
(viii)		RCC M35 Grade		
Case I		Using concrete mixer	cum	9275.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10393.00
(ix)		RCC M40 Grade	cum	10745.00
C		**Bottom Plug**		
(i)		PCC Grade M20		
Case I		Using Concrete Mixer	cum	8418.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	9391.00
(ii)		PCC Grade M25		
Case I		Using Concrete Mixer	cum	8805.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	9773.00
(iii)		PCC Grade M30		
Case I		Using Concrete Mixer	cum	8882.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	9855.00
(iv)		PCC Grade M35		
Case I		Using Concrete Mixer	cum	9061.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	10030.00
D		**Intermediate plug**		
(I)		Grade M20 PCC		
Case I		Using Concrete Mixer	cum	7825.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	8812.00
(ii)		Grade M25 PCC		
Case I		Using Concrete Mixer	cum	8172.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	9157.00
(iii)		Grade M30 PCC		
Case I		Using Concrete Mixer	cum	8242.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	9253.00
E		**Top plug**		
(i)		Grade M15 PCC		
Case I		Using Concrete Mixer	cum	6839.00
(ii)		Grade M20 PCC		
Case I		Using Concrete Mixer	cum	7467.00
(iii)		Grade M25 PCC		
Case I		Using Concrete Mixer	cum	8003.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	9022.00
(iv)		Grade M30 PCC		
Case I		Using Concrete Mixer	cum	8073.00
Case II		Using Batching Plant, Transit Mixer and Crane/concrete pump	cum	9086.00
F		**Well cap**		
(i)		RCC Grade M20		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
Case I		Using concrete Mixer	cum	7991.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	9018.00
(ii)		RCC Grade M25		
Case I		Using concrete Mixer	cum	8767.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	9796.00
(iii)		RCC Grade M30		
Case I		Using Concrete Mixer	cum	8788.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	9814.00
(iv)		RCC Grade M35		
Case I		Using Concrete Mixer	cum	8939.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump	cum	9960.00
(v)		RCC M40 Grade Using Batching Plant, Transit Mixer and Concrete Pump	cum	10124.00
12.12	**1200**	**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 rekonewedfrom bed level.**		
A		**Sandy soil**		
(i)		Depth below bed level upto 3.0 M	metre	4722.00
(ii)		Beyond 3m upto 10m depth	metre	6763.00
(iii)		Beyond 10m upto 20m	metre	8932.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	16754.00
b		For sinking including kentledge	metre	20104.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	39805.00
b		For sinking including kentledge	metre	47766.00
B		**Clayey soil (6m dia. Well)**		
(i)		Depth below bed level upto 3.0 M	metre	6786.00
(ii)		Beyond 3m upto 10m depth	metre	14397.00
(iii)		Beyond 10 m upto 20 m		
a		For sinking	metre	19015.00
b		For sinking including kentledge	metre	19966.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	35668.00
b		For sinking including kentledge	metre	44585.00
c		For sinking including kentledge & dewatering if required.	metre	46814.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	84741.00
b		For sinking including kentledge	metre	101690.00
c		For sinking including kentledge & dewatering if required.	metre	106774.00
C		**Soft rock (6m dia well)**		
(i)		Depth of soft rock strata upto 3m	metre	18836.00
D		Hard rock (6m dia well)		
(i)		Depth of soft rock strata upto 3m	metre	20320.00
12.13	**1200**	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 rekonewed from bed level.		
A		**Sandy soil**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(i)		Depth below bed level upto 3.0 M	metre	7084.00
(ii)		Beyond 3m upto 10m depth	metre	9664.00
(iii)		Beyond 10m upto 20m	metre	12763.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	23941.00
b		For sinking including kentledge	metre	28729.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	56883.00
b		For sinking including kentledge	metre	68260.00
B		Clayey soil (7m dia. Well)		
(I)		Depth below bed level upto 3.0 M	metre	9664.00
(ii)		Beyond 3m upto 10m depth	metre	14234.00
(iii)		Beyond 10 m upto 20 m		
(a)		For sinking	metre	18799.00
b		For sinking including dewatering, if required., if required	metre	19739.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	35261.00
b		For sinking including kentledge	metre	44077.00
c		For sinking including kentledge & dewatering, if required.	metre	46280.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	83775.00
b		For sinking including kentledge		100530.00
c		For sinking including kentledge & dewatering, if required.	metre	105556.00
C		Soft rock (7m dia well)		
(i)		Depth of soft rock strata upto 3m	metre	16301.00
D		Hard rock (7m dia well)		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(i)		Depth upto 3 m	metre	23243.00
12.14	1200	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 rekonewed from bed level		
A		**Sandy soil**		
(i)		Depth below bed level upto 3.0 M	metre	8803.00
ii)		Beyond 3m upto 10m depth	metre	10863.00
(iii)		Beyond 10m upto 20m	metre	14346.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	26910.00
b		For sinking including kentledge	metre	32292.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	63936.00
b		For sinking including kentledge	metre	76723.00
B		**Clayey soil (8m dia. Well)**		
(i)		Depth upto 3.0 M	metre	11827.00
(ii)		Beyond 3m upto 10m depth	metre	14789.00
(iii)		Beyond 10 m upto 20 m		
a		For sinking	metre	19532.00
b		Adding for dewatering @ 5% of cost, if required.	metre	20509.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	36639.00
b		For sinking including kentledge	metre	45798.00
c		For sinking including kentledge & dewatering, if required.	metre	48088.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	87049.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
b		For sinking including kentledge	metre	104459.00
c		For sinking including kentledge & dewatering, if required.	metre	109682.00
C		**Soft rock (8m dia well)**		
(i)		Depth in soft rock strata upto 3m	metre	18210.00
D		Hard rock (8m dia well)		
(i)		Depth in hard rock strata upto 3 m	metre	23434.00
12.15	**1200**	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 rekonewed from bed level.		
A		**Sandy soil**		
(i)		Depth below bed level upto 3.0 M	metre	8902.00
(ii)		Beyond 3m upto 10m depth	metre	11921.00
(iii)		Beyond 10m upto 20m	metre	15745.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	29533.00
b		Adding 20% of cost for Kentledge including supports, loading arrangement and Labour .	metre	35440.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	70167.00
b		For sinking including kentledge	metre	84201.00
B		**Clayey soil (9m dia. Well)**		
(i)		Depth below bed level upto 3.0 M	metre	12478.00
(ii)		Beyond 3m upto 10m depth	metre	15951.00
(iii)		Beyond 10 m upto 20 m		
a		For sinking	metre	21066.00
b		For sinking including dewatering, if required	metre	22119.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	39513.00
b		For sinking including kentledge	metre	49392.00
c		For sinking including kentledge & dewatering, if required.	metre	51861.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	93876.00
b		For sinking including kentledge	metre	112652.00
c		For sinking including kentledge & dewatering, if required.	metre	118284.00
C		**Soft rock (9m dia well)**		
(i)		Depth upto 3m	metre	21958.00
D		Hard rock (9m dia well)		
(i)		Depth of hard rock strata upto 3 m	metre	26949.00
12.16	1200	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 rekonewed from bed level.		
A		**Sandy soil**		
(i)		Depth below bed level upto 3.0 M	metre	10722.00
(ii)		Beyond 3m upto 10m depth	metre	12582.00
(iii)		Beyond 10m upto 20m	metre	16618.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	31170.00
b		For sinking including kentledge	metre	37404.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	74054.00
b		Adding 20% of cost for Kentledge including supports, loading arrangement, and Labour etc.	metre	88865.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
B		**Clayey soil (10m dia. Well)**		
(i)		**Depth below bed level upto 3.0 M**	metre	13690.00
(ii)		**Beyond 3m upto 10m depth**	metre	15645.00
(iii)		**Beyond 10 m upto 20 m**		
a		For sinking	metre	20662.00
b		Adding for dewatering @ 5% of cost, if required.	metre	21696.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	38759.00
b		For sinking including kentledge	metre	48448.00
c		For sinking including kentledge & dewatering, if required.	metre	50871.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	92087.00
b		For sinking including kentledge	metre	110505.00
c		For sinking including kentledge & dewatering, if required.	metre	116030.00
C		**Soft rock (10m dia well)**		
(i)		Depth of soft rock strata upto 3m	metre	23460.00
D		**Hard rock (10m dia well)**		
(i)		Depth of hard rock strata upto 3 m	metre	30989.00
12.17	**1200**	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 rekonewed from bed level.		
A		**Sandy soil**		
(i)		Depth from bed level upto 3.0 M	metre	24743.00
(ii)		Beyond 3m upto 10m depth	metre	19339.00
(iii)		Beyond 10m upto 20m	metre	25540.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	47908.00
b		For sinking including kentledge	metre	57489.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	113824.00
b		For sinking including kentledge	metre	136589.00
B		**Clayey soil (11 m dia. Well)**		
(i)		Depth from bed level upto 3.0 M	metre	22818.00
(ii)		Beyond 3m upto 10m depth	metre	32184.00
(iii)		Beyond 10 m upto 20 m		
a		For sinking	metre	42505.00
b		For sinking including dewatering, if required	metre	44630.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	79730.00
b		For sinking including kentledge	metre	99662.00
c		For sinking including kentledge & dewatering, if required.	metre	104645.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	189427.00
b		For sinking including kentledge	metre	227312.00
c		For sinking including kentledge & dewatering, if required.	metre	238678.00
C		**Soft rock (11m dia well)**		
(i)		Depth of soft rock strata upto 3m	metre	52670.00
D		**Hard rock (11m dia well)**		
(i)		Depth of hard rock upto 3 m	metre	69513.00
12.18	1200	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		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		as per drawing and technical specifications. Depth of sinking is rekonewed from bed level.		
A		**Sandy soil**		
(i)		**Depth below bed level upto 3.0 M**	metre	51031.00
(ii)		**Beyond 3m upto 10m depth**	metre	57296.00
(iii)		**Beyond 10m upto 20m**	metre	75670.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	141937.00
b		For sinking including kentledge	metre	170325.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	337223.00
b		For sinking including kentledge	metre	404668.00
B		**Clayey soil (12 m dia. Well)**		
(i)		**Depth below bed level upto 3.0 M**	metre	56009.00
(ii)		**Beyond 3m upto 10m depth**	metre	81758.00
(iii)		**Beyond 10 m upto 20 m**		
a		For sinking	metre	107976.00
b		For sinking including dewatering, if required	metre	113375.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	202534.00
b		For sinking including kentledge	metre	253168.00
c		For sinking including kentledge & dewatering, if required.	metre	265827.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	481194.00
b		For sinking including kentledge	metre	577433.00
c		For sinking including kentledge & dewatering	metre	606305.00
C		**Soft rock (12m dia well)**		
(i)		**Depth of soft rock strata upto 3m**	metre	124388.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
D		**Hard rock (12m dia well)**		
(i)		**Depth of hard rock strata upto 3 m**	metre	158596.00
12.19	**1200**	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.		
A		**Sandy soil**		
(i)		**Depth from bed level upto 3.0 M**	metre	11558.00
(ii)		**Beyond 3m upto 10m depth**	metre	12471.00
(iii)		**Beyond 10m upto 20m**	metre	16472.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	30898.00
b		For sinking including kentledge	metre	37078.00
(v)		Beyond 30m upto 40 m		
a		For sinking	metre	73410.00
b		For sinking including kentledge	metre	88091.00
B		**Clayey soil (Twin D Type Well)**		
(i)		**Depth below bed level upto 3.0 M**	metre	13560.00
(ii)		**Beyond 3m upto 10m depth**	metre	17334.00
(iii)		**Beyond 10 m upto 20 m**		
a		For sinking	metre	22891.00
b		For sinking including dewatering, if required	metre	24036.00
(iv)		Beyond 20m upto 30 m		
a		For sinking	metre	42935.00
b		For sinking including kentledge	metre	53669.00
c		For sinking including kentledge & dewatering, if required.	metre	56353.00
(v)		Beyond 30m upto 40 m		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
a		For sinking	metre	102010.00
b		For sinking including kentledge	metre	122412.00
c		For sinking including kentledge & dewatering, if required.	metre	128532.00
C		**Soft rock (Twin D Type well)**		
(i)		**Depth of soft rock strata upto 3m**	metre	26526.00
D		**Hard rock (Twin D Type well)**		
(i)		**Depth of hard rock strata upto 3 m**	metre	33516.00
12.20		Pneumatic sinking of wells with equipment of approved design, drawing and specifications worked by competent and trained personnel and comprising of compression and decompression chambers, reducers, two air locks separately for men and plant & materials		
12.21	1207	Sand filling in wells complete as per drawing and technical specifications	cum	1448.00
12.22	1200 & 1900	Providing steel liner 10 mm thick for curbs and 6mm thick for steining of wells including fabricating and setting out as per detailed drawing	tonne	99335.00
12.23	1100 & 1700	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)		
A		Without plasticiser	metre	6832.00
B	1101 & 1700	With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (asterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999	metre	7244.00
12.24	1100,1600 & 1700	Bored cast-in-situ M35 grade R.C.C. pile excluding reinforcement complete as per drawing and technical specifications and removal		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		of excavated earth with all lifts and lead upto 1000 m. (Pile diameter-1000 mm)		
A		Without Plasticiser	metre	11459.00
B	**1100,1600 & 1701**	With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999)	metre	12193.00
12.25	**1100 & 1700**	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)		
A		Without plasticiser	metre	15123.00
B	**1100 & 1701**	With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999	metre	16180.00
12.26	**1100 & 1700**	Driven cast-in-place vertical M35 grade R.C.C. pile excluding reinforcement complete as per drawing and & Technical Specification (Pile diameter - 750 mm)		
A		Without plasticiser	metre	4893.00
B	**1101 & 1700**	With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999	metre	5306.00
12.27	**1100 & 1700**	Driven cast-in-place vertical M35 grade R.C.C. piles excluding reinforcement complete as per drawing and & Technical Specification (Pile diameter - 1000 mm)		
A		Without plasticiser	metre	8277.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
B	**1100 & 1700**	With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999	metre	9011.00
12.28	**1100& 1700**	Driven cast-in-place vertical M35 grade R.C.C. piles excluding reinforcement complete as per drawing and & Technical Specification (Pile diameter - 1200 mm)		
A		Without plasticiser	metre	11998.00
12.28B	**1100& 1701**	With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999 (Pile diameter - 1200 mm)	metre	13055.00
12.37	**1100**	**Pile load test on single vertical pile in accordance with IS:2911(Part-IV).**		
a)		Initial and Routine load test.	Ton	330.00
b)		Lateral load test	Ton	5500.00
12.38	**1100,1500 & 1700**	**Cement concrete for reinforced concrete in pile cap complete as per drawing and Technical Specification.**		
I		**Without Plasticiser**		
A		**RCC Grade M20**		
(i)		Using Concrete Mixer	cum	7037.00
(ii)		Using Batching Plant, Transit Mixer and Concrete Pump	cum	6898.00
B		**RCC Grade M25**		
(i)		Using concrete mixer.	cum	7611.00
(ii)		Using Batching Plant, Transit Mixer and Concrete Pump	cum	7486.00
C		**RCC Grade M30**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(i)		Using concrete mixer.	cum	7683.00
(ii)		Using Batching Plant, Transit Mixer and Concrete Pump	cum	7544.00
D		**RCC Grade M35**		
(i)		Using concrete mixer.	cum	7835.00
(ii)		Using Batching Plant, Transit Mixer and Concrete Pump	cum	7710.00
II)		With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999.		
A		**RCC Grade M20**		
(i)		Using Concrete Mixer	cum	7786.00
(ii)		Using Batching Plant, Transit Mixer and Concrete Pump	cum	7647.00
B		**RCC Grade M25**		
(i)		Using concrete mixer.	cum	8494.00
(ii)		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8370.00
C		**RCC Grade M30**		
(i)		Using concrete mixer.	cum	8583.00
(ii)		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8444.00
D		**RCC Grade M35**		
(i)		Using concrete mixer.	cum	8768.00
(ii)		Using Batching Plant, Transit Mixer and Concrete Pump	cum	8644.00
12.39	1100 & 1700	Levelling course for Pile cap	cum	5870.00
12.40	1600	**Reinforcement in Foundation:** Supplying, fitting and placing TMT IS:1786 Fe500 D bar		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		reinforcement in foundation complete as per drawing and technical specifications		
(a)		TMT-IS 1786 (Fe-500 D) Primary Producer (TATA/ SAIL/ Esser Steel/ Jindal Panther steel/ Shyam steel or equivalent)	tonne	78391.00
(b)		TMT-IS 1786 (Fe-500 D) Secondary Producer (ISI approved)	tonne	72847.00
12.41	1600	Supplying, fitting and placing un-coated Mild steel (IS: 1786 Fe-250) reinforcement complete in foundation as per drawing and technical specification	tonne	83652.00

CHAPTER-13

SUB-STRUCTURE

Preamble:

1. Although, substructures 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 if permitted by design.
2. The cost of formwork will vary with the height of the substructure. Provision has accordingly been made.
3. Bride bearing, being commercial items produced by specialized 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 abutments are required to be provided as per guidelines given in IRC: 78-2000.
5. Weep holes shall be provided as per clause 2706 of MoRT&H's Specifications.
6. In case of roller-cum-rocker bearings, only full circular rollers are to be provided.
7. All bearings shall be set truly level so as to have full and eve seating.
8. For elastomeric bearing pads, the concrete surface shall be leveled such that the variation is not more than 1.5mm form a straight edge placed in any direction across the area.
9. The Ministry of Road Transport and Highways should procure the bearing only from those manufactures that have been re-qualified.
10. The bottoms of girders resting on the bearing shall be plane and truly horizontal.
11. For spans in grade, the bearing shall be placed horizontal by using sole plates for suitably designed RCC pedestals.

