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ರಸ್ತೆ ಮತ್ತು ಸೇತುವೆಗಳ ದರಪಟ್ಟಿ 2021-2022
ಸಂಪುಟ 3

PUBLIC WORKS DEPARTMENT
SCHEDULE OF RATES FOR ROADS & BRIDGES 2021 - 2022
VOLUME 3



GOVERNMENT OF KARNATAKA



**SCHEDULE OF RATES FOR
ROAD AND BRIDGE WORKS
2021 - 2022**

PUBLIC WORKS DEPARTMENT

VOLUME - 3

PREFACE

1. The Karnataka Schedule of rates for Roads & Bridges comprising of the Specifications, Rate Analysis & Technical details is prepared based on MoRTH Standard Data Book for Analysis of Rates - 2019. It consists of the following chapters prepared by Superintending Engineers of Public Works and Rural Development & Panchayath Raj Engineering Departments.

Sl No.	Chapter	Prepared by SE, PWD
1	Carriage of Materials	Ballari
2	Site Clearance	Ballari
3	Earthwork, Erosion Control & Drainage	Ballari
4	Sub Bases, Bases & Shoulders	Ballari
5	Bases & Surface courses	Bengaluru
6	Cement Concrete Pavements	Bengaluru
7	Geosynthetics, Reinforced Earth & Protection Works	Bengaluru
8	Traffic signs Markings & Other Appurtenant works	Bengaluru
9	Pipe Culverts	Hassana
10	Maintenance of Roads	Hassana
11	Horticulture	-
12	Foundations	Dharwada
13	Sub structure	Dharwada
14	Super structure	Dharwada
15	Box Cell structures	-
16	River training & Protection works	Shivamogga
17	Repair & Rehabilitation	Mangaluru
18	Tunnel Work	Mangaluru
19	Environmental & Safety Management & Bio Engineering	Mysuru
	Rural Roads	SE, PRED
20	Panchayath Raj Engineering Department Items	Bengaluru
21	Other Items	

2. The area specific loading as per Vol-1 Common SR shall be added to the finished rate of items mentioned in this Schedule of rates.
3. Roads & Bridges SR-2021-22 has been prepared on the basis of the "Standard Data Book

for Analysis of Rates" of MoRT&H, published by Indian Roads Congress. Some items, which do not find place in the Standard Data Book for Analysis of Rates, as these are required and had not been provided in the previous SR, looking to the necessity of execution these items have also been included in new SR. The items pertaining to Rural roads are also considered in the SR preparation.

- "Specifications" would refer to the "Specifications for Road and Bridge works" (V Revision) published by the Indian roads Congress in April 2013, on behalf of the Government of India, Ministry of Road Transport & Highways.
 - "Clause" would refer to the clauses of the Specifications referred to, in note (a) above.
 - "Engineer-in-Charge" would refer to the Executive Engineer of the division concerned.
 - "Table" would refer to the table of the aforesaid Specifications.
4. The basic material incorporated in this document are conforming to IRC standard / MoRTH & MoRD specifications.
 5. The material rates for the preparation of SR is obtained from PWD Division, Bengaluru. For labour and machinery, the information provided in Vol-I Common SR is adopted.
 6. The finished rates in the SR are inclusive of lead. No separate charges shall be paid to unless it in an extra ordinary case.
 7. The items of Earth work & Concrete works are to be taken from Volume - I, Common SR. The items which are specific to Roads & Bridges are included in the SR under relevant chapters.
 8. For Concrete works, the usage of GGBS, Fly Ash, Silica Fumes & Recycled Concrete Aggregate (RCA) and others as specified relevant IS codes shall be encouraged in civil works. If Cementitious materials are used, the rate analysis shall be reworked considering the data provided in Vol-I Common SR.
 9. Rates for the items of Dense Bituminous Macadam and Bituminous Concrete are based on the bitumen percentage as specified in the items. If additional bitumen required as per job mix formula shall be deemed to be included in the quotation of the Contractor. No additional payment shall be payable on this account.
 10. Mode of measurements shall be as per provisions contained in the relevant clauses of the specifications, unless specified otherwise and all the rates shall be rounded off as per IS-2 (1960)
 11. The material rates in the SR are exclusive of GST.

12. The GST of 12%, Overhead Charges 10% for Road, Overhead Charges 20% for Bridges, Contractor's profit 10% and Labour Cess 1% (subsumed in Overheads) have been adopted in the scheduled rates.
13. The GST of 12% shall be added separately to the estimate as per Govt Order No. PWD 51 RDF 2019, Bengaluru Dated : 18-03-2022.
14. Adoption of SI units in all construction work is made mandatory as per recommendation of Technical Working Group.
15. As per the GO : PWD 51 RDF 2019, Bengaluru Dated : 18-03-2022 The New SR for Roads and Bridges named "Karnataka Schedule of Rates for Roads and Bridges" is issued w.e.f 18-03-2022.
16. Special thanks to Secretary PWD, Chairman & Members of TWG, Engineer-in-Chief, PRAMC, Chief Engineers of PWD, Chief Engineers of National Highways, KSHIP, SHDP, KRDCL and PRED, Superintending Engineers of PWD Circles, National Highways and PRED, Under Secretary PWD and appreciation to team of dedicated Engineers of Department who contributed in compiling this document.
17. Due care has been taken to bring Karnataka Schedule of Rates for Roads & Bridges 2021-22 as per MoRTH Standard Data Book 2019, MoRD and IRC specifications and rate analysis verified by team of Engineers to realistic accuracy. However, if any errors are noticed; same could be intimated to Superintending Engineers for necessary corrections and issue of addendums.

Sd/-
(B. H. Manjunath)
Member Secretary
Technical Working Group
& Superintending Engineer
Public Works Department, Bengaluru Circle

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I. BASIC RATES OF MATERIALS

Sl. No.	Description	Unit	Basic rate in Rs.
001	Aggregates 90 mm to 5.6 mm	m ³	From UNI SR
002	AC pipe 100 mm dia	m	53.00
003	PVC Pipe 110mm outer dia at 2kg per cm ² .	m	152.00
004	Acrylic polymer bonding coat	l	263.00
005	Aluminium Paint	l	117.00
006	Aluminium alloy plate 2mm Thick or Aluminium composite material ACM sheeting - 3MM Thick fixed with Micro Prismatic (HIP) Type XI sheeting including 2% towards cost of drilling holes, nuts, bolts etc.and signs as applicable (lettering included)	m ²	4661.00
007	Aluminium alloy/galvanised steel	t	55085.00
008	Aluminium sheeting 2mm thick or Aluminium composite material ACM sheeting - 3MM Thick fixed with Micro Prismatic (HIP) Type IV sheeting including 2% towards cost of drilling holes, nuts, bolts etc.and signs as applicable (lettering included)	m ²	4407.00
009	Cold Rolled Coil Sheet 16 Guage (1.6mm thickness) sheeting .	kg	44.00
010	Aluminium studs 100 x 100 mm fitted with lense reflectors	Nos	254.00
011	Barbed wire	kg	34.00
012	Bearing (Cast steel rocker bearing assembly of 250 t)	Nos	67797.00
013	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	8534.00
014	Bearing (Forged steel roller bearing of 250 t	Nos	3136.00
015	Bearing (Pot type bearing assembly consisting of a metal piston supported by a disc, PTFE pads providing sliding surfaces against stainless steel mating together with cast steel assemblies/ fabricated structural steel assemblies duly painted with all components	Nos	55085.00
016	Bearing (PTFE sliding plate bearing assembly of 80 t)	Nos	67797.00
017	Bearing (Supply of sliding plate bearing of 80 t)	Nos	69492.00
018	Bentonite	kg	4.00
019	Binding wire	kg	55.00
020	Bitumen VG40*	t	55862.00

Sl. No.	Description	Unit	Basic rate in Rs.
021	Bitumen VG30*	t	52608.00
022	Bitumen VG10*	t	50721.00
023	Bitumen (emulsion) Slow Setting SS1*	t	50383.00
024	Bitumen (emulsion) Rapid Setting RS1*	t	46794.00
025	C.I. Shoes for the pile	kg	85.00
026	Cement*	t	From UNI SR
027	Cold twisted bars (TMT Bars) FE500*	t	From UNI SR
028	Cold twisted bars (TMT Bars) FE 550 Grade*	t	From UNI SR
029	Collar for joints 300 mm dia	Nos	220.00
030	Compressible Fibre Board(20mm thick)	m ²	339.00
031	Connectors/ Staples	each	5.00
032	Copper Plate(12m long x 250mmwide)	kg	410.00
033	Corrosion resistant Structural steel*	t	From UNI SR
034	Corrugated sheet, 3 mm thick, "Thrie" beam section railing	kg	47.00
035	Credit for excavated rock found suitable for use	m ³	250.00
036	Curing compound	l	195.00
037	Delineators from ISI certified firm as per the standard drawing given in IRC - 79	each	1407.00
038	Earth Cost or compensation for earth taken from private land (including royalty)	m ³	248.00
039	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),	m	10678.00
040	Epoxy compound with accessories for preparing epoxy mortar	kg	170.00
041	Epoxy mortar	kg	170.00
042	Epoxy primer	kg	334.00
043	Epoxy resin-hardner mix for prime coat	kg	576.00
044	Flag of red color cloth 600 x 600 mm	each	20.00
045	Galvanised MS flat clamp	Nos	34.00
046	Galvanised steel wire crates of mesh size 100 mm x 100 mm woven with 4mm dia. GI wire in rolls of required size.	m ²	152.00

Sl. No.	Description	Unit	Basic rate in Rs.
047	Gelatin 80%	kg	106.00
048	Geo grids	m ²	148.00
049	Geomembrane	m ²	55.00
050	Geonets	m ²	74.00
051	Geotextile	m ²	200.00
052	Geotextile filter fabric	m ²	70.00
053	GI bolt 10 mm Dia	Nos	8.00
054	HDPE pipes 75mm dia	m	99.00
055	HDPE pipes 90mm dia	m	127.00
056	Helical pipes 600mm diameter	m	152.00
057	Hot applied thermoplastic compound	kg	152.00
058	HTS strand	t	50847.00
059	Joint Sealant Compound (650)	kg	152.00
060	Jute netting, open weave, 2.5 cm ² opening for seeding and Mulching	m ²	13.00
061	LDO for steam curing	l	40.00
062	M.S. Clamps	Nos	51.00
063	M.S.shoes @ 35 kg per pile of 15 m	kg	51.00
064	Mild Steel bars*	t	50847.00
065	Modular strip/box seal expansion joint including anchorage catering to a horizontal movement beyond 70 mm and upto 140mm assembly comprising of edge beams, central beam, 2 modules chloroprene seal, anchorage elements, support and control system, all steel sections protected against corrosion and installed by the manufacturer or his authorised representative	m	4746.00
066	Modular strip/box seal expansion joint catering to a horizontal movement beyond 140mm and upto 210mm box/box seal joint assembly containing 3 modules/cells and comprising of edge beams, two central beams, chloroprene seal, anchorage elements, support and control system, all steel sections protected against corrosion and installed by the manufacturer or his authorised representative	m	5805.00
067	Nipples 12mm	Nos	8.00

Sl. No.	Description	Unit	Basic rate in Rs.
068	Nuts and bolts	kg	42.00
069	Paint	l	229.00
070	Pavement Marking Paint	l	203.00
071	Paving Fabric	m ²	18.00
072	Perforated geosynthetic pipe 150 mm dia	m	212.00
073	Perforated pipe of cement concrete, internal dia 100 mm	m	254.00
074	Pipes 200 mm dia, 2.5 m long for drainage	m	220.00
075	Plastic sheath, 1.25 mm thick for dowel bars	m ²	5.00
076	Plastic tubes 50 cm dia, 1.2 m high	Nos	24.00
077	Polymer braids	m	25.00
078	Pre moulded Joint filler,25 mm thick for expansion joint.	m ²	532.00
079	Preformed continuous chloroprene elastomer or closed cell foam sealing element with high tear strength, vulcanised in a single operation for the full length of a joint to ensure water tightness.	m	11186.00
080	Pre-moulded asphalt filler board	m ²	530.00
081	Pre-packed cement based polymer concrete of strength 45 Mpa at 28 days	kg	170.00
082	Primer	kg	118.00
083	Quick setting compound	kg	127.00
084	Random Rubble Stone	m ³	860.00
085	RCC Pipe NP 3 heavy duty non presure pipe 1000 mm dia	m	4800.00
086	RCC Pipe NP 4 heavy duty non presure pipe 900 mm dia	m	5025.00
087	RCC Pipe NP 3 heavy duty non presure pipe 900 mm dia	m	4136.00
088	RCC Pipe NP 4 heavy duty non presure pipe 1200 mm dia	m	8097.00
089	RCC Pipe NP 3 heavy duty non presure pipe 1200 mm dia	m	6449.00
090	RCC Pipe NP 4 heavy duty non presure pipe 300 mm dia	m	979.00
091	Reflectorising glass beads	kg	47.00
092	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Copper Strips)	m	1098.00
093	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Galvanised carbon steel strips)	m	107.00

Sl. No.	Description	Unit	Basic rate in Rs.
094	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Glass reinforced polymer/fibre reinforced polymer/polymeric strips)	m	170.00
095	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. (Stainless steel strips)	m	610.00
096	Reinforcement strips 60 mm wide 5 mm thick as per clause 3102. Aluminium strips)	m	36.00
097	Scrap tyres of size 900 x 20	Nos	200.00
098	Separation Membrane of impermeable plastic sheeting 125 micron thick	m ²	25.00
099	Sheathing duct	m	13.00
100	Square Rubble Coursed Stone	m ³	910.00
101	Steel circular hollow pole of standard specification for street lighting to mount light at 5 m height above deck level	each	4237.00
102	Steel circular hollow pole of standard specification for street lighting to mount light at 9 m height above road level	each	6780.00
103	Steel drum 300 mm dia 1.2 m high/empty bitumen drum	Nos	125.00
104	Steel helmet and cushion block on top of pile head during driving.	kg	51.00
105	Steel pipe 25 mm external dia as per IS:1239	m	85.00
106	Steel pipe 50 mm external dia as per IS:1239	m	170.00
107	Strip seal expansion joint	m	10170.00
108	Structural Steel*	t	59322.00
109	Class B GI pipe of 75mm dia	t	34237.00
110	Super plastisizer admixture IS marked as per 9103-1999	kg	170.00
111	Synthetic Geogrids as per clause 3102.8 and approved design and specifications.	m ²	280.00
112	Tie rods 20mm diameter	Nos	83.00
113	Tiles size 300 x 300 mm and 25 mm thick	each	24.00
114	Traffic cones with 150 mm reflective sleeve	Nos	339.00
115	Tube anchorage set complete with bearing plate, permanent wedges etc	Nos	11864.00
116	Unslaked lime	t	4237.00

Sl. No.	Description	Unit	Basic rate in Rs.
117	Water	KL	44.00
118	Water based cement paint	l	58.00
119	Welded steel wire fabric	kg	37.00
120	Wire mesh 50mm x 50mm size of 3mm wire	kg	34.00
121	Wooden ballies 2" Dia for bracing	each	190.00
122	Wooden ballies 8" Dia and 9 m long	each	212.00
123	Wooden packing	m ³	28813.00
124	Wooden staff for fastening of flag 25 mm dia, one m long	each	8.00
125	Silica Fume	kg	13.00
126	Synthetic Geogrid Ultimate tensile strength- 100 kN/m	m ²	59.00
127	Synthetic Geogrid Ultimate tensile strength- 150 kN/m	m ²	63.00
128	Synthetic Geogrid Ultimate tensile strength- 200 kN/m	m ²	68.00
129	Synthetic Geogrid Ultimate tensile strength- 250 kN/m	m ²	72.00
130	Synthetic Geogrid Ultimate tensile strength- 300 kN/m	m ²	76.00
131	Synthetic Geogrid Ultimate tensile strength- 350 kN/m	m ²	80.00
132	Synthetic Geogrid Ultimate tensile strength- 400 kN/m	m ²	85.00
133	Synthetic Geogrid Ultimate tensile strength- 450 kN/m	m ²	89.00
134	Synthetic Geogrid Ultimate tensile strength- 600 kN/m	m ²	93.00
135	Synthetic Geogrid Ultimate tensile strength- 700 kN/m	m ²	97.00
136	Synthetic Geogrid Ultimate tensile strength- 800 kN/m	m ²	102.00
137	Synthetic Geogrid Ultimate tensile strength- 900 kN/m	m ²	106.00
138	Synthetic Geogrid Ultimate tensile strength- 1000 kN/m	m ²	110.00
139	Synthetic Geogrid Ultimate tensile strength- 1100 kN/m	m ²	114.00
140	Synthetic Geogrid Ultimate tensile strength- 1200 kN/m	m ²	119.00
141	Explosives for blasting	kg	37.00
142	Detonators	Nos.	10.00

* Items subjected to quarterly revision of rates.

Note : The material rates (excluding GST) are rounded off and listed for infomation purpose and shall not be used for direct payments.

V. BASIC NOTES FOR PREPARATION OF SCHEDULE OF RATES

Schedule of rates for Road and Bridge works is indicated as under :

Description of items

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

2. **Mechanical Means**

Due to mechanization of construction work, rate for various items have been derived using mechanical means. However, manual means have also been provided for certain cases, where areas may be inaccessible for machines or quantum of work may not be large enough to justify deployment of the machines.

3. **Overhead Charges**

- 3.1 **10 percent overhead charges has been considered in the Schedule of Rates**

- (i) Site accommodation, setting up plant, access road, water supply, electricity and general site arrangements.
- (ii) Office furniture, equipment and communications.
- (iii) Expenditure on
 - a) Office of contractor
 - b) Site Supervision
 - c) Documentation and "as built" drawings
- (iv) Mobilisation/de-mobilisation of resources.
- (v) Labour camps with minimum amenities and transportation to work sites.
- (vi) Light vehicles for site supervision including administrative and managerial requirements
- (vii) Laboratory equipment and quality control including field and laboratory testing
- (viii) Minor T&Ps 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) Financing Expenditure
- (xiii) Work Insurance/compensation

4. Contractor Profit

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

5. Basic Inputs

Other than the Basic given in the standard data book of MoRT&H, the rate for plants & equipments, material and labour are as per the prevailing market rates from the near by authorised dealers/quarry etc.

6. Plants and Equipments

- 6.1 A dozer is preferred for excavation where cutting and filling for the roadway is within 100 m. For longer leads, a combination of hydraulic excavator and tipper is proposed.
- 6.2 Keeping in view the job and managerial factors and the age factor of machines, the output of plant and equipment is taken approximately 70 percent of the rated capacity given by manufacture under ideal condition.
- 6.3 It has been assumed that a water tanker would make one trip per hour on an average. Water charges have not been included for items where the requirement is very nominal. It is assumed that the same would be covered under sundries. In some cases, water charges are added as per the necessity.
- 6.4 Output of plant/equipment is considered for the compacted quantities.
- 6.5 The usage charges for machines include ownership charges, cost of repair and maintenance including replacement of tyres and running and operating charges which includes crew, fuel and lubricants as specified in Vol-I Common SR.

7. Materials

- 7.1 Quantities of materials considered in the rate are approximate for the purpose of estimating and include normal wastages. Actual consumption would have to be based on mix design. If necessary, the cost for concrete works are to be worked out from approved mix designs considering the rate analysis provided in Vol-I Common SR.
- 7.2 Karnataka has typical topographical conditions having different altitude, wherein maximum construction material are brought from Bengaluru and utilised in different station located in state. Hence, to maintain the uniformity in rates, it is decided to prepare the Roads & Bridges SR 2021-22 considering lead on materials and aggregate. The transportation cost shall be included in the estimate as per distance from the source of procurement of material/aggregate. The following sources have been adopted in the schedule 2021-22. The rates are inclusive of lead.
 - (i) Bitumen product - Maharatna / Miniratna companies
 - (ii) All Steel items / Cement - Mean rates of PWD Zones
 - (iii) Aggregate - Bengaluru Rural

- 7.3 For large scale works alternative proposal for cost of aggregates by installing crusher is to be compared with procurement of crushed aggregates from the market and proposal found more economical is to be adopted.
- 7.4 The specifications of materials shall be governed by section 1000 of MoRT&H Specifications for Road and Bridge Works.
8. **Labour** : The rates issued by labour department, GoK is considered for SR.
10. **General** :
- 10.1 The clause numbers refer to MoRT&H Specifications for Road and Bridges Works.
- 10.2 Assumptions made have been indicated in respective chapter in the form of notes, where required.
- 10.3 Sundries to cater for unforeseen contingency and miscellaneous items have been added in the overhead charges. Additionally if the item needs specific non measurable items sundries have been considered.
- 10.4 Arrangement for traffic during construction shall be as per Clause 112 of MoRT&H Specifications for Road and Bridge Works.
- 10.5 Contractor will make his own arrangements for borrowing earth. However, compensation for earth taken from private land has been included in the rate for construction of embankment with borrowed earth. The royalty charges shall be deducted as per Mines & Geology department circular.
- 10.6 **Credit for Dismantled Material**
- Credit for dismantled materials has not been included in this schedule of rates. The dismantled materials should be examined and a realistic assessment made for such materials, which can be utilised for works and to be reflected in the estimate.
- 10.7 The source of material and samples are required to be approved by the Engineer before start of any work.
- 10.8 The rates of items include cost of testing dismantled materials.
- 10.9 The use of surface by construction vehicles shall be governed by Clause 119 of MoRT&H Specifications.
- 10.10 The contractor shall arrange to provide and maintain adequate equipment for field laboratory as per Clause 121.
- 10.11 Quality Control of works shall be governed by Section 900 of MoRT&H Specifications.
- 10.12 The various activities of works shall also be documented by photographs and video cassettes as per Clause 121 of MoRT&H Specifications.
- 10.13 The classification of soil shall be as per Clause 301.2 of MoRT&H Specifications.
- 10.14 The earth excavated from foundations has been considered to be backfilled and balance utilised locally for road work except in the case of marshy soil.

- 10.15 The rate for removal of unsuitable soil does not provide for replacement by suitable soil which will have to be paid separately.
- 10.16 Work specific Items for hilly terrain are to be analysed separately.
- 10.17 Grade of cement may be adopted as per mix design. IS:10262:2009
- 10.18 The coarse and fine aggregates shall conform to IS:383:2016
- 10.19 **BRIDGE WORKS :**

Definitions

- a) Major Bridge : Having a total length of above 60 m. measured along the centre line of the bridge between inner face of the dirt walls.
- b) Minor Bridge : Having a total length more 6 m. and upto 60 m. measured along the centre line of the bridge between inner face of the dirt walls.
- c) Culverts : Having a total length 6 m. or less between the inner face of the dirt walls or extreme vents way boundaries measured at right angle thereof.

Foundation

- i) All works below average ground level or lowest water level, whichever is higher shall be termed as foundation work.
- ii) Lowest water level shall be the average water level met with at the time of doing the foundation work. The maximum and minimum water levels shall be recorded by the Engineer, just before starting the particular foundation and within a reasonable time at the closer of that foundation work, the average of these two levels shall be the low water level for that foundation work.

Sub-Structure:

The part of the bridge structure below: (a) Soffit level of the deck slab/beams and or (b) Springing level for arch spans, but above average ground level or LWL whichever is higher, shall be termed as sub-structure of the bridge part.

Super-Structure

The work above: (a) Soffit level for deck slabs/beams and (b) Springing level for arch span, including kerbs, railing, expansion joints, beams, slabs etc. shall be termed as super-structure of the bridge part.

Concrete

- a) The mixing of the concrete, transportation, placing & compaction shall be carried out as per provision made in clause 1708 and 1709 of the specifications of Road and Bridge Works of MoRTH (5th Revision).

- b) Equipment used for production, transportation and compaction of concrete shall be as per provision made in clause 1707 of specifications for Road and Bridge works of MoRTH (5th Revision).
- c) Finishing of concrete by plastering the surface shall not be done without obtaining written permission from the Executive Engineer. No extra for plastering shall be payable. Light touching up and rubbing the uneven surfaces by carborandum stone/Grinding shall be carried out as part of finishing of concrete surface.
- d) The grading, size, quality of coarse aggregates shall be followed strictly as per the specifications for Road and Bridge works" of MoRTH (5th Revision) and respective IRC Codes.
- e) The size and quality of aggregate, mixing etc. for plain concrete or RCC works should be as given in "Specification for Road and Bridge works" of MoRTH (5th Revision).
- f) The rates of concreting items and for cost of form work and centering, the percentages specified in Vol-I Common SR shall be followed.
- g) Admixtures may be used for the concrete work to improve the workability with minimum water cement ratio and shall be provided as per provision made in clause 1705 of "Specification for Road and Bridge works" of MoRTH (5th Revision).

Steel

- i) The usage of Steel shall be as specified in Vol-I Common SR (Appendix-III)
- ii) Steel used as reinforcement and other structural steel or HT steel shall be measured as per the actual quantity of steel placed in finished structures as per clause 1608 of "Specification for Road and Bridge works" of MoRTH (5th Revision).

Additionalities

As per the recommendations of Technical Working Group and based on MoRTH Standard data book, the following percentages for different types of Bridges shall be applied on the finished rate of Concrete as below: (Refer Vol-1 Common SR)

Sl No.	Type of structure	Percentage on finished rate of concrete per m³
1.	Solid Slab Super Structure	20%
2.	T-Beam & Slab	25%
3.	Box Girder & Balanced Cantilever	38%
4.	Cast insitu Box girder & Segmental construction	38%

Sl No.	Type of structure	Percentage on finished rate of concrete per m ³
5.	For T-beam & slab, including launching of precast girders by launching truss upto 40 m span	21%
6.	Box Culverts	20%

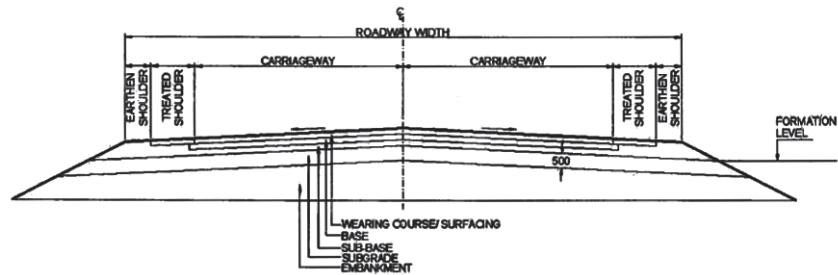
For Bridge Works, Overhead charges as per the below table is considered in the rate analysis.

Summary of overheads

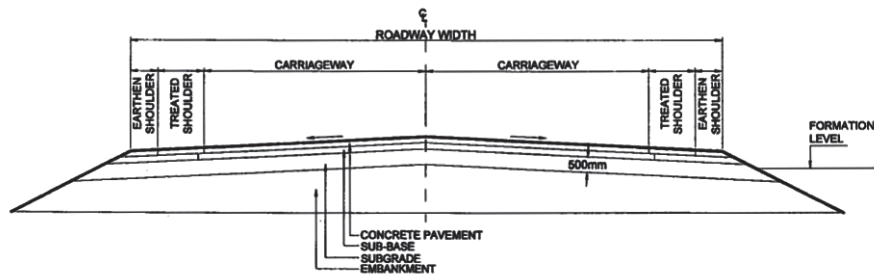
Sl No.	Description	Overhead charges
1.	Major & Minor Bridges	20%
2.	Bridge Works (Rehabilitation)	30%
3.	Tunnel Works	25%

Note : Chapter Nos. 12 to 18 pertains to Bridge works. Necessary Overhead charges as per the above table are considered in the rate analysis. However, for Earth Work and Concrete Works considered from Vol-I Common SR with necessary Overheads to be added in the rate analysis.

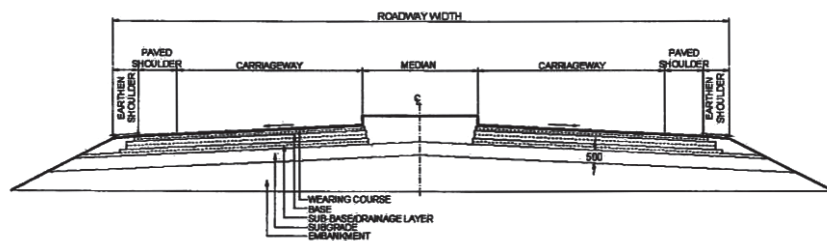
CROSS SECTIONS OF THE ROAD



Specifications to Describe Road Cross-Section Elements with a Flexible Pavement



Specifications to Describe Road Cross-Section Elements with a Concrete Pavement



Specifications to Describe Road Cross-Section Elements of a Dual Carriageway

VI. CHAPTER WISE SUMMARY

Chapter - 1 : Carriage of Materials

1. Analysis for loading has been done both for manual and mechanical means for adoption as per actual situations.
2. The cost of carriage will vary depending upon the riding surface of the road. Provision has accordingly been made considering surface roads, unsurfaced gravelled roads and katcha tracks.
 - i) The speed of loaded vehicle on black top surface road is taken as 25 kmph and empty vehicle is taken as 35 kmph.
 - ii) The speed of loaded vehicle on gravelled surface road is taken as 20 kmph and empty vehicle speed is taken as 30 kmph.
 - iii) The speed of loaded vehicle on kutchra road is taken as 10 kmph and empty vehicle speed is taken as 15 kmph and in hilly area speed of loaded vehicle on katcha road is taken as 5 kmph and empty vehicle speed is taken as 7 kmph.
 - iv) The speed of loaded Transit Mixer is taken as 20 kmph and empty Transit Mixer speed is taken as 30 kmph.
3. Provision has been made for a tractor trolley instead of tipper where dismantled materials of sorts or material having more volume as compared with weight are required to be transported. This arrangement is more economical.
4. Where loading is done by mechanical plant like HMP or batching plant and there is automatic loading in tippers, provision of loading and un-loading time has been taken by the tipper for getting loaded at the plant and un-loading in the paver or otherwise at site.

Chapter - 2 : Site Clearance

1. Carriage of dismantled materials, bushes, branches of tree etc., has been catered with a tipper mechanical loading and unloading
2. Unless otherwise stated the rates include sorting and disposal of unserviceable material and stacking of serviceable material with all lifts and lead.
3. The Clearing and grubbing road land has been considered both by manual and mechanical means. The rates include sorting and disposal of unserviceable material and stacking of serviceable material with all lifts and lead. The estimator or the sanctioning authority use discretion depending upon quantum of work and particular site conditions for mechanical means.

4. The dismantling of structures has been considered both by manual and mechanical means. The rates include sorting and disposal of unserviceable material and stacking of serviceable material with all lifts and lead. The estimator or the sanctioning authority use discretion depending upon quantum of work and particular site conditions for mechanical means.
5. The rates include T&P and scaffolding required for items of dismantling.
6. Dismantling of Hume pipes has been catered mechanical means as pipes can be easily rolled by men to a suitable stacking place within the right of way.
7. For dismantling of structures, which remain submerged in water, the cost may be enhanced by 50%.
8. Dismantling of utilities is required to be done under the supervision of concerned departments with prior information to the users.
9. All minor T&P items unspecified and required for dismantling are already included in overhead charges.
10. For dismantling of utility services like water pipe lines, electric and telephone lines, prior intimation should be given to users.

Chapter - 3 : Earthwork, Erosion Control and Drainage

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 for small jobs.
2. In the analysis of Earthwork, only compacted volume of earth has been considered.
3. Rates have been analyzed for average working conditions. For extra-ordinary conditions, where the management of materials, labour and machinery are difficult, necessary changes can be made by the Superintending Engineers with prior approval of Chief Engineers.
4. Average achievable outputs of machines have been considered taking into account job and management factors.
5. A water tanker of 6, 12, & 16 KL capacity which is commonly used at construction sites has been considered.
6. The replacement of unsuitable soil by suitable soil shall be included separately in the estimate. The analysis for removal of unsuitable soil does not provide for replacement by suitable soil.
7. In cases where embankment is constructed with earth taken from roadway, the cost of depositing the earth at the site of embankment is already included in the disposal of excavated earth.
8. For narrow and restricted areas, plate compactor has been proposed for compaction to achieve the desired density.

9. For small jobs where loading and unloading is required to be done manually, tractor - trolley has to be proposed for carriage instead of a tipper.
10. In case excavated rock is found suitable for incorporation in works, suitable credit for the available rock shall be given.
11. The possibility of using the blasted rock fragments for backfilling behind structures or backfilling of foundation pits or filling in medians / separators or use in service road shall be examined before proposing disposal of excavated rock.
12. In case of hill roads, the cut earth can be pushed down the valley in case there is no objection. In that case, cost of disposal is not required to be provided.

Chapter - 4 : Sub-Bases, Bases (Non-Bituminous) and Shoulders

1. For construction of sub-base, three alternatives as under have been provided:
 - a. Plant mix method
 - b. Mix in Place method
 - c. Crusher Run method
2. For Plant Mix method of Granular sub base, a wet mix plant of 250, 200 & 100 TPH capacity is taken as the appropriate mixing plant.
3. The plant mix method is actually being practiced from quite some time to get better quality of mix. It is also found economical as it can achieve more progress.

Grading Requirements of Granular Sub Base Materials (%)						
IS Sieve Designation	Preferably be used in top layer of Sub Base		Preferably be used in lower Sub Base (Poorly Graded)		Preferably be used in Sub Base cum Drainage Layer	
	Grading I	Grading II	Grading III	Grading IV	Grading V	Grading VI
75.00 mm	100	-	-	-	100	-
53.00 mm	80-100	100	100	100	80-100	100
26.50 mm	55-90	70-100	55-75	50-80	55-90	75-100
9.50 mm	35-65	50-80	-	-	35-65	55-75
4.75 mm	25 - 55	40-65	10-30	15-35	25-50	30-55
2.36 mm	20- 40	30-50	-	-	10-20	10-25
0.85 mm	-	-	-	-	2-10	-
0.425 mm	10-15	10- 15	-	-	0-5	0-8
0.075 mm	<5	< 5	< 5	< 5	-	0-3

4. In case of cement treated sub-base or base course, Plant mixing as well as site mixing with the help of cement spreader, stabilizer equipment is considered in the analysis.
5. In case of medians, separators and footpaths, plate compactor has been catered for compaction due to restricted space.
6. Separate rate for penetration coat over top layer of crushed cement concrete base has been provided, as this item is optional.
7. The quantity considered in the output is the compacted quantity. The quantities of aggregates provided in the rate analysis under the head material are the un-compacted quantities.

Chapter - 5 : Bases and Surface Course (Bituminous)

1. The clauses of MoRT&H Specifications, which have been mentioned for each item, may be referred for detailed specifications and construction procedure.
2. The Machinery and equipment included in analysis are as per various specifications of MoRT&H and are mandatory. As per the present trend, contractors are procuring machinery and equipment of higher capacity.
3. The outputs taken for the construction equipment are for the compacted quantities of the relevant items and not for loose quantities.
4. The items of bituminous works under maintenance have been added in the Chapter on Maintenance.
5. Tack coat and prime coat, wherever provided are required to be measured and paid/ separately.
6. Brooming & Cleaning of surface is a part of the 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.
7. It is presumed that tack coat, where required, will be provided immediately preceding the bituminous layer.
8. Rolling of bituminous courses is required to be done as per Clause 501.6. Provision in the analyses has accordingly been made. 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 road rollers are deployed at sites as per provision in the rate analysis.
9. Spreading of bituminous materials shall be done as per Clause 501.5.3.

10. Mixing , Laying and Rolling Temperatures for Bituminous mixes are to be as per Table 500-2

Bitumen Viscosity Grade	Bitumen Temperature	Aggregate Temperature	Mixed Material Temperature	Laying Temperature	Rolling Temperature
VG – 40	160-170	160-175	160-170	150 Min	100 Min
VG – 30	150-165	150-170	150-165	140 Min	90 Min
VG – 20	145-165	145-170	145-165	135 Min	85 Min
VG -10	140-160	140-165	140-160	130 Min	80 Min

11. The source of all materials to be used on the project must be tested and expressly approved by the Engineer in Charge and Quality Assurance agencies of the department.
12. Choice of grade of bitumen shall be made as per IRC - 37:2018.
13. Bituminous layers options recommended as per IRC 37:2018, Table 9.1 vide Chief Engineer Quality Assurance Zone, PWD Bengaluru Circular No. 712 dt. 17-03-2021

Summary of Bituminous Layer Options Recommended in these Guidelines.

Sl No.	Traffic Level	Surface Course		Base/Binder Course	
		Mix type	Bitumen type	Mix type	Bitumen type
1	>50 msa	SMA	Modified bitumen or VG40	DBM	VG40
		GGRB	Crumb rubber modified bitumen.		
		BC	With modified bitumen		
2	20-50 msa	SMA	Modified bitumen or VG40	DBM	VG40
		GGRB	Crumb rubber modified bitumen.		
		BC	Modified bitumen or VG40		
3	<20 msa ¹	BC/SDBC/PMC/ MSS/ Surface Dressing (besides SMA, GGRB and BC with modified binders)	VG40 or VG30	DBM/BM	VG40 or VG30

¹ For expressways and national highways, even if the design traffic is less than 20 msa, VG40 or modified bitumen shall be used for surface course and VG40 bitumen shall be used for the DBM.

Special cases :

- Mastic Asphalt can also be used for roads in heavy rainfall areas and junction locations.
- BC/SDBC with VG30 is recommended if total bituminous layer requirement is less than 40 mm.

As per recommendations of Technical Working Group, VG-30 grade of Bitumen shall be used for State Highways and Major District Roads for traffic <20 MSA.

For traffic >20 MSA Bituminous Layer Options as per IRC-37:2018 shall be followed.

Chapter - 6 : Cement Concrete Pavement

1. High capacity of batch mix plants of 240 m³/hr & 120 m³/hr have been considered in the rate analysis of cement concrete pavement works. The items involving Cement Concrete Roads by manual Concrete mixers & Self Loading Mixers are also included in the SR, as decided by the Technical Working Group.
2. While tippers have been provided for transportation of dry lean cement concrete and rolled cement concrete, transit truck mixers have been considered for the cement concrete pavement.
3. Chemical admixture and Silica Fumes are to be considered to improve workability with reduced water cement ratio.
4. OPC 43 & 53 grade, Portland Slag Cement (PSC) and Portland Pozzolana Cement (PPC) is recommended for the cement concrete pavement i.e, for pavement quality concrete to get higher strength. However, for dry lean concrete, OPC 43 grade, Portland Slag Cement and Portland Pozzolana Cement shall be used.
5. The rate for slip form paver has been considered for pavement quality concrete, mechanical paver has been provided for dry lean concrete. However for smaller length construction by fixed form paver is an alternative.
6. Ultrafine GGBS as per IS 16715-2018 can be used as concrete admixtures for improved mechanical properties and corrosion resistance.

Chapter - 7 : Geosynthetic, Reinforced Earth and Protection Works

1. The specifications for geo-synthetics which includes geotextiles, geogrids, geo-nets, geomembranes, geo-composites, geo-cells, geo-synthetic-map, natural geotextiles and Paving Fabric and Glass Grids shall be as per section 700 of MoRT&H Specifications.
2. The geotextile proposed for sub-surface drain shall satisfy the requirements given in Clause 702.2.3.1
3. Bitumen overlay shall follow on the same day where paving fabric is laid.

Chapter - 8 : Traffic Signs, Markings and Other Road Appurtenances

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

2. Rate analysis for fencing provides for three types as under :
 - a) Barbed wire fencing
 - b) Welded steel wire fabric with mesh size of 75 X 25 mm
 - c) Welded steel wire fabric with mesh size of 75 X 50 mm
3. Kerb stone laying and road marking has been provided for laying by mechanical means.
4. Back filling of foundation of boundary pillars has been proposed with stone spalls, tightly packed and compacted.
5. The item pertaining to road traffic signals has not been analyzed as this is a specialized work and rates can be obtained from firms having specialization for design and installation of this work.
6. For metal beam crash barrier, a 'W' shaped beam of size 311 X 83 mm flange width made with structural steel corrugated plate 3 mm thick and having a length of 4.5 m has been provided, over a channel post of 150 X 75 X 5 mm with a spacer of channel section 150 X 75 X 5 mm, 330 mm long.
8. Two supports have been provided for direction and place identification signs where size is more than 0.9 m². Only one is provided for size upto 0.9 m².
9. The Traffic signs proposed are of retro-reflectorized type made of encapsulated lens type reflective sheeting fixed over aluminum sheeting as per Clause 801.3 and installation.
10. The size, location of traffic signs shall be as per IRC:67-2012.
11. The analyses for rigid, semi-rigid and flexible crash barriers have been included.
12. Provision has been made for a crane for installation of overhead signs.
13. Separate rate analysis has been made for Tubular steel railing with RCC posts and MS steel posts.
14. Additional & regularly used Road Safety items have been included in other items chapter.
15. The organization and financial aspects are required to be finalized in consultation with administrative and traffic authorities.

IRC 67 2012 Table 6.2 Suggested Guidelines for Usage of Retro-Reflective Sheeting

Class of Sheeting	Type of Sheeting (ASTM)	Category of Road				
		National/ State Highway	Major District Roads	Rural Roads	Urban/City Roads	Express way
Class A	Type I	No	Yes	Yes	No	No
	Type II	No	Yes	Yes	No	No

Class of Sheeting	Type of Sheeting (ASTM)	Category of Road				
		National/ State Highway	Major District Roads	Rural Roads	Urban/City Roads	Express way
Class B	Type III	Yes	Yes	Yes	Yes	No
	Type IV	Yes	Yes	Yes	Yes	No
Class C	Type VIII	Yes	No	No	Yes	Yes
	Type IX	Yes	No	No	Yes	Yes
	Type XI	Yes	No	No	Yes	Yes

Design patterns

Road Type	Background	Arrows/Border/Letters
Expressway	Blue	White
National Highway (NH)	Green	White
State Highway (SH)	Green	White
Major District Road (MOR)	Green	White
Village Road (VR)	White	Black
Urban/City Road	Blue	White

Table 8.3 C

- iii) Warranty for Class B and Class C sheet of Cautionary /Mandatory / Informative Sign boards **Class B**(Type IV High intensity micro-prismatic grade sheeting-HIP) shall have 7 years written warranty from the manufacturer and authorised distributor/convertor issued for field performance including the screen printed areas and cut-out sheeting and cut-out durable transparent overlay film and this warranty certificate in original should be submitted to the Engineer in Charge by the contractor/supplier.

Class C(Type XI Micro prismatic grade sheeting) shall have 10 years written warranty from the manufacturer and authorised distributor/convertor issued for field performance including the screen printed areas and cut-out sheeting and cut-out durable transparent overlay film and this warranty certificate in original should be submitted to the Engineer in Charge by the contractor/supplier.

The contractor shall produce the written warranty from the manufacturer and authorised distributor/convertor, else 20% of single item amount shall be deducted from his bill.

Chapter - 9 : Pipe Culverts

- Excavation for structures has been provided both by manual and mechanical means. The rate relevant to a particular situation may be adopted.

2. The earth excavated from foundation has been proposed to be backfilled and balance quantity utilized for road work locally except for marshy soil where disposal has to be provided.
3. Pipe culverts of size 1000 mm, 1200 mm & 1500 mm dia in single row and double row which are generally used on roads, have been included. Only laying pipe has been included in the rate. Auxiliary works such as excavation, backfilling, concrete and masonry shall be paid for separately, as provided under the respective clauses.
4. The choice between first class bedding and cement cradle bedding will depend on particular situations and approved design.
5. The joining of pipes is proposed by collar or flush joints.
6. Backfilling upto 300 mm above top of the pipe shall be carefully done and the soil thoroughly rammed, tamped or vibrated in layers not exceeding 150 mm.
7. Head walls and other ancillary works shall be executed under respective clauses.
8. Pipe shall be laid at least 600 mm below from the sub-base.

Chapter - 10 : Maintenance of Roads

1. In 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 per cent is required to be provided as fresh material.
2. For making up earthen shoulders, it has been assumed that on an average 150 mm filling will be required. Similarly, for stripping of excess soil from 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 the dozer on the valley side. In case there is any objection to this arrangement due to particular site conditions, resources like loader and tripper will have to be provided for disposal of earth/debris for the lead involved.
5. Pot-hole repair and patchwork are provided to be done by mechanical means.
6. The cost of other items like repair of ruts and undulation maintenance of earthen shoulders, cross drainage works, minor and major bridges and miscellaneous items like turfing and arboriculture, painting and lettering on km stones, repair to signage, repair to footpath, street light, 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.