CHAPTER-13

SUB-STRUCTURE

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
13.1	1300 & 2200	Brick masonry work in 1:3 in sub-structure complete excluding pointing and plastering, as per drawing and technical specifications	cum	7985.00
13.2	1300 & 2200	Pointing with cement mortar (1:3) on brick work in substructure as per Technical specifications	sqm	68.00
13.3	1300 & 2200	Plastering with cement mortar (1:3) on brick work in sub-structure as per Technical specifications	sqm	142.00
13.4	1400 & 2200	Stone masonry work in cement mortar 1:3 for substructure complete as per drawing and Technical Specifications		
A		Random Rubble Masonry	cum	4196.00
B		Coursed rubble masonry (first sort)	cum	4359.00
C		Ashlar masonry (first sort)	cum	5768.00
13.5 (N)	**1500,1700 & 2200**	Plain/Reinforced cement concrete, in sub structure complete as per drawing and technical specification and steel shuttering formwork		
I		**Without plasticiser**		
A		**PCC Grade M15**	cum	6601.00
		Height upto 5m		
B		**PCC Grade M20**	cum	7290.00
		Height upto 5m		
C		**PCC Grade M25**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	7870.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9161.00
b		Height 5m to 10m		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
Case I		Using concrete Mixer	cum	8156.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9494.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	8514.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9910.00
D		**PCC Grade M30**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	7932.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9046.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	8221.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9375.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	8581.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9786.00
E		**RCC Grade M20**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	7507.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	8623.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	7780.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	8937.00
c		Height above 10m		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
Case I		Using concrete Mixer	cum	8121.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	6527.00
F		**RCC Grade M25**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	8092.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9209.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	8092.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9209.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	8754.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9962.00
G		**RCC Grade M30**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	8127.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9245.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	8356.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9505.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	8755.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9959.00
H		**RCC Grade M35**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
a		Height upto 5m		
Case I		Using concrete Mixer	cum	8288.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9406.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	8469.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9611.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	8740.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9919.00
II		**With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser(Masterplast ACPL or equivalent) conforming to IS-9103-1999**		
A		**PCC Grade M15**		
		Height upto 5m	cum	7523.00
B		**PCC Grade M20**		
		Height upto 5m	cum	8214.00
C		**PCC Grade M25**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	8803.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9924.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	9124.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9494.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
c		Height above 10m		
Case I		Using concrete Mixer	cum	9524.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10736.00
D		**PCC Grade M30**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	8880.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9994.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	9203.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10358.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	9607.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10812.00
E		**RCC Grade M20**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	8430.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9545.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	8737.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	9893.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	9120.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10326.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
F		**RCC Grade M25**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	9036.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10152.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	9332.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10485.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	9775.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10983.00
G		**RCC Grade M30**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	9079.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10196.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	9335.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10483.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	9698.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10891.00
H		**RCC Grade M35**		
a		Height upto 5m		
Case I		Using concrete Mixer	cum	9275.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10393.00
b		Height 5m to 10m		
Case I		Using concrete Mixer	cum	9478.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10620.00
c		Height above 10m		
Case I		Using concrete Mixer	cum	9781.00
Case II		With Batching Plant, Transit Mixer and Concrete Pump	cum	10960.00
13.6		**Supplying, fitting and placing TMT IS:1786 (Fe 500) bar reinforcement in sub-structure complete as per drawing and technical specifications**		
(a)		TMT-IS 1786 (Fe-500 D) Primary Producer (TATA/ SAIL/ Esser Steel/ Jindal Panther steel/ Shyam steel or equivalent)	tonne	78525.00
(b)		TMT-IS 1786 (Fe-500 D) Secondary Producer (ISI approved)	tonne	72981.00
13.7		Supplying, fitting and placing un-coated Mild steel (IS: 1786 Fe-250) reinforcement complete in sub-structure as per drawing and Technical Specification	tonne	81413.00
13.8		Providing weep holes in Brick masonry/ Plain/Reinforced concrete abutment, wing wall/return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V :20H towards drawing foce. Complete as per drawing and Technical specification.	each	199.00
13.9		Back filling behind abutment, wing wall and return wall complete as per drawing and Technical specification		
A		Granular material	cum	1420.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
B		Sandy material	cum	1420.00
13.10		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 toeards the wall and provided over the entire surfaces behind the abutement, wing wall and return wall to the full height compacted to firm condition complete as per drawing and technical specification.	cum	1896.00
13.11		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.	tonne capacity	727.00
13.12		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.	tonne capacity	628.00
13.13		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 & 9.2 (for PTFE) and clause 2004 of MORT&H specification.	tonne capacity	337.00
13.14		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	cubic centimetre	5.13

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		all accessories as per drawing and Technical Specifications.		
13.15		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.	tonne capacity	189.00
13.16		Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainlesssteel matting surfaces, complete assembly to be of cast steel/fabricated structural steel, meatal and elastomer elements to be as per IRC:83 part-I &II respectively and parts conforming to BS:5400, section 9.1 & 9.2 and clause 2006 of MORTH&S Specification complete as per drawing and approved technical specification.	tonne capacity	214.00

CHAPTER-14

SUPERSTRUCTURE

Preamble:

1. The rate for the wearing coat has been analyzed as under:

   a) Cement concrete wearing coat

   b) Asphalted 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 specialized in this work. In this connection, Circular No. RW/NH-34041/44/91-S&R dated 21.3.2000 of Ministry of Road Transport and Highway may be referred for further details.

5. Expansion joints involving movements exceeding 40 mm do reputed firms with imported technology and parts commercially produce specialized readymade items. The rates of such joints are ascertained from the firms pre-qualified by the Ministry.

6. The rates for pre-cast and pre-tensioned girders have also been included.

7. The rates for Structural steel Built-Up-Girder (BUG) have now been relocated in this Chapter.

8. MoRT&H's letter No. RW/NH-34059/1/96/ S&R dated 30.11.2000 and subsequent corrigendum dated 25.1.2001 may be referred for detailed Specifications and provisions for various types of expansion joints.

9. For bridges having wide deck/span length of more than 120 m or/and involving complex movements/rotations in different directions/planes, provisions of special type of modular expansion joints such as swivel joists joints are required for which firms specialized in this field may be consulted. Such cases will require prior approval of Ministry.

TABLE 1700-1

Grade Designation	Specified characteristic Compressive strength of 150 mm cubes at 28 days, in MPa
M 15	15
M 20	20
M 25	25
M 30	30
M 35	35
M 40	40
M 45	45
M 50	50
M 55	55

1703.2. Table lowest grades of concrete in bridges and corresponding minimum cement contents and water-cement ratios shall be maintained as indicated in Tables 1700-2 and 1700-3.

TABLE 1700-2 FOR BRIDGES WITH PRESTRESSED CONCRETE OR THOSE WITH INDIVIDUAL SPAN LENGTHS MORE THAN 30 M OR THOSE THAT ARE BUILT WITH INNOVATIVE DESIGN/CON-STRUCTION

(A) MINIMUM CEMENT CONTENT AND MAXIMUM WATER CEMENT RATIO

Structural Member	Min. cement content for all exposure conditions (kg/cu.m)	Max. water cement ratio Exposure conditions	
		Normal	Severe
a) PCC members	360	0.45	0.45
b) RCC members	400	0.45	0.40
c) PSC members	400	0.40	0.40

(B) MINIMUM STRENGTH OF CONCRETE

Member	Conditions of Exposure	
	Normal	Severe
a) PCC members	M 25	M 30
b) RCC members	M 35	M 40
c) PSC members	M 35	M 40

TABLEI706-3. FOR BRIDGES OTHER THAN THOSE MENTIONED IN TABLE 1700.2 AND FOR CULVERTS AND OTHER INCIDENTAL CONSTRUCTIQN

(A) MINIMUM CEMENT CONTENT AND MAXIMUM WATER CEMENT RATIO

Structural Member	Min. cement content (kg/cu.m)		Max. water cement ratio	
	Exposure conditions		Exposure conditions	
	Normal	Severe	Normal	Severe
a) PCC members	250	310	0.50	0.45
b) RCC members	310	400	0.45	0.40

(B) MINIMUM STRENGTH OF CONCRETE

Member	Conditions of Exposure	
	Normal	Severe
a) PCC members	M15	M20
b) RCC members	M20	M25

Notes Applicable to Tables 1700-2 and 1700-3

(i) The minimum cement content is based on 20 mm aggregate (nominal max. size). For 40 mm and larger size aggregates, it may be reduced suitably but the reduction shall not be more than 10 per, cent.

(ii) For underwater concreting, the cement content shall be increased by 10 per cent.

(iii) Severe conditions of exposure shall mean altemate wetting and drying due 10 sea spray, alternate wetting and drying combined with freezing and buried in soil have corrosive effect.

(iv) Moderate conditions of exposure shall mean other that those mentioned in (iii) above. The cement content shall be as low as possible but not less than the quantities specified above. In no case shall it exceed 540 kg/cu.m. of concrete.

TABLE 1700-4.

	TYPE	SLUMP (mm)
1.	(a) Structures with exposed inclined surface requiring low slump concrete 10 allow proper computation	25
	(b) plain cement concrete	25
2.	RCC structures with widely spaced reinforcement; e.g. solid columns, piers, abutment, footings, well steining	40-50
3.	RCC structures with fair degree of congestion of reinforcement; e.g. pier and abutment caps, box culverts well curb, well cap walls with thickness greater than 300 mm	50-75
4.	RCC and PSC structures with highly congested reinforcement e.g. deck slab girders, box girders, walls with thickness less than 300 mm	75-125
5.	Underwater concreting through tremie e.g. bottom plug, cast-in-situ piling	100-200

TABLE 1700.5.

Concrete Grade	Current Margin (MPa)	Target Mean Strength (MPa)
M 15	10	25
M 20	10	30
M 25	11	36
M 30	12	42
M 35	12	47
M 40	12	52
M 45	13	58
M 50	13	63
M 55	14	69

TABLE 1700-6. PROPORTIONS FOR NOMINAL MIX CONCRETE

Concrete Grade	Total Quantity of dry aggregate by mas's per 50 kg of cement to be taken as the sum of individual masses of fine and coarse aggregates (kg)	Proportion of fine to Coarse aggregate (by mass)
M15	350	Generally 1:2, subject to upper limit 1:1.5 and lower limit of 1:2.5
M20	250	

TABLE 1700.7.

	Components	**Maximum Nominal Size of Coarse Aggregate (mm)**
i)	RCC well curb	20
ii)	RCC/PCC well steining	40
iii)	Well cap or Pile Cap Solid type piers and abutments	40
iv)	RCC work in girders slabs, wearing coat, kerb, approach slab, hollow piers and abutments pier/abutment caps, piles	20
v)	PSC work	20
vi)	Any other item	As specified by Engineer

Maximum nominal size of aggregates shall also be restricted to the smaller of the following values:

a) 10 mm less than the minimum lateral clear distance between main reinforcements

b) 10 mm less than the minimum clear cover to the reinforcements

The proportions of the various individual size of aggregates shall be so adjusted that the grading produces densest mix and the grading curve corresponds to the maximum nominal size adopted for the concrete mix.

TABLE 1700.8

Quantity of Concrete in work, m^2	**No. of samples**
1-5	1
6-15	2
16-30	3
31-50	4
51 and above	4 plus one additional sample for each additional $50m^3$ or part thereof

At least one sample shall be taken from each shift of work.