Chapter -12 : Bridge Foundation

1. Excavation for Structures has been provided both by manual and mechanical means. The rate relevant to a particular situation may be adopted as per Vol-I Common SR.
2. The earth excavated from foundation has been proposed to be backfilled and balance quantity utilised for road work locally except for marshy soil where disposal has been provided as per Vol-I Common SR.
3. The rock foundations are required to be prepared which are to be analysed.
4. In case of rocks, excavation has been considered upto a depth of 3 m only.
5. Embedment of foundation in soft and hard rocks has been provided as required by the specifications.
6. Dewatering has been provided in excavation for foundation. In case dewatering is not required for a particular site condition, the same may be omitted while preparing the estimate.
7. Mixing of cement concrete has been considered only by using batching plant.
8. Concrete batching plant is generally placed within one km of the bridge site. In case of longer lead transportation cost may be worked out on t-km.
9. The Coarse and fine aggregate for cement concrete shall be as per IS : 383 : 2016
10. Description of items has been given very brief. Relevant clauses of MoRT&H Specifications may be referred for detailed specification.
11. The rate analysis for well foundation has been included for diameter varying from 6 m to 12 m. Well for twin D type has also been included.
12. Pneumatic sinking is a specialised 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.
13. Rate analysis for various types of piles like bored cast in situ, driven precast RCC pile and driven steel piles of H section have been included. If the steel casting in case of driven pile is required to be retained, the same is required to be priced separately.
14. Pile driving rigs including vibratory hammers are assumed to be self contained with power units and necessary accessories required for driving.
15. The quantity of concrete which is required which is required to be stripped off upto a minimum height of 600 mm above the designed top level of the pile has been taken into account in the rate analysis.
16. The levelling course below the pile cap shall be of M 15 grade concrete.
17. Steel reinforcement for cement concrete work is required to be protected with steel plates of thickness not less than 10 mm upto top level of well curb. For height above the top of curb,

the thickness of the steel plate may be reduced to 6 mm. This extra height of steel lining should be limited to 3 m.

18. Appendix-4 of IRC :78 may be referred regarding precautions to be taken during sinking of wells.
19. In case of blasting during sinking of wells the inner face of the curb is required to be protected with the steel plates of thickness not less than 10 mm upto top level of well curb. For height above the top of curb, the thickness of the steel plate may be reduced to 6 mm. This extra height of steel lining should be limited to 3 m.
20. The concrete mix used in bottom plug shall have optimum cement content and a slump of about 150 mm to permit easy flow of concrete through tremie to fill up all cavities.
21. Necessary safety precautions shall be taken for excavation on open foundations for which guidance may be taken from IS 3764:1992.
22. A levelling course of 100 mm thickness in M10 shall be provided before laying open foundations.
23. In case of open foundation, dewatering shall not be permitted from the time of placing of concrete upto 24 hours after placement.
24. In case of open foundations in rock, the trenches around the footing shall be filled up with concrete of M-15 grade upto a level of 0.6 m for hard rock and 1.5 m for soft rock above the foundation level. The portion above this may be filled by boulders grouted with cement.
25. 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.
26. The well curb shall be in RCC of the mix not leaner than M25 grade with minimum steel reinforcement of 72 kg /m³ excluding bond rods.
27. The top of the bottom plug shall be at least 300 mm above the top of curb.
28. No dewatering shall be carried out within 7 days of casting the bottom plug.
29. In case of cement concrete piles, the minimum grade of concrete shall be M 35 grade.
30. The top of the pile shall be project 50 mm into the pile cap and reinforcement of the pile shall be fully anchored in the pile cap.
31. The minimum thickness of the pile cap should be at least 0.6 m or 1.5 times the diameter of the pile whichever is more.
32. Guidance for piles is obtained from IS : 2911-2010
33. Concrete in driven cast in situ piles shall be cast upto a minimum height of 600 mm above the designed top level of the pile, which shall be stripped off to obtain sound concrete either before final set or after 3 days.

Chapter -13 : Bridge Substructure

1. The cost of form work will vary with the height of sub structure. Provision has accordingly been made on percentage basis.
2. Bridge bearing, being commercial items produced by specialised firms with imported technology and parts, the rates for the same are required to be ascertained from the market for the approved design and technical specifications. These rates are not included in the analysis as they can vary from design to design and based on the loading arrangement and span variations, hence if required they may be analysed for a particular project depending upon the loadings and design.
3. Filter media and backfilling behind abutments are required to be provided as per guidelines given in IRC:78.
4. Weep holes shall be provided as per clause 2706 of MoRT&H specifications.
5. In case of roller-cum-rocker bearings, only full circular rollers are to be provided.
6. All bearings shall be set truly level so as to have full and even seating.
7. For elastomeric bearing pads, the concrete surface shall be levelled such that the variation is not more than 1.5 mm from a straight edge placed in any direction across the area.
8. The bearing should be procured only from those manufacturers who have been pre qualified by the Ministry of Road Transport and Highways and as per relevant Indian Standards.
9. The bottoms of the girders resting on the bearing shall be plane and truly horizontal.
10. For Spans in grade, the bearing shall be placed horizontal by using sole plates for suitable designed RCC pedestals.

Chapter -14 : Bridge Superstructure

1. The rate for the wearing coat has been analysed as under:
 - a. Cement Concrete Wearing Coat.
 - b. Asphaltic Concrete wearing coat.
 - c. Bitumen mastic wearing coat.

The item may be selected as per the approved design. In case the thickness of wearing coat is different from that analysed, the rate for the desired thickness may be worked out on pro-rata basis.
2. The rate analysis has been done both for RCC Railing and MS 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 as 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 required to be ascertained from the firms specialized in this work by the concerned Superintending Engineer.
5. Expansion joints involving movements exceeding 40 mm are specialised readymade items commercially produced by reputed firms with imported technology and parts.
6. Supply of new type of expansion joint may be obtained on the basis of competitive bidding from amongst the suppliers pre-qualified by the Ministry of Road Transport and Highways. Further, a warranty of 10 years of trouble free performance may be insisted from the suppliers.
7. For Bridges having wide deck/span length of more than 120 m or/and involving complex movements/ rotations in different directions / planes, provision of special type of modular expansion joints such as swivel joists joints are required for which firms specialised in this field may be consulted. Such cases will require prior approval of Chief Engineer.

Chapter -16 : River Training And Protection Works

1. Three types of Aprons on river bed as under have been catered.
 - a. Boulder apron laid dry
 - b. Boulder apron laid in wire crates / blocks
 - 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 (uncoursed) or in nominal mix cement concrete M 15. Depending upon the design, the rates may be adopted under respective clauses.
3. The rate analysis for gabion structures comprising of stone boulders laid in blocks have been included. Such structures are suited as retaining structures and for erosion in river training works especially for situations where some settlement of foundation is anticipated. These structures can adjust in minor settlements, being flexible structures, without losing their functional requirement.

Chapter -17 : Repair And Rehabilitation

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 analysed for three different spans 25,50 and 100 m.
3. Sealing of cranks has been proposed with cement grout, cement mortar (1:1) grout and epoxy grout by injecting with grout pump through nipples.
4. Bonding of new concrete with old concrete is proposed with epoxy resin.

5. The repair and placement of the following structures has been included
 - a. Bridge Bearings
 - b. Expansion Joints
 - c. Concrete Railing
 - d. Mild Steel Railing
 - e. Crash Barrier

Chapter -18 : Tunnel Work

1. The items are considered as per specifications mentioned in IRC-91:2010.
2. The Overhead Charges shall be 25% and Contractor's profit of 10%.
3. Most of the tunnel works are constructed using New Austrian Tunneling Method (NATM) and Tunnel Boring Machines (TBM). However, such high end technology works involves specific datas to be prepared by the Sanctioning authorities.
4. The items in this chapter are for reference and are to be operated with prior approval of Chief Engineer.

Chapter -19 : Environmental & Safety Management and Bio Engineering

1. The items of Bio Engineering comprising Bamboo Crib Wall, Fascines, Brush Layers, Palisades in Hills and Slopes, Seeding and Mulching have been included in the chapter to stabilise hill slopes.
2. Seeding and Mulching has been included as earth work to stabilise the cut and fill slope in plane
3. To attenuate the environmental pollution generated during construction and operation stage, three type of preventive measures have been provided
 - a. Dust Supression
 - b. Noise Barrier
 - c. Silt Fencing

The selection of the attenuation factor will be based on site situation and the sensitive receptors
4. The cost of Environmental and Social Workshops to create awareness to the locals, NGOs, etc., has been evaluated.
5. The Cost of Maintenance for plantation has been considered and included for the purpose of estimation.

Chapter - 1
CARRIAGE OF MATERIALS

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER-1 CARRIAGE OF MATERIALS				
1.1		A	Loading and Unloading of Stone Boulder/Stone aggregates/ Sand/Kankar/Moorum. (Tipper 5.5 m ³)	m ³ 118.00
1.1		B	Loading and Unloading of Stone Boulder/Stone aggregates/ Sand/Kankar/Moorum. (Tipper 10 m ³)	m ³ 83.00
1.1		C	Loading and Unloading of Stone Boulder/Stone aggregates/ Sand/Kankar/Moorum. (Tipper 14 m ³)	m ³ 74.00
1.1		D	Loading and Unloading of Stone Boulder/Stone aggregates/ Sand/Kankar/Moorum. (Tipper 18 m ³)	m ³ 72.00
1.2			Loading and Unloading of Boulders by Manual Means	m ³ 331.00
1.3			Loading and Unloading of Cement or Steel by Manual Means and Stacking.	t 485.00
1.4	(i)		Cost of Haulage Excluding Loading and Unloading	
			Case-1 : Surfaced Road	
		A	Taking output 10 t load and lead 10 km = 100 t.km	t.km 12.00
		B	Taking output 18 t load and lead 10 km = 180 t.km	t.km 7.00
		C	Taking output 25 t load and lead 10 km = 250 t.km	t.km 5.00
		D	Taking output 32 t load and lead 10 km = 320 t.km	t.km 4.00
1.4	(ii)		Case-II : Unsurfaced Gravelled Road	
		A	Taking output 10 t load and lead 10 km = 100 t.km	t.km 12.00
		B	Taking output 18 t load and lead 10 km = 180 t.km	t.km 8.00
		C	Taking output 25 t load and lead 10 km = 250 t.km	t.km 6.00
		D	Taking output 32 t load and lead 10 km = 320 t.km	t.km 5.00
1.4	(iii)		Case-III : Katcha Track and Track in River Bed/Nallah Bed and Choe Bed.	
		A	Taking output 10 t load and lead 10 km = 100 t.km	t.km 24.00
		B	Taking output 18 t load and lead 10 km = 180 t.km	t.km 17.00
		C	Taking output 25 t load and lead 10 km = 250 t.km	t.km 13.00
		D	Taking output 32 t load and lead 10 km = 320 t.km	t.km 10.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
1.4	(iv)	Case-IV : Katcha Track in hilly area.		
		Taking output 10 t load and lead 10 km = 100 t.km	t.km	49.00
1.4	(v)	Case-V : Transit mixers		
		Taking output 15 t load and lead 10 km = 150 t.km	t.km	10.00
1.5		Hand Broken stone Aggregates 63mm nominal size		
		Supplying of quarried stone, hand breaking into course aggregates 63mm nominal size (passing 80mm and retained on 50mm sieve) and stacking at as directed	m³	1,297.00

Chapter - 2
SITE CLEARANCE

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
CHAPTER - 2 SITE CLEARANCE				
2.1	201	A	Cutting of Trees, excluding removal of stumps and roots of trees	
		(i)	Girth from 300 mm to 600 mm	each 469.00
		(ii)	Girth from 600 mm to 900 mm	each 749.00
		(iii)	Girth from 900 mm to 1800 mm	each 1,382.00
		(iv)	Girth above 1800 mm	each 2,512.00
2.2	201	B	Removal of stumps and roots including backfilling with suitable material to required compaction	
		(i)	Girth from 300 mm to 600 mm	each 233.00
		(ii)	Girth from 600 mm to 900 mm	each 322.00
		(iii)	Girth from 900 mm to 1800 mm	each 384.00
		(iv)	Girth above 1800 mm	each 476.00
2.3	201		Clearing Grass and Removal of Rubbish & dumping to outside periphery by manual means	ha 28,451.00
2.4	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 material to be used or auctioned, including removal and disposal of top organic soil not exceeding 150 mm in thickness.	
2.4		(i)	By Manual Means	
		A	In area of light jungle	ha 1,68,300.00
		B	In area of thorny jungle	ha 1,96,700.00
2.5		(ii)	By Mechanical Means using Dozer	
		A	In area of light jungle	ha 1,58,044.00
		B	In area of thorny jungle	ha 1,68,586.00
2.6		(iii)	By Mechanical Means using Motor Grader	
		A	In area of light jungle	ha 1,39,983.00
		B	In area of thorny jungle	ha 1,46,154.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
2.7	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 dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts and lead		
2.7		I Lime /Cement Concrete		
		(i) By Manual Means		
		A Lime Concrete, cement concrete grade M-10 and below	m ³	618.00
		B Cement Concrete Grade M-15 & M-20	m ³	731.00
		C Prestressed / Reinforced cement concrete grade M-20 & above	m ³	1,853.00
2.8		(ii) By Mechanical Means		
		A Cement Concrete Grade M-15 & M-20	m ³	881.00
		B Prestressed / RCC grade M-20 & above	m ³	1,204.00
2.9		(iii) Dismantling Brick / Tile work		
		By Manual Means		
		A In lime mortar	m ³	379.00
		B In cement mortar	m ³	499.00
		C In mud mortar	m ³	322.00
		D Dry brick pitching or brick soling	m ³	299.00
2.10		(iv) Dismantling Stone Masonry		
		By Manual means		
		A Rubble stone masonry in lime mortar	m ³	413.00
		B Rubble stone masonry in cement mortar.	m ³	481.00
		C Rubble Stone Masonry in mud mortar.	m ³	367.00
		D Dry rubble masonry	m ³	344.00
		E Dismantling stone pitching/ dry stone spalls.	m ³	322.00
		F Dismantling boulders laid in wire crates including opening of crates and stacking dismantled materials.	m ³	367.00
2.11		II By Mechanical means		
		A Dismantling Brick / Tile work / rubble masonry / pitching / etc by mechanical means	m ³	135.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
2.12		Wood Work wrought framed and fixed in frames of trusses upto a height of 5 m above plinth level	m ³	835.00
2.13		Steel Work in all types of sections upto a height of 5 m above plinth level excluding cutting of rivet.		
	A	Including dismembering	t	2,156.00
	B	Excluding dismembering	t	1,530.00
	C	Extra over item No (V) A and (V) B for cutting rivets.	t	15.00
2.14	(vi)	Scraping of Bricks Dismantled from Brick work including stacking.		
	A	In lime/cement mortar	Nos.	2.00
	B	In mud mortar	Nos.	0.70
2.15	(vii)	Scraping of Stone from Dismantled Stone masonry		
	A	In cement and lime mortar	m ³	797.00
	B	In Mud mortar	m ³	171.00
2.16	(viii)	Scarping Plaster in Lime or Cement Mortar from Brick/ Stone Masonry	m ²	25.00
2.17	(ix)	Removing all type of Hume Pipes and Stacking including Earthwork and Dismantling of Masonry Works.		
	A	Upto 600 mm dia	m	715.00
	B	Above 600 mm to 900 mm dia	m	757.00
	C	Above 900 mm	m	1,026.00
	Note	1. The excavation of earth, dismantling of stone masonry work in head walls and protection works is not included which is to be measured and paid separately.		
		2. Credit for retrieved stone from masonry work may be taken as per actual availability.		
2.18	202	Dismantling of Flexible Pavements		
		Dismantling of Flexible pavements and disposal of dismantled materials and stacking serviceable and unserviceable materials separately		
	I	By Manual Means		
	A	Bituminous course	m ³	967.00
	B	Granular course	m ³	682.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		II By Mechanical Means		
	A	Bituminous course	m ³	201.00
	B	Granular courses	m ³	37.00
2.19	202	Dismantling of Cement Concrete Pavement		
		Dismantling of cement concrete pavement by mechanical means using pneumatic tools, breaking to pieces not exceeding 0.02 m ³ in volume and stock piling at designated locations and disposal of dismantled materials and stacking serviceable and unserviceable materials separately	m ³	422.00
2.20	202	Dismantling of Guard Rails		
		Dismantling guard rails by manual means and disposal of dismantled material with all lifts and lead, stacking serviceable materials and unserviceable materials separately.	m	89.00
2.21	202	Dismantling of Kerb Stone		
		Dismantling kerb stone by manual means and disposal of dismantled material with all lifts and lead	m	18.00
2.22	202	Dismantling of Kerb Stone Channel		
		Dismantling kerb stone channel by manual means and disposal of dismantled material with all lifts and lead	m	24.00
2.23	202	Dismantling of Kilometre Stone		
		Dismantling of kilometre stone including cutting of earth, foundation and disposal of dismantled material with all lifts and lead		
	A	5th KM stone	each	529.00
	B	Ordinary KM Stone	each	352.00
	C	200 m stone	each	70.00
2.24	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 lead, stacking serviceable material and unserviceable material separately.	m	75.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
2.25	202	Dismantling of CI Water Pipe Line		
		Dismantling of CI water pipe line 600 mm dia including disposal with all lifts and lead and stacking of serviceable material and unserviceable material separately under supervision of concerned department	m	149.00
2.26	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 lead and stacking of serviceable and unserviceable material separately but excluding earth excavation and dismantling of masonry works.	m	178.00
2.27	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 lead and stacking the serviceable and unserviceable material separately	No.s	264.00
		Note <i>All the serviceable materials resulting from removal of Telephone/ Electric pole & lines shall be handed over to department.</i>		

Chapter - 3

**EARTHWORK,
EROSION CONTROL AND
DRAINAGE**

(To refer UNI SR of Technical Working Group)

**Note : This chapter contain items
which are not found in UNI SR)**

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 3				
EARTH WORK, EROSION CONTROL AND DRAINAGE				
3.1	301		Removal of Unserviceable Soil with Disposal upto a suitable distance as directed by the Engineer incharge of work	m ³ 32.00
3.2	303		Presplitting 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 tipper by a front end loader and disposing of the material with all lifts and lead, all as specified in clause No. 303	m ² 252.00
3.3	305.4.3	(i)	Scarifying Existing Granular Surface to a Depth of 50 mm by Manual Means	m ² 34.00
3.4	305.4.3	(ii)	Scarifying Existing Granular Surface to a Depth of 50 mm by Mechanical Means using Hydraulic excavator	m ² 4.00
3.5	305.4.3		Scarifying the existing bituminous road surface to a depth of 50 mm and disposal of scarified material by Mechanical Means using Hydraulic excavator with in all lifts and lead	m ² 4.00
3.6	305		Construction of Subgrade and Earthen Shoulders	
			Construction of sub-grade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	m ³ 413.00
3.7	305.3.4		Compacting Original Ground	
			Compacting original ground supporting embankment	
			Loosening, leveling and Compacting original ground supporting embankment to facilitate placement of first layer of embankment, scarified to a depth of 150 mm, mixed with water at OMC and then compacted by rolling so as to achieve minimum dry density as given in Table 300-2 for embankment construction.	m ³ 87.00
3.8	309		Surface Drains in with perforated pipe	
			Construction of surface drain with perforated pipe of 100 mm internal diameter of metal/ asbestos cement/cement concrete/ PVC, closely jointed, perforations ranging from 3 mm to 6 mm depending upon size of material surrounding the pipe, with 150 mm bedding below the pipe and 300 mm cushion above the pipe cross section of excavaton 450 x 550 mm. Excavated material to be utilised in roadway at site.	m 451.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
3.9	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.	m	148.00
3.10	309	Underground Drain at Edge of Pavement		
		Construction of an underground drain 1 m x 1 m (inside dimensions) lined with RCC M-20, 15 cm thick and covered with RCC slab 10 cm in thickness on urban roads.	m ²	4,927.00
3.11	310	Preparation and Surface Treatment of Formation.		
		Preparation and surface treatment of formation by removing mud and slurry, watering to the extent needed to maintain the desired moisture content, trimming to the required line, grade, profile and rolling with 8-10 t smooth wheeled roller, complete as per clause 310.	m ²	3.00
3.12	313	Construction of rock fill embankment with all lifts and lead		
		Construction of rock fill embankment with broken hard rock fragments of size not exceeding 300 mm laid in layers not exceeding 500 mm thick including filling of surface voids with stone spalls, blinding top layer with granular material, rolled with vibratory road roller, all complete as per clause 313.	m ³	122.00
3.13		Embankment Construction with Flyash/Pond ash available from coal or lignite burning Thermal Plants as waste material.		
		Construction of embankment with Flyash conforming to table 1 of IRC: SP: 58 - 2001 obtained from coal or lignite burning thermal power stations as waste material, spread and compacted in layer of 200mm thickness each at OMC, all as specified in IRC: SP: 58-2001 and as per approved plans.	m ³	99.00

Chapter - 4
SUB-BASES, BASES
(NON-BITUMINOUS) AND SHOULDERS

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 4				
SUB-BASES, BASES (NON- BITUMINOUS) AND SHOULDERS				
4.1	401		Granular Sub-Base	
		A	Plant Mix Method	
			Construction of Granular Sub-Base of required grading as per design mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	
		(i)	For Grading -I Material	m ³ 2,349.00
		(ii)	For Grading -II Material	m ³ 2,397.00
		(iii)	For Grading -III Material	m ³ 2,382.00
		(iv)	For Grading -IV Material	m ³ 2,384.00
		(v)	For Grading -V Material	m ³ 2,347.00
		(vi)	For Grading -VI Material	m ³ 2,373.00
4.2	401	B	By Mix in Place Method	
			Construction of Granular Sub-Base of required grading as per design spreading in uniform layers with motor grader on prepared surface mixing by mix in place method with front end loader at OMC and compacting with vibratory roller to achieve the desired density, complete as per clause 401	
		(i)	For Grading -I Material	m ³ 2,235.00
		(ii)	For Grading -II Material	m ³ 2,283.00
		(iii)	For Grading -III Material	m ³ 2,268.00
		(iv)	For Grading -IV Material	m ³ 2,271.00
		(v)	For Grading -V Material	m ³ 2,234.00
		(vi)	For Grading -VI Material	m ³ 2,259.00
		Note:	Any one of the grading for GSB material may be adopted as per design IRC-37:2018.	
4.3	401 & 407	C	Using Crusher Run	
			Construction of granular sub-base using crusher run spreading in uniform layers with motor grader on prepared surface mixing by mix in place method with rotovator at OMC and compacting with vibratory roller to achieve the desired density, complete as per clause 401	m ³ 2,254.00
		Note:	Grading for material may be adopted as per design	

SI No	Ref. to MoRT&H Spec.		Description	Unit	Rate ₹
4.4	402		Lime Stabilisation for Improving Sub-grade		
			Providing, laying and spreading available soil in the sub-grade on a prepared surface, pulverising, mixing the spread soil in place with rotavator with 2 per cent slaked lime having minimum content of 70 per cent of CaO (Calcium Oxide), grading with motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved sub grade	m ³	655.00
4.5	402	(i)	Lime Stabilisation for Improving Sub-grade		
			Providing, laying and spreading available soil in the sub-grade on a prepared surface, pulverising, mixing the spread soil in place with rotavator with 2 per cent slaked lime using Binder spreader Machine having minimum content of 70 per cent of CaO (Calcium Oxide), grading with motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved sub grade	m ³	708.00
4.6	402	(ii)	Lime Stabilisation for Improving Sub-grade		
			Providing, laying and spreading available soil in the sub-grade on a prepared surface, pulverising, mixing the spread soil in place with soil stabilisor with 2 per cent slaked lime manually spread having minimum content of 70 per cent of CaO (Calcium Oxide), grading with motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved sub grade	m ³	657.00
4.7	402	A	Cement Stabilisation for Improving Sub-grade		
			Providing, laying and spreading soil on a prepared sub grade, pulverising, mixing the spread soil, in place with rotavator with 2% cement, grading with the motor grader and compacting with the road roller at OMC to the desired density to form a layer of sub grade.	m ³	771.00
4.8	403	B	Cement Stabilisation for Improving Sub-grade		
		(I)	Providing, laying and spreading available in the sub grade on a prepared surface, pulverising, mixing the spread soil in place with soil stabilisor with 2% cement using binder spreader machine, 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.	m ³	824.00
4.9	403	(II)	Cement Stabilisation for Improving Sub-grade		
			Laying and spreading available soil in the sub grade on a prepared surface, pulverising, mixing the spreaded soil in place with soil stabilisor with 2% cement manually spread,	m ³	774.00

SI No	Ref. to MoRT&H Spec.		Description	Unit	Rate ₹
			grading with the motor grader and compacting with the road roller at OMC to achieve the desired density to form a layer of improved sub-grade.		
4.10	402	A	Lime stabilisation in Embankment		
			Providing, laying and spreading available soil in the embankment on a prepared surface, pulverising, mixing the spreaded soil in place with rotovator with 2% of slaked lime having minimum content of 70% of CaO, 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 improved embankment. (By Manual Means)	m ³	622.00
4.11	402	(i)	Lime stabilisation in Embankment		
			Providing, laying and spreading available soil in the embankment on a prepared surface, pulverising, mixing the spreaded soil in place with Soil stabilisor with 2% of slaked lime using Binder spreader Machine having minimum content of 70% of CaO, grading with the motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved embankment. (By Mechanical Means)	m ³	675.00
4.12	402	(ii)	Lime stabilisation in Embankment		
			Providing, laying and spreading available soil in the embankment on a prepared surface, pulverising, mixing the spreaded soil in place with Soil stabilisor with 2% of slaked lime manually spread having minimum content of 70% of CaO, grading with the motor grader and compacting with the road roller at OMC to achieve the desired density to form a layer improved embankment. (By Manual Means)	m ³	624.00
4.13	402	(iii)	Cement stabilisation in Embankment		
			Providing, laying and spreading available soil in the embankment on a prepared surface, pulverising, mixing the spreaded soil in place with Soil Stabilisor with 2% of cement using Binder spreader machine grading with the motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved embankment. (By Mechanical Means)	m ³	775.00
4.14	402	(iv)	Cement stabilisation in Embankment		
			Providing, laying and spreading available soil in the embankment on a prepared surface, pulverising, mixing the spreaded soil in place with Soil Stabilisor with 2% of cement manually spreaded grading with the motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved embankment. (By Manual Means)	m ³	724.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
4.15	402	Lime Treated Soil for Sub- Base		
		Providing, laying and spreading soil on a prepared embankment, pulverising, mixing the spread soil in place with rotavator with 3 percent slaked lime with minimum content of 70 per cent of CaO (Calcium Oxide), grading with motor grader and compacting with the road roller at OMC to achieve at least 98 per cent of the max dry density to form a layer of sub base.	m ³	801.00
4.16	403	Cement Treated Soil for Sub- Base/ Base		
		Providing, laying and spreading soil on a prepared embankment, pulverising, adding 4% quantity of cement to the spread soil mixing in place with rotavator, grading with 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..	m ³	1,123.00
4.17	403	Cement Treated Crushed Rock or combination as per clause 403 and table 400-4 in Sub- Base/ Base		
		Providing, laying and spreading material on a prepared sub grade, adding the adding the designed quantity of cement to the spread .material, mixing in place with rotavator grading with motor grader and compacting with the road roller at OMC to achieve at least desired unconfined compressive strength & to form a layer of sub-base/base.		
		(i) For Sub-Base Course	m ³	2,782.00
		(ii) For Base Course	m ³	2,799.00
4.18	403	A Cement Treated Crushed stone Sub- Base (Plant mix method)		
		Construction of Granular Sub Base by providing graded Material, mixing with cement in a mechanical mix plant at OMC carriage of mixed material to work site spreading in a uniform layer with mechanical paver on prepared surface and compaction with vibratory power roller to achieve the desired density complete as per clause 401 (2.5% Cement)		
4.19		Laying using Mechanical Paver		
		(i) Grading III materials	m ³	2,851.00
		(ii) Grading IV materials	m ³	2,877.00
4.20	403	Cement Treated Crushed stone Sub- Base		
		B By Mix in place method		
		Construction of Granular Sub-Base by providing graded Material, mixing, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		surface, mixing with cement at OMC and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 (2.5% Cement)		
		By Mechanical means		
		(i) For grading III Material	m ³	2,974.00
		(ii) For grading IV Material	m ³	2,974.00
4.21	404.3.1	Making 50 mm x 50 mm Furrows		
		Making 50 mm x 50 mm furrows, 25mm/ 50mm deep, 45 degrees 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		
		A 25 mm deep furrow cutting	m ²	6.00
		B 50 mm deep furrow cutting	m ²	12.00
4.22	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	m ³	1,982.00
4.23	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 3 wheeled steel/ vibratory roller in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density.		
		A By Manual Means		
		(i) Grading-I (63 mm to 45 mm)		
		(a) Using Screening Crushable type such as Moorum or Gravel	m ³	2,288.00
		(b) Using Screening Type A (13.2mm agg)	m ³	2,464.00
		(b) Using Screening Type B (11.2mm agg)	m ³	2,589.00
		(ii) Grading-II (53 mm to 22.4 mm)		
		(a) Using Screening Crushable type such as Moorum or Gravel	m ³	2,218.00
		(b) Using Screening Type B (11.2mm agg)	m ³	2,519.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
4.24		B Mechanical means		
		(i) Grading-I (63 mm to 45 mm)		
		(a) Using Screening Crushable type such as Moorum or Gravel	m ³	2,031.00
		(b) Using Screening Type A (13.2mm agg)	m ³	2,225.00
		(b) Using Screening Type B (11.2mm agg)	m ³	2,350.00
		(ii) Grading-II (53 mm to 22.4 mm)		
		(a) Using Screening Crushable type such as Moorum or Gravel	m ³	1,961.00
		(b) Using Screening Type B (11.2mm agg)	m ³	2,280.00
4.25	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 400-9 transporting the aggregates obtained from breaking of cement concrete slabs with lead, laying and compacting the same as sub base/ base course, constructed as WBM to clause 405 except the use of screening or binding Material.	m ³	336.00
4.26	405.2	Penetration Coat Over Top Layer of Crushed Cement Concrete Base		
		Spraying of VG-30 bitumen over cleaned dry surface of crushed cement concrete base at the rate of 25 kg per 10 m ² by a bitumen pressure distributor, spreading of key aggregates at the rate of 0.13 m ³ per 10 m ² by a mechanical gritter and rolling the surface as per clause 506.3.8	m ²	28.00
4.27	406	A Wet Mix Macadam (Plant mix method)		
		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	m ³	2,394.00
		uniform layers with paver/grader in sub-base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.		
4.28	406	Cement Treated Crushed stone base Plant Mix Method		
		Providing, laying, spreading and compacting graded stone aggregate mixed with cement to crushed stone treated base specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with Paver in sub base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density. (Laying using Mechanical paver)	m ³	3,244.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
4.29	408	Construction of Median and Island with Soil Taken from Roadway Cutting		
		Construction of Median and Island above road level with approved material deposited at site from roadway cutting and excavation for drain and foundation of other structures, spread, graded and compacted as per clause 408	m ³	290.00
4.30	408	Construction of Median and Island with Soil Taken from Borrow Areas	m ³	451.00
		Construction of median and Island above road level with approved material brought from borrow pits, spread, sloped and compacted as per clause 408		
4.31	408	Construction of Shoulders		
		A. Earthen Shoulders		
		The rate as applicable for sub-grade construction may be adopted.		
		B. Hard Shoulders		
		Rate as applicable for sub-base and or base may be adopted as per approved design.		
		C. Paved shoulders		
		The rate may be adopted as applicable for different layers of pavement depending upon approved design of paved shoulders.		
4.32	410	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 pre-cast	m ²	787.00
		concrete tiles in cement mortar 1:3 including provision of all drainage arrangements but excluding kerb channel..		
		i) For Granular sub base material		
		ii) For cement concrete grade M15		
		iii) For cement plaster 1:3		
		iv) Pre-cast cement concrete tiles		
		v) RCC pipes		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
4.33	407	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 407 to form a layer of sub-base/Base		
	A	By Mix in Place Method		
		i) For 53 mm maximum size (Table 400-14)	m ³	2,200.00
		ii) For 37.5 mm maximum size (Table 400-14)	m ³	2,247.00
	Note:	<i>Any one of the aggregate grading may be adopted</i>		
	B	By Mixing in Plant method		
		i) For 53 mm maximum size (Table 400-14)	m ³	2,247.00
		ii) For 37.5 mm maximum size (Table 400-14)	m ³	2,294.00

Chapter - 5

**BASES AND SURFACE COURSES
(BITUMINOUS)**

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 5				
BASES AND SURFACE COURSES (BITUMINOUS)				
5.1	502	A	Prime Coat over WMM/WBM	
		(i)	Providing and applying primer coat with SS1 grade Bitumen Emulsion on prepared surface of granular base including cleaning of road surface and spraying primer at the rate of 0.90 kg per m ² using mechanical means.	44.00
5.2	502	B	Prime Coat over Stabilised soil base / Crusher Run Macadam	
		(i)	Providing and applying primer coat with SS1 grade Bituminous Emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.90 kg/m ² using mechanical means.	56.00
5.3	503	(i)	Tack coat on Bituminous surface	
			Providing and applying tack coat with RS1 Bituminous Emulsion using emulsion pressure distributor at the rate of 0.20 kg/m ² on the prepared bituminous surface cleaned with mechanical broom	12.00
5.4	503	(ii)	Tack coat on Granular surface treated with primer	
			Providing and applying tack coat with RS1 Bituminous Emulsion using emulsion pressure distributor at the rate of 0.25 kg/m ² on the prepared bituminous surface cleaned with mechanical broom	15.00
5.5	503	(iii)	Tack coat on Cement concrete pavement	
			Providing and applying tack coat with RS-1 Bituminous Emulsion using emulsion pressure distributor at the rate of 0.30 kg/m ² on the prepared bituminous surface cleaned with mechanical broom	18.00
5.6	504	(i)	Bituminous Macadam Grading - I for traffic <20 MSA	
		A	Providing and laying Bituminous Macadam with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-30 @ 3.3% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	7,487.00

SI No	Ref. to MoRT&H Spec.		Description	Unit	Rate ₹
		B	Providing and laying Bituminous Macadam with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-30 @ 3.3% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	7,405.00
		C	Providing and laying Bituminous Macadam with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading premixed with bituminous binder VG-30 @ 3.3% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	7,508.00
5.7	504	(i)	Bituminous Macadam Grading - I for traffic >20 MSA		
		A	Providing and laying Bituminous Macadam with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-40 @ 3.3% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	7,773.00
		B	Providing and laying Bituminous Macadam with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-40 @ 3.3% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	7,691.00
		C	Providing and laying Bituminous Macadam with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading premixed with bituminous binder VG-40 @ 3.3% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	7,794.00
5.8	504	(ii)	Bituminous Macadam Grading - II for traffic <20 MSA		
		A	Providing and laying Bituminous Macadam with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-30 @ 3.4% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	7,886.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		B Providing and laying Bituminous Macadam with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-30 @ 3.4% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	7,804.00
		C Providing and laying Bituminous Macadam with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading premixed with bituminous binder VG-30 @ 3.4% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	7,907.00
5.9	504	(ii) Bituminous Macadam Grading - II for traffic >20 MSA		
		A Providing and laying Bituminous Macadam with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-40 @ 3.4% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	8,180.00
		B Providing and laying Bituminous Macadam with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-40 @ 3.4% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	8,098.00
		C Providing and laying Bituminous Macadam with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading premixed with bituminous binder VG-40 @ 3.4% by weight of mix, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per clauses 501.6 and 501.7 to achieve the desired compaction	m ³	8,201.00
5.10	505	A Dense Graded Bituminous Macadam Grading - I for traffic <20 MSA		
		A Providing and laying Dense Graded Bituminous Macadam with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 4.0 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment,	m ³	9,132.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.		
		B Providing and laying Dense Graded Bituminous Macadam with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 4.0 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	9,046.00
		C Providing and laying Dense Graded Bituminous Macadam with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 4.0 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	9,154.00
5.11	505	A Dense Graded Bituminous Macadam Grading - I for traffic >20 MSA		
		A Providing and laying Dense Graded Bituminous Macadam with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 4.0 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	9,496.00
		B Providing and laying Dense Graded Bituminous Macadam with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 4.0 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	9,410.00
		C Providing and laying Dense Graded Bituminous Macadam with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 4.0 per cent by weight of total mix and filler, transporting the	m ³	9,518.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.		
5.12	505	Dense Graded Bituminous Macadam Grading - II for traffic <20 MSA		
		A Providing and laying Dense Graded Bituminous Macadam with 120 TPH capacity HMP batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 4.5 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	9,867.00
		B Providing and laying Dense Graded Bituminous Macadam with 100 TPH capacity HMP batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 4.5 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	9,781.00
		C Providing and laying Dense Graded Bituminous Macadam with 40/60 TPH capacity HMP using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 4.5 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	9,889.00
5.13	505	Dense Graded Bituminous Macadam Grading - II for traffic >20 MSA		
		A Providing and laying Dense Graded Bituminous Macadam with 120 TPH capacity HMP batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 4.5 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	10,276.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		B Providing and laying Dense Graded Bituminous Macadam with 100 TPH capacity HMP batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 4.5 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	10,190.00
		C Providing and laying Dense Graded Bituminous Macadam with 40/60 TPH capacity HMP using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 4.5 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.	m ³	10,298.00
5.14	507	A Bituminous Concrete Grading I for traffic <20 MSA		
		A Providing and laying Bituminous Concrete with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-30 @ 5.2 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,162.00
		B Providing and laying Bituminous Concrete with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-30 @ 5.2 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,075.00
		C Providing and laying Bituminous Concrete with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder VG-30 @ 5.2 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,185.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
5.15	507	A Bituminous Concrete Grading I for traffic >20 MSA		
		A Providing and laying Bituminous Concrete with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-40 @ 5.2 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,646.00
		B Providing and laying Bituminous Concrete with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-40 @ 5.2 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,558.00
		C Providing and laying Bituminous Concrete with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder VG-40 @ 5.2 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,668.00
5.16	507	B Bituminous Concrete Grading II for traffic <20 MSA		
		A Providing and laying Bituminous Concrete with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 5.4 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,508.00
		B Providing and laying Bituminous Concrete with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 5.4 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,420.00

SI No	Ref. to MoRT&H Spec.		Description	Unit	Rate ₹
		C	Providing and laying Bituminous Concrete with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder VG-30, @ 5.4 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,531.00
5.17	507	B	Bituminous Concrete Grading II for traffic >20 MSA		
		A	Providing and laying Bituminous Concrete with 120 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 5.4 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	12,010.00
		B	Providing and laying Bituminous Concrete with 100 TPH capacity hot mix plant batch type using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 5.4 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	11,922.00
		C	Providing and laying Bituminous Concrete with 40/60 TPH capacity hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder VG-40, @ 5.4 per cent of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	12,032.00
5.18	509		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 VG-30 laid on prepared surface and rolling with 8-10 t smooth wheeled steel roller		
		Case-I	19 mm nominal chipping size	m ²	108.00
		Case-II	13mm nominal size chipping	m ²	86.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
5.19	510	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 viscosity grade bitumen VG-30 to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable Hot mix plant of capacity not less than 40/60 TPH laying and rolling with a smooth wheeled roller, finished to required level and grades.	m ²	151.00
5.20	508	Close Graded Premix Surfacing/Mixed Seal Surfacing		
		Providing, laying and rolling of close-graded premix surfacing material of 20 mm thickness composed of 11.2 mm to 0.09 mm (Type-A) or 13.2 mm to 0.09 mm (Type-B) aggregates using VG-30 bitumen to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable hot mix plant of capacity not less than 40/60 TPH, laying and rolling with a Smooth wheeled roller finishing to required level and grade.		
		Type - A	m ²	198.00
		Type - B	m ²	179.00
5.21	511	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 with bituminous binder VG-30		
		(i) Case - I : Type A Premix Sand Seal coat	m ²	82.00
		(ii) Case - II : Type B Premix Sand Seal coat	m ²	57.00
5.22	516	Mastic Asphalt		
		Providing and laying 25 mm thick mastic asphalt wearing course with paving grade bitumen meeting the requirements given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 13.2 mm nominal size at the rate of 0.005 m ³ per 10 m ² and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces is not less than 1000 degrees Centigrade, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 516	m ²	676.00
5.23	512	Slurry Seal		
		Providing and laying slurry seal consisting of a mixture of fine aggregates, portland cement filler, bituminous emulsion and		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		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)	2-3 mm thickness (Type-I)	m ²	51.00
	(ii)	4-6 mm thickness (Type-II)	m ²	81.00
	(iii)	6-8 mm thickness (Type - III)	m ²	100.00
5.24	519	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 central recycling plant after carrying out necessary checks and evaluation, adding fresh material including rejuvenators as required, mixing in a hot mix plant, transporting and laying at site and compacting to the required grade, level and thickness, all as specified in clause 519		
	A	(i) Using by Bituminous Macadam Grading - I	m ³	7,073.00
		(ii) Using by Bituminous Macadam Grading - II	m ³	7,182.00
	B	(i) Using by Dense Graded Bituminous Macadam Grading - I	m ³	7,952.00
		(ii) Using by Dense Graded Bituminous Macadam Grading - II	m ³	8,629.00
	C	(i) Using by Bituminous Concrete Grading - I	m ³	9,499.00
		(ii) Using by Bituminous Concrete Grading - II	m ³	9,761.00
5.25	513	Fog Spray		
		Providing and applying low viscosity bitumen emulsion for sealing cracks less than 3 mm wide or incipient fretting or disintegration in an existing bituminous surfacing.	m ²	49.00
5.26	519	Bituminous Cold Mix (Including Gravel Emulsion)		
		Providing, laying and rolling of bituminous cold mix on prepared base consisting of a mixture of unheated mineral aggregate and emulsified or cutback bitumen, including mixing in a plant of suitable type and capacity, transporting, laying, compacting and finishing to specified grades and levels.		
	(i)	Using SS1 bitumen emulsion and 9.5 mm or 13.2 mm size aggregate	m ³	13,975.00
	(ii)	Using SS1 bitumen emulsion and 19 mm or 26.5 mm nominal size aggregate	m ³	13,974.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
5.27	506	Sand Asphalt Base Course		
		Providing, laying and rolling sand-asphalt base course composed of sand, mineral filler and bituminous binder VG-30 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, compacting and finishing.	m ³	10,595.00
5.28	517	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 complying with IRC: SP-53:2010, sprayed at the rate of 9 kg per 10 m ² and spreading 5.6 mm crushed stone aggregates @ 0.11 m ³ per 10 m ² with hydraulic chip spreader, sweeping the surface for uniform spread of aggregates and surface finished to conform to clause 902.	m ²	75.00
		(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 complying with IRC: SP-53:2010, sprayed at the rate of 11 kg per 10m ² and spreading 11.2 mm crushed stone aggregates @ 0.12 m ³ per 10 m ² , sweeping the surface for uniform spread of aggregates and surface finished to conform to clause 902.	m ²	88.00
		(iii) Stress Absorbing Membrane (SAM) crack width above 9 mm and cracked area above 50 per cent		
		Providing and laying a single coat of a stress absorbing membrane over a cracked road surface, with crack width above 9 mm and cracked area above 50 per cent after cleaning with a mechanical broom, using modified binder complying with IRC:SP-53:2010 sprayed at the rate of 15 kg per 10 m ² and spreading 11.2 mm crushed stone aggregates @ 0.12 m ³ per 10 m ² , sweeping the surface for uniform spread of aggregates and surface finished to conform to clause 902.	m ²	170.00
		Note <i>In case 2nd coat is also required to be provided, material provided for the 2nd coat shall be as per table 500-43</i>		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
5.29		A Bituminous Concrete Grading I Using waste plastic		
		Providing and laying Bituminous Concrete with not less than 40/60 TPH capacity HMP using crushed aggregates of specified grading, premixed with bituminous binder VG-30 @ 4.78% Bitumen and waste plastic 8% of Bitumen of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	10,344.00
		B Bituminous Concrete Grading II Using waste plastic		
		Providing and laying Bituminous Concrete with not less than 40/60 TPH capacity HMP using crushed aggregates of specified grading, premixed with bituminous binder VG-30 @ 4.78% Bitumen and waste plastic 8% of Bitumen of mix and filler, transporting the hot mix to work site, laying with mechanical paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects	m ³	10,673.00
5.30	519	A Hot Recycling in place of Bituminous pavement with Bituminous Concrete Grading I		
		Providing and placing Bituminous Concrete with Hot Recycling in place using crushed aggregate of specified grading, with bituminous binder VG-30 @ 5.2 percent of mix and filler, transporting the aggregates to work site, laying with a Hot Recycling in place to the required grade, level and alignment, rolling with smooth wheeled vibratory and tandem roller to achieve the desired compaction as per MORTH specification clause No. 519 complete in all respect.	m ³	4,053.00
	519	B Hot Recycling in place of Bituminous pavement with bituminous concrete Grading II		
		Providing and placing Bituminous Concrete with Hot Recycling in place using crushed aggregate of specified grading, with bituminous binder VG-30 @ 5.4 percent of mix and filler, transporting the aggregates to work site, laying with a Hot Recycling in place to the required grade, level and alignment, rolling with smooth wheeled vibratory and tandem roller to achieve the desired compaction as per MORTH specification clause No. 519 complete in all respect.	m ³	4,114.00