CHAPTER-14

SUPER-STRUCTURE

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
14.1		**Furnishing and Placing Reinforced/ Prestressed cement concrete in super-structure as per drawing and Technical Specification' including steel shuttering formwork.**		
I		**Without Plasticiser**		
A		**RCC Grade M20**		
Case I		**Using Concrete Mixer**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	8120.00
b		Height 5m to 10m	cum	8459.00
c		Height above 10m	cum	8797.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	8459.00
b		Height 5m to 10m	cum	8797.00
c		Height above 10m	cum	9135.00
Case II		**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	9307.00
b		Height 5m to 10m	cum	9695.00
c		Height above 10m	cum	10082.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	9695.00
b		Height 5m to 10m	cum	10082.00
c		Height above 10m	cum	10470.00
B		**RCC Grade M25**		
Case I		**Using Concrete Mixer**		
(i)		**For solid slab super-structure**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
a		Height upto 5m	cum	8782.00
b		Height 5m to 10m	cum	9148.00
c		Height above 10m	cum	9514.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	9148.00
b		Height 5m to 10m	cum	9514.00
c		Height above 10m	cum	9880.00
Case II		**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	9977.00
b		Height 5m to 10m	cum	10393.00
c		Height above 10m	cum	10809.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	10393.00
b		Height 5m to 10m	cum	10809.00
c		Height above 10m	cum	11225.00
C		**RCC Grade M 30**		
Case I		**Using Concrete Mixer**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	8893.00
b		Height 5m to 10m	cum	9263.00
c		Height above 10m	cum	9634.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	9263.00
b		Height 5m to 10m	cum	9634.00
c		Height above 10m	cum	10004.00
Case II		**Using Batching Plant, Transit Mixer and Concrete Pump.**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	10015.00
b		Height 5m to 10m	cum	10433.00
c		Height above 10m	cum	10850.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	10433.00
b		Height 5m to 10m	cum	10850.00
c		Height above 10m	cum	11267.00
D		**RCC/PSC Grade M35**		
Case 1		**Using concrete mixer.**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	8917.00
b		Height 5m to 10m	cum	9294.00
c		Height above 10m	cum	9672.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	9294.00
b		Height 5m to 10m	cum	9672.00
c		Height above 10m	cum	10050.00
(iii)		**For box girder and balanced cantilever**		
a		Height upto 5m	cum	10428.00
b		Height 5m to 10m	cum	11183.00
c		Height above 10m	cum	11939.00
Case II		**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	10014.00
b		Height 5m to 10m	cum	10438.00
c		Height above 10m	cum	10862.00
(ii)		**For T-beam & slab**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
a		Height upto 5m	cum	10438.00
b		Height 5m to 10m	cum	10862.00
c		Height above 10m	cum	11287.00
(iii)		**For box girder and balanced cantilever**		
a		Height upto 5m	cum	11711.00
b		Height 5m to 10m	cum	12560.00
c		Height above 10m	cum	13408.00
E		**PSC Grade M-40**		
Case 1		Using concrete mixer.		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	9211.00
b		Height 5m to 10m	cum	9595.00
c		Height above 10m	cum	9979.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	9595.00
b		Height 5m to 10m	cum	9979.00
c		Height above 10m	cum	10363.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	10110.00
b		Height 5m to 10m	cum	10538.00
c		Height above 10m	cum	10967.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	10538.00
b		Height 5m to 10m	cum	10967.00
c		Height above 10m	cum	11395.00
(iii)		**For box girder and balanced cantilever**		
a		Height upto 5m	cum	11823.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
b		Height 5m to 10m	cum	12680.00
c		Height above 10m	cum	13537.00
F		**PSC Grade M-45**		
(i)		**For solid slab/voided slab super-structure**		
a		Height upto 5m	cum	10324.00
b		Height 5m to 10m	cum	10769.00
c		Height above 10m	cum	11214.00
(ii)		**For I-beam & slab including launching of precast girders by launching truss upto 40 m span**		
a		Height upto 5m	cum	10769.00
b		Height 5m to 10m	cum	11214.00
c		Height above 10m	cum	11659.00
(iii)		**For cast-in-situ box girder, segmental construction and balanced cantilever**		
a		Height upto 5m	cum	12105.00
b		Height 5m to 10m	cum	12995.00
c		Height above 10m	cum	13885.00
G		**PSC Grade M-50**		
(i)		**For cast-in-situ box girder, segmental construction and balanced cantilever**		
a		Height upto 5m	cum	12336.00
b		Height 5m to 10m	cum	13250.00
c		Height above 10m	cum	14164.00
H		**PSC Grade M- 55**		
(i)		**For cast-in-situ box girder, segmental construction and balanced cantilever**		
a		Height upto 5m	cum	12839.00
b		Height 5m to 10m	cum	13790.00
c		Height above 10m	cum	14741.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
II		**With plasticiser (Masterplast PL-1/SPL-2 or equivalent), air entraining and water reducing plasticiser (Masterplast PAE or equivalent) and accelerating plasticiser (Masterplast ACPL or equivalent) conforming to IS-9103-1999.**		
A		**RCC Grade M20**		
Case I		**Using Concrete Mixer**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	9221.00
b		Height 5m to 10m	cum	9605.00
c		Height above 10m	cum	9989.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	9605.00
b		Height 5m to 10m	cum	9989.00
c		Height above 10m	cum	10373.00
Case II		**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	10301.00
b		Height 5m to 10m	cum	10730.00
c		Height above 10m	cum	11159.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	10730.00
b		Height 5m to 10m	cum	11159.00
c		Height above 10m	cum	11588.00
B		**RCC Grade M25**		
Case I		**Using Concrete Mixer**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	10082.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
b		Height 5m to 10m	cum	10502.00
c		Height above 10m	cum	10922.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	10502.00
b		Height 5m to 10m	cum	10922.00
c		Height above 10m	cum	11342.00
Case II		**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	11228.00
b		Height 5m to 10m	cum	11695.00
c		Height above 10m	cum	12163.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	11695.00
b		Height 5m to 10m	cum	12163.00
c		Height above 10m	cum	12631.00
C		**RCC Grade M 30**		
Case I		**Using Concrete Mixer**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	10216.00
b		Height 5m to 10m	cum	10642.00
c		Height above 10m	cum	11068.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	10642.00
b		Height 5m to 10m	cum	11068.00
c		Height above 10m	cum	11494.00
Case II		**Using Batching Plant, Transit Mixer and Concrete Pump.**		
(i)		**For solid slab super-structure**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
a		Height upto 5m	cum	11339.00
b		Height 5m to 10m	cum	11811.00
c		Height above 10m	cum	12284.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	11811.00
b		Height 5m to 10m	cum	12284.00
c		Height above 10m	cum	12756.00
D		**RCC/PSC Grade M35**		
Case 1		**Using concrete mixer.**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	10267.00
b		Height 5m to 10m	cum	10702.00
c		Height above 10m	cum	11137.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	10702.00
b		Height 5m to 10m	cum	11137.00
c		Height above 10m	cum	11572.00
(iii)		**For box girder and balanced cantilever**		
a		Height upto 5m	cum	12008.00
b		Height 5m to 10m	cum	12878.00
c		Height above 10m	cum	13748.00
Case II		**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	11365.00
b		Height 5m to 10m	cum	11846.00
c		Height above 10m	cum	12328.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	11846.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
b		Height 5m to 10m	cum	12328.00
c		Height above 10m	cum	12809.00
(iii)		**For box girder and balanced cantilever**		
a		Height upto 5m	cum	13291.00
b		Height 5m to 10m	cum	14254.00
c		Height above 10m	cum	15217.00
E		**PSC Grade M-40**		
Case 1		Using concrete mixer.		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	10611.00
b		Height 5m to 10m	cum	11053.00
c		Height above 10m	cum	11495.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	11053.00
b		Height 5m to 10m	cum	11495.00
c		Height above 10m	cum	11937.00
Case II		Using Batching Plant, Transit Mixer and Concrete Pump		
(i)		**For solid slab super-structure**		
a		Height upto 5m	cum	11486.00
b		Height 5m to 10m	cum	11973.00
c		Height above 10m	cum	12460.00
(ii)		**For T-beam & slab**		
a		Height upto 5m	cum	11973.00
b		Height 5m to 10m	cum	12460.00
c		Height above 10m	cum	12946.00
(iii)		**For box girder and balanced cantilever**		
a		Height upto 5m	cum	13433.00
b		Height 5m to 10m	cum	14407.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
c		Height above 10m	cum	15380.00
F		**PSC Grade M-45**		
(i)		**For solid slab/voided slab super-structure**		
a		Height upto 5m	cum	11788.00
b		Height 5m to 10m	cum	12296.00
c		Height above 10m	cum	12804.00
(ii)		**For I-beam & slab including launching of precast girders by launching truss upto 40 m span**		
a		Height upto 5m	cum	12296.00
b		Height 5m to 10m	cum	12804.00
c		Height above 10m	cum	13312.00
(iii)		**For cast-in-situ box girder, segmental construction and balanced cantilever**		
a		Height upto 5m	cum	13820.00
b		Height 5m to 10m	cum	14836.00
c		Height above 10m	cum	15852.00
G		**PSC Grade M-50**		
(i)		**For cast-in-situ box girder, segmental construction and balanced cantilever**		
a		Height upto 5m	cum	14131.00
b		Height 5m to 10m	cum	15177.00
c		Height above 10m	cum	16224.00
H		**PSC Grade M- 55**		
(i)		**For cast-in-situ box girder, segmental construction and balanced cantilever**		
a		Height upto 5m	cum	14777.00
b		Height 5m to 10m	cum	15871.00
c		Height above 10m	cum	16966.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
14.2		Reinforcement in Super Structure: Supplying, fitting and placing TMT conforming to IS:1786 Fe 500 D reinforcement in super-structure including splicing complete as per drawing and technical specifications		
(a)		TMT-IS 1786 (Fe-500 D) Primary Producer (TATA/ SAIL/ Esser Steel/ Jindal Panther steel/ Shyam steel or equivalent)	tonne	80072.00
(b)		TMT-IS 1786 (Fe-500 D) Secondary Producer (ISI approved)	tonne	74297.00
14.3		High tensile steel wires/strands including all accessories for stressing, stressing operations and grouting complete as per drawing and Technical Specifications	tonne	157232.00
14.4		Providing and laying Cement concrete wearing coat M-30 grade including reinforcement complete as per drawing and Technical Specifications	cum	14559.00
14.5		**Mastic Asphalt**		
(A)		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 aftering cleaning the surface, including providing antiskid surface with bitumen pre coated fine grained hard stone shipping of 9.5mm nominal size at the rate of .005 cum per 10sqm and at approximate spaciong of 10cm center to center in both directions, pressed into surfaces when temperature of the surfaces not less than 100 degC. , protuding 1mm to 4mm over mastic surfaces, all complete as per clause 515.	sqm	434.00
(B)		Providing and laying Bituminous wearing course comprising of tack coat with bitumen	sqm	546.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		emulsion CSS-1h as per APWD SOR item no 5.2 & MOSRT&H Specification Nos 503 0.6mm thick mastic asphalt as per APWD SOR item no 14.5 & MOSRT&H Specification Nos 515 & 2702 and 2 layers of 25 mm thick Asphalt concrete including of close Graded Premix Surfacing(CGPS) materials with Type -a aggregate as per APWD SOR tem no 5.11 & MOSRT&H Specification Nos 512 including all lead and lift as directed.		
14.6		Construction of precast RCC railing of M30 Grade, aggregate size not exceeding 12 mm, true to line and grade, tolurence of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequat space between vertical posts for expansion, complete as per approved drawings and technical specifications.	metre	2312.00
14.7		Construction of RCC railing of M30 Grade in-situ with 20 mm nominal size aggregate, true to line and grade, tolurence of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequat space between vertical posts for expansion, complete as per approved drawings and technical specifications.	metre	2253.00
14.8		Providing, fitting and fixing mild steel railing complete as per drawing and Technical Specification	metre	4450.00
14.9		Drainage Spouts complete as per drawing and Technical specification	Each	8866.00
14.10		PCC M15 Grade leveling course below approach slab complete as per drawing and Technical specification	cum	6001.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
14.11		Reinforced cement concrete approach slab including reinforcement and formwork complete as per drawing and Technical specification		
(a)		TMT-IS 1786 (Fe-500 D) Primary Producer (TATA/ SAIL/ Esser Steel/ Jindal steel/ Shyam steel or equivalent)	cum	13449.00
(b)		TMT-IS 1786 (Fe-500 D) Secondary Producer (ISI approved)	cum	13172.00
(c)		MS bar-IS 1786 (Fe-250) Secondary Producer	cum	13172.00
14.13		**Precast - pretensioned Girders** (Providing, precasting, transportation and placing in position precast pretensioned concrete girders as per drawing and technical specifications)	cum	24981.00
14.14		**Structural steel Built-Up-Girder (BUG)** (Providing and launching Steel Truss of Structural steel BUG Super Structure including painting complete as per as per drawing and technical specifications under Section 1900 of MOST.)	MT	158977.00
14.16		**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.)		
(A)		**For Plain surface**	sqm	51.00
(B)		**For RCC Railing**	RM	182.00
14.17		**Burried Joint** (Providing and laying a burried expansion joint, expansion gap being 20 mm, covered with 12 mm thick, 200 mm wide galvanised wieldable structural steel plate as per IS: 2062, placed symmetrical to centre line of the joint, resting freely over the top	metre	1497.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		surfaces of the deck concrete, welding of 8mm dia, 100mm long galvanized nails spaced 300mm C/C along the center line of the plate , all as specified in clause 2604.)		
14.18		**Filler joint**		
(i)		Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.	metre	4298.00
(ii)		Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.	metre	362.00
(iii)		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 specification.	metre	328.00
(iv)		Providing and filling joint sealing compound as per drawings and technical specifications with coarse sand and 6% bitumen by weight	metre	23.00
14.19		**Asphaltic Plug joint** (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 200mmX 6mm of wiedable structural steel conforming to IS:2062, asphaltic plug consist of polymer modified bitumen binder, carefully selected singl;e size aggregate of 12.5mm nominal size and heat resistant foam caulking/backer rod, all as per approved drawing and specifications.)	metre	1276.00
14.20		**Elastomeric Slab Seal Expansion Joint** (Providing and laying of an elastomeric slab	metre	24997.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		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 specification to be installed by the manufacture/supplier or their authorised representative ensuring compliance to the manufacturers instructios for installation and clause 2506 of MORTS&H specification of bridge works.)		
14.21		**Compression Seal Joint** (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 gap with special adhesive binder to cater for a horizontal movement up to 40mm and vertical movement of 3mm.)	metre	13839.00
14.22		**Strip Seal Expansion Joint** (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 instruction for installation).	metre	27761.00
14.23		**Modular Strip / Box Seal Joint** (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 teh manufacture/supplier or their authorised representative ensuring compliance to the manufacturer's instruction for installation.)	metre	150525.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
14.24		**Modular Strip** / **Box Seal Joint** (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 manufactu/supplier or their authorised representative ensuring compliance to the manufacturer's instruction for installation.)	metre	228152.00
14.25		**Extra for providing water proofing compound** (Providing and applying cement mortar(1 cement 3 sand) with STRUCO LATEX or its equivalent as per specification and as directed by the Department	sqm	340.00
14.26		**Extra for providing water proofing compound** (Cleaning the surface and applying two coats ofARMOURCRETE or its equivalent as per specification and as directed by the Departments	qm	237.00

CHAPTER-15

RIVER TRAINING AND PROTECTION WORKS

Preamble:

1. Three types of aprons on riverbed as under been catered.

   a) Boulder apron lay dry.

   b) Boulder apron laid in wire crates.

   c) Apron laid in cement concrete blocks on M 15

2. A toe wall for toe protection of pitching can be either in dry rubble masonry (un-coursed) or in nominal mix cement concrete M 15. Depending upon the design, the rates are adopted under respective clauses.

3. Flooring has been proposed in dry rubble stone, rubble stone laid in C M 1:3 and with cement concrete blocks M 15.

4. Curtain walls proposed are of following two types:

   a) Course rubble stone masonry (1st sort) in CM 1:3

   b) 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 corrosion 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.

6. Rates for border items are derived considering an initial lead of 30.00 km. from quarry for this chapter.

CHAPTER-15

RIVER TRAINING AND PROTECTION WORKS

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
15.1	**2403**	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.		
A		**Boulder laid dry without wire crates.**	cum	1919.00
15.2	**2503**	**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 & IS:4826 in 100mm x 100mm mesh (weaved diagonally) including 10% extra for laps and joints laid with stone boulders weighting not less than 40Kg each.)	cum	2961.00
15.3	**2503**	**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.)	cum	6365.00
15.4	**2504**	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		
A		Stone/Boulder	cum	1919.00
B		Cement Concrete blocks of size 0.3x0.3x0.3m cast in cement concrete of Grade M15	cum	6365.00
15.5	**2504**	Providing and laying Filter material underneath pitching in slopes complete as per drawing and Technical specification	cum	2069.00
15.8	**2505**	Providing and laying Flooring complete as per drawing and Technical specifications laid over cement concrete bedding.		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
A		Rubble stone laid in cement mortar 1:3	cum	5938.00
B		Cement Concrete blocks Grade M15	cum	9554.00
15.9	**2506**	Dry rubble Flooring, Construcytion of dry rubbl flooring at cross drainage works for relatively less important works.	cum	2288.00
15.10	**2507.2**	Curtain wall complete as per drawing and Technical specification		
A		Stone masonry in cement mortar (1:3)	cum	4428.00
B		Cement concrete Grade M15	cum	6128.00
15.11	**2507.2**	Flexible Apron :Construction of flexible apron 1 m thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.	cum	1963.00
15.12	**2503.3**	**Gabian Structure for Retaining Earth** (Providing and construction of a gabain structure for retaining earth with segments of wire crates of size 7 m x 3 m x 0.6 m each divided into 1.5 m compartments by cross netting, made from 4 mm galvanised steel wire @ 32Kgs per 10Sqm having minimum tensil strength of 300Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into meshes with double twist, mesh size not exceeding to 100mmX100mm , firred with boulders at least dimension of 200mm , all loose ends to be tied with 4mm galvenized steel wire.)	cum	3148.00
15.13	**2503.3**	**Gabian Structure for Erosion Control, River Training Works and Protection works** (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@ 32Kgs per 10Sqm	cum	5002.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		having minimum tensil strength of 300Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into meshes with double twist, mesh size not exceeding to 100mmX100mm , firred with boulders at least dimension of 200mm , all loose ends to be tied with 4mm galvenized steel wire.)		

CHAPTER-16

REPAIRS 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 pre-stressing has been analyzed for three different spans of 25, 50 and 100 m.

3. Sealing of crakes has been proposed with cement grout, cement mortar 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 the following structure has been included:

   a) Bridge bearings.

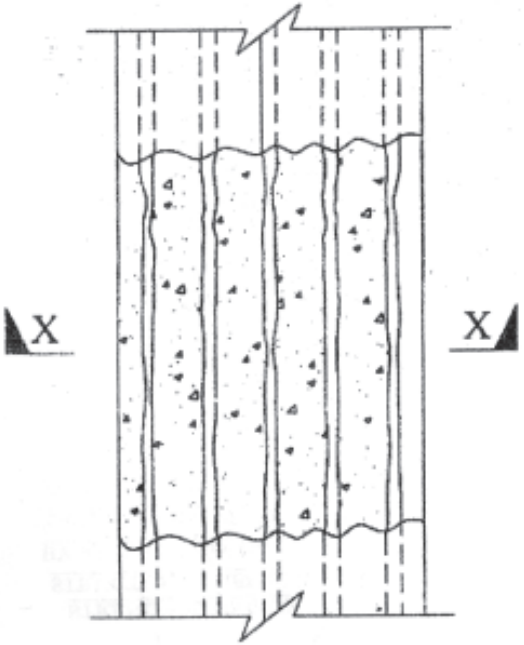
   b) Concrete Railing

   c) Mild steel railing

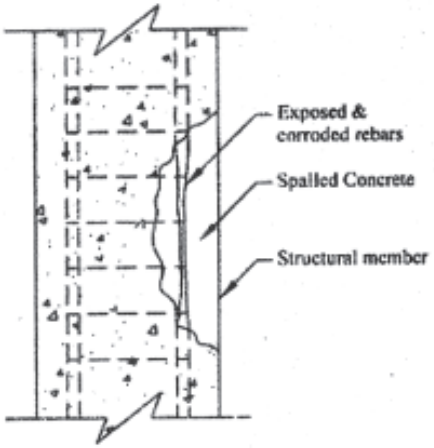
   d) Expansion ailing

   e) Crash barrier.

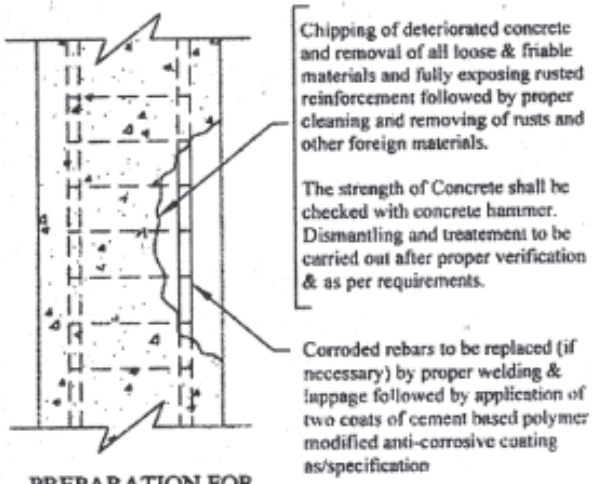
6. Non destructive testing items like Rebound Hammer Deflection Testing, Corrosion Analysis, Pile Integrity Test etc. have been included.



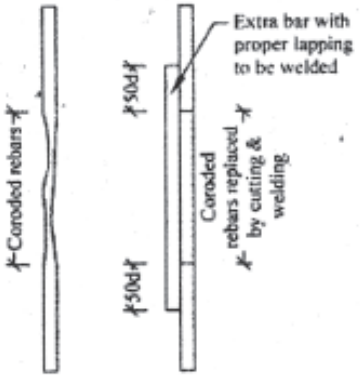
SPALLED CONCRETE AND CORROSION OF REINFORCEMENT IN STRUCRAL MEMBER



SECTION X-X

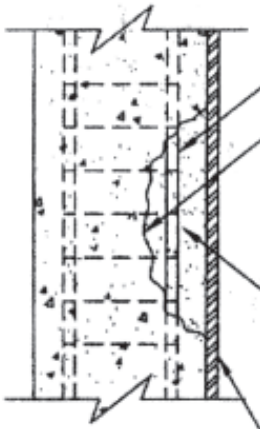


PREPARATION FOR REPAIR & REHABILITATION



DETAILS OF REBARS REPLACEMENT

SURFACE PREPARATION & REPLACEMENT OF REBARS



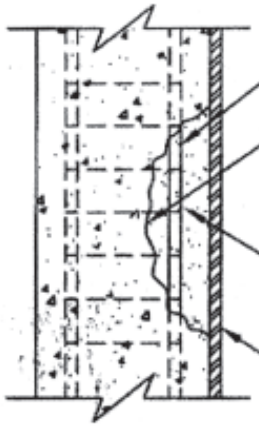
Application of zinc rich anti-corrosive protective coating with "Techguard 102" of Choksey chemicals or equivalent
Or
Application of zinc based epoxy anti corrosive coating like "Concresive ZRI" of Degussa brand or equivalent

Application of epoxy based bonding agent "Master bond EP" of Choksey chemicals or equivalent.
Or
Application of polymer based bonding agent "Nitobond SBR" of Fosroc or equivalent.