Chapter - 6

CEMENT CONCRETE PAVEMENT

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 6 CEMENT CONCRETE PAVEMENTS				
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 content not to be less than 150 kg/ m ³ , optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, laid with a paver with electronic sensor, compacting with 8-10 t vibratory roller, finishing and curing.	m ³	4,196.00
6.2	602	Cement Concrete Pavement with OPC/PPC/PSC		
		Construction of M40 grade un-reinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with Cement at 420 kg/m ³ , coarse and fine aggregate conforming to IS 383:2016, maximum size of coarse aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design transported to site, laid with a paver finisher, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing	m ³	9,348.00
6.3	602	Cement Concrete Pavement with OPC and GGBS		
		Construction of M40 grade un-reinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with Cement @ 315 kg/m ³ and GGBS@ 105 kg/m ³ , coarse and fine aggregate conforming to IS 383:2016, maximum size of coarse aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design transported to site, laid with a paver finisher, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing	m ³	8,738.00
6.4		Construction of Flyash Dry Lean cement concrete Sub-Base.		
		Construction of Dry lean cement concrete sub-base over a prepared sub grade with coarse and fine aggregates confirming to IS 383:2016 the size of coarse aggregates not exceeding 25mm replacing cement by fly ash to the extent of 20 percent,	m ³	4,196.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		aggregate cement ratio not to exceed 15:1 aggregates gradation after blending to be as per table 600-1, cement content not to be less than 129 kg/m ³ , optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, laid with a paver with electronic sensor, compacting with 8-10 t vibratory roller, finishing and curing.		
6.5		Thin White Topping with OPC/PPC/PSC		
		Construction of Thin white topping with M40 grade plain cement concrete pavement over existing surface with approved grade cement @ 420 kg/m ³ and as per IRC SP 76:2015, coarse and fine aggregate conforming to IS 383:2016, maximum size of fine aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design, transported to site, laid with paver finisher, spread, compacted and finished in a continuous operation with Texture Curing Machine including provision of contraction joint, joint filler, sealant primer, joint sealant, admixtures as approved, curing compound, finishing to lines and grades as per drawing.	m ³	9,076.00
6.6		Thin White Topping with OPC & GGBS		
		Construction of Thin White Topping with M40 grade plain cement concrete pavement over existing surface with approved grade Cement @ 315 kg/m ³ and GGBS @ 105 kg/m ³ as per IRC SP 76:2015, coarse and fine aggregate conforming to IS 383:2016, maximum size of fine aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design, transported to site, laid with paver finisher, spread, compacted and finished in a continuous operation with Texture Curing Machine including provision of contraction joint, joint filler, sealant primer, joint sealant, admixtures as approved, curing compound, finishing to lines and grades as per drawing.	m ³	8,467.00
6.7		Thin White Topping with OPC & Fly Ash		
		Construction of Thin White Topping with M40 grade plain cement concrete pavement over existing surface with approved grade Cement @ 357 kg/m ³ and Flyash @ 63 kg/m ³ as per IRC SP 76:2015, coarse and fine aggregate conforming to IS 383:2016, maximum size of fine aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design, transported to site, laid with paver finisher, spread, compacted and finished in a continuous operation with Texture Curing Machine including provision of contraction joint, joint filler, sealant primer, joint sealant, admixtures as approved, curing compound, finishing to lines and grades as per drawing.	m ³	8,499.00

Chapter - 7

**GEOSYNTHETICS AND
REINFORCED EARTH AND
PROTECTION WORKS**

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 7				
GEOSYNTHETICS AND REINFORCED EARTH AND PROTECTION WORKS				
7.1	702	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 drawings including excavation and backfilling	m	1,083.00
7.2	708	Laying of paving Fabric Beneath Pavement overlay		
		Providing and laying paving fabric with physical requirement as per table 700-16 over a tack coat of paving grade bitumen VG-10 penetration, laid at the rate of 1 kg per m ² over thoroughly cleaned and repaired surface to provide a water resistant layer. Paving fabric to be free of wrinkling and folding and to be laid before cooling of tack coat, brooming and rolling of surface with pneumatic roller to maximize paving fabric contact with pavement surface.	m ²	90.00
7.3	703	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 m interval, made with geogrids having characteristics as per clause 704.2, joining sides with connectors/ring staples, top corners to be tie tensioned, placing of suitable cross 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 200 mm and specific gravity not less than 2.65, packed with 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.	m ³	2,450.00
7.4	3100	Reinforced Earth Structures		
		Reinforced earth Structures 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.		
		Each component is analysed separately as under:		

SI No	Ref. to MoRT&H Spec.		Description	Unit	Rate ₹
7.4	3103	(i)	Assembling, joining and laying of reinforcing elements.		
		Type 1	Galvanised carbon steel strips	m	148.00
		Type 2	Copper strips	m	1,470.00
		Type 3	Aluminium strips	m	247.00
		Type 4	Stainless steel strips	m	300.00
		Type 5	Glass reinforced polymer/fibre reinforced polymer/ polymer strips	m	232.00
7.5		B	With reinforcing elements of synthetic geogrid	m ²	380.00
7.6	3105	(ii)	Facing elements of RCC	m ²	1,862.00
		Note	1. The specification and construction details to be adopted shall be as per section 3100 of MoRTH Specification. 2. Drainage arrangement shall be made as per approved design and drawings. 3. The quantity of filler media shall be calculated as per approved design and specifications and shall be priced separately. 4. Excavation for foundation including foundation concrete and groove in the foundation for seating of bottom most fascia panel and capping beam to be calculated as per design and priced separately. 5. 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. 6. For compaction of Earthwork, attention is invited to clause 3105.5 of MoRTH Specification. 7. Length of reinforcing strips will vary with the height of wall and will be as per approved design and drawings. 8. The type of reinforcing elements to be adopted shall be as per approved design and specifications. 9. The market rate for supply of reinforcing elements and their accessories are to be ascertained from reputed firms in the field of earth reinforcement. 10. 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, alkalies, mineral oil, fungus and microbes and shall be of specified PH value.		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		11. Capping beam is to be priced separately as per approved design. The rate for cement concrete shall be taken from the chapter of sub-structure in bridge section. 12. The cost of reinforced earth retaining wall shall include following: (i) Excavation for foundation including backfilling. (ii) Foundation concrete as per approved design. (iii) Cost of facial pannels and their erection . (iv) Cost of reinforcing elements including their fixing and joining with the facial pannels. (v) Drainage arrangement including filter media as per approved design and drawings. 13. The compacted earth filling to be retained shall form part of embankment. 14. The excavation for foundation including backfilling paid separately 15. The compacted earth filling to be retained shall form part of embankment/backfilling.		
7.7	703	(i) Supplying and laying of bi-axial extruded high module polypropylene geogrid confirmoing to MORT&H specification for base/sub base reinforcement having minimum tensile strength 15kN/m in the logitudinal and transverse direction, with 5kN/m and 7kN/m tensile strength at 2% and 5% strain respectively in the logitudinal and transverse direction, junction efficiency not less than 95% and with 38mm X 38mm mesh opening.	m ²	72.00
7.8	703	(ii) Supplying and laying of bi-axial extruded high module polypropylene geogrid confirmoing to MORT&H specification for base/sub base reinforcement having minimum tensile strength 20kN/m in the logitudinal and transverse direction, with 7kN/m and 14kN/m tensile strength at 2% and 5% strain respectively in the logitudinal and transverse direction, junction efficiency not less than 95% and with 38mm X 38mm mesh opening.	m ²	77.00
7.9	703	(iii) Supplying and laying of bi-axial extruded high module polypropylene geogrid confirmoing to MORT&H specification for base/sub base reinforcement having minimum tensile strength 30kN/m in the logitudinal and transverse direction, with 10.5kN/m and 21kN/m tensile strength at 2% and 5% strain respectively in the logitudinal and transverse direction, junction efficiency not less than 95% and with 38mm X 38mm mesh opening.	m ²	83.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
7.10	703	(iii) Supplying and laying of bi-axial extruded high module polypropylene geogrid conforming to MORT&H specification for base/sub base reinforcement having minimum tensile strength 40kN/m in the longitudinal and transverse direction, with 14kN/m and 28kN/m tensile strength at 2% and 5% strain respectively in the longitudinal and transverse direction, junction efficiency not less than 95% and with 38mm X 38mm mesh opening.	m ²	88.00
7.11	703	Supplying and laying high trength flexible geogrids (HSFG) as soil reinforcement / basal reinforcement as per MORT&H 3100 and IRC 113, made of high tenacity polyester core with poethylene coating with minimum Long Term Design Strength (LTDS) of more than 50% of ultimate tensile strength at 30 degree Celsius corresponding to 12% strain etc., complete and as directed by Engineer-in-charge.		
		(i) Synthetic Geogrid Ultimate tensile strength 100kN/m	m ²	90.00
		(ii) Synthetic Geogrid Ultimate tensile strength 150kN/m	m ²	97.00
		(iii) Synthetic Geogrid Ultimate tensile strength 200kN/m	m ²	103.00
		(iv) Synthetic Geogrid Ultimate tensile strength 250kN/m	m ²	112.00
		(v) Synthetic Geogrid Ultimate tensile strength 300kN/m	m ²	115.00
		(vi) Synthetic Geogrid Ultimate tensile strength 350kN/m	m ²	122.00
		(vii) Synthetic Geogrid Ultimate tensile strength 400kN/m	m ²	128.00
		(viii) Synthetic Geogrid Ultimate tensile strength 450kN/m	m ²	134.00
		(ix) Synthetic Geogrid Ultimate tensile strength 600kN/m	m ²	140.00
		(x) Synthetic Geogrid Ultimate tensile strength 700kN/m	m ²	146.00
		(xi) Synthetic Geogrid Ultimate tensile strength 800kN/m	m ²	153.00
		(xii) Synthetic Geogrid Ultimate tensile strength 900kN/m	m ²	158.00
		(xiii) Synthetic Geogrid Ultimate tensile strength 1000kN/m	m ²	165.00
		(xiv) Synthetic Geogrid Ultimate tensile strength 1200kN/m	m ²	171.00

Chapter - 8

**TRAFFIC SIGNS, MARKINGS
AND OTHER APPURTENANCES**

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 8
TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES

8.1	409		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 15 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 409	m ³	204.00
8.2	409		Cast in Situ Cement Concrete M 20 Kerb with Channel		
			Construction of cement concrete kerb with channel with top and bottom width 115 and 165 mm respectively, 250 mm high in M 20 grade PCC on M10 grade foundation 150 mm thick, kerb channel 300 mm wide, 50 mm thick in PCC M20 grade, sloped towards the kerb, kerb stone with channel laid with kerb laying machine, foundation concrete laid manually, all complete as per clause 409	m ³	222.00
	801		Printing New Letter and Figures of any Shade		
8.3			Printing new letter and figures of any shade with synthetic enamel paint black or any other approved colour to give an even shade	per cm height per letter	1.20
8.4			English and Roman	per cm height per letter	0.70
8.5	801	A	Retro-Reflectorised Traffic Signs		
			Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC:67:2012 made of Class B Type IV retro reflective sheeting fixed over 2 mm thick aluminium sheeting vide clause 803.1, 3mm/4mm thick Aluminium composite material sheet depending on the size of the sign fixed over the back support frame of min 25 x 25 x 3mm angle mounted on a mild steel circular pipe 65 NB, 3.2 mm thickness firmly fixed to the ground by means of properly designed foundation with M25 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing. The sign shall be maintained as per section 12 of IRC:67:2012.		
		(i)	120 cm equilateral triangle	each	6,050.00
		(ii)	90 cm equilateral triangle	each	4,599.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		(iii) 75 cm equilateral triangle	each	4,029.00
		(iv) 60 cm equilateral triangle	each	3,560.00
		(v) 120 cm circular	each	8,758.00
		(vi) 90 cm circular	each	6,119.00
		(vii) 75 cm circular	each	5,084.00
		(viii) 60 cm circular	each	4,237.00
		(ix) 90 mm x 75 mm rectangular	each	6,327.00
		(x) 80 mm x 60 mm rectangular	each	5,287.00
		(xi) 60 mm x 50 mm rectangular	each	4,327.00
		(xii) 60 cm x 45 cm rectangular	each	4,167.00
		(xiii) 60 cm x 60 cm square	each	4,647.00
		(xiv) 120 cm high octagon	each	9,089.00
		(xv) 90 cm high octagon	each	6,306.00
		(xvi) 75 cm high octagon	each	5,212.00
8.6	801	A Retro-Reflectorised Traffic Signs		
		Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC:67:2012 made of Class C Type XI retro reflective sheeting fixed over 2 mm thick aluminium sheeting vide clause 801.3, 3mm/4mm thick Aluminium composite material sheet depending on the size of the sign fixed over the back support frame of min 25 x 25 x 3mm angle mounted on a mild steel circular pipe 65 NB, 3.2 mm thickness firmly fixed to the ground by means of properly designed foundation with M25 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing.The sign shall be maintained as per section 12 of IRC:67:2012.		
		(i) 120 cm equilateral triangle	each	6,245.00
		(ii) 90 cm equilateral triangle	each	4,707.00
		(iii) 75 cm equilateral triangle	each	4,104.00
		(iv) 60 cm equilateral triangle	each	3,607.00
		(v) 120 cm circular	each	9,106.00
		(vi) 90 cm circular	each	6,315.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		(vii) 75 cm circular	each	5,220.00
		(viii) 60 cm circular	each	4,324.00
		(ix) 90 mm x 75 mm rectangular	each	6,534.00
		(x) 80 mm x 60 mm rectangular	each	5,435.00
		(xi) 60 mm x 50 mm rectangular	each	4,420.00
		(xii) 60 cm x 45 cm rectangular	each	4,250.00
		(xiii) 60 cm x 60 cm square	each	4,758.00
		(xiv) 120 cm high octagon	each	9,456.00
		(xv) 90 cm high octagon	each	6,511.00
		(xvi) 75 cm high octagon	each	5,356.00
		Note Any one area of aluminium sheeting given at (i) to (xvi) may be adopted as per site requirement and in accordance with IRC : 67:2012		
8.7	801	Direction and Place Identification Signs upto 0.9 m2 Size Board.		
		Providing and erecting direction and place identification retro-reflectorised sign as per IRC:67:2012 made of high intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick or Aluminium composite material sheet with overall thickness of 4mm with area not exceeding 0.9 m ² fixed over back support frame of min 35 x 35 x 3mm angle mounted on a mild steel circular pipe 65 NB, firmly fixed to the ground by means of properly designed foundation with M25 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing	m ²	8,068.00
8.8	801	Direction and Place Identification Signs with size more than 0.9 m2 size Board.		
		Providing and erecting direction and place identification retro-reflectorised sign as per IRC:67:2012 made of high intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick or Aluminium composite material sheet with overall thickness of 4mm with area exceeding 0.9 m ² fixed over back support frame of min 40 x 40 x 5mm angle mounted on a mild steel circular pipe 65 NB, firmly fixed to the ground by means of properly designed foundation with M25 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing	m ²	8,656.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
8.9	802	Overhead Signs		
		Providing and erecting overhead signs with a corrosion resistant 2mm thick aluminium alloy sheet reflectorised with high intensity retro-reflective sheeting as per IRC:67:2012 with vertical and lateral clearance given in clause 802.2 and 802.3 and installed as per clause 802.7 over a designed support system of aluminium alloy or galvanised steel trestles and trusses of sections and type as per structural design requirements and approved plans.		
	A	Truss and Vertical Support	t	83,446.00
	B	Aluminium Alloy Plate for Over Head Sign	m ²	5,479.00
8.10	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	m ²	85.00
8.11	803	Painting on Steel Surfaces		
		Providing and applying two coats of ready mix paint of approved brand on steel surface after thorough cleaning of surface to give an even shade	m ²	85.00
8.12	803	Painting on Wood Surfaces		
		Providing and applying two coats of ready mix paint of approved brand on wood surface after thorough cleaning of surface to give an even shade	m ²	86.00
8.13	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:164:2015 on bituminous surface, including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control		
	(i)	Over 10 cm in width	m ²	154.00
	(ii)	Up to 10 cm in width	m ²	134.00
8.14	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 conforming to IS: 164 on bituminous surface, including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		(i) Over 10 cm in width	m ²	119.00
		(ii) Upto 10 cm in width	m ²	111.00
8.15	803	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads on Bituminous Surface		
		Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250 g/ m ² area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35:2015. The finished surface to be level, uniform and free from streaks and holes.	m ²	478.00
		Note 1. A sealing primer may be applied in advance on cement concrete pavement to ensure proper bonding. Any laitance and/or curing compound to be removed where paint is required to be applied on concrete surface.		
		2. Cost of painter is already included in usage charges of road marking machine.		
8.16	805	Kilometre Stone		
		Reinforced cement concrete M15 grade kilometre stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc		
		(i) 5th kilometre stone (precast)	each	4,028.00
		(ii) Ordinary kilometer stone (precast)	each	2,444.00
		(iii) 200 m stone (precast)	each	1,611.00
8.17	806	Road Delineators		
		Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide strips, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and conforming to IRC-79 and the drawings.	each	1,890.00
8.18	807	Boundary pillar		
		Reinforced cement concrete M15 grade boundary pillars of standard design as per IRC:25, fixed in position including finishing and lettering but excluding painting	each	647.00
8.19	808	G.I Barbed Wire Fencing 1.2 m High		
		Providing and fixing 1.2 m high GI barbed wire fencing with 1.8 m angle iron posts 40 mm x 40 mm x 6 mm placed every 3 m center to center founded in M15 grade cement concrete, 0.6 m below ground level, every 15th post, last but one end	m	218.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		post and corner post shall be strutted on both sides and end post on one side only and provided with 9 horizontal lines and 2 diagonals interwoven with horizontal wires, fixed with GI staples, turn buckles etc complete as per clause 817		
8.20	808	G.I Barbed Wire Fencing 1.8 Metre High		
		Providing and fixing 1.8 m high GI barbed wire fencing with 2.4 m angle iron posts 50 mm x 50 mm x 6 mm placed every 3 m center to center founded in M15 grade cement concrete, 0.6 metre below ground level, every 15th post, last but one end post and corner post shall be strutted on both sides and end post on one side only and provided with 12 horizontal lines and 2 diagonals interwoven with horizontal wires, fixed with GI staples, turn buckles etc complete as per clause 808	m	401.00
8.21	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, 2 m centre to centre, complete as per approved drawings	m	1,844.00
8.22	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 posts 1.8 m high (1.2 m above GL) with 3 holes 50 mm dia for pipe, fixed 2 m centre to, complete as per approved drawing	m	4,022.00
8.23	811	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-25 grade concrete with TMT reinforcement conforming to IRC:21 and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified. (Area = 0.243 m ² /m, single face)		
	(i)	M 25 grade concrete	m	2,290.00
	(ii)	M 30 grade concrete	m	2,374.00
	Note	<i>i) Excavation and backfilling are incidental to work and not to be measured separately.</i>		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		<i>ii) If PCC is required below crash barrier then it should be measured & paid separately</i>		
8.24		B Reinforced Cement Concrete Crash Barrier (New Jersey)		
		Provision of an Reinforced cement concrete new jersey crash barrier at the medians constructed with reinforcement cement concrete with TMT reinforcement conforming MoRT&H Specification and as per details given IRC:119 (Fig-6) including dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, as per approved drawing and at locations directed by the Engineer, all as specified		
	(i)	M 25 grade concrete	m	2,459.00
	(ii)	M 30 grade concrete	m	2,550.00
	Note	<i>i) Excavation and backfilling are incidental to work and not to be measured separately.</i>		
		<i>ii) If PCC is required below crash barrier then it should be measured & paid separately</i>		
8.25	811	Metal Beam Crash Barrier		
	A	Type - A, "W" : Metal Beam Crash Barrier		
		Providing and erecting a "W" metal beam crash barrier system comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 811	m	3,271.00
	B	Type - B, "THRIE" : Metal Beam Crash Barrier		
		Providing and erecting a "Thrie" metal beam crash barrier system comprising of 3 mm thick corrugated sheet metal beam rail, 85 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 2 m high with 1.15 m below ground level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a space of channel section 150 x 75 x 5 mm, 546 mm long complete as per clause 810	m	3,973.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		Note <i>In the case of median crash barrier, 'W' metal beam or thrie beam section should be provided on both sides of the vertical posts fixed in the median. Extra provision for metal beam railing and spacer is required to be made when fixed in the median depending on approved design.</i>		
8.26		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, embedded in M 15 grade cement concrete 450 x 450 x 450 mm, 1.50 m center to center and with 4 horizontal steel wire rope 40 mm dia and anchored at terminal posts 15 m apart. Terminal post to be embedded in M 15 grade cement concrete foundation 2400 x 450 x 900 mm (depth), strengthened by a strut of RS joist 100 x 75 mm, 2 m long at 450 inclination and a tie 100 x 8 mm, 1.50 m long at the bottom, all embedded in foundation concrete as per approved design and drawing, rate excluding excavation and cement concrete.	m	2,542.00
8.27		Anti-Glare Devices in Median		
		A Plantation		
		Plantation of shrubs and plants of approved species in the median. apart from cutting off glare from vehicle coming from opposite direction, these plants provide a pleasant environment and are eco-friendly. The rate for this item are to be taken from Forest/Horticulture/Watershed SR.		
		B Anti-glare screen with 25 mm steel pipe framework fixed with circular and rectangular vans		
		Providing and erecting an anti - glare screen with 25 mm dia vertical pipes fabricated and framed in the form of panels of one metre length and 1.75 metre height fixed with circular vane 250 mm dia at top and rectangular vane 600 x 300 mm 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 paint on all exposed surfaces, all as per approved design and drawings.	m	2,531.00
		Note <i>The items of excavation and cement concrete as per approved design to be measured and paid separately</i>		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
8.28		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 45 degree to the direction of flow of traffic, 1.5 m center to center, top edge of the screen 1.75 m above ground level, vertical post firmly embedded in M-15 cement concrete foundation 0.60 m below ground level, applying 2 coats of paint on exposed faces, all complete as per approved design and drawings	m	1,087.00
8.29		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 m thick layer of granular material free of rock pieces, outer to outer distance of pipe at least half dia of pipe subject to minimum 450 mm in case of double and triple row ducts, joints to be made leak proof, invert level of duct to be above higher than ground level to prevent entry of water and dirt, all as per IRC: 98 - 1997 and approved drawings.		
		(i) Single row for one utility service	m	2,017.00
		(ii) Double row for two utility services	m	3,701.00
		(iii) Triple Row for three utility services	m	5,407.00
	804	Solar Powered Road Marker (Solar Stud)		
8.30		Supplying of Solar Raised Pavement Markers made of polycarbonate molded body with circular shape, solar powered, LED self illumination in active mode, 360 degree illumination and reflective panels with micro prismatic lens capable of providing total internal reflection of the light entering the lens face in passive mode. The marker shall support a load of 20000 kg tested in accordance to ASTM D 4280. The marker should be resistant to dust and water ingress according to IP 65 standards and should withstand temperatures in the range of 0 C to 70 C. Color of lighting could be provided in red or yellow (amber) as per requirement and typical frequency of blinking is 1 Hz. There should be current losses of less than 20 microamperes at 2.4 V in sleepcharging mode to enhance the life of the marker and a full charge should provide for a minimum autonomy of 50 hours. The height, width and length of the marker shall not	each	350.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		be less than 10 mm x 100 mm x 100 mm. Also, the surface diameter of the marker shall not be less than 100 mm respectively. The weight of the marker shall not exceed 0.5 kg. Fixing will be by drilling holes on the road for the shanks to go inside, without nails and using epoxy resin based adhesive and complete as directed by the engineer.		
8.31	813.4	Traffic Cone		
		Provision of red fluorescent with white reflective sleeve traffic cone made of low density polyethylene (LDPE) material with a square base of 390 x 390 x 35 mm and a height of 770 mm, 4 kg in weight, placed at 1.5 m interval, all as per BS 873	each	415.00
8.32		Rumble Strips		
		Provision of 15 nos rumble strips covered with premix bituminous carpet, 15-20 mm high at center, 250 mm wide placed at 1 m center to center at approved locations to control speed, marked with white strips of road marking paint.	m ²	172.00
8.33		Policeman Umbrella		
		Provision of a 2 m high (floor to roof) umbrella for traffic policeman at road crossings, where necessary, installed on a raised platform, built on a central support of a steel pipe 100 mm dia, roof made of 25 mm dia steel pipe to provide covered area of 3 m ² , roofed with CGI sheets, all steel parts to be given 2 coats of paint	each	3,254.00
8.34		Portable Barricade in Construction Zone		
		Installation of a steel portable barricade with horizontal rail 300 mm wide, 2.5 m in length fitted on a 'A' frame made with 45 x 45 x 5 mm angle iron section, 1.5 m in height, horizontal rail painted (2 coats) with yellow and white stripes, 150 mm in width at an angle of 45 degree, 'A' frame painted with 2 coats of yellow paint, complete as per IRC:SP:55:2001	each	
8.35		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 stripes, 150 mm in width at an angle of 45 degree, complete as per IRC:SP:55:2001	each	5,691.00
	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	each	7,403.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		100mm wooden vertical post, painted with yellow and white strips, 150 mm in width at an angle of 45 degree, complete as per IRC:SP:55-2001		
	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	1,7093.00
8.36		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 reflectors 3 Nos of 7.5 cm dia, all as per IRC:SP 55:2001	each	577.00
8.37		Water Filled Barricades Work zone sheeting		
		Specification Providing water filled barricads made up of LDPE to segregate the ehicul movemen nd work zone as pe IRC SP 55 shall be in Trapezoidal Shape 800 mm to 1000 mm in length, 700 mm in heght for Major Roads and expreesway and 500mm tall for othe roads wih intelocking arrangemens, to be placed 0.5m from the edge of the caiage way for expresway and 0.3m for other roads, it should have reboundle work zone sheeting as per ASTM D 4956 52.	each	345.00
8.38		Tubular Marker / Spring post 450 mm		
		Specification Providing Tubular marker made up of Polyurethane used to divide opposing lanes of road users shall be fixible in nature. Tubular marker having height upto 450 mm shall be having 75 mm Reboundable work zone retroreflective sheeting as per ASTM 4956 S2 Application of Tubular Marker shall be done s per IRC:SP 55:2001	each	345.00
8.39		Tubular Marker / Spring post 700 mm		
		Specification Providing Tubular marker made up of Polyurethane used to divide opposing lanes of road users shall be fixible in nature. Tubular marker having height 700 mm shall be having 75 mm Reboundable work zone retroreflective sheeting as per ASTM 4956 S2 Application of Tubular Marker shall be done s per IRC:SP 55:2001	each	345.00
8.40		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	603.00



Cautionary Signboard



Mandatory Signboard



Facility information board



Informatory/Direction Signboards

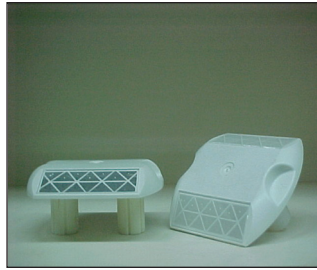
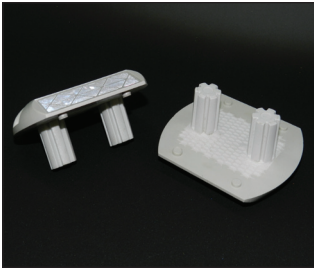


Over Head Gantry board



Chevron Boards

RPM's/Cat Eyes/Road studs



Vertical Delineator



Rigid Median Marker



Flexible Median Marker



Anti Glare Screen



Rumble Strips



Traffic Cones



Standard Delineator



Hybrid Solar Delineator



Aluminum Backed flexible Prismatic Sheet



Chapter - 9
PIPE CULVERTS

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 9 PIPE CULVERTS				
9.1	2900		Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row .	
			Laying Reinforced cement concrete pipe NP4/prestressed concrete pipe for culverts on first class bedding of granular material in single row including fixing collar with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets .	
		i.	1000 mm dia	m 8,864.00
		ii.	1200 mm dia	m 10,192.00
		iii.	1500 mm dia	m 10,217.00
9.2	2900		Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Double Row .	
			Laying Reinforced cement concrete pipe NP4 / prestressed concrete pipe for culverts on first class bedding of granular material in double row including fixing collar with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets .	
		i.	1000 mm dia	m 17,800.00
		ii.	1200 mm dia	m 20,460.00
		ii.	1500 mm dia	m 20,517.00
9.3			Supplying, Fitting and Placing TMT Fe 500 & above Reinforcement in Foundation / Substructure / Superstructure complete as per Drawing and Technical Specifications.	t 76,376.00

Chapter - 10
MAINTENANCE OF ROADS

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 10 MAINTENANCE OF ROADS				
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 rammers to restore the original alignment, levels and slopes	m ³ 146.00
		Note	<i>Only 75 per cent of fresh material has been provided as 25 per cent can be retrieved at site from earth that is flown down the slope in the form of slurry and deposited at the foot of there in cuts</i>	
10.2	3003		Maintenance of Earthen Shoulder (filling with fresh soil)	
			Making up loss of material/ irregularities on shoulder to the design level by adding fresh approved soil and compacting it with appropriate equipment.	m ² 78.00
10.3	3003		Maintenance of Earth Shoulder (stripping excess soil)	
			Stripping excess soil from the shoulder surface to achieve the approved level and compacting with plate compactor	m ² 31.00
		Note	<i>The earth stripped from earthen shoulders to be dumped on the side slopes locally for disposal.</i>	
10.4	3004.2		Filling Pot-holes and Patch Repairs with Open-Graded Premix surfacing, 20mm (using VG-30 Grade Bitumen)	
			Removal of all failed material, trimming of completed excavation to provide firm vertical faces, cleaning of surface, painting of tack coat on the sides and base of excavation as per clause 503, back filling the pot holes with hot bituminous material as per clause 510, compacting, trimming and finishing the surface to form a smooth continuous surface, all as per clause 3004.2	m ² 158.00
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, back filling the pot holes with hot bituminous material as per clause 504, compacting, trimming and finishing the surface to form a smooth continuous surface, all as per clause 3004.2	

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		(i) For Grading I Material	m ²	428.00
		(ii) For Grading II Material	m ²	433.00
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.	m	5.00
10.7	3004.4	Dusting		
		Applying crusher dust to areas of road where bleeding of excess bitumen has occurred.	m ²	2.00
10.8	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	m	366.00
10.9	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	m	52.00
10.10	3000	Hill Side Drain Clearance		
		Removal of earth from the choked hill side drain and disposing it on the valley side manually	m	57.00
10.11	3000	Land Slide Clearance in soil		
		Clearance of land slides in soil and ordinary rock by a bulldozer D 80 A-12, 180 HP and disposal of the same on the valley side	m ³	58.00
		Note <i>Land Slide clearance involves pushing of loose earth slid on the road surface from hill face on the valley side. Since no cutting of original ground is involved, the output of dozer has been taken as 60 m³ per hour for soil, ordinary rock and blasted hard rock. However, if there are objection to disposing of earth on valley side, additional resources for its disposal shall be considered as per site conditions.</i>		
10.12	3000	Landslide Clearance in Hard Rock Requiring Blasting		
		Clearing of land slide in hard rock requiring blasting for 50 per cent of the boulders and disposal of the same on the valley side.	m ³	97.00
		Note <i>Credit for the rock if found acceptable as construction material shall be afforded</i>		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
10.13	811	Replacement of Metal Beam Crash Barrier		
		A Type - A, "W" : Metal Beam Crash Barrier		
		Replacement of "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 811	m	3,843.00
10.14		B Type - B, "THRIE" : Metal Beam Crash Barrier		
		Replacement of "Thrie" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 85 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 2 m high with 1.15 m below ground level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a space of channel section 150 x 75 x 5 mm, 546 mm long complete as per clause 811	m	4,000.00

Chapter - 11
HORTICULTURE
(To refer combined SR of
Forest / Watershed / Horticulture)

Chapter - 12
FOUNDATIONS

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
CHAPTER-12 FOUNDATIONS				
OPEN FOUNDATION : Refer Vol.-1 Common SR				
		WELL FOUNDATION		
12.1	1200	Providing and Constructing Temporary Island 24 m diameter for Construction of Well Foundation for 8m dia. Well.		
		A Assuming depth of water 1.0 m and height of island to be 1.25 m.	No.	2,97,241.00
		B Assuming depth of water 4.0 m and height of island 4.5 m.	No.	13,68,867.00
		C Providing and constructing one span service road to reach island location from one pier location to another pier location		
		Assuming span length 30 m, width of service road 10m and depth of water 1m	m	7871.00
12.2	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.	t	1,12,359.00
12.3	Section 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 reckoned from bed level.		
12.3.1		A Sandy Soil (6 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.50 m/hr)	m	3,824.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.33 m/hr)	m	5,270.00
		(iii) Beyond 10m upto 20m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
12.3.2		B Clayey Soil (6 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.33 m/hr)	m	5,270.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.17 m/hr)	m	11,638.00
		(iii) Beyond 10 m upto 20 m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add for dewatering @ 5 per cent of cost, if required.		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering of the cost, if required		
		c Add 25 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering, if required		
		c Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
12.4		C Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in Soft Rock (6 m dia well)	m	29,190.00
12.5		D Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in Hard Rock (6 m dia well)	m	41,967.00
12.6		E Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in rock bouldery strata (6 m dia well)	m	39,604.00
12.7	Section 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 reckoned from bed level.		
12.7.1		A Sandy Soil (7 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.30 m/hr)	m	5,515.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.22 m/hr)	m	7,207.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		(iii) Beyond 10m upto 20m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
12.7.2		B Clayey Soil (7 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.22 m/hr)	m	7,207.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.17 m/hr)	m	11,392.00
		(iii) Beyond 10 m upto 20 m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add for dewatering @ 5 per cent of cost, if required.		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering of the cost, if required		
		c Add 25 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering, if required		
		c Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
12.8		C Extra over item no 12.13 (A) or (B) irrespective of depth for sinking in Soft Rock (7 m dia well)	m	37,032.00

SI No	Ref. to MoRT&H Spec.		Description	Unit	Rate ₹
12.9		D	Extra over item no 12.13 (A) or (B) irrespective of depth for sinking in Hard Rock (7 m dia well)	m	53,462.00
12.10		E	Extra over item no 12.13 (A) or (B) irrespective of depth for sinking in rock bouldery strata (7 m dia well)	m	51,722.00
12.11	Section 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 reckoned from bed level.		
12.11.1		A	Sandy Soil (8 m dia. Well)		
		(i)	Depth below bed level upto 3.0 m (Rate of sinking = 0.25 m/hr)	m	6,716.00
		(ii)	Beyond 3m upto 10m depth (Rate of sinking = 0.20 m/hr)	m	8,163.00
		(iii)	Beyond 10m upto 20m		
		a	Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		(iv)	Beyond 20m upto 30 m		
		a	Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b	Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
		(v)	Beyond 30m upto 40 m		
		a	Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b	Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
12.11.2		B	Clayey Soil (8m dia. Well)		
		(i)	Depth below bed level upto 3.0 m (Rate of sinking = 0.18 m/hr)	m	8,808.00
		(ii)	Beyond 3m upto 10m depth (Rate of sinking = 0.17 m/hr)	m	12,150.00
		(iii)	Beyond 10 m upto 20 m		
		a	Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b	Add for dewatering @ 5 per cent of cost, if required.		
		(iv)	Beyond 20m upto 30 m		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering of the cost, if required		
		c Add 25 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering, if required		
		c Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
12.12		C Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in Soft Rock (8m dia well)	m	45,861.00
12.13		D Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in Hard Rock (8m dia well)	m	67,099.00
12.14		E Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in rock bouldery strata (8m dia well)	m	65,485.00
12.15	Section 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 reckoned from bed level.		
12.15.1		A Sandy Soil (9 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.25 m/hr)	m	6,871.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.18 m/hr)	m	8,963.00
		(iii) Beyond 10m upto 20m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
		(v) Beyond 30m upto 40 m		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
12.15.2		B Clayey Soil (9m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.17 m/hr)	m	9,364.00
		(ii) Beyond 3 m upto 10 m depth (Rate of sinking = 0.15 m/hr)	m	13,088.00
		(iii) Beyond 10 m upto 20 m (Rate of sinking = 0.15 m/hr)		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add for dewatering @ 5 per cent of cost, if required.		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering of the cost, if required		
		c Add 25 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering, if required		
		c Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
12.16		C Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in Soft Rock (9m dia well)	m	55,676.00
12.17		D Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in Hard Rock (9m dia well)	m	82,085.00
12.18		E Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in rock bouldery strata (9m dia well)	m	80,893.00
12.19	Section 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 reckoned from bed level.		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
12.19.1		A Sandy Soil (10 m dia. Well)		
	(i)	Depth below bed level upto 3.0 m (Rate of sinking = 0.20 m/hr)	m	8,007.00
	(ii)	Beyond 3m upto 10m depth (Rate of sinking = 0.17 m/hr)	m	9,519.00
	(iii)	Beyond 10m upto 20m		
	a	Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	(iv)	Beyond 20m upto 30 m		
	a	Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
	(v)	Beyond 30m upto 40 m		
	a	Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
12.19.2		B Clayey Soil (10 m dia. Well)		
	(i)	Depth below bed level upto 3.0 m (Rate of sinking = 0.18 m/hr)	m	10,850.00
	(ii)	Beyond 3m upto 10m depth (Rate of sinking = 0.15 m/hr)	m	13,356.00
	(iii)	Beyond 10 m upto 20 m		
	a	Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add for dewatering @ 5 per cent of cost, if required.		
	(iv)	Beyond 20m upto 30 m		
	a	Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add 5 per cent of cost for dewatering of the cost, if required		
	c	Add 25 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
	(v)	Beyond 30m upto 40 m		
	a	Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add 5 per cent of cost for dewatering, if required		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		c Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
12.20		C Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in Soft Rock (10 m dia well)	m	66,479.00
12.21		D Extra over item no 12.16 (A) or (B) irrespective of depth for sinking in Hard Rock (10 m dia well)	m	98,743.00
12.22		E Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in rock bouldery strata (10 m dia well)	m	97,946.00
12.23	Section 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 reckoned from bed level.		
12.23.1		A Sandy Soil (11 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.15 m/hr)	m	15,648.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.13 m/hr)	m	15,916.00
		(iii) Beyond 10m upto 20m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
12.23.2		B Clayey Soil (11 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.10 m/hr)	m	17,877.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.08 m/hr)	m	27,565.00
		(iii) Beyond 10 m upto 20 m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		b Add for dewatering @ 5 per cent of cost, if required.		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering of the cost, if required		
		c Add 25 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering, if required		
		c Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
12.24		C Extra over item no 12.12 (A) or (B) irrespective of depth for sinking in Soft Rock (11 m dia well)	m	78,268.00
12.25		D Extra over item no 12.17 (A) or (B) irrespective of depth for sinking in Hard Rock (11 m dia well)	m	1,17,071.00
12.26		E Extra over item no 12.17 (A) or (B) irrespective of depth for sinking in rock bouldery strata (11 m dia well)	m	1,16,643.00
12.27	Section 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 as per drawing and technical specifications. Depth of sinking is reckoned from bed level.		
12.27.1		A Sandy Soil (12 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.05 m/hr)	m	37,815.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.038 m/hr)	m	43,500.00
		(iii) Beyond 10m upto 20m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
12.27.2		B Clayey Soil (12 m dia. Well)		
		(i) Depth below bed level upto 3.0 m (Rate of sinking = 0.04 m/hr)	m	43,141.00
		(ii) Beyond 3m upto 10m depth (Rate of sinking = 0.03 m/hr)	m	66,022.00
		(iii) Beyond 10 m upto 20 m		
		a Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add for dewatering @ 5 per cent of cost, if required.		
		(iv) Beyond 20m upto 30 m		
		a Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering of the cost, if required		
		c Add 25 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering, if required		
		c Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
12.28		C Extra over item no 12.18 (A) or (B) irrespective of depth for sinking in Soft Rock (12 m dia well)	m	91,045.00
12.29		D Extra over item no 12.18 (A) or (B) irrespective of depth for sinking in Hard Rock (1 m dia well)	m	137,070.00
12.30		E Extra over item no 12.18 (A) or (B) irrespective of depth for sinking in rock bouldery strata (12 m dia well)	m	136,985.00
12.31	Section 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.		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		Dimensions of well		
		Overall length = 12 m		
		Overall width = 6 m		
12.31.1	A	Sandy Soil		
	(i)	Depth below bed level upto 3.0 m (Rate of sinking = 0.18 m/hr)	m	8,498.00
	(ii)	Beyond 3m upto 10m depth (Rate of sinking = 0.17 m/hr)	m	9,181.00
	(iii)	Beyond 10m upto 20m		
	a	Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	(iv)	Beyond 20m upto 30 m		
	a	Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
	(v)	Beyond 30m upto 40 m		
	a	Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour.		
12.31.2	B	Clayey Soil (Twin D Type Well)		
	(i)	Depth below bed level upto 3.0 m (Rate of sinking = 0.16 m/hr)	m	10,164.00
	(ii)	Beyond 3m upto 10m depth (Rate of sinking = 0.16 m/hr)	m	14,753.00
	(iii)	Beyond 10 m upto 20 m		
	a	Add 5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add for dewatering @ 5 per cent of cost, if required.		
	(iv)	Beyond 20m upto 30 m		
	a	Add 7.5 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
	b	Add 5 per cent of cost for dewatering of the cost, if required		
	c	Add 25 per cent of cost for Kentledge including supports, loading arrangement and Labour).		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		(v) Beyond 30m upto 40 m		
		a Add 10 per cent for every additional meter depth of sinking over the rate of sinking for the previous meter		
		b Add 5 per cent of cost for dewatering, if required		
		c Add 20 per cent of cost for Kentledge including supports, loading arrangement and Labour).		
12.32		C Extra over item no 12.19 (A) or (B) irrespective of depth for sinking in Soft Rock (Twin D Type well)	m	56,089.00
12.33		D Extra over item no 12.19 (A) or (B) irrespective of depth for sinking in Hard Rock (Twin D Type well)	m	85,846.00
12.34		E Extra over item no 12.19 (A) or (B) irrespective of depth for sinking in rock boundary strata (Twin D Type well)	m	81,581.00
12.35	1200	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, arrangement for supply of fresh air to working chambers, check valves, exhaust valves, shafts made from steel plates of riveted construction not less than 6 mm thick to withstand an air pressure of 0.50 MPa, controlled blasting of hard rock where required, staircases and 1 m wide landing platforms with railing, arrangement for compression and decompression, electric lighting of 50 V maximum, proper rooms for rest and medical examinations and compliance with safety precautions as per IS:4138, all as per clause 1208.8 of MoRTH Specifications.	m ³	51,544.00
12.36	1207	Sand Filling in Wells complete as per Drawing and Technical Specifications.	m	2,431.00
12.37	1200 & 1900	Providing Steel Liner 10 mm thick for Curbs and 6 mm thick for Steining of Wells including Fabricating and Setting out as per Detailed Drawing.	t	1,02,615.00
12.38	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	m	8,468.00
12.39	1100, 1600 & 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.		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		Pile diameter-1000 mm	m	11,376.00
12.40	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	m	15,060.00
12.41	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-1500 mm	m	21,204.00
12.42	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	m	6,883.00
12.43	1100 & 1700	Driven cast-in-place vertical M35 grade R.C.C. Pile excluding Reinforcement complete as per Drawing and & Technical Specification		
		Pile diameter - 1000 mm	m	10,695.00
12.44	1100 & 1700	Driven cast-in-place vertical M35 grade R.C.C. Pile excluding Reinforcement complete as per Drawing and & Technical Specification		
		Pile diameter - 1200 mm	m	15,681.00
12.45	1100 & 1700	Driven precast vertical M35 grade R.C.C. Piles excluding Reinforcement complete as per Drawing and & Technical Specification		
		Pile Diameter = 500 mm	m	3,980.00
12.46	1100 & 1700	Driven precast vertical M35 grade R.C.C. Piles excluding Reinforcement complete as per Drawing and & Technical Specification		
		Pile Diameter = 750 mm	m	6,165.00
12.47	1100 & 1700	Driven precast vertical M35 grade R.C.C. Piles excluding Reinforcement complete as per Drawing and & Technical Specification		