Concreting with non shrink cementitious micro concrete with "Mastergrout CN 250" of Choksey chemicals or "Rendoroc RG" of Fosroc or equivalent
Or
Applying structural grade prepacked polymer modified mortar "Renderoc HB 2" of Fosroc or equivalent.

Placing high rich polymer modified mortar by mixing 100 % acrylic polymer "Mastercrete M-81" of Choksey chemicals or equivalent with cement and sand mortar

STRENGTHENING OF STRUCTURAL MEMBER BY APPLICATION OF ANTI CORROSIVE PAINT , MICRO CONCRETE & PLASTERING



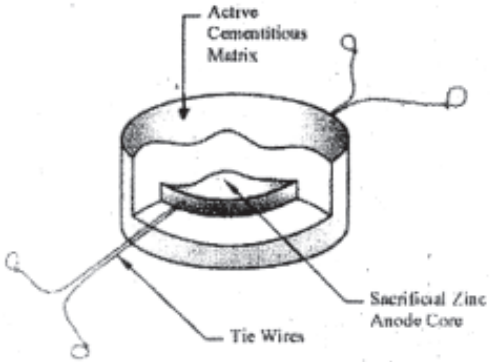
Removal of corrosion from reinforcement, application of zinc rich anti corrosive coating and application of an embedded sacrificial zinc anode like "Galvashield XP" of Fosroc 1 unit per 0.5m run of reinforcement to prevent corrosion of reinforcement in concrete.

Cleaning the damaged surface thoroughly and application of bonding agent

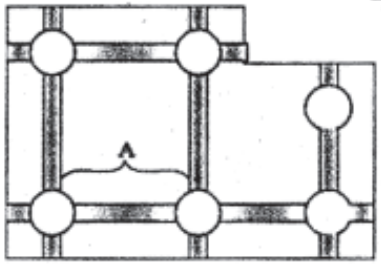
Concreting with non shrink cementitious micro concrete
Or
Structural grade prepacked polymer modified mortar

Placing high rich polymer modified mortar by mixing 100% acrylic polymer "Mastercrete M-81" of Choksey chemicals or equivalent with cement and sand mortar
&
Applying Nitowrap 410 saturant Fosroc Chemicals or equivalent with wet film thickness @250 microns over a coat of saturant epoxy primer Nitowrap 30 of Fosroc chemicals or equivalent with brush followed by fixing carbon fibre composite system Nitowrap EP (CF) of Fosroc Chemicals or equivalent by pressing on the saturant and impregnate the same by applying a final coat of Nitowrap 410 saturant Fosroc Chemicals or equivalent.

STRENGTHENING OF STRUCTURAL MEMBER BY APPLICATION OF GALVASHIELD XP OR EQUIVALENT



CUT-AWAY OF GALVASHIELD XP



Design Table - Anode Spacing

Steel Surface Area per m2 of Concrete	Maximum Spacing Between XP units (A)
<0.6	610 mm
0.61 - 0.9	500 mm
0.91 - 1.2	430 mm

CHAPTER-16

REPAIR AND REHABILITATION

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
16.1	**2809**	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 1000.(Thickness 75mm.)	sqm	114.00
16.2	**2809**	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.	sqm	86.00
16.3	**2807**	Guniting concrete surface with cement mortar applied with compressor after cleaning surface and spraying with epoxy complete as per Technical specification	sqm	1092.00
16.4	**2800**	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.	each	215.00
16.5	**2806**	Sealing of cracks/porous concrete by injection process through nipples/Grouting complete as per Technical specification.		
A		Cement Grout	kg	199.00
B		Cement mortar (1:1) Grouting	kg	192.00
16.6	**2800**	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.	sqm	877.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
16.7	**2803**	Sealing of crack / porous concrete with Epoxy Grout by injection through nipples complete as per clause 2803.1.	kg	1208.00
16.8	**2804**	Applying epoxy mortar over leached, honey combed and spalled concrete surface and exposed steel reinforcement complete as per Technical specification	sqm	795.00
16.9	**2807**	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 conformiong 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 2000Kg/cum. , strength not less than 25Mpa and workmanship conforming to to clause no.2807.6	sqm	359.00
16.10	**2800**	Applying pre-packed cement based polymer mortar of strength 45 Mpa at 28 days for replacement of spalled concrete	sqm	212.00
16.11	**2805**	Eproxy bonding of new concrete to old concrete	sqm	206.00
16.12		Providing external prestressing with high tensile steel wires/strands including drilling for passage of prestessing steel, all accessories for stressing and stressing operation and grouting complete as per drawing and Technical specification(span=25M)	tonne	449029.00
16.13		Providing external prestressing with high tensile steel wires/strands including drilling for passage of prestessing steel, all accessories for stressing and stressing operation and grouting complete as per drawing and Technical specification(span=50M)	tonne	434817.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
16.14		Providing external prestressing with high tensile steel wires/strands including drilling for passage of prestessing steel, all accessories for stressing and stressing operation and grouting complete as per drawing and Technical specification(span=100M)	tonne	397863.00
16.15	**2808**	Labour for replacement of Bearings complete as per Technical Specification (Cost of bearing to be paid extra)	each	3966.00
16.16	**2808**	Labour for Lifting of superstructure span by jacking up from below i.e. by placing the jacks on pier/abutment caps for span length of 30m. (Cost of bearing to be paid extra) (Rectification of Bearings as per Technical Specifications)		
A		Lifting from the pier cap	each	64061.00
B		Lifting with constructing auxilary structure upto 6M height including dismentling and removal of same	each	400000.00
16.17		Replacement of Expansion Joints complete as per drawings	metre	3897.00
16.18		Replacement of damaged concrete railing.	metre	213.00
16.19		Replacement of crash barrier.	metre	384.00
16.20		Replacement of damaged mild steel railing	metre	179.00
16.21		**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 f	metre	267.00
16.22		**Repair of RCC Railing** (Carrying out repair of RCC M30 railing to bring it to the original shape.)	metre	235.00
16.23		**Repair of steel Railing** (Repair of steel railing to bring it to the original shape)	metre	378.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
16.24		Chipping of deteriorated concrete and removal of all loose & friable materials and fully exposing rusted reinforcement followed by proper cleaning and removing of rusts and other foreign materials using sand blasting/ emery cloths/ wire brush etc. including formwork as directed and specified by the department complete	sqm	238.00
16.25		Replacement of corroded reinforcement by cutting and welding new reinforcement of minimum 25mm dia. including lapping on both sides to the specified length as directed and as per relevant IS/IRC codes and cost of gas ,welding rods,higher charge of welding machines etc. including formwork as required.(Reinforcement to be measured and paid seperately)	metre	386.00
16.26		**Anticorrosive treatment**		
(A)		Supplying and applying two coats of Zinc rich anti-corrosive protective coating with'Techguard 102' of Choksey Chemicals or euivalent @ 0.50 Lit per Sqm over thoroughly cleaned and prepared steel bars including formwork as directed and specified by the department complete.	sqm	432.00
(B)		Spplying and applying one coat of Zinc based epoxy anticorrosive coating like CONCRESIVE ZRI of Degussa brand or euivalent @ 0.09 Lit per Sqm all over the exposed reinforcement over thoroughly cleaned and prepared steel bars including formwork as directed and specified by the department complete.	sqm	283.00
16.28		**Bonding between old and new concret surfaces**		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(A)		Supplying and applying Epoxy based bonding agent Masterbond EP of Choksey Chemicals or euivalent @ 0.50 Lit pe sqm after totally saturating the cleaned concrete surface with clean water for proper bonding of old and new concrete including formwork as specified and directed by the department complete.	sqm	790.00
(B)		Providing and applying coating of the cleaned patches with two part of polymer based bonding agent Nitobond SBR of Fosroc or equivalent @ 0.22 Lit per Sqm prior to application of polymer modified mortar with brush after totally saturating the cleaned concrete surface with clean water for proper bonding of old and new concrete including formwork as specified and directed by the department complete.	sqm	448.00
16.29		Plastering the surface with high rich polymer modified mortar 10mm thick with cement sand mortar in prop. 1:4 mixed with 100% acrylic polymer Mastercrete M-81 of Chosey chemicals or equivalent @15% by weight of cement followed by proper curing as specified and directed by the department complete including formwork.	sqm	641.00
16.30		Concreting of the structure with nonshrink cementitious microconcrete with properly graded 5mm to 12mm slit free aggregate with Mastergrout CNS250 of Choksey Chemicals or equivalent, (mixing ratio CNS250 - 1part : graded 12mm down aggregate-0.6part and water/powder ratio-0.16) with water @ 0.16 w/p ratio and poured at a super fluid consistency only from one side to avoid air entrapment continuously without vibration followed by proper curing for minimum 7 days. as specified and directed by the department complete including formwork.	cum	63484.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
16.31		Concreting of the structure with free flow nonshrink cementitious microconcrete with Rendorec RG of Fosroc or equivalent after proper mixing with cleanwater including formwork followed by proper curing for 28 days as per manufacturer's specifications complete and as directed by the Department .	cum	75913.00
16.32		Providing and laying Zinc anode unit Galvashield XP of Fosroc make or equivalent, fixed to the reinforcement steel by means of wire ties to allow attachment in horizontal, vertical and overhead locations with a spacing of one piece per 0.5m c/c and ensuring good electrical continuity as per specification of manufacturer including cost of labour,copnsumables, tools and tackles and formwork.	each	2268.00
16.33		**Structural Strengthening with carbon Fibre:**		
(A)		Patching in depression of concrete surface wherever necessary by laying epoxy putty , Nitocote VF of Fosroc Chemicals or equivalent @ 1 Lit per sqm after proper surface preparation and proper scraping of concrete protrusion as specified and directed by the department complete including formwork .	sqm	2143.00
(B)		Applying Nitowrap 410 saturant Fosroc Chemicals or equivalent with wet film thickness @ 250 microns (0.27Lit per sqm) over a coat of saturant epoxy primer Nitowrap 30 of Fosroc Chemicals or equivalent @ 0.11Lit per sqm with brush followed by fixing carbon fibre composite system Nitowrap EP (CF) of Fosroc Chemicals or equivalent by pressing on the saturant and impregnate the same by applying a final coat of Nitowrap 410 saturant Fosroc Chemicals or equivalent as specified and directed by the department complete including formwork.	sqm	5574.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(C)		Applying two coats of UV resistant coating Nitowrap 512 of Fosroc Chemicals or equivalent over fibre system having wet film thickness of 100 micron @ 0.11Lit per sqm as specified and directed by the department complete including formwork.	sqm	571.00
16.34		Providing & fixing 16mm dia MS nozzles in a grid of 1m c/c up to the half of the thickness of the concrete structure.A grout slurry of neat cement & chloride free expanding grout Mastergrout CPG-1 of Choksey Chemicals or equivalent @ 0.5% by weight of cement water cement ratio 0.35 to 0.40 and viscosity not more than 1.02 centipoise with grouting pressure till the refusal of injection grout Mastergrout CPG-1. The grouting operation pressure shall be 2Kg/sq.cm.Cutting the exposed nozzle after the grouting with a good cutter to make the surface free from the grouting pipes and to seal the gap with plugging compound Masterplug of Choksey Chemicals as per the specification and the direction of the department complete including formwork.	Each	840.00
16.35		Providing & fixing PVC pipes in a grid of 0.5m c/c throughout the crack of the concrete structure.A low viscous Epoxy grout with Mastergrout EP 150 of Choksey Chemicals or equivalent should be inserted throughout the crack to fill the crack.Cutting the exposed nozzle after the grouting with a good cutter to make the surface free from the grouting pipes and to seal the gap with the appeared crack with Epoxy putty of Choksey Chemicals as per the specification and the direction of the department complete including formwork.	metre	907.00
16.36		Extra for fibre reinforcing concrete/mortars by providing and mixing Recron3S (CT 2024		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		12mm fibre cut length / CT 2012 6mm fibre cut length) of Reliance Industries Ltd. @ 125gms per bag (50Kg) of cement as specified and directed by the Department complete at all levels.		
(A)		**In concrete**		
		(I) In M-20 grade.	cum	324.00
		(II) In M-25 grade.	cum	376.00
		(III) In M-30 grade.	cum	379.00
		(IV) In M-35 grade.	cum	393.00
(B)		**In cement morter Plastering**		
		(I) 1:3 (1 cement: 3 coarse sand)	sqm	5.00
		(II) 1:4 (1 cement: 4 coarse sand)	sqm	4.00
16.37		Applying 2-coats of anti-carbonation - a protective coating Techguard 103 of Choksey Chemicals or equivalent @ 0.275 Lit per sqm with brush over exposed portion of the concrete structure of the bridge & other structure works etc. complete as desired to protect the reinforced concrete by preventing the process of carbonation and directed by the department including formwork.	sqm	322.00
16.38		Applying and placing Antiwash, non-shrink, cementatious, high strength Renderoc UW of Fosroc Chemicals or equivalent by mixing with clean water to repair the damaged and deteriorated underwater structural elements including formwork as per the department's instructions with labour, tools complete as specified and directed by the department including formwork.	cum	108504.00
16.39		Drilling 14 mm dia holes on the concrete surface to a depth of 75mm using a rotary cum hammering,drilling machine as per specification	each	88.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		and throughly cleaning the hole using compressed air & water jet and fixing of shear connectors of 8mm dia and anchoring it with polyester resin anchor grout Lokfix P of Fosroc india and as per manufacture's specifications. (Cost inclusive of drilling,cleaning,fixing, steel,labour,tools and tackles)		
16.40		Fabrication and fixing of steel pedestal support for bearing	MT	18200.00
16.41		Providing and fixing of Foundation bolts for steel pedestals.	Each	552.50
16.42		Providing and fixing of Steel plates for placing of bearings	MT	58500.00
16.43		Non-destuctive testing with Ultrasonic Pulse Velocity Meter with data storage facility for detection of cracks, voids and other imperfections in Reinforced concrete structures and furnishing the findings thereof in proper comprehensible format , complete as directed by the department.	Each	500.50
16.44		Non-destuctive testing with Profometer 5 Scanlog or equivalent equipment with facility for built-in memory storage and statistical analysis of data for detection of location and orientation of rebars in Reinforced concrete structures and furnishing the findings thereof in proper comprehensible format , complete as directed by the department.	Sqm	2145.00
16.45		Non-destuctive testing with Permeability Tester, without causing damages to the structure, for determination the water permeability and water absorption into the near surface zone of the concrete structure and furnishing the findings thereof in proper comprehensible format , complete as directed by the department.	Each	550.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
16.46		Conducting PH tests on concrete stucture, as per stipulated procedures, for determination the PH (alkalinity) of the concrete structure and furnishing the findings thereof in proper comprehensible format , complete as directed by the department.	Each	88.00
16.47		Conducting Carbonation tests on concrete stucture, as per stipulated procedures, for determination the depth of carbonation of cover concrete of the structures and furnishing the findings thereof in proper comprehensible format , complete as directed by the department.	Each	88.00
16.48		Conducting suitable tests on concrete stucture, including preparation of samples etc. as per stipulated procedures, for determination the chloride and sulphate concentration in the concrete of the structures and furnishing the findings thereof in proper comprehensible format , complete as directed by the department.	Each	715.00
16.49		Conducting Concrete Core tests of 75mm diacores, on concrete stucture, as per stipulated procedures, for determination the equivalent cube compressive strength, concrete of the structures including preparation and furnishing the report showing the findings thereof in proper comprehensible format , complete as directed by the department.	Each	5005.00
16.50		Evaluation of Loss of pre-stress in superstructure PSC girders including measurement of deflection by suitable instruments and necessary calculations for estimation of the probable loss in pre-stress and furnishing the findings thereof in a proper comprehensible format with all details, complete as directed by the department.	Each Span	200000.00
16.51		Stressing operation and grouting complete, including all accessories for stressing of dummy	MT	10861.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		cables, as per drawing and technical specifications of section 1800 of MORTH Specification of Roads and Bridge Work .		
16.52		Load testing of existng foundation to ensire no void/ gap/ loose pocket below the foundation with a total weight of 250MT (in form of sand bags filling with locally available sand/ soil etc. placed uniformly on top of well-cap) placed concentric & uniform w.r.t existing well foundation, including dewatering and making arrangement with atleast 4 nos dial gauges, for measurement of settlement of foundation during application and release of the load, all complete as per specification as directed byb the department.	Each	70000.00
16.53		Providing, placing and fixing in position Chemical rebar fastners (of M/s Hilti or M/s Sika or approved equivalent conforming to Europian standard CSTB/ETA and Civil Aid standard) of vaious diameters in Piers, Pier caps, including drilling holes of specified size and depth, cleaning holes, placing chemicals inside the holes and fixing reinforcing bars as per specifications of the chemical rebar supplier, and under supervision of the authorized representative of the supplier and conducting pull-out test of atleast 5% of total nos. of chemical re-ba fastners (cost of reinforcing bars to be paid seperately) all complete as per specification as directed byb the department.		
a		a) 12 mm dia re-bar fastners.	Each	500.00
b		b) 16 mm dia re-bar fastners.	Each	700.00
c		c) 20 mm dia re-bar fastners.	Each	750.00
d		d) 25 mm dia re-bar fastners.	Each	800.00

CHAPTER - 17

MISCELLANEOUS ITEMS OF WORK

Preamble:

1. The rate has been provided is for various miscellaneous items in APWD works, which are not covered by MoRT&H Data Book.

2. The rates are provided for bamboo bridges footbridges bamboo palasiding etc.

3. The rate included various items foe timber bridges and other works like mar boats etc.

4. Rates for concrete work using batching plants, transit mixer, concrete pump for flyover/ ROB works in city/ urban area due to restricted work site working hour conditions are included in this chapter considering idle charge of machinery.