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		Pile Diameter = 1000 mm	m	9,520.00
12.48	1100 & 1700	Driven precast vertical M35 grade R.C.C. Piles excluding Reinforcement complete as per Drawing and & Technical Specification		
		Size of pile - 300 mm x 300 mm	m	3,155.00
12.49	1100 & 1700	Driven precast vertical M35 grade R.C.C. Piles excluding Reinforcement complete as per Drawing and & Technical Specification		
		Size of pile - 500 mm x 500 mm	m	4,669.00
12.50	1100 & 1700	Driven precast vertical M35 grade R.C.C. Piles excluding Reinforcement complete as per Drawing and & Technical Specification		
		Size of pile - 750 mm x 750 mm	m	7,750.00
12.51	1100, 1900	Driven Vertical Steel Piles complete as per Drawing and & Technical Specification		
		Section of the pile - H Section steel column 400 x 250 mm (ISHB Series)	m	8,381.00
12.52	1100 & 1900	Driven Vertical Steel Piles complete as per Drawing and & Technical Specification		
12.53		Section of the pile - H Section steel column 450 x 250 mm (ISHB Series)	m	9,507.00
12.54		Dismantling of Reinforced Concrete Pile head complete as per drawing and Technical Specification	m³	1,246.00
12.55	1600	Supplying, Fitting and Placing un-coated TMT Fe 500 & above bar Reinforcement in Foundation complete as per Drawing and Technical Specifications.	t	84,383.00
12.56	1600	Supplying, fitting and placing un-coated Mild steel reinforcement complete in foundation as per drawing and technical specification	t	73,392.00

Chapter - 13
SUB-STRUCTURE

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
CHAPTER - 13				
SUB-STRUCTURE				
13.1	Section 1600 & 2200	Supplying, Fitting and Placing un-coated TMT bar Reinforcement in sub-structure complete as per Drawing and Technical Specifications.	t	83,780.00
13.2	Section 1600 & 2200	Supplying, fitting and placing Mild steel reinforcement complete in sub structure as per drawing and technical specification	t	72,790.00
13.3	2706 & 2200	Providing weep holes in Brick masonry/Plain/ Reinforced concrete abutment, wing wall/ return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V :20H towards drawing face. Complete as per drawing and Technical Specifications	m	172.00
		Note 1. In case of stone masonry, the size of the weep hole shall be 150 mm x 80 mm or circular with 150 mm diameter. 2. For structure in stone masonry the weep holes shall be deemed to be included in the item of stone masonry work and shall not be paid separately.		
13.4	2706 & 2200	Providing weep holes in Brick masonry/Plain/ Reinforced concrete abutment, wing wall/ return wall with PVC Pipe 110mm outer dia at 2 kg per m ² , extending through the full width of the structure with slope of 1V :20H towards drawing face. Complete as per drawing and Technical Specifications	No./ m	239.00
13.5	710.1.4.of IRC:78 & 2200	Back filling behind abutment, wing wall and return wall complete including compaction as per drawing and Technical Specification		
		A Granular material	m ³	944.00
13.6		B Sandy material	m ³	2,797.00
13.7	710.1.4.of IRC:78 and 2200	Providing and laying of Filter media with granular materials/ stone crushed aggregates satisfying the requirements laid down in clause 2504.2.2. of MoRTH specifications to a thickness of not less than 600 mm with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and Technical Specification.	m ³	1,105.00
13.8	2000, 1000 & 2200	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.	Each tonne bearing capacity	365.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
13.9	2000, 1000 & 2200	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.	Each tonne bearing capacity	20.00
13.10	2000 & 2200	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 MoRTH Specifications.	t	1,141.00
13.11	2000 & 2200	Supplying, fitting and fixing in position true to line and level elastomeric bearing conforming to IRC: 83 (Part-II) section IX and clause 2005 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications.	cc	0.64
13.12	2000 & 2200	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.	t	1,167.00
13.13	2000 & 2200	Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, complete assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC: 83 part-I & II respectively and other parts conforming to BS: 5400, section 9.1 & 9.2 and clause 2006 of MoRTH Specifications complete as per drawing and approved Technical Specifications.	t	369.00
13.14	Sugg	Protection to sub structure by using coal tar epoxy		
		Providing and applying two coats of Two component, high build, 100% solid content, low VOC., polycyclin aromatic hydro carbon based, Pot life - 2 hours @ 72 deg.F, Tack free - 4.6 hrs, DFE percent 80 - 120 microns (dry) coal tar epoxy coating with Coal tar	m ²	176.00
13.15		Providing structural steel for sub-structure complete as per drawing and technical specification	t	14,3457.00

Chapter - 14
SUPER-STRUCTURE

SI No	Ref. to MoRT&H Spec.		Description	Unit	Rate ₹
CHAPTER-14 SUPER-STRUCTURE					
14.1	1600		Supplying fitting & placing TMT bar reinforcement to super structure complete as per Specifications	t	83,997.00
14.2	1800		High tensile steel wires/strands including all accessories for stressing, stressing operations and grouting complete as per drawing and Technical Specifications	t	1,99,486.00
14.3	2702	A	Providing and laying Cement concrete wearing coat M-30 grade including reinforcement complete as per drawing and Technical Specifications. (Batching Plant)	m ³	14,047.00
14.4	515 & 2702		Mastic Asphalt		
			Providing and laying 12 mm thick mastic asphalt wearing course on top of deck slab excluding prime coat with paving grade bitumen meeting the requirements given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 9.5 mm nominal size at the rate of 0.005 m ³ per 10 m ² and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces not less than 100 deg. C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 515.	m ²	422.00
14.5	2703, 1500, 1600 & 1700	A	Construction of precast RCC railing of M30 Grade, aggregate size not exceeding 12 mm, true to line and grade, tolerance of vertical RCC post not to exceed 1 in 500, c/c spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications.	m	2,307.00
14.6	2703, 1500, 1600 & 1700	A	Construction of RCC railing of M30 Grade in-situ with 20 mm nominal size aggregate, true to line and grade, tolerance of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications.	m	2,244.00
14.7	2703.2 & 1900		Providing, fitting and fixing mild steel railing complete as per drawing and Technical Specification	m	3,970.00
14.8	2705		Drainage Spouts using 100 mm GI pipe complete as per drawing and Technical specification	No	2,928.00
14.9	2700		PCC M15 Grade leveling course below approach slab complete as per drawing and Technical specification	m ³	6,651.00

SI No	Ref. to MoRT&H Spec.		Description	Unit	Rate ₹
14.10	1500, 1600, 1700 & 2704		Reinforced cement concrete M30 grade for approach slab including reinforcement and formwork complete as per drawing and Technical specification (Batching Plant)	m ³	12,012.00
14.11	1600		Providing anti-corrosive treatment to TMT reinforcement with Fusion Bonded Epoxy Coating (FBEC)	kg	750.00
14.12	1800 & 2300		Precast - pretensioned Girders		
			Providing, precasting, transportation and placing in position precast pretensioned concrete girders M40 grade as per drawing and technical specifications	m ³	28,556.00
14.13	1700 & 1800		Providing and fixing Helical pipes in voided concrete slabs	m	483.00
14.14	811		Crash Barrier for Bridges		
			Provision of an Reinforced cement concrete crash barrier at the bridge deck & approaches to bridge structure, constructed with Reinforced cement concrete with TMT reinforcement conforming to MORT&H specifications and as per details given in IRC-5 including dowel bars, 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board etc, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/ NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the and approved drawing and at locations directed by the Engineer, all as specified		
		A	Crash Barrier for Bridges (Height 950 mm) as per details given IRC-5 (fig-1) (Area 0.254 m ² for 1 m length)	m	4,112.00
		B	Crash Barrier for Bridges (Height 1100 mm) as per details given IRC-5 (fig-2) (Area 0.298 m ² for 1 m length)	m	4,807.00
		C	Crash Barrier for Bridges (Height 1550 mm) as per details given IRC-5 (fig-2) (Area 0.514 m ² for 1 m length)	m	8,284.00
			Note : IRC-5 : 2015 shall be followed for reference figures.		
14.15	800		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 m ² .	m ²	71.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
14.16	2605	Filler joint		
		(i) Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.	m	2,528.00
		(ii) Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.	m	122.00
		(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 specifications.	m	226.00
		(iv) Providing and filling joint sealing compound as per drawings and technical specifications with coarse sand and 6 per cent bitumen by weight	m	38.00
14.17	2600	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 of 200mm x 6mm of weldable structural steel conforming to IS: 2062, asphaltic plug to consist of polymer modified bitumen binder, carefully selected single size aggregate of 12.5 mm nominal size and a heat resistant foam caulking/backer rod, all as per approved drawings and specifications.	m	1,230.00
14.18	2606	Elastomeric Slab Steel Expansion Joint		
		Providing and laying of an elastomeric slab steel expansion joint, catering to right or skew (less than 20 deg., moderately curved with maximum horizontal movement upto 50 mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation and clause 2606 of MoRTH specifications for road & bridge works.	m	14,877.00
14.19	2600	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 joint gap with special adhesive binder to cater for a horizontal movement upto 40 mm and vertical movement of 3 mm.	m	17,145.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
14.20	2607	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 instructions for installation.	m	14,160.00
14.21	2600	Modular Strip / Box Seal Joint		
		Providing and laying of a modular strip Box seal expansion joint including anchorage catering to a horizontal movement beyond 70 mm and upto 140mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation.	m	6,337.00
14.22	2600	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 manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation.	m	7,753.00
14.23		Painting with synthetic enamel paint bridge No. and span arrangements.		
		Painting two coats after filling the surface with synthetic enamel paint bridge No and span arrangements as per as directed by Engineer.	Nos	797.00
14.24	1700	Providing structural steel for super-structure complete as per drawing and technical specification	t	1,46,323.00

Chapter - 15
BOX CELL STRUCTURE
(To refer Common SR, Vol-1)

Chapter - 16

**RIVER TRAINING AND
PROTECTION WORKS**

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 16				
RIVER TRAINING AND PROTECTION WORKS				
16.1	2503		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.	m ³ 1,637.00
16.2	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 per cent extra for laps and joints laid with stone boulders weighing not less than 40 kg each.	m ³ 1,630.00
		Note	<i>Readymade woven wire crate rolls have been considered in the rate analysis. In case readymade rolls are not available, GI wire 4mm dia. @ 32 kg per 10 m² may be provided. In that case 2 per cent of the cost of GI wire may be added for weaving the wire crates.</i>	
16.3	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/m ³ as per IRC: 21-2000.	m ³ 6,218.00
16.4	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	m ³ 1,635.00
		B	Cement Concrete Blocks of size 0.3x0.3 x0.3 m cast in cement concrete of Grade M15	m ³ 6,218.00
16.4	2504		Providing and laying Filter material underneath pitching in slopes complete as per drawing and Technical specification	m ³ 3,397.00
16.5	700 & 2504		Geotextile Filter	
			Laying of a geotextile filter between pitching and embankment slopes on which pitching is laid to prevent escape of the embankment material through the voids of the stone pitching/ cement concrete blocks as well as to allow free movement of water without creating any uplift head on the pitching.	m ² 431.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
16.6	2504.4	Toe protection		
		A toe wall for toe protection can either be in dry rubble masonry in case of dry rubble pitching or pitching with stones in wire crates or it can be in PCC M15 nominal mix if cement concert block have been used for pitching . Rates for toe wall can be adopted from respective clauses depending upon approved design. The rate for excavation for foundation, dry rubble masonry and PCC M15 have been analysed and given in respective chapters of different volumes.		
16.7	2507.2	Curtain wall complete as per drawing and Technical specification		
		A Stone masonry in cement mortar (1:3)	m ³	5,611.00
		B Cement concrete Grade M15	m ³	5,926.00
		Note <i>Other items like excavation for foundation, filling behind wall, filter media, weep holes etc. shall be added separately as per approved design.</i>		
16.8	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.	m ³	1,744.00
16.9	2503.3	Gabian Structure for Retaining Earth		
		Providing and construction of a gabion structure for retaining earth with segments of wire crates of size 7 m x 3 m x 0.6 m each divided into 1.5 m compartments by cross netting, made from 4 mm galvanised steel wire @ 32 kg per 10 sqm having minimum tensile strength of 300 Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into mesh with double twist, mesh size not exceeding 100 x 100 mm, filled with boulders with least dimension of 200 mm, all loose ends to be tied with 4 mm galvanised steel wire	m ³	3,280.00
16.10	2503.3	Gabion Structure for Erosion Control, River Training Works and Protection works		
		Providing and constructing gabion structures for erosion control, river training works and protection works with wire crates of size 2 m x 1 m x 0.3 m each divided into 1m compartments by cross netting, made from 4 mm galvanised steel wire @ 32 kg per 10 sqm having minimum tensile strength of 300 Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into mesh with double twist, mesh size not	m ³	5,985.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
		exceeding 100 mm x 100 mm, filled with boulders with least dimension of 200 mm, all loose ends to be securely tied with 4 mm galvanised steel wire.		
		Note <i>Readymade woven wire crate rolls have been considered in the rate analysis. In case readymade rolls are not available, GI wire 4mm dia. @ 32 kg per 10 sqm may be provided. In that case 2 per cent of the cost of GI wire may be added for weaving the wire crates.</i>		
16.11	2503	Gabion structure for erosion control, River Training Works and Protection Works		
		Providing and making gabion structure with mechanically woven Double twisted Hexagonal shaped wire mesh Gabion Boxes as per IS 16014:2012, MoRT&H Clause 2500, of required size, Mesh Type 10x12 (D=100 mm with tolerance of (+or-) 2%) Zinc coated, Mesh wire diameter 3.0 mm mechanically edged with partitions at every 1m interval and shall have minimum 10 numbers of openings per meter of mesh perpendicular to twist, tying with lacing wire of diameter 2.2 mm, supplied @ 3% by weight of Gabion boxes, filled with boulders with least dimensions of 200 mm, as per drawing. all complete as per directions of Engineer in charge of work.	m ³	2,616.00
16.12		Embankment Erosion Protection using Fine Aggregates Concrete Filled Fabric Foam Mattress system		
		Laying of fine aggregates concrete grade M30 filled fabric of embankments	m ³	1,942.00

Chapter - 17

REPAIR AND REHABILITATION

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 17 REPAIR AND REHABILITATION				
17.1	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.	m ² 132.00
17.2	2809		Removal of existing asphaltic wearing coat comprising of 50 mm thick asphaltic concert laid over 12 mm thick mastic asphalt including disposal with all lift and lead.	m ² 123.00
17.3	2807		Guniting concrete surface with cement mortar applied with compressor after cleaning surface and spraying with epoxy complete as per Technical Specification	m ² 830.00
17.4	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	Nos 160.00
17.5	2806		Sealing of cracks/porous concrete by injection process through nipples/Grouting complete as per Technical Specification.	
		A	Cement Grout	kg 192.00
		B	Cement Mortar (1:1) Grouting	kg 181.00
17.6	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.	m ² 7,825.00
17.7	2803		Sealing of crack / porous concrete with Epoxy Grout by injection through nipples complete as per clause 2803.1.	kg 431.00
17.8	2804		Applying epoxy mortar over leached, honey combed and spalled concrete surface and exposed steel reinforcement complete as per Technical Specification	m ² 491.00
17.9	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 conforming to IS: 383 and table 1 of IS: 9012 respectively, water cement ratio ranging from 0.35 to 0.50, density of gunite not less than 2000 kg/m ³ , strength not less than 25 Mpa and workmanship conforming to clause 2807.6.	m ² 430.00
17.10	2800		Applying pre-packed cement based polymer mortar of strength 45 Mpa at 28 days for replacement of spalled concrete	m ² 421.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
17.11	2805	Epoxy bonding of new concrete to old concrete	m ²	746.00
17.12	2810	Providing external prestressing with high tensile steel wires/ strands including drilling for passage of prestressing steel, all accessories for stressing and stressing operation and grouting complete as per drawing and Technical Specification Span assumed: 25 m, No. of Cables : 4 Nos., No. of anchorages : 8 No.	t	5,11,076.00
17.13	2810	Providing external prestressing with high tensile steel wires/ strands including drilling for passage of prestressing steel, all accessories for stressing and stressing operation and grouting complete as per drawing and Technical Specification Span assumed: 50 m, No. of Cables : 4 Nos., No. of anchorages : 8 No.	t	4,03,831.00
17.14	2810	Providing external prestressing with high tensile steel wires/ strands including drilling for passage of prestressing steel, all accessories for stressing and stressing operation and grouting complete as per drawing and Technical Specification Span assumed: 100 m, No. of Cables : 6 Nos., No. of anchorages : 12 No.	t	3,66,572.00
17.15	2808	Replacement of Bearings complete as per Technical Specification	Nos	1,25,621.00
17.16	2808	Rectification of Bearings as per Technical Specifications	Nos	43,312.00
17.17		Replacement of Expansion Joints complete	m	559.00
17.18		Replacement of Damaged Concrete Railing.	m	347.00
17.19		Replacement of Crash Barrier.	m	627.00
17.20		Replacement of Damaged Mild Steel Railing	m	291.00
17.21		Repair of Crash Barrier		
		Repair of concrete crash barrier with cement concert of M-30 grade by cutting and trimming the damaged portion to a regular shape, cleaning the area to be repaired thoroughly, applying cement concert after erection of proper form work.	m	284.00
17.22		Repair of RCC Railing		
		Carrying out repair of RCC M30 railing to bring it to the original shape.	m	186.00
17.23		Repair of Steel Railing		
		Repair of steel railing to bring it to the original shape	m	317.00

Chapter - 18
TUNNEL WORKS

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
CHAPTER - 18 TUNNEL WORK				
18.1		Drill steel with Drill jumbo		
		Excavation for tunnel by using drilling & blasting methods in all types of rock including cost of all materials, machinery, labour, scalling excavated surface, marking, ventilatio, lighting, drainage, removing and hauling the excavated duck outside tunnel upto specified dump area and all other ancillary operations etc.	m ³	1,868.00
18.2	304	Dewatering tunnel by pumping out water collected by natural drainage inside tunnel including		
		Dewatering in tunnel by pumping out water collected by natural drainage inside tunnel including providing sump wherever necessary, cost of all materials, machinery, labour, drainage and all other ancillary operaions etc., complete.	hr	418.00
18.3		Providing, Fitting and Placing of Ribs		
		Providing, Fitting and Placing of Ribs including Fabrication, Erection, Temporary fixture, Handling of material inside fabrication workshop, final matching, field welding and complete as per Drawing and Technical Specifications.	t	1,16,863.00
18.4	2807	Shotcreting with Steel fiber reinforced micro silica shotcrete (SFRS)		
		Shotcreting to upper bench / lower bench with steel fiber reinforced shotcrete (SFRS), shotcrete compressive strength shall be 25 N/mm2 and complete as per Drawing and Technical Specifications.	m ³	13,131.00
18.5	2807	Shotcreting with welded wire mesh		
		Shotcreting to upper bench / lower bench with welded wire mesh, shotcrete compressive strength shall be 25 N/mm2 and complete as per Drawing and Technical Specifications.	m ³	15,887.00
18.6	2806 & 3200	Providing and fixing 25 mm diameter 3 m long steel rock bolts including drilling 45 mm dia holes, plate, nuts, cement grout, cost of all materials, machinery, labour, ventilation, lighting, drainage and all other ancillary operations etc. complete as per Drawing and Technical Specification.	No.	2,271.00
18.7	2806 & 3200	Providing and fixing 32 mm diameter 7 m long steel rock bolts including drilling 51 mm dia holes, plate, nuts, cement grout, cost of all materials, machinery, labour, ventilation, lighting, drainage and all other ancillary operations etc. complete as per Drawing and Technical Specification.	No.	6,711.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
18.8		2806 Grouting with Cement		
		Gouting cement slurry in grout holes under specified pressure for consolidation / contact grouting including cost of all materials, machinery, labour, predrilling wherever necessary, ventilation, lighting, drainage and other ancillary operations etc. complete as per Drawing and Technical specifications.	t	31,121.00
18.9		1600 Supplying, fitting and placing TMT Fe 500 & above bar reinforcement in Tunnel Work complete as per drawing and technical specifications	t	87,586.00

Chapter - 19

**ENVIRONMENTAL & SAFETY
MANAGEMENT AND
BIO ENGINEERING**

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
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CHAPTER - 19 ENVIRONMENTAL & SAFETY MANAGEMENT AND BIO ENGINEERING				
19.1		Noice Barriers		
	(i)	Masonry Wall	m ³	7,332.00
	(ii)	Galvanised steel plain sheet	m ²	475.00
	(iii)	Acrylic noice barrier sheet	m ²	191.00
19.2		Constructon of Bamboo crib wall complete as per drawing and additional technical specification	m ²	1,137.00
19.3		Constructon of Fascines with a bundle of sticks complete as per drawing and additional Technical specification	m	202.00
19.4		Constructon and laying of brush layers across he slope complete as per drawing and additional Technical specification	m ²	97.00
19.5		Constructon of vegetative Palisades in Hill usng hard wood cutting complete as per drawing and additional Technical specification	m	218.00
19.6		Laying of Palisades in Slopes complete as per drawing and additional Technical specification	m ²	97.00
19.7		Dust supression		
		Sprinkling of water in the settelment and working area as per instructions of Engineer.	KL	1,088.00
19.8		Water Quality Monitoring		
		Grab Sample as per the monitoring locations mention in the Environmental Impact Assessment and Environmental Management Plan report or one sample/10 km length.	Nos	1,320.00
19.9		Soil Quality Monitoring		
		Grab Sample as per the monitoring locations mention in the Environmental Impact Assessment and Environmental Management Plan report or one sample/10 km length.	Nos	1,320.00
19.10		Ambient Air Quality Monitoring		
		24 hrs continuous for location as mention in the EIA/EMP report or one montoring location within 10 km radius.	Nos	1,320.00

SI No	Ref. to MoRT&H Spec.	Description	Unit	Rate ₹
19.11		Ambient Noice Monitoring 24 hour continuous	Nos	1,320.00
		To be carried out as per the location mention in the Environmental Impact Assessment and Environmental Management Plan report.		
19.12		Pollution prevention		
		Site fencing on either side of the streams and rivers icluding erection and maintanance for entire construction phase	m	24.00