5. The rate of anticorrosive treatment is ascertained from firms specialized in this works.

6. Rectangular and Circular RCC guard posts have been included.

CHAPTER-17

MISCELLONEOUS ITEMS OF WORK

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		Bamboo Bridge		
17.1		Construction of cold weather Bamboo bridge overall width of 3.70m and clear road way 3m with jungle wood post 20cm to 25cm dia 5nos. In each rows and rows being 2.1m. apart except for the navigable span which should be 3m. Post to be driven at least 180cm. or more below ground level including providing 20cm to 25cm center to center and placed over 20 cm dia, jungle wood dham, 15cm dia. jungle wood bracing collar fixed by bolts and nuts, straps etc. mature bholuka Bamboo cross groth all closely packed and tied 75cm wide track way made from 38mm thick 1st class local plank fixed on 75mmx100mm first class local wood battens 120cm apart and 3 lines of jati bamboo horizantal railing fixed in bholuka bamboo post placed at 210cm apart and white washed including all necessary nuts and bolts, coir ropes, struts, nails etc. complete with a layer of brushwood to exposed portion out-side trackway with earth topping complete as per direction of the department.	meter	12709.30
17.2		Construction of temporary Bamboo bridge of 3.70m clear road way with Bholuka or Barua Bamboo post 5nos. in each rows driven at least180cm. below ground level and rows not more than 150cm apart from center to center Bholuka or Barua Bamboo dham longitudinal groth both closely placed and tied with half bamboo 90cm to 120cm apart in both layers and ttwo layers of jati bamboo chattais (top layer should be digonally woven), 70 mm to 100 mm thick brushwood in between chattias should	meter	3250.10

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		be tied with half jati bamboo on both ends, bamboo railing with bholuka or barua bamboo post placed at150cm apart jati or betua bamboo hand rails of two lines both side of every alternate rows.All tying must be done with cane or coir string and only mature bamboo should be used in work.		
17.3		Making 120mm wide bamboo foot bridge with 100mm Bholuka or Barua bamboo posts driven 120 cm to 180 cm underground 3 Nos. in each row and rows being 3m apart bholuka or Barua bamboo dham placed over the posts and tied with cane or wire , Bholuka or barua bamboo struts in each row both up and down stream, jati bamboo long gorhs closely packed and tied with dham. Single layer of mat placed over 75mm thick brush wood and tied with bholuka or Barua bamboo rail stand fixed in one side of the bridge etc. complete.	meter	1014.50
		Timber Bridge		
17.4		Supplying and driving timber piles of 25cm to 30cm diameter, dressed to heart wood including making length in every 30 cm interval, coal tarring two (2) coats with best tar applied hot (Rate inclusive of the cost of the required quantity of tar.)		
A		**Using Sal Timber**		
(a)		Mechanically with Rod monkey and crab winch		
(i)		Portion of pile actually driven underground.	meter	8363.80
(ii)		Portion of pile remaining above rground.	meter	8244.80
(b)		Manually with labour		
(i)		Portion of pile actually driven underground.	meter	7102.30
(ii)		Portion of pile remaining above rground.	meter	6993.70

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
B		**Using Azar/ Nahar/ Nageswar/ Zarul Timber**		
(a)		Mechanically with Rod monkey and crab winch		
(i)		Portion of pile actually driven underground.	meter	7323.80
(ii)		Portion of pile remaining above ground.	meter	7204.80
(b)		Manually with labour		
(i)		Portion of pile actually driven underground.	meter	6062.30
(ii)		Portion of pile remaining above rground.	meter	5953.70
17.5		Wood work including supplying , fitting and fixing complete with necessary M.S. bolts, nuts, nails, screw etc. and coal tarring two (2) coats with best tar applied hot (Rate is inclusive of the cost of the required quantity of tar.)		
A		**Using Sal Wood**		
(a)		Underssed in floor planks, collars, bracing, standards, wheel guards, struts and railings, runner belts, rail, posts etc.	cum	3699.80
(b)		In track way planks (alternate nailing to be done with decking in a seggragate way.)	cum	45673.70
B		**Using Azar/ Nahar/ Nageswar/ Zarul Wood**		
(a)		Undressed in floor planks, collars, bracing, standards, wheel guards, struts and railings, runner belts, rail, posts etc	cum	31651.90
(b)		In track way planks (alternate nailing to be done with decking in a seggragate way.)	cum	38380.70
17.6		Supplying, fitting and fixing timber beam and bearing beam rectangular in size fitted with M.S. etc. supplying spikes etc. as necessary and coal tarring two (2) coats with best tar applied hot as directed (Rate inclusive of cost of the required quantity of tar)		
(a)		**Using Sal Timber**	cum	3688.80
(b)		**Using Azar/ Nahar/ Nageswar/ Zarul Timber**	cum	31092.80

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
17.7		Supplying, fitting and fixing 25 cm to 30 cm dia. sal wood log beam dressed to heartwood including supplying and fixing with 20mm dia M.S. bolts and nuts etc.including coal tarring two (2) coats with best tar applied hot as directed (Rate inclusive of cost of the required quantity of tar)		
(a)		**Using Sal Timber**	meter	7040.30
(b)		**Using Azar/ Nahar/ Nageswar/ Zarul Timber**	meter	6000.30
17.8		Scarfing and joining piles 25 cm to 30 cm diameter, dressed to heartwood of 90 cm in length includng supplying, fitting and fixing with 2 nos. of 50mm x 10mm MS FI clamps and 16 mm dia MS bolts and nuts etc. complete as directed. (Timber for piles and coal tarring shall be measured and paid separately.)	each Joints	1476.60
17.9		Labour for taking out old piles of timber bridge with necessary scaffolding, jati bamboos, jumper ropes etc, complete and stacking them at suitable places as directed.	each	1525.70
17.10		Labour for dismantling all members of the timber bridge (excluding piles) with necessary scaffolding, jati bamboos, jumper ropes etc, complete and stacking them at suitable places as directed (all members will be under custody of the contractor till taken over by the department)	meter	1216.70
17.11		Labour for driving timber piles of 25cm to 30cm diameter, dressed to heartwood marking length in every 30cm interval including coal tarring two (2) coats with best tar applied hot including providing ncessary scaffolding or staging (Rate inclusive of cost of the required quantity of tar)		
(a)		With Rod monkey and crab winch		
(i)		Portion of pile actually driven under ground	meter	666.30

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(ii)		Portion of pile remaining over ground	meter	503.80
(b)		By use of labour		
(i)		Portion of pile actually driven under ground	meter	1012.40
(ii)		Portion of pile remaining over ground	meter	677.90
17.12		Labour for fitting and fixing RSJ beam, CI saddle etc. in position including necessary scaffolding, cutting them to required size, drilling holes and supplying and fixing ncessary bolts and nuts, painting two coats complete (Tar-Steel paints to be supplied by the contractor at his own costs) including all lead and lifts from PWD Godown.	Quintal	829.40
17.13		Labour for fitting and fixing RSJ beam, Old CI saddle etc. in position including necessary scaffolding and fixing necessary bolts and nuts, painting two coats complete as directed (Tar-Steel paints to be supplied by the contractor at his own costs)	Quintal	707.40
17.14		Labour for making and fitting MS F.I. Straps and cleats etc. in position including drilling holes complete with all lead and lifts from PWD Godown.	Quintal	3106.90
17.15		Supplying fitting and fixing "U" shaped flat iron strap making 0.5m x 0.3m size from 150mm x 12mm size MS flat including providing 10 bolts holes and fitting with 0.35m long 20mm dia MS bolts including fitting tightly with bearing beam, pile and RSJ beams etc. complete as directed.	Each	1619.50
17.16		Labour for fitting woodwork including sizing, supplying and fixing with new MS bolts, nuts, nails, spikes etc. and coal tarring with best tar applied hot as directed (Rate inclusive of cost of the required quantity of tar) complete with all lead and lifts from PWD Godown.		
(a)		Applying 2 (two) coats of Coal Tar	cu.m.	2782.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(b)		Applying 1 (one) coats of Coal Tar	cu.m.	2232.80
17.17		Labour for fitting and fixing 25cm to 30cm diameter Log Beam including supplying and fixing necessary MS nuts and bolts etc. and coal tarring with best tar applied hot as directed (Rate inclusive of cost of the required quantity of tar)		
(a)		Applying 2 (two) coats of Coal Tar	meter	584.00
(b)		Applying 1 (one) coats of Coal Tar	meter	394.60
17.18		Labour for talking out old woodworks of bridge and the refitting the same including supplying and fixing necessary new MS bolts, nuts, spikes, nail etc. complete and coal tarring with best tar applied hot as directed (Rate inclusive of cost of the required quantity of tar)	cum	3578.90
17.19		Labour for talking out old Log Beam of bridge and the refitting the same including supplying and fixing necessary new MS bolts, nuts, spikes, nail etc. complete and coal tarring with best tar applied hot as directed (Rate inclusive of cost of the required quantity of tar)	meter	322.10
17.20		Pile shoes : supplying fitting and fixing the pile shoes made of 6mm thick mild steel plate with necessary welding joints, size of pile shoe will be 78.54 cm (circumferential length of at top.) x 50cm(Depth) x 5cm (circumferential length at bottom) and 25cm inside diameter at top, including fitting and fixing 3 (Three) nos. M.S. plate of size of 6mm x 50mm, length 45cm at top of the pile shoe with necessary welding and drilling three nos of holes in each plate including fitting and fixing the pile shoes at the pile end with necessary patent nails etc. , complete as directed by the Department .The pile shoe should be camphered to fit the pile shoe properly with necessary grooving for	Each	2187.90

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		placing the MS plates and pile shoe.		
		Spurs & Palasiding Works		
17.21		Single bamboo spur and palasiding of whole 2nd class bamboo (Jati or Bethua) 65mm to 75mm dia closely packed & driven, including fitting and fixing with half bamboo kamis horizantally in three rows with the cane or tieing wire complete and struts 1500 mm apart longitudinally and providing brush wood as per drawing and technical specification clause 1302.5 of MORD		
(a)		Driven at least 900mm below and 1800 mm above the ground on average.	meter	610.10
(b)		Driven at least 900mm below and 900 mm above the ground on average	meter	497.70
17.22		Single bamboo spur and palasiding of whole 1st class bamboo (Bholuka or Barua) 85mm to 100mm dia closely packed & driven, including fitting and fixing with half 2nd class bamboo (Jati or Bethua) bamboo kamis horizantally in three rows with the cane or tieing wire complete and struts 1500 mm apart longitudinally and providing brush wood as per drawing and technical specification clause 1302.5 of MORD.		
(a)		Driven at least 900mm below and 1800 mm above the ground on average.	meter	692.00
(b)		Driven at least 900mm below and 900 mm above the ground on average	meter	423.20
(c)		Driven at least 900mm below and 1200 mm above the ground on average	meter	393.80
17.23		Bamboo spur 'A' type with whole bamboo placed 230mm center to center driven 900mm below ground and 1200mm to 1500mm above the ground tied with 2nd class bamboo (Jati		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		or Bethua) on either side at 450mm apart horizantally with galvanized wire etc. complete as per drawing and technical specifications.		
(a)		2nd class bamboo (Jati or Bethua) 65mm to 75mm dia.	meter	644.70
(b)		1st class bamboo (Bholuka or Barua) 85mm to 100mm dia.	meter	527.10
17.24		Bamboo single spur 'A' type with 1st class bamboo (Bholuka or Barua) 85mm to 100mm dia, driven closely placed 3m to 4m above the ground and 1.20m to 1.5m below the ground and tied with cane or coir string, half 2nd class bamboo (Jati or Bethua) kamis horizontally on both face placed not more than one meter apart including whole bamboo struts inside one meter apart and 2nos. of purlin at top and bottom fitted with vertical struts at 1500mm apart and filling with brushwood or jungle wood inside the spur complete as per drawing and technical specifications.	meter	905.10
17.25		Close bamboo toe walling with 65mm to 75mm diameter bamboos of length ranging from 1.2m to 3.0m driven at least 150mm c/c and provided with three horizontal split bamboo runner fixed with nails complete including coal tarring as directed (Rate inclusive of cost of the required quantity of tar)	meter	728.70
17.26		Double timber spur with two rows of 1st class local wood (Azar/ Nahar/ Nageswar/ Zarul) timber piles of 150mm to 200mm dia driven 800mm c/c apart upto minimum 2000mm below ground and 3600mm above ground and average placed at 800mm belt, bracing etc. of 100mm x 75mm size dia bolts and nuts etc. including coal tarring of timber members and necessary bamboo staging etc. as directed	meter	25331.30

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		and as per drawing and technical specifications.		
17.27		Supplying and filling up hollows of the timber spur to an average height of 3600mm above the ground with jungle wood branches as directed and as per drawing and technical specifications.	meter	54.60
17.28		Providing split bamboo digonally wooven lining over slope of bridges, abutement and road embakement etc. secured to the ground at least 70cm long bamboo pegs and half bamboo horizontally at 100cm center to center both ways complete as directed.	sqm	113.40
17.29		Supplying, fitting and fixing whole Bholuka or Barua bamboo pegs 85mm to 100mm dia, closely placed all round the hollows of spur fitted with necessary nail in the horizontal timber between 90 cm below ground and 360cm above ground on average (timber works will be paid for separately).		
(a)		For 360 cm above ground on average	meter	767.60
(b)		For 200 cm above ground on average	meter	613.20
		Guard Posts		
17.30		Supplying, fitting and fixing RCC guard post 150cm long erected 75cm above the ground and 75cm below the ground with M-15 grade (nominal mix 1:2:4 with broken stone aggregate up to 20mm size) of cement concrete and required reinforcement tied in position with annealed black wire including centering, moulding the top, curing including painting concrete surfaces in 23cm strips upto 0.75m from the top alternately in black and white and having 2 nos. reflective band of desired shade etc. complete as per design and as directed.		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
(a)		30 cm dia. RCC guard post with reinforcement of 6nos. 12mm dia TMT main steel bars and 6mm TMT/ MS stirrups at 15cm c/c.	Each	2207.00
(b)		15 cm dia. RCC guard post with reinforcement of 4nos. 12mm dia TMT main steel bars and 6mm TMT/ MS stirrups at 15cm c/c.	Each	1072.00
17.31		Supplying, fitting and fixing 20cm to 25cm diameter Jungle Wood Dressed guard post of 150cm long erected 75cm above the ground and 75cm below the ground, fitted with horizantal struts size 50mm x 50mm x 550mm long at bottom with necessary nails necessary etc. including coal tarring one coat below ground and painting surfaces in 23cm strips upto 0.75m from the top alternately in black and white and having 2 nos. reflective band of desired shade etc. complete as per design and as directed.	Each	499.80
		Earthwork by Head Load		
17.32		Earthwork in filling in the guide bund by head load up to lead of 60m with approved quality all leads and lifts ramming and compacting with rammer weighing not less than 10kg and falling from height of not less than 90cm and sprinkling with water if necessary. earth is to collected after removing the 1st 20cm of top soil and should be free from grass, shrubs and other foreign matter and rate will be including payment of land compensation.	cum	86.90
(a)		Extra lead for each 30cm and part thereof beyond 60m up to a lead 200m.	cum	11.50
(b)		Extra lift for each 1.50m or part thereof beyond the initial lift of 1.50m	cum	11.50

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
17.33		Earth work by head load in filling embankment in layers not exceeding 20cm thick including breaking clods, dressing and sectioning, cambering and ramming, within a lead up to 30m and lift up to 1.5m including payment of land conpensation for obtaining earth from private land or govt. land as required (measurement will be on the bais of profile or section measurement, 12.5% deduction being made on the quantity thus arrived for shrinkage allowance.		
(i)		Sandy soil.	cum	86.90
(ii)		Ordinary soil, Basti land, Low marshy land.	cum	127.70
(iii)		Hard soil mixed with moorum and gravel	cum	155.60
(a)		Extra lead for each 30m and part thereof beyond initial lead of 30m.	cum	11.50
(b)		Extra lift for each 1.50 m or part thereof beyond the initial lift of 1.50m	cum	11.50
17.34		Earth work in core of embankment by head load with soil of approved quality with a lead up to 30 m and lift up to 1.5 m in layers not exceeding 20 cm including breaking clods, dressing grading to required shape and compacting to meet requiremenet of Table 300 - 2 (including payment of land conpenssation for obtaining earth).	cum	206.70
(a)		Extra lead for each 30m and part thereof beyond initial lead of 30m.	cum	11.50
(b)		Extra lift for each 1.50 m or part thereof beyond the initial lift of 1.50m	cum	11.50
17.35		Earth work in sub grade and shoulders by head load with selected soil of approved quality with a lead of 30 m and lift up to 1.5 m spreading grading to required shape and compacting to meet requirement of Table 300	cum	209.80

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		-2 (including payment of land compensation of obtaining earth).		
(a)		Extra lead for each 30m and part thereof beyond initial lead of 30m.	cum	11.50
(b)		Extra lift for each 1.50 m or part thereof beyond the initial lift of 1.50m	cum	11.50
		Miscelleneous Road Pavement Works		
17.36		Labour for spreading metal gravel / granular material on the road surface as directed including dressing and cambering the formation and utilizing the loose earth in filling the depression as directed including carriage of gravel within 30m.	Cum	185.70
17.37		Close graded Premix Surfacing using cationic Bitumen Emulsion SS-2 or Tailor made as per(IRC:SP:100-2014)		
		Providing, laying and rolling of close-graded premix surfacing material of 20 mm thickness composed of 11.2 mm to 0.9 mm (Type-A) or 13.2 mm to 0.9 mm (Type-B) aggregates using Bitumen 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 three wheel 8-10 kN static roller and finishing to required level and grades as per Technical Specification Clause 509		
A		Manual Means		
(i)		Type-A	sqm	150.00
(ii)		Type-B	sqm	140.00
		Seal coat with Emulsion		
17.38		Seal coatwith cold mix Binder (as per IRC: SP-100, 2014) Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels grade and cross fall		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		using Type A,Type B and Type C as per Technical specification clause 510.		
A		By manual means		
		Case-I: Type A (11.2mm to2.36mm) Bitumen Emulsion (CRS-2)	sqm	61.10
		Case-II: Type-B (2.36mm to 180 micron) Bitumen Emulsion (CSS-2)	sqm	44.90
		Case III:Type-C (9.5mm to 2.36mm) Bitumen Emulsion (CSS-2)	sqm	48.70
B		By mechanical means		
		Case-I: Type A (11.2mm to2.36mm) Bitumen Emulsion (CRS-2)	sqm	59.60
		Case-II: Type-B (2.36mm to 180 micron) Bitumen Emulsion (CSS-2)	sqm	47.40
		Case III:Type-C (9.5mm to 2.36mm) Bitumen Emulsion (CSS-2)	sqm	49.60
		Paved Shoulder & Interlocking Concrete Block Pavement		
17.39		Providing stone brick soling in earthen shoulder with stone/best quality jhama brick, sand packed and laid to true line and level and in panel after preparing the subgrade including earthwork in excavation as directed including all labour and materials and if necessary dewatering, complete.		
(a)		Bricks on flat soling,	sqm	723.20
(b)		Bricks on edge soling,	sqm	1062.30
(c)		Stone soling of thickness 150mm.	sqm	647.50
17.40		Providing and laying Interlocking Concrete Block Pavement (ICBP) conforming to IS:15658-2006 including all lead and lift		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		complete as per technical specification and as directed.		
(a)		80mm thick interlocking precast blocks having compressive strength of 40N/sq.mm.	sqm	805.50
(b)		100mm thick interlocking precast blocks having compressive strength of 50N/sq.mm.	Sq m	1148.60
(c)		Providing and laying M-40 grade cement concrete Edge block/ Edge restraints complete as per Technical specification clause 1504.	cum	9514.2 0
		Miscelleneous Road Appurtenances		
17.41		RCC Pipe Delineator Providing of hume pipe delineator, 250 mm in diameter, 1250 mm high, having 25mm skin thickness filled with earth for stability up to 5 cm from top and remaining filled with 1:3:6 c.c.in spherical segment to prevent percolation of water and emeded in c.c. (1:3:6) below ground level up to a depth of 500mm, 75mm thick cc surrounding the pipe, painted white as per approved drawing.	Each	3046.00
17.42		Drum Delineator Providing of metal drum/empty bitumen drum delineator, 600 mm in diameter, 800 mm high, filled with earth for stability up to 5 cm from top and remaining filled with 1:3:6 c.c. to prevent percolation of water, painted in circumferential strips of alternate black and white 120 mm wide all as per IRC:SP:55-2001and drawing.	Each	743.00
17.43		Pre fabricated railing :- Providing,fitting and erecting pre fabricated railing of STRUCTURA materials having size of 2.00x0.90M in panels made of 25x25x2.6/40x40x2.6 vertical bars and 40x40x2.6/32x32x2.6 horizontal bars.The two end posts of each panel are founded with M-15 cement concrete up to a depth of 200mm	metre	1385.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		with anti corrosive primer and paint etc. complete as per approved drawing and technical specification as directed..		
17.44		Crash Barrier :- Providing and erecting steel rails crash barrier in selected location with vertical post of STRUCTURA WRS of size 113.50mm x 113.50mm x 4.80mm of required height above the GL attached to the gusset plate 330mm x 330mm x 25mm with nut and bolts and embeded in cement concrete (450mm x 450mm x 750mm) in prop. 1:2:4 as per approved and technical specification, 3.70m center to center for intermediate bay and 3.00m for end bay, 4 nos. horizantal steel rails of size 113.50mm x 113.50mm x 4.80mm of STRUCTURA WRS to be fixed on the vertical posts with a spacer channel section of size 113.50mm x 113.50mm x 4.80mm of STR-WRS including all fittings such as Stainless Steel Hexagonal Head, SS washer & screw head, nylon top hat washer and galvanized steel washer including transportation & erection etc. complete as per approved drawing.		
I		Four rails System		
(A)		1.50m heigh above ground level	meter	7254.50
(B)		1.25m heigh above ground level	meter	7199.90
II		Single rail System		
(A)		0.60m heigh above ground level	meter	3180.50
(B)		0.75m heigh above ground level	meter	3224.60
(C)		0.75m heigh above ground level both side	meter	6081.60
17.45		Wire rope safety fence Barrier: Providing & erecting 4 rope wire rope safety fence barrier consisting of 4 tensioned galvanized factory prestressed steel wire ropes of 19mm dia.	meter	4372.20

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		constructed of 3x7 (i.e.7 wires in a strand and three strand in each rope) having tensile strength of 1370 N/sqm with a minimum break load of 17.7 tons and supported by 5mm thick galvanized steel posts of 'Z' section with a standard section of 100mm x 55mm x 5mm. One upper rope is located within a central slot in the top of the posts and three ropes interwoven along the adjacent posts. The ropes are joined and tensioned by means of rigging screws and the ends of the ropes are attached to anchors embeded in the ground or surface mounted. The top wire shall be 930 +_30 from ground level to centre of wire and the posts shall be placed maximum 3.2 mtrs c/c including all end rope anchors, terminals, check ropes, tail ropes, soft eye connecting with D-Shackle complete as per technical specifications and as directed.		
		Reinforced Earth Retaining Walls		
17.46		Construction of Reinforced Earth Retaining Walls with plain finished cruciform shaped precast concrete facing panels in M 35 grade concrete, 18 cm thick, including High Adherence Structural Reinforcing 40 X 5mm section strips (hot dip galvanised) with bearing pads, joint fillers, tie strips, fastener and all accessories and consumable complete as per technical specification and drawing.	sqm	2452.80
17.47		Earth work including excavation, backfilling, grading and compaction with selected backfill soil in layers in Reinforced Earth works as per Technical specification and drawings.	cu.m.	165.90
17.48		Construction of PCC strips level footing (35cm X 15cm) in M-15 grade concrete complete as per technical specification and drawing.	meter	327.60

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
17.49		Providing 600mm drainage bay behind RE wall with compacted granular material as per technical specification and drawing.	cum	1256.90
17.50		Construction of crash barrier, parapet, coping beam with friction slab in M-30 grade concrete complete as per technical specification and drawing.	meter	1742.60
		Miscelleneous Embankment Protection		
17.51		Providing approved variety of vetiver plantation certified by The Vetiver Network International (TVNI) or its affiliate in India including pouching of tiller with selected soil for agricultural use mixed with farmyard manure in 8"x 6" poly pouch, maintaining the pouched plants for at least 1(one) month with application of growth promoter, fertilizer, watering, weeding etc., dressing of the area of plantation, planting the pouched plants as per design approved by The Vetiver Network International (TVNI) or its affiliate in India. (Excluding jungle clearance, earth work in trimming, cutting, filling etc.) and Maintenance of the vetiver plants by watering, pruning, weeding, mulching, application of manure, fertilizer, growth promoter etc. for 4 (four) months after completion of plantation.		
		Part-1 Plantation Part	metre	102.90
		Part-II Maintenance part	metre	33.60
17.52		Labour for laying apron with man size boulders by hand packing the stone with dry stone masonry template crosswalls to ensure regular and orderly deposition of the full intended quality of stone in the apron including labour for buildung these walls about one meter thick and to the full height of the specific thockness of the apron at interval of 30 meters all along the length of the apron with local carriage of stone within 60 meters complete.	cum	1282.60

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
17.53		Stone masonry work. Uncoursed rubble masonry work in all retaining wall, wing wall, abutement etc. in cement mortar 1;6 withoutside face stone roughly hammer dressed and inside (earthen side) undressed as per drawing and technical sopecifications including racking out joints and curing , supplying and carriage of stone as directed.	cum	5537.40
		Soil Stabilization		
17.54		Providing, laying, spreading and compacting available clay soil in Sub-grade course including in situ mixing 30% Stone Dust, 70% Soil & 4% of RBI 81 product, spreading in uniform layers with motor grader on a prepared base including watering and compacting with 8 to 10 tonne vibratory power roller to achieve the desired density including all materials, labour, HOM of machinery, etc complete as per specifications.	cum	4048.80
17.55		Providing, laying, spreading and compacting available soil (excluding clay soil) and aggregate in base course including in situ mixing 30% Aggregate, 70% Soil & 4% of RBI 81 product, spreading in uniform layers with motor grader on a prepared base including watering and compacting with 8 to 10 tonne vibratory power roller to achieve the desired density including all materials, labour, HOM of machinery, etc complete as per specifications.	cum	4635.80
17.56		Providing, laying, spreading and compacting available soil in base course including in situ mixing 30% Aggregate, 20% Stone Dust, 50% Soil & 4% of RBI 81 product, spreading in uniform layers with motor grader on a prepared base including watering and compacting with 8 to 10 tonne vibratory power roller to achieve	cum	4909.80

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		the desired density including all materials, labour, HOM of machinery, etc complete as per specifications.		
		Miscelleneous Bridge Works		
17.57		Providing and constructing temporary island for construction of pile foundation with depth of water upto 4.0m complete as per technical specification.	each	55825.40
17.58		Providing and constructing temporary island for construction of well foundation complete as per technical specification.		
(a)		For 6m dia. Well		
(i)		Depth of water above 1.0 m upto 2.0 m	each	114203.30
(ii)		Depth of water above 2.0 m upto 3.0 m	each	145075.40
(iii)		Depth of water above 3.0 m upto 4.0 m	each	164178.00
(b)		For 7m dia. Well		
(i)		Depth of water above 1.0 m upto 2.0 m	each	124097.40
(ii)		Depth of water above 2.0 m upto 3.0 m	each	159964.40
(iii)		Depth of water above 3.0 m upto 4.0 m	each	193706.10
(c)		For 8m dia. Well		
(i)		Depth of water above 1.0 m upto 2.0 m	each	133555.80
(ii)		Depth of water above 2.0 m upto 3.0 m	each	170298.50
(iii)		Depth of water above 3.0 m upto 4.0 m	each	207321.50
17.59		Greasing of Bearing with ULTRATACK AP3 grease including clearing of bearings with steel brush, removal of dusts and dirt with necessary scaffolding etc. complete as directed by the department.	each	1225.40
		Geo-Bags		
17.60		Supplying, filling and laying in loose with Geo-textile bags of Type-A (1.30x0.70 M) made of Geo textile non woven fabric sheets of 400 GSM		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		manufactured from polyster/ polypropylene conforming to relevant ISO standard filled with specified sand/ silt from flood plain or adjacent char within a distance of 90 m of the work site including excavation, filling Geo bags with sand weighing 126.00 kg after filling, stitching the mouth of the filled bags with polypropylene or polyster complete as per technical specifications and as directed.		
(a)		With Boat	Bag	313.00
(b)		Without Boat	Bag	301.00
17.61		Supply, Stitching and Laying of Non wooven Geo textile Fabric sheet of 400 gsm	Sqm	223.00
17.62		Supplying, filling and laying in cages with Geo-textile bags of Type-A (1.30x0.70 M) made of Geo textile non woven fabric sheets of 400 GSM manufactured from polyster/ polypropylene conforming to relevant ISO standard filled with specified sand/ silt from flood plain or adjacent char within a distance of 90 m of the work site including excavation, filling Geo bags with sand weighing 126.00 kg after filling, stitching the mouth of the filled bags with polypropylene or polyster thread by power driven double needle machine, stacking the same in batches of 100, carrying the same to the dumping site including all handling charges and local carriage within a distance of 150m and laying properly in cages of PVC coated G.I.Gabion box of size 1.5m x 1.5m x 0.45m complete as per technical specifications and as directed.		
(a)		With Boat	Cage	1039.00
(b)		Without Boat	Cage	687.00
17.63		Earthwork in excavation in key cage of size 1.00m x 1.00m x 1.00m for anchoring geo fabrics mat including supply and filling of geo	Cum	3641 .00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		bags (bags are filled with sand/silt from flood plain or adjacent char within a distance of 90 m of the work site), filling geo bags with sand weighing 126kg after filling, stitching mouth with polyster/ polypropylene thread by power driven double needle machine, carrying the same to the site including all handling charges and local carriage from a distance of 150m complete as per technical specifications and as directed.		
17.64		Supplying, laying, fitting and fixing g-mat in doubled layer composite geo textile fabricated to form a three dimensional mattresses after filling sand by pump, the upper layer of mattress being heavily woven with polyproplyne fabric needle punched with a mixture of U.V. stabilized green fibres and cut tape yarns (Typical value of mass per unit area ASTM D5261) is 650g/ sqm, tensile strength (ASTMD4595)is 45kn/m, pore size (ASTMD4751) is less than 0.35mm and UV stability (strength retained per ASTMD4355-92 @ 500hrs is 80%) the lower layer of the mattress being polypropyline wooven fabric, UV stabilized (Typical value of mass per unit area (ASTM D 4595) is greater than 80kn/m, pore size (ASTMD4751) is less than 0.35mm and UV stability (strength retained per ASTM4355-92 @ 500hrs is 80%). The sewing thread being of high tenacity polyster, continued parrell stitches positioned 350mm apart with a stitch length not exeeding 40mm anchoring by cutting trenches of 1.5m x 1m placing the mat filling earth filled cement bags anchorage at lower end, double locking chain stitch 3 stitch/inch including all charges complete. (Approved rate of CWC for the FMP scheme under WRD)	Sqm	2394.00
		Repairing of Boat		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
17.65		Labour for haulding up boat and refloating the same after repair		
(a)		Mar boat	each	3559.50
(b)		Single boat	each	1772.40
17.66		Renewing rotton planks of boat with 25 mm to 38 mm thick timber planks including supplying and fitting with necessary nail etc. including coat tarring two coats applied hot.		
(a)		With Sal planks	sq.m	2618.70
(b)		With Cham or Lorul planks	sq.m	2163.00
17.67		Making good cracks of the joint boat with necessary jute mixed with putty of dhuna and flat nails including coaltarring after taking out old nails, rotten jute etc.	metre	31.50
17.68		Supplying, fitting and fixing kori (for boat) of wood of required sizes.		
(a)		With Sal timber	each	2679.60
(b)		With cham/sundi/nageswar/gamari timber	each	1892.10
17.69		Supplying sal wood helm for marboat 18cm dia 6.10m as per direction including fixing in position and coal tarring complete as directed.cham/nageswar wood helm for mar boat 13cm dia. 6.10m long as per direction including fixing in position and coal and coal tarring as directed.	each	5989.20
17.70		Supplying cham/nageswar wood helm for mar boat 13cm dia. 6.10m long as per direction including fixing in position and coal and coal tarring as directed.	each	3390.50
17.71		Renewing oars of wood plank complete as directed.		
(a)		Of Sal wood	each	1021.70
(b)		Of Cham wood	each	836.90

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
17.72		Supplying fitting and fixing in position koniaghosa of required size of wood to fit exactly at boat and coal tarring etc. complete as directed.		
(a)		Sal wood	each	294.00
(b)		Cham/ Sundi/ Gamari wood	each	211.10
17.73		Repariring or providing timber free board line 8cm by 5cm painted white with two coats of approved paint complete as directed.		
(a)		With Sal timber	metre	231.00
(b)		With Cham/ Sundi/ Gamari timber	metre	180.60
17.74		Refitting drop gates with necessary hinges, spikes, bolts and nuts etc. complete up to 6 tonne mar boat.	set of two	417.90
17.75		Refitting drop gates with necessary hinges, spikes, bolts and nuts etc. complete above 6 tonne mar boat.	set of two	587.00

CHAPTER - 18

NEW TECHNOLOGY

Preamble:

The rate has been provided is for various items of innovative/ new Technology Road works in APWD works, which are not covered by MoRT&H Data Book.

CHAPTER-18

NEW TECHNOLOGY

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
18.1		**Open - Graded Premix Surfacing (specially for shaded areas)**		
		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 Bitumen Emulsion With cold mix Binder Ezee PC (MS) (As per IRC : SP : 100 -2014) to required line, grade and level to serve as wearing course on a per Technical Specification and through credible technology partners duly licensed by CRRI.	sqm	177.00
18.2		Seal coat with Cold mix Binder (specially for shaded areas) - Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels grade and cross fall using Type A,Type B and Type C as per Technical specification clause 510.With cold mix Binder Ezee PC (MS) (As per IRC : SP : 100 -2014)and through credible technology partners duly licensed by CRRI.	sqm	34.00
18.3		Construction of Sub-Base/Base of road pavement by making use of **EVOCRETE CCL Soil Modifier (GERMAN) technology** by re-using the existing/in-situ soil. Profiling the road to the required design standard followed by spreading of 7% of O.P.C. 43 Grade cement of stabilized soil (Variable depending upon soil properties) , then spreading 2 % EVOCRETE additive of 7 % OPC and pulverising the cement , additive & profiled soil/pavment material with help of Recycler/Stabilizer including moisturing to OMC. On completion of pulverisation re-garding, profiling to required grade/camber with		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		motor grader & compacting simaltaneously with 14 tonne vibratory roller to achieve 95% degree of compaction as directed by the Engineer-in-charge & finally irrigating the stabilized surface for next 48 hours.		
I		20.0cm thick Sub-Base & Base with Evocrete and Cement etc.	cum	3410.00
18.4		**Bio Enzyme Soil Stabilizer Terrazyme under IRC accredited new Technology**		
I		Providing of 1st layer of Bioenyme based soil stabilised layer to a required thickness as per manufacture design with a existing soil, by ripping open the existing road formation and treating it with TerraZyme in the ratio 1L for 12.6 cum soil spreading in uniform layer with motor grader on prepared surface , mixing by mix in place method with rotavator at OMC and compacting with smooth wheel roller to achieve the desired density complete as per technical specification incl all labour , equipments etc as per direction of the Engineer -in -charge of the work. The soil will have PI between 7 and 18% and clay % by hydrometry should be more than 15% and less than 40%.	cum	1458.00
II		Providing of 2nd layer of Bioenyme based soil stabilised layer to a required thickness as per manufacture design with local soil material/ gravel/murram, having CBR greater than 8% and treating it with Terrazyme in the ratio 1L for 15.0 cum soil with 25% 40mm crusher broken metal in design mix, spreading in uniform layer with tractor grader on prepared surface, mixing by mix in place method with rotavator at OMC and compacting with smooth wheel roller to achieve the desired densiality complete as per technical specification including all labour, materials like soil and	cum	1656.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		metal, equipments etc. complete as per direction of the Engineer-in-charge of the work. The soil will have PI between 7 and 13% and clay % by hydrometry should be more than 15% and less than 30%.		
18.5		**Soil Stablized subbase/ base using Roadstab**		
I		Providing of soil stabilized subase/base course by providing,laying and spreading ordinary soil on a prepared subgrade,palverising,adding the designed quantity of Roadstab mixing compound adding 4% cement, mixing at OMC,with rotavator grading with motor grader and compacting with the road roller/vibratory roller at OMC to acheive the desired unconfined compression strength and to form a layer of subbase and necessary curing	cum	3946.00
18.6		**RBI Grade 81 Treated Base Layer**		
A		**For Selected soil having CBR 5% to 6%**		
I		Providing, laying, spreading and compacting Soil conforming to engineering requirement and Aggregate in base layer including in situ mixing of 30% Aggregatesof size 22.4 mm to 2.56 mm (for WMM as per page 154 of Assam SOR 2016-17 for rural road & table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 20% Stone dust+46% in-situ soil (CBR 5% to 6%) + 4% RBI Grade-81 (a soil stabilizer cum pavement material) , speading in uniform layers with motor grader on prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base layer including all cost of materials , labour, HOM of machinery, etc. complete as per specifications and EIC directions.	cum	4688.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
B		**For Existing In-situ soil having CBR 5% to 6%**		
		Providing, laying, spreading and compacting including mixing of In-situ Soil (CBR 5% to 6%), Aggregate size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for Rural Roads and Table 400.13 & Technocal Specification clause 406 of MORT&H 5th Revision) and Stone Dust with Soil Stabiliser and Pavement Material RBI Grade 81 (SRSPL), spreading in uniform layers with motor grader on prepared sub-base / sub-grade including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the desired density for preparing the Base / Sub-base layer. Including basic cost of materials, labour, HOM of machinary, etc. as per specifications and EIC directions. The rate mentioned here are exclusive of carriage charge of Aggregates / Stone Dust / Selected Soil from quarry to site. The carriage charge will be added to these rates to arrive at final rate. Various combinations of Aggregates, Stone Dust Insitu Soil and RBI grade 81 percentages have been given. The optimum combination would depend upon the following factors: 1. In Situ Soil CBR and PI. 2. Traffic Catagory. 3. Distance of Quarry from Site For further increasing the durability of the road, out of the combinitations as bellow the combination with higher percentage of RBI Grade-81 should be prepared so long as commercial viability is maintained.		
I		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base layer including in situ mixing of 30% Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural	cum	4771.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 30% Stone Dust + 36% In-Situ Soil (CBR 5 % to 6 %) + 4 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions		
II		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base layer including in situ mixing of 30% Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 20% Stone Dust + 46% In-Situ Soil (CBR 5 % to 6 %) + 4 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4688.00
III		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base layer including in situ mixing of 30% Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 30%	cum	4549.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		Stone Dust + 36.25 % In-Situ Soil (CBR 5 % to 6 %) + 3.75 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions		
IV		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base layer including in situ mixing of 30% Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 20% Stone Dust + 46.25% In-Situ Soil (CBR 5 % to 6 %) + 3.75 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4466.00
V		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base layer including in situ mixing of 30% Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 30% Stone Dust + 36.5 % In-Situ Soil (CBR 5 % to 6 %) + 3.5 % RBI Grade-81 (a soil stabilizer cum	cum	4327.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions		
VI		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base layer including in situ mixing of 30% Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 20% Stone Dust + 46.5% In-Situ Soil (CBR 5 % to 6 %) + 3.5 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4244.00
VII		**RBI GRADE 81 - 2%**		
		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in sub base layer including in situ mixing of 30% Aggregate of size 22.4 mm to 2.56 mm (for WMM item in ASSAM SOR 2017-18 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 20% Stone Dust + 48% In-Situ Soil (CBR 5 % to 6 %) + 2 % RBI Grade-81 (a soil stabilizer cum pavement material),	cum	2828.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions		
C		**For Selected Soil Having CBR 7% to 9%**		
		RBI GRADE-81 - 4% Providing , laying spreading and compacting inncluding in situ mixing of selected soil (CBR 7% to 9%), Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 408 of MORTH 5th Revision) & Stone Dust with Soil Stabilizer and PavementMaterial RBI Grade 81 (SRSPL) , spreading in uniform layers with Motor grader on a prepared subbase including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the desired density for preparing the base layer including basic cost of materials, labour,HOM of machinearyetc, complete as per specification and EIC directions.The rates mentioned here are Exclusive of carriage charges for Agrregate/ Stone Dust/ Setected Soil from quarry to site . The carriage charges will be added to these rates to arrive at final rate.Various combinations of in-situ soil/selected soil, aggregate and RBI percentages have been given, The optimum combination would depend upon the following factors:1. In-situ soil/selected soil (as applicable), CBR, and PI2. Traffic Category3. Distance of Quarry from site		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
I		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 45 % Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 51 % Selected Soil (CBR 7 % to 9 %) + 4 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4817.00
II		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 30 % Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 15 % Stone Dust + 51 % Selected Soil (CBR 7 % to 9 %) + 4 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4647.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
III		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 45 % Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 51.25 % Selected Soil (CBR 7 % to 9 %) + 3.75 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4595.00
D		**RBI GRADE-81 - 3.75%**		
I		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 30 % Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 15 % Stone Dust + 51.25 % Selected Soil (CBR 7 % to 9 %) + 3.75 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4426.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
II		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 45 % Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 51.5 % Selected Soil (CBR 7 % to 9 %) + 3.5 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4373.00
		RBI GRADE-81 - 3.5%		
III		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 30 % Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 15 % Stone Dust + 51.5 % Selected Soil (CBR 7 % to 9 %) + 3.5 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4203.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		RBI GRADE-81 - 2%		
IV		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 30 % Aggregate of size 22.4 mm to 2.56 mm (for WMM as per page 154 of ASSAM SOR 2016-17 for rural roads & Table 400.13 & technical specification clause 406 of MORTH 5th Revision) + 15 % Stone Dust + 53 % Selected Soil (CBR 7 % to 9 %) + 2 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	2787.00
E		**40% AGGREGATE 20MM + SOIL (CBR 7% TO 9%) + RBI GRADE-81(SRSPL)**		
		Providing,laying,spreading and compacting including in situ mixing of selected soil aggregate of size 20mm with soil stabiliser and pavemebt material RBI Grade-81 (SRSPL), spreading in uniform layers with Motor grader on a prepared sub base icluding watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the desired density for preparing the base layer. Including basic cost of materials, labour, HOM machinery,etc complete as per specifications and EIC directions. The rates mentioned here are exclusive of carriage charges for aggregate/ stone dust/selected soil from quarry site. Various combinations of in-situ soil/selected soil(as applicable),aggregate and RBI percentages		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		have been given. The optimum combination would depend upon the following factors :1. In situ soil/selected soil (as applicable) CBR and PI2. Traffic category3. Distance of quarry from site		
I		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 40% Aggregate (20 mm) + 56% Soil (CBR 7% to 9%) with 4 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4963.00
II		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 40% Aggregate (20 mm) + 56.25% Soil (CBR 7% to 9%) with 3.75 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	4741.00
III		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in base course including in situ mixing of 40% Aggregate (20	cum	4520.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		mm) + 56.5% Soil (CBR 7% to 9%) with 3.5 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions		
IV		Providing, laying, spreading and compacting Soil conforming to engineering requirements and Aggregate in sub base layer including in situ mixing of 40% Aggregate (20 mm) + 58% Soil (CBR 7% to 9%) with 2% RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared base including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the required density at OMC for preparing the base Layer Including all cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions	cum	3104.00
18.7		Providing, laying, spreading and compacting including in situ mixing of In-Situ 94 % Soil + 4 % PI Reducing Agent with 2 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the desired density for preparing the Sub Base/Subgrade.Including basic cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions.	cum	2589.00
18.8		Providing, laying, spreading and compacting	cum	2969.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		including in situ mixing of In-Situ 93.5 % Soil + 4 % PI Reducing Agent with 2.5 % RBI Grade-81 (a soil stabilizer cum pavement material), spreading in uniform layers with motor grader on a prepared including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the desired density for preparing the Sub Base/Subgrade.Including basic cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions.		
18.9		Providing, laying, spreading and compacting including in situ mixing of 98 % In-Situ Soil (PI < = 10) with 2 % RBI Grade-81 (Soil Stabiliser and Pavement Material), spreading in uniform layers with Motor grader on a prepared surface including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the desired density for preparing the Subgrade.Including basic cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions .	cum	1988.00
18.10		Providing, laying, spreading and compacting including in situ mixing of 97.5 % In-Situ Soil (PI < = 10) with 2.5 % RBI Grade-81 (Soil Stabiliser and Pavement Material), spreading in uniform layers with Motor grader on a prepared surface including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the desired density for preparing the Subgrade.Including basic cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions .	cum	2368.00
18.11		Providing, laying, spreading and compacting including in situ mixing of 98 % Selected Soil (PI < = 10) with 2 % RBI Grade-81 (Soil	cum	1988.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		Stabiliser and Pavement Material), spreading in uniform layers with Motor grader on a prepared surface including watering and compacting with 10 to 12 tonne single drum vibratory roller to achieve the desired density for preparing the Subgrade.Including basic cost of materials, labour, HOM of machinery, etc complete as per specifications and EIC directions .		
18.12		**ZYCOSOIL NANO TECHNOLOGY**		
A		**Water Proofing**		
I		Waterproofing on top compacted (as per relevant MoRD specification) sub Grade soil base, shoulders with Organosilane Nanotechnology & nano acrylic co-polymer with water (<1000 ppm TDS) in the ratio of 1 kg Organosilane Nanotechnology:1 kg nano acrylic co-polymer :200 liter water spray @ 3 liter /sqm in two spray applications (1.5 liter + 1.5 liter) as per direction of the Engineer-in-charge.	sqm	15.00
II		Stabilized Sub-base / Base: Providing, Laying, Spreading and Compacting in-situ/borrow area soil of CBR >5% mixed with / without 30% crushed aggregate / muruum / GSB Grade 1 as per mix design. Application: (1) Rip and loosen soil with excavator / tractor operated ripper and scarify with tractor operated rotavator upto depth of 200 mm. Mix aggregates as per mix design. (2) Apply 1 kg /cum organosilane Nanotechnology mixed in OMC water (<1000 ppm TDS) on loose soil. Scarify the treated and allow it to dry. (2) Spread Cement 3% by weight of soil on the silane treated and dry soil. (3) Apply 1 kg/cum of nano acrylic Co-Polymer mixed in OMC water (<1000 ppm TDS), on the above treated	cum	2372.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		soil mixed with cement. Scarify and grade the soil. (4) Spread 13.2 and down size aggregates on the graded soil surface to form 20-25 mm thick soil-aggregate layer.(5).Compact the stabilized soil-aggregate base with 8 to 10 tonne vibratory roller to achieve stone embedded layer with the desired density.(6) Waterproof the top of the compacted stabilized base with organosilane & nano acrylic Polymer in the ratio of 1 kg organosilane :1 kg nano acrylic Co-Polymer : 200 liter water (<1000 ppm TDS) @ 3ltrs/sqm in two spray applications (1.5 ltrs. + 1.5 ltrs.).Rates include all material, labour, hire charges of machinery etc. as per MoRD specifications & direction of Engineer-in-Charge.		
III		Prime Coat (with silane Nanotechnology)		
(i)		Low porosity		
		Prime Coat : Preparing and applying of water soluble organo silane nanotechnology (for bitumen emulsion application, IRC approved) with cationic bitumen emulsion CSS1 and water (<1000 ppm TDS) in the ratio of 1 kg organo silane : 100 kg cationic bitumen emulsion CSS1 : 200 liter water . Mixing & Spraying : Take 1 kg of organo silane nanotechnology and add in 200 liter water while filling water in tanker/drum and then add 100 kg cationic bitumen emulsion under circulation. Mix the solution completely. Spray the solution @ 1 liter per sqm on compacted stone base. Rates including all materials, labour, hire Charges of machery etc. complete as per MoRD specifications & direction of Engineer-in-Charge.	sqm	22.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
18.13		20mm thick Open-Graded Premix Carpet using Bituminous (penetration grade) Binder Using Nanotechnology.(Providing, laying and rolling of open-graded premix carpet of 20 mm thickness composed of 13.2 mm to 5.6 mm stone aggregates using S-65 penetration grade bitumen mixed with silane nanotechnology @ 0.1% by weight of bitumen S-65 grade @ 14.6 kg/10 sqm to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable hot mix plant, laying and rolling with a three wheel 80-100 kN static roller capacity, finished to required level and grades to be followed by seal coat of Type D as per Technical Specification Clause 508 of MoRD and as per direction of Engineer-in-Charge.**)**		
		Bitumen (S-90)	sqm	140.00
18.14		Seal Coat(with Nanotechnology) (Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall using Type D as per Technical Specification Clause 510 of MORD with S-65grade bitumen mixed with organosilane nanotechnology @ 0.1% by weight of S-65 bitumen binder laid as per direction of Engineer-in-Charge.**)**		
A		By Mechanical Means		
I		Case -3 : Type C: Bitumen (S-90)	sqm	50.00
18.15		**EVOCRETE TECHNOLOGY**		
A		Stabilization/soil binding of in-situ soil of sub-base/base course using EvocreteCCL soil stabilizer (Construction of Sub-Base/Base of road pavement by making use of EVOCRETE CCL Soil Modifier (GERMAN) technology by re-using the existing/in-situ soil. Profiling the		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		road to the required design standard followed by spreading of 7% of O.P.C. 43 Grade cement of stabilized soil (Variable depending upon soil properties) , then spreading 2 % EVOCRETE additive of 7 % OPC and pulverising the cement , additive & profiled soil/pavment material with help of Recycler/Stabilizer including moisturing to OMC. On completion of pulverisation re-garding, profiling to required grade/camber with motor grader & compacting simaltaneously with 14 tonne vibratory roller to achieve 95% degree of compaction as directed by the Engineer-in-charge & finally irrigating the stabilized surface for next 48 hours)		
I		20.0cm thick Sub-Base & Base with Evocrete and Cement etc.	cum	3441.00
18.16		**Cell Filled Concrete Pavement**		
I		Construction of plastic cell filled cement concrete pavement, thickness 100mm (as per design), over a prepared sub base, with 53 grade Ordinary Portland Cement(OPC) or any other type as per Clause 1501.2.4 M30 (Grade), coarse and fine aggregates conforming to IS : 2386, mixing in a concrete mixer of not less than 0.2 cum capacity and appropiate weigh batcher using approved mix design (As per IRC:44-2008), laid in the cells made of high density polythyne sheets of thickness 0.22mm to about 0.25mm,side 150mm and depth 100mm of approximate weight of 1250 kg for a road of 3.75m wide and 1.00km , putting iron spike of 200mm long at the end corners of the cells and using nylon threads passing through the cells 10 mm below the top of the cells, in approved fixed side formwork (steel channe, wedges, steel plates		

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
		including levelling the formwork as per drawing),maitaining camber of about 3 to3.5%, spreading the concrete with sholvels, rakes, compacted using needle, scareed and plate vibrators and finished in continuous operation, curing of concrete slabs for 14- days, curing compound (where specified) and water finishing to lines and grade as per drawing and Technical Specification of Cell filled Concrete Pavement Published by NRRDA		
a		Rate analysis is being carried out for Cell filled concrete pavement of 3.75m and 25m in width and length. As per the requirement of DIY on cell filled concrete block, the following are the requirements for a pavement of 3.75m and 25m in width and length that can be constructed in **one day**: *200 micron plastic sheet-1 kg=28 meter long of 10cm width-(1.75 sq.m/kg-53.57 Kg for 3.75mx25m)*Labour approximately*Male workers 20Female workers 7Mason 41 number concrete mixerPlate or screed vibrator - 1 no.Mechanical trowelling - 1 no.Max. 25meter length(of width 3.75meter) can be laid in a day (about 10 Cum of CC)	sqm	903.00
18.17		**TENAX 3D GRID TECHNOLOGY**		
I		Supplying and laying of Polypropylene extruded Geogrid with a minimum stiffness (modulus) at 0.5% strain according to ISO 10319 should be 350x550 Kn/m with apparaent coefficient of friction soil/geosynthetics accroding to EN 13738 must be atleast 1.70(us/gsy) at 10 KPa load and with a min transversal rib thickness of 2.5 mm and longitudinal rib thickness of 3.6 mm. Aperture of geogrid should be 30mm x 30 mm. Geogrid should not be made of bonding of strands or punching and stretched sheets	sqm	157.00

Item No.	Ref. of MoSRT&H	Description	Unit	Rate (18-19)
18.18		**Recycling of Bituminous Pavement with Central Recycling Plant**		
		Recycling pavement by cold milling of existing bituminous layers, planning the surface after cold milling, reclaiming excavated material to the extent of 30 per cent of the required quantity, hauling and stock piling the reclaimed material near the cent	cum	6373.00
18.19		**Protective coatings to the structures, equipments and machine parts with performance guarantee for 3 years.**		
I		Application cost of two part highbuild 100% solid content system of Cyclophat polyamino based KRAYON KI30021 COROGARD to give protective coating to the substract by giving good bonding to the intermediate coat of Krayon KI 30031 RUST CONVERTOR coat giving the cured coat of crosslinked protective coating from rust , corrosion and weathering effect including cost of material, labour, scafolding, cleaning over application of one part primer fron three part system and two part primer from three part system Krayon KI 30031 RUST CONVERTOR PRIMER and consumable complete as directed by the Engineer-incharge and conforming quality as per IS / IRC Specifications.	sqm	780.00

(C) Materials

Sl. No.	Description	Unit	Rate
M-001	Stone Boulder of size 150 mm and below at Cruser Plant	cum	1055.00
M-002	Supply of quarried stone 150 - 200 mm size for Hand Broken at site	cum	898.00
M-003	Boulder with minimum size of 300 mm for Pitching at Site	cum	898.00
M-004	Coarse sand at Mixing Plant	cum	950.00
M-005	Coarse sand at Site	cum	950.00
M-006	Fine sand at Site	cum	850.00
M-007	Moorum at Site	cum	698.00
M-008	Gravel/Quarry spall at Site	Cum	987.00
M-009	Granular Material or hard murrum for GSB works at Site	Cum	698.00
M-010	Granular Material or hard murrum for GSB works at Mixing Plant	Cum	698.00
M-011	Fly ash conforming to IS: 3812 (Part II & I) atHMP Plant / Batching Plant / Crushing Plant	Cum	375.00
M-012	Filter media/Filter Material as per Table 300-3 (MoRT&H Specification)	Cum	1013.00
M-013	Close graded Granular sub-base Material 53 mm to 9.5 mm	cum	1119.00
M-014	Close graded Granular sub-base Material 37.5 mm to 9.5 mm	cum	1101.00
M-015	Close graded Granular sub-base Material 26.5 mm to 9.5 mm	cum	1101.00
M-016	Close graded Granular sub-base Material 9.5 mm to 4.75 mm	cum	1084.00
M-017	Close graded Granular sub-base Material 9.5 mm to 2.36 mm	cum	1041.50
M-018	Close graded Granular sub-base Material 4.75mm to 2.36 mm	cum	1041.50
M-019	Close graded Granular sub-base Material 4.75mm to 75 micron mm	cum	1089.00
M-020	Close graded Granular sub-base Material 2.36 mm	cum	698.00
M-021	Stone crusher dust finer than 3mm with not more than 10% passing 0.075 sieve.	cum	698.00
M-022	Coarse graded Granular sub-base Material 2.36 mm & below	cum	698.00
M-023	Coarse graded Granular sub-base Material 4.75mm to 75 micron mm	cum	698.00
M-024	Coarse graded Granular sub-base Material 4.75 mm to 2.36 mm	cum	1041.50
M-025	Coarse graded Granular sub-base Material 9.5 mm to 4.75 mm	cum	1084.00
M-026	Coarse graded Granular sub-base Material 26.5 mm to 4.75 mm	cum	1089.00
M-027	Coarse graded Granular sub-base Material 26.5 mm to 9.5 mm	cum	1101.00
M-028	Coarse graded Granular sub-base Material 37.5 mm to 9.5 mm	cum	1101.00
M-029	Coarse graded Granular sub-base Material 53 mm to 26 .5mm	cum	1124.00
M-030	Aggregates below 5.6 mm	cum	1104.00
M-031	Aggregates 22.4 mm to 2.36 mm	cum	1440.50
M-032	Aggregates 22.4 mm to 5.6 mm	cum	1440.50

M-033	Aggregates 45 mm to 2.8 mm	cum	1623.00
M-034	Aggregates 45 mm to 22.4 mm	cum	1623.00
M-035	Aggregates 53 mm to 2.8 mm	cum	2035.00
M-036	Aggregates 53 mm to 22.4 mm	cum	1623.00
M-037	Aggregates 63 mm to 2.8 mm	cum	1936.00
M-038	Aggregates 63 mm to 45 mm	cum	1510.00
M-039	Aggregates 90 mm to 45 mm	cum	1440.50
M-040	Aggregates 10 mm to 5 mm	cum	1510.00
M-041	Aggregates 11.2 mm to 0.09 mm	cum	1510.00
M-041_1	Aggregates 11.2 mm to 2.36 mm	cum	1510.00
M-042	Aggregates 13.2 mm to 0.09 mm	cum	1599.50
M-043	Aggregates 13.2 mm to 5.6 mm	cum	1599.50
M-044	Aggregates 13.2 mm to 10 mm	cum	1599.50
M-045	Aggregates 20 mm to 10 mm	cum	1777.00
M-046	Aggregates 25 mm to 10 mm	cum	1827.00
M-047	Aggregates 19 mm to 6 mm	cum	1104.00
M-048	Aggregates 37.5 mm to 19 mm	cum	1619.00
M-049	Aggregates 37.5 mm to 25 mm	cum	1619.00
M-050	Aggregates 6 mm nominal size	cum	1807.00
M-051	Aggregates 10 mm nominal size	cum	1916.00
M-052	Aggregates 13.2/12.5 mm nominal size	cum	1510.00
M-053	Aggregates 20 mm nominal size	cum	1777.00
M-054	Aggregates 25 mm nominal size	cum	1827.00
M-055	Aggregates 40 mm nominal size	cum	1500.00
M-056	G.I. pipe 100 mm dia	metre	900.00
M-057	Acrylic polymer bonding coat	litre	340.00
M-058	Alluminium Paint	litre	231.00
M-059	Aluminium alloy plate 2mm Thick	sqm	460.00
M-060	Aluminium alloy/galvanised steel	tonne	56000.00
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	8750.00
M-062	Aluminium studs 100 x 100 mm fitted with lense reflectors	nos	438.00
M-063	Barbed wire	kg	78.00
M-064	Bearing (Cost of parts)	nos	32300.00
M-065	Bearing (Cast steel rocker bearing assembly of 250 tonne)	nos	135850.00

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	14180.00
M-067	Bearing (Forged steel roller bearing of 250 tonne)	nos	117306.00
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 comp	nos	39560.00
M-069	Bearing (PTFE sliding plate bearing assembly of 80 tonnes)	nos	19760.00
M-070	Bearing (Supply of sliding plate bearing of 80 tonne)	nos	11025.00
M-071	Bentonite	kg	12.00
M-072	Binding wire	kg	85.00
M-073	Bitumen (Cationic Emulsion) **(CSS-1h)**	tonne	38530.00
M-074	Bitumen (Cationic Emulsion) **(CSS-1)(IS:8887-2004)**	tonne	36950.00
M-074_1	Bitumen (Cationic Emulsion) **(CSS-2)**	tonne	27790.00
M-074_2	Bitumen (Cationic Emulsion) **(CSS-1)**	tonne	36950.00
M-075	Bitumen (Cationic Emulsion) **(RS-1)**	tonne	26260.00
M-075_1	Bitumen (Cationic Emulsion) **(RS-2)**	tonne	26260.00
M-076	Bitumen (Cationic Emulsion) **(MS)**	tonne	27790.00
M-077	Bitumen **(60-70 grade OR VG-30)**	tonne	32627.00
M-078	Bitumen **(80-100 grade OR VG-10)**	tonne	31681.00
M-079	Bitumen **(CRMB-55)**	tonne	31950.00
M-080	Bitumen(Penetration at 25 deg C=15+/- 5	tonne	40572.00
M-081	Bitumen (Polymer modified graded) **PMB**	tonne	33280.00
M-082	Brick	each	8.00
M-083	C.I.shoes for the pile	kg	85.00
M-084	Cement	tonne	7200.00
M-085	TMT-IS 1786 (Fe-500 D) Primary Producer (TATA/ SAIL/ Esser Steel/ Jindal Panther steel/ Shyam steel or equivalent)	tonne	53667.00
M-085_1	TMT-IS 1786 (Fe-500 D) Secondary Producer (ISI approved)	tonne	49667.00
M-085_2	MS bar-IS 1786 (Fe-250) Secondary Producer	tonne	55637.00
M-086	Coller for joints 300 mm dia	nos	504.00
M-087	Compressible Fibre Board(20mm thick)	sqm	1077.00
M-088	Connectors/ Staples	each	75.00
M-089	Copper Plate(12m long x 250mmwide)	kg	646.00
M-090	Corrosion resistant Structural steel	tonne	66150.00
M-091	Corrugated sheet, 3 mm thick, “Thrie” beam section railing	kg	88.00
M-092	Credit for excavated rock found suitable for use	cum	186.00

M-093	Curing compound	liter	214.00
M-094	Delineators from ISI certified firm as per the standard drawing given in IRC - 79	each	0.00
M-095	Earth Cost or compensation for earth taken from private land	cum	33.00
M-096	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	18000.00
M-097	Electric Detonators @ 1 detonator for 1/2 gelatin stick of 125 gms each	100 nos	1500.00
M-098	Epoxy resin-hardner mix for prime coat	kg	840.00
M-098_1	Epoxy compound with accessories for preparing epoxy mortar	kg	605.00
M-098_2	Epoxy mortar	kg	422.00
M-098-3	Epoxy primer	kg	395.00
M-099	Flag of red color cloth 600 x 600 mm	each	11.00
M-100	Flowering Plants	each	31.00
M-101	Galvanised MS flat clamp	nos	288.00
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	233.00
M-103	Galvanised structural steel plate 200 mm wide, 6 mm thick, 24 m long	kg	61.00
M-104	Gelatin 80%	kg	72.00
M-105	Geo grids(TGB-40)	sqm	240.00
M-106	Geomembrane(1.5mm thick)	sqm	333.00
M-107	Geonets(Geonet 121)	sqm	310.00
M-108	Geotextile(GNW-280)	sqm	116.00
M-109	Geotextile filter fabric(GNW-280)	sqm	137.00
M-110	GI bolt 10 mm Dia	nos	13.00
M-111	Grouting pump with agitator	hour	310.00
M-112	Grass (Doob)	kg	18.00
M-113	Grass (Fine)	kg	27.00
M-114	HDPE pipes 75mm dia	metre	111.00
M-115	HDPE pipes 90mm dia	metre	160.00
M-116	Hedge plants	each	12.00
M-117	Helical pipes 600mm diameter	metre	87.00
M-118	Hot applied thermoplastic compound	litre	133.00
M-119	HTS strand	tonne	114109.00
M-120	Joint Sealant Compound	kg	590.00
M-121	Jute netting, open weave, 2.5 cm square opening for seeding and Mulching	sqm	34.00
M-122	LDO for steam curing	litre	34.00

M-123	M.S. Clamps	nos	19.00
M-124	M.S. Clamps	kg	90.00
M-125	M.S.shoes @ 35 Kg per pile of 15 m	kg	42.00
M-126	TMT IS 1786 (Fe-500)reinforcement bar.	tonne	53667.00
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	metre	114000.00
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	metre	172800.00
M-129	Nipples 12mm	nos	25.00
M-130	Nuts and bolts	kg	90.00
M-131	Paint	litre	258.00
M-132	Pavement Marking Paint	litre	85.00
M-133	Paving Fabric(1.5mmthick)	sqm	315.00
M-134	Perforated geosynthetic pipe 150 mm dia	metre	470.00
M-135	Perforated pipe of cement concrete, internal dia 100 mm	metre	95.00
M-136	Pesticide	kg	504.00
M-137	Pipes 200 mm dia, 2.5 m long for drainage	metre	552.00
M-138	Plastic sheath, 1.25 mm thick for dowel bars	sqm	25.00
M-139	Plastic tubes 50 cm dia, 1.2 m high	nos	58.00
M-140	Polymer braids	metre	25.00
M-141	Pre moulded Joint filler,25 mm thick for expansion joint.	sqm	742.00
M-142	Pre-coated stone chips of 13.2 mm nominal size	cum	3890.00
M-144	Pre-moulded asphalt filler board	sqm	647.00
M-145	Pre-packed cement based polymer concrete of strength 45 Mpa at 28 days	kg	46.00
M-146	Primer	kg	158.00
M-147	Quick setting compound	kg	32.00
M-148	Random Rubble Stone	cum	470.00
M-149	RCC Pipe NP 4 heavy duty non presure pipe 1000 mm dia	metre	8579.00
M-150	RCC Pipe NP 4 heavy duty non presure pipe 1200 mm dia	metre	10370.00
M-151	RCC Pipe NP 4 heavy duty non presure pipe 300 mm dia	metre	2592.00
M-152	Reflectorising glass beads	kg	102.00
M-153	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Copper Strips)	metre	1103.00
M-154	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Galvanised carbon steel strips)	metre	240.00

M-155	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Glass reinforced polymer/fibre reinforced polymer/polymeric strips)	metre	650.00
M-156	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Stainless steel strips)	metre	650.00
M-157	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. Aluminium strips)	metre	475.00
M-158	Rivets	each	4.50
M-159	Sand bags (Cost of sand and Empty cement bag)	nos	16.00
M-160	Sapling 2 m high 25 mm dia	each	42.00
M-161	Scrap tyres of size 900 x 20	nos	30.00
M-162	Seeds	kg	30.00
M-163	Selected earth	cum	165.00
M-164	Separation Membrane of impermeable plastic sheeting 125 micron thick	sqm	40.00
M-165	Sheathing duct	metre	95.00
M-166	Shrubs	each	12.00
M-167	Sludge / Farm yard manure @ 0.18 cum per 100 sqm at site of work for turfing	cum	60.00
M-167_1	Well decayedFarm yard manure @ 0.18 cum per 100 sqm at site of work for turfing	cum	170.00
M-168	Sodium vapour lamp (250 Watts)	each	7900.00
M-169	Square Rubble Coursed Stone	cum	590.00
M-170	Steel circular hollow pole of standard specification for street lighting to mount light at 5 m height above deck level	each	7500.00
M-171	Steel circular hollow pole of standard specification for street lighting to mount light at 9 m height above road level	each	11000.00
M-172	Steel drum 300 mm dia 1.2 m high/empty bitumen drum	nos	66.00
M-173	Steel helmet and cushion block on top of pile head during driving.	kg	60.00
M-174	Steel pipe 25 mm external dia as per IS:1239	metre	72.00
M-175	Steel pipe 50 mm external dia as per IS:1239	metre	140.00
M-176	Steel wire rope 20 mm	kg	155.00
M-177	Steel wire rope 40 mm	kg	95.00
M-178	Strip seal expansion join	metre	20000.00
M-179	Structural Steel	tonne	60000.00
M-180	Super plastisizer admixture IS marked as per 9103-1999	kg	104.00
M-181	Synthetic Geogrids as per clause 3102.8 and approved design and specifications.(TGU-150)	sqm	370.00
M-182	Through and bond stone	each	8.50
M-183	Tie rods 20mm diameter	nos	55.00
M-184	Tiles size 300 x 300 mm and 25 mm thick	each	57.00

M-185	Timber	cum	34100.00
M-186	Traffic cones with 150 mm reflective sleeve	nos	1300.00
M-187	Tube anchorage set complete with bearing plate, permanent wedges etc	nos	1500.00
M-188	Unsiaked lime	tonne	5900.00
M-189	Water	KL	45.00
M-189_1	Anti stripping agent	Kg	240.00
M-190	Water based cement paint	litre	36.00
M-191	Welded steel wire fabric	kg	46.00
M-192	Wire mesh 50mm x 50mm size of 3mm wire	kg	46.00
M-193	Wooden ballies 2" Dia for bracing	each	210.00
M-194	Wooden ballies 8" Dia and 9 m long	each	3300.00
M-195	Wooden packing	cum	25500.00
M-196	Wooden staff for fastening of flag 25 mm dia, one m long	each	60.00
M-0197	Bamboo Bholuka or Barua 55mm to 100mm dia and 6m long	each	90.00
M-0198	Bamboo Jati or Bethua 50mm to mm dia and 6m long	each	75.00
M-0199	Wood local first class piles 25cm to 30cm	metre	4200.00
M-0200	Wood local first class planks 25cm to 38cm thick	cum	26500.00
M-0201	Wood local first class small section	cum	18700.00
M-0202	Wood local first class scantling up to 15cmx15cm	cum	21200.00
M-0203	Wood local first class heavy section above 15cmx15cm	cum	24100.00
M-0204	Wood sal piles 25cm to 30cm dia	metre	5000.00
M-0205	Wood sal planks 25cm to 38cm dia thick	cum	32000.00
M-0206	Wood sal scantling heavy section above 15cm to 15cm	cum	27000.00
M-0207	Wood sal scantling upto15x15cm	cum	120.00
M-208	Admixture (Masterplast Pl-1 or equivalent)	Lit	120.00
M-209	Admixture (Masterplast SPl-2 or equivalent)	Lit	100.00
M-210	Air entraining and water reducing plasticiser conforming to IS-9103-1999 (Masterplast PAE or equivalent)	Lit	75.00
M-211	Accelerating plasticiser conforming to IS-9103-1999 (Masterplast APCL or equivalent)	Lit	95.00
M-212	PVC rain water pipe 100mm Dia	RM	90.00