**RURAL DEVELOPMENT &
PANCHAYATH RAJ ENGINEERING
DEPARTMENT**

Chapter - 20

PANCHAYATH RAJ

ENGINEERING DEPARTMENT

ITEMS

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
		LOADING, UNLOADING, CARRIAGE CRUSHING OF MATERIALS AND SETTING OUT		
20.1		Loading, Unloading and Stacking of Bricks by Manual Means		
(i)		Loading of Bricks by manual means including a lead upto 30 m	1000 Nos.	334.00
(ii)		Unloading and Stacking of Bricks by manual means including a lead upto 30 m	1000 Nos.	334.00
20.2		Loading and Unloading of Bitumen Drums by manual means		
(i)		Loading of Bitumen Drums by manual means including a lead upto 30 m	t	290.00
(ii)		Unloading of Bitumen Drums by Manual Means including a lead upto 30 m	t	267.00
20.3		Loading and Unloading of Timber by manual means		
(i)		Loading of Timber by manual means including a lead upto 30 m	t	432.00
(ii)		Unloading of Timber by manual means including a lead upto 30 m	t	432.00
20.4		Loading and Unloading of C.C Blocks, Kerb, etc		
(i)		Loading with care C.C. Blocks, km Stone, 200 m Stone, Boundary Pillar, Kerb, Channel, Bond Stone, etc. by manual means including a lead upto 30 m	m3	641.00
(ii)		Unloading with care C.C. Blocks, km Stone, 200 m Stone, Boundary Pillar, Kerb, Channel, Bond Stone, etc. by manual means including a lead upto 30 m	m3	641.00
20.5		Loading and Unloading of Hume pipe		
(i)		Loading of RCC Hume pipes by mechanical means including a lead upto 30 m		
A.		1000 / 1200 mm dia Hume pipe	per pipe	120.00
B.		750 mm dia Hume pipe	per pipe	72.00
C.		600/450 mm dia Hume pipe	per pipe	51.00
(ii)		Unloading of RCC Hume pipe by manual means including a lead upto 30 m		
A.		1000/1200 mm dia RCC Hume pipes	per pipe	755.00

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
B.		750 mm dia Hume pipe	per pipe	629.00
C.		600/450 mm dia Hume pipe	per pipe	472.00
(iii)		Unloading of RCC Hume pipes by mechanical means including a lead upto 30 m		
A.		1000/1200 mm dia Hume pipe	per pipe	85.00
B.		750 mm dia Hume pipe	per pipe	51.00
C.		600/450 mm dia Hume pipe	per pipe	36.00
		EARTHWORK, EROSION CONTROL AND DRAINAGE		
20.6		Stripping, Storing and Relaying Top Soil from Right-of-Way (R.O.W)	m3	572.00
20.7	302.3.2	Stripping, Storing and Relaying Top Soil from Borrow Areas in Agricultural Fields		
		Stripping of top soil from borrow areas located in agriculture fields, storing at a suitable place, spreading and relaying after taking the borrow earth to maintain fertility of the agricultural field, finishing it to the required levels to the satisfaction of the farmer/land owner as per Technical Specification Clause 302.3.2.	m3	250.00
20.8	307	Surface Drains in Soil		
		Construction of unlined surface drains of average cross-sectional area 0.40 m2 in soil to specified lines, grades, levels and dimensions. Excavated material to be used in embankment with a lift upto 3m and lead of 50 m (average lead 25 m) as per Technical Specification Clause 307.		
(A)		Manual Means	m	113.00
(B)		Mechanical Means	m	18.10
20.9	307	Surface Drains in Ordinary Rock		
		Construction of unlined surface drain of average cross-sectional area 0.4 m2 in ordinary rock to specified lines, grades, levels and dimensions as per approved design and Technical Specification Clause 307. Excavated material to be used in embankment at site.		
(A)		Manual Means	m	170.00
(B)		Mechanical Means	m	38.00

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
		GRANULAR SUB-BASES, BASES (NON-BITUMINOUS) AND SHOULDERS		
20.10	405	Water Bound Macadam Sub-base/base		
		WBM Grading 2 Stone Screening		
		Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with smooth wheel roller 80-100 kN in stages to proper grade and camber, applying and brooming, stone screening/binding materials to fill-up the interstices of coarse aggregate, watering and compacting to the required density grading 2 as per Technical Specification Clause 405.		
		By Manual Means	m3	2,831.00
20.11	405	WBM Grading 3 Stone Screening		
		Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with smooth wheel roller 80-100 kN in stages to proper grade and camber, applying and brooming, stone screening to fill-up the interstices of coarse aggregate, watering and compacting to the required density Grading 3 as per Technical Specification Clause 405.		
		By Manual Means	m3	2,770.00
20.12	405	WBM Grading 2 Crushable Screening		
		Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with three wheel 80-100 kN static roller in stages to proper grade and camber, applying and brooming, crushable screening to fill-up the interstices of coarse aggregate, watering and compacting to the required density Grading 2 as per Technical Specification Clause 405.		
		By Manual Means	m3	2,476.00

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
		BASES AND SURFACE COURSES (BITUMINOUS)		
20.13	507	Mix Seal Surfacing		
		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 VG-30 bitumen 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 507.		
		Type B by Manual Means using VG-30 Bitumen	m²	233.00
20.14	508	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, Type B and Type C as per Technical Specification Clause 508		
		By Manual Means		
		Case - II : Type B using VG-30 Bitumen	m²	69.00
		CEMENT CONCRETE PAVEMENT		
20.15	1502	Roller Compacted Concrete Pavement		
		Construction of Roller Compacted Concrete Pavement (RCCP) with coarse and fine aggregates conforming to IS:383, the size of coarse aggregate not exceeding 25 mm with minimum aggregate cement ratio of 5:1 mm and with minimum cement content of 310 kg per m ³ , aggregate gradation to be as per Table 1500.3 after blending, mixing in concrete mixer at optimum moisture content, transporting to site, laying with wheel barrows or steel pans or with mechanical paver, compacting with 80-100 kN smooth wheel, tandem vibratory roller, to achieve, the designed flexural strength, finishing and curing as per drawings and Technical Specification Clause 1502	m³	7,047.00
		PIPE CULVERTS		
20.16	1101.6	Providing and Laying Reinforced Cement Concrete Pipe NP3 as per design in Single Row		
		Providing and laying reinforced cement concrete pipe NP3 for culverts on first class bedding of granular material in single row including fixing collar with cement		

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
		mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets Clause 1101.6.		
A		1200mm dia	m	8,161.00
B		1000mm dia	m	6,152.00
C		750 mm dia	m	3,194.00
20.17	1101.6	Providing and Laying Reinforced Cement Concrete Pipe NP3 as per Design in Double Row		
		Providing and laying reinforced cement concrete pipe NP3 for culverts on first class bedding of granular material in double row including fixing collar with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets as per Clause 1101.6.		
(A)		1200 mm dia	m	16,431.00
(B)		1000 mm dia	m	12,373.00
(C)		750 mm dia	m	6,388.00
20.18	1101.6	Laying Cement Concrete Pipe NP3 (buried conduits) on first class bedding of granular material including fixing collar with cement sand mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry work in head wall and parapets		
		500 mm dia	m	2,471.00
		MAINTENANCE OF ROADS		
20.19	1907	Maintenance of WBM Road		
		Maintenance of WBM road including filling up of pot holes, ruts and rectifying corrugated surface, damaged edges and ravelling as per technical specification Clause 1907.	m ²	318.00
20.20	1908	Maintenance of Drains		
		The maintenance of drains include erosion, repair, clearing, cleaning, reshaping, regrading, deepening of side drains as well as catch water drains as per technical specification Clause 1908.	m	4.55
20.21	1909	Maintenance of Culverts		
(I)		Maintenance of Hume pipe Culvert by way of Clearing, Cleaning, Erosion repair, repairs to cracks, parapet wall and protection work as per drawing and technical specification Clause 1909	One No. Hume Pipe	1,626.00

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
		Maintenance of Culverts Slab type		
(II)		Maintenance of Slab type Culverts by way of clearing, Cleaning, Erosion repair, repairs to cracks, parapet walls and Protection works as per drawing and technical specification Clause 1909	Culvert	3,462.00
20.22	1910	Maintenance of Causeway		
		Maintenance of Causeway by way of minor Surface repairs, replacing Guide Posts, repair of flood gauges, removal of debris, providing boulders and protection work and painting as per technical specification Clause 1910	m	81.00
20.23	1911	Maintenance of Road Signs		
		Maintenance of road signs by way of cleaning and repainting of mandatory / regulatory / cautionary / informatory and place identifications sign board as per drawings and technical specification Clause 1911	km	1,578.00
20.24	1912	Maintenance of steel and RCC Railing		
(i)		Repair of steel railing to bring it to original shape cleaning and repainting as per drawing and technical specification Clause 1912		
		Steel Railing	m	292.00
(ii)		Repair of RCC railing to bring it to the original shape, cleaning and repainting as per drawings and technical specification Clause 1912		
		RCC Railing	m	1,926.00
20.25	1913	Maintenance of 200 metre and km stones		
		Maintenance of 200 metre km stone by way of refitting of tilted stones repairing with cement mortar, cleaning, repairing and lettering on 200 metre km stone and 5th km stone as per drawing and technical specification Clause 1913		
(i)		Painting two coats with synthetic enamel paint	km	162.00
(ii)		Printing letters and figures of any shade with synthtic enamel paint of any approved colour to give an even shade	km	847.00

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
20.26	1915	Cutting of branches of trees shrubs and trimming of grass and weeds		
(i)		Cutting of branches of trees and shrubs from the road way or with in R.O.W including disposal of wood and leaves to suitable location as per technical specification Clause 1915	one tree	170.00
(ii)		Cutting of shrubs from the road way or with in R.O.W and disposal of shrubs to suitable locations as per technical specifications Clause 1915	each	11.38
(iii)		Trimming of grass and weeds from the shoulders/berms and disposing off the same to suitable locations as per technical specifications Clause 1915	m²	3.79
20.27	1916	White washing of parapet walls of CD work and tree trunks		
		White washing two coats on parapet walls and tree trunks including preparation of surface by cleaning scraping etc. as per technical specifications Clause 1916	m²	23.00
		OTHER ITEMS(CC Pavement and PMGSY Boards)		
20.28	1501	Providing and constructing un-reinforced plain cement concrete pavement, thickness as per design, over a prepared sub base, with 43 grade cement or any other type as per Clause 1501.2.2 M20 (Grade), coarse and fine aggregates conforming to IS:383, maximum size of coarse aggregate not exceeding 25 mm, mixed in a concrete mixer of not less than 0.2 m ³ capacity and appropriate weigh batcher using approved mix design, laid in approved fixed side formwork (steel channel, laying and fixing of 125 micron thick polythene film, wedges, steel plates including levelling the formwork as per drawing), spreading the concrete with shovels, rakes, compacted using needle, screed and plate vibrators and finished in continuous operation including construction joints, primer, sealant , curing of concrete slabs for 14-days, and water finishing to lines and grade as per drawing and technical specification clause 1501 with all lead, lifts, loading & unloading charges, cost and conveyance of all materials, labour, equipments etc., complete. as per the directions of the Engineer-in-charge of the work.	m³	6,442.00

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
20.29	1501	Providing and constructing un-reinforced plain cement concrete pavement, thickness as per design, over a prepared sub base, with 43 grade cement or any other type as per Clause 1501.2.2 M30 (Grade), coarse and fine aggregates conforming to IS:383, maximum size of coarse aggregate not exceeding 25 mm, mixed in a concrete mixer of not less than 0.2 cum capacity and appropriate weigh batcher using approved mix design, laid in approved fixed side formwork (steel channel, laying and fixing of 125 micron thick polythene film, wedges, steel plates including levelling the formwork as per drawing), spreading the concrete with shovels, rakes, compacted using needle, screed and plate vibrators and finished in continuous operation including construction joints, , primer, sealant , curing of concrete slabs for 14-days, and water finishing to lines and grade as per drawing and technical specification clause 1501 with all lead, lifts, loading & unloading charges, cost and conveyance of all materials, labour, equipments etc., complete. as per the directions of the Engineer-in-charge of the work.	m3	6,837.00
20.30	1701	Providing and Fixing 'Logo' of PMGSY Project		
		Providing and fixing of typical PMGSY informatory sign board with Logo as per MORD specifications and drawing. i)The board will be a composite unit consisting of three plates of Aluminium Composite Materials (ACM), material specifications as per Clause 1701.3.7. The top most plate will be in diamond shape of 600mm x 600 mm size, riveted over welded M.S. angle iron frame of 25 mm x 25mm x 5 mm size on back on edges. The middle plate will be 1200 mm x 150 mm size riveted over welded M.S. angle iron frame of 25mm x 25mm x 5 mm size on back on edges. The main lower most plate will be 1500 mm x 600 mm size, riveted over welded M.S. angle iron frame of 25 mm x 25 mm x 5 mm size. Welding of all the sheets over angle iron frame will be done neatly to have plain surface on one side. The angle iron frames of the lower most plate and the middle plate will be welded to two nos. 75 mm x 75 mm (12 SWG) sheet tubes posts placed at 1125 mm apart centre to centre. The top of the middle plate will be flushed with the top of 75 mm tube posts and these posts will be embedded in cement concrete M15 grade blocks of 450 mm x 450 mm x 600 mm below ground level. The height of bottom of the lower most plate will be 1200 mm from normal ground level and the bottom of middle plate will be 100 mm above the top level of the lower most plate. The diamond shaped plate mounted over angle iron frame will be connected to middle		

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
		plate by square medium steel section of 47 mm x 47 mm thickness 12 SWG having a spacing of 100 mm between the diamond shaped plate and middle plate and this square section will be welded to the bottom point of the diamond shaped plate. (ii) The lettering and borders, etc. of middle and bottom plate, PMGSY logo on top plate shall be as per clause 1701.4.6 Messages/Borders. All the sections of frame and posts will be painted with primer and two coats of Epoxy paint. The steel tube below ground level will be painted with three coats of Epoxy paint. The design, painting and lettering shall be done as per approved drawing. (iii) For warranty and durability the clause 1701.5 and for maintenance the clause 1911 shall be applicable. (iv) A reference number along with the month and year of installation should be placed on the back of a sign in a contrasting colour or by stamping in characters not exceeding 50 mm in height.485777/2019/Dir(Tech) 7		
A		Retro Reflective Traffic Sign As per IRC 67 Clause 1701.3.8.1 Class A Type-1	Each	14,937.00
B		Retro Reflective Traffic Sign As per IRC 67 Clause 1701.3.8.2 Class B Type-3	Each	15,518.00
20.31		Providing and Fixing 'Logo Board ' of PMGSY at Starting Point		
		Providing and fixing of typical Logo board as per specifications and drawing. Two ACP Sheet of 3mm thick, top and Bottom plate duly welded/bolted with MS Square angle 25mm x25mmx 5mm size on back and on the edges. The Top and Bottom plate will be welded/ bolted to 1 nos75x75x6 mm square Hallow section duly embedded in cement concrete M15 Grade of 600*600*600 mm, 450 mm below ground level.Retro-Reflecting Sheet as per IRC:67 Clause 1701.3.8.1 fixed over aluminium sheeting.All sections of steel tube will be painted with primer and two coats of epoxy paint as per drawing.		
A		Retro Reflective Traffic Sign As per IRC 67 Clause 1701.3.8.1 Class A Type-1	Each	9,807.00
B		Retro Reflective Traffic Sign As per IRC 67 Clause 1701.3.8.2 Class B Type-3	Each	10,086.00

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
20.32	1701	Providing and Fixing 'Logo Board ' of PMGSY at Intermediate Point		
		Providing and fixing of typical Logo board as per specifications and drawing. Two ACP Sheet of 3mm thick, top and Bottom plate duly welded/bolted with MS Square angle 25mm x25mmx 5mm size on back and on the edges. The Top and Bottom plate will be welded/ bolted to 1 nos75x75x6 mm square Hallow section duly embedded in cement concrete M15 Grade of 600*600*600 mm, 450 mm below ground level.Retro-Reflecting Sheet as per IRC:67 made of encapsulated lens type reflective sheeting vide Clause 1701.2.3 fixed over aluminium sheeting.All sections of steel tube will be painted with primer and two coats of epoxy paint as per drawing.		
A		Retro Reflective Trafic Sign As per IRC 67 Clause 1701.3.8.1 Class A Type-1	Each	9,234.00
B		Retro Reflective Trafic Sign As per IRC 67 Clause 1701.3.8.2 Class B Type-3	Each	9,480.00
20.33	1701	Providing and Fixing 'Citizen Information Board A'		
		Providing and fixing of typical 'Citizen Information Board A' as per specifications and drawing. Two ACP Sheet of 4mm thick having minimum 0.25mm thick aluminum skin both sides and fixed over a back support of Ms plate of 5mm thick. Supported on frame post of 2 no's of MS Suare hallow section 75mmx75mmx6mm which is duly embedded in cement concrete M20 Grade of 600x600x750mm,600mm below ground level.All MS will be stove enameled on both the sides.All sections of framed posts,MS sheet and Stell tubes will be painted with primer and two coats of epoxy paint as per drawing etc..Retro-Reflective Sheet as per IRC 67 fixted over a two no's of Aluminum composite material(ACP) sheeting of size 900x750mm of 4mm thick duly bolted/reveted with MS plate of 5mm thick on backside of ACP Sheet.Including cost and conveyance of all materials,equipment,machinery and labour with all leads andlifts,loadingchargeschargesnecessaryforsatisfactory completion of work as per directed by engineer incharge. (i) For warranty and durability the clause 1701.5 and for maintenance the clause 1911 shall be applicable. (ii) A reference number along with the month and year of installation should be placed on the back of a sign in a contrasting colour or by stamping in characters not exceeding 50 mm in height.485777/2019/Dir(Tech) 7		

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
A		Retro Reflective Traffic Sign As per IRC 67 Clause 1701.3.8.1 Class A Type-1	Each	20,470.00
B		Retro Reflective Traffic Sign As per IRC 67 Clause 1701.3.8.2 Class B Type-3	Each	20,494.00
20.34	1701	Providing and Fixing 'Citizen Information Board B"		
		Providing and fixing of typical 'Citizen Information Board B" as per specifications and drawing. Two ACP Sheet of 4mm thick having minimum 0.25mm thick aluminum skin both sides and fixed over a back support of Ms plate of 5mm thick. Supported on frame post of 2 no's of MS Suare hallow section 75mmx75mmx6mm which is duly embedded in cement concrete M20 Grade of 600x600x750mm,600mm below ground level.All MS will be stove enameled on both the sides.All sections of framed posts,MS sheet and Stell tubes will be painted with primer and two coats of epoxy paint as per drawing etc..Retro-Reflective Sheet as per IRC 67 fixted over a two no's of Aluminum composite material(ACP) sheeting of size 900x750mm of 4mm thick duly bolted/reveted with MS plate of 5mm thick on backside of ACP Sheet.Including cost and conveyance of all materials,equipment,machinery and labour with all leads andlifts,loadingchargeschargesnecessaryforsatisfactory completion of work as per directed by engineer incharge. (i) For warranty and durability the clause 1701.5 and for maintenance the clause 1911 shall be applicable. (ii) A reference number along with the month and year of installation should be placed on the back of a sign in a contrasting colour or by stamping in characters not exceeding 50 mm in height.485777/2019/Dir(Tech) 7		
A		Retro Reflective Traffic Sign As per IRC 67 Clause 1701.3.8.1 Class A Type-1	Each	20,435.00
B		Retro Reflective Traffic Sign As per IRC 67 Clause 1701.3.8.2 Class B Type-3	Each	20,988.00
20.35	1701	Providing and Fixing 'Maintenance Information Board "		
		Providing and fixing of typical Maintenance information board as per specifications and drawing. ACP Sheet of 3 mm thick having minimum 0.25mm thick aluminum skin both sides and fixed over a back support of Ms plate of 5mm thick. Supported on frame post of 2 no's of MS Suare hallow section 75mmx75mmx6mm which		

Sl. No.	MORD Ref.	Specification	Unit	Rate ₹
		is duly embedded in cement concrete M20 Grade of 600x600x750mm,600mm below ground level.All MS will be stove enameled on both the sides.All sections of framed posts,MS sheet and Stell tubes will be painted with primer and two coats of epoxy paint as per drawing etc..Retro-Reflective Sheet as per IRC 67 fixted over a Aluminum composite material(ACP) sheeting of size 900x1500mm of 3mm thick duly bolted/reveted with MS plate of 5mm thick on backside of ACP Sheet.Including cost and conveyance of all materials,equipment,machinery and labour with all leads and lifts,loading charges charges necessary for satisfactory completion of work as per directed by engineer incharge. (i) For warranty and durability the clause 1701.5 and for maintenance the clause 1911 shall be applicable. (ii) A reference number along with the month and year of installation should be placed on the back of a sign in a contrasting colour or by stamping in characters not exceeding 50 mm in height.485777/2019/Dir(Tech) 7		
A		Retro Reflective Trafic Sign As per IRC 67 Clause 1701.3.8.1 Class A Type-1	Each	19,862.00
B		Retro Reflective Trafic Sign As per IRC 67 Clause 1701.3.8.2 Class B Type-3	Each	20,863.00

Chapter - 21
OTHER ITEMS

Sl. No.		Specification	Unit	Rate ₹
21-A		Road Works		
		Semi Dense Bituminous Concrete		
1	IRC-37: 2018	Providing and laying Semi Dense Bituminous Concrete with 40/60 TPH capacity hot mix plant batch type using crushed aggregates of specified grading premixed with bituminous binder VG-30 @ 5% by weight of mix and filler, transported to site, laid over a previously prepared surface with mechanical paver finisher to the required grade, level and alignment and rolled as per MoRTH V revision.	m ³	10,579.00
		Stone Matrix Asphalt (SMA)		
2	MoRTH Sec 515	i) Stone Matrix Asphalt, a gap graded, densely compacted Mix as per section 515 of MoRTH revision. ii) The Bitumen shall conform to 515.21 & design mix requirement as per table 500.2. iii) The coarse & fine aggregate shall conform to table 500-35 & fine aggregate as per 515.2.3. iv) The filler shall be inert conforming to table 500.36. 0.3% minimum by weight (on loose fibre basis) of total mix pelletized cellulose fibre shall be used and tested in accordance to ASTM D 6390 and requirements as per 515.2.6. v) The complete mix design of SMA shall be as per table 500:38. vi) The executing authorities shall prepare the rate analysis based on these variables & informations provided in MoRTH V revision.		
3	MoRTH Sec 503	Tack coat on Bituminous surface		
		Providing and applying tack coat with VG-10 Bitumen using pressure distributor at the rate of 0.20 kg/m ² on the prepared bituminous surface cleaned with mechanical broom	m ²	13.00
4	MoRTH Sec 503	Tack coat on Granular surface treated with primer		
		Providing and applying tack coat with VG-10 Bitumen using pressure distributor at the rate of 0.25 kg/m ² on the prepared bituminous surface cleaned with mechanical broom	m ²	16.00
5	MoRTH Sec 503	Tack coat on Cement concrete pavement		
		Providing and applying tack coat with VG-10 Bitumen using pressure distributor at the rate of 0.30 kg/m ² on the prepared bituminous surface cleaned with mechanical broom	m ²	19.00

Sl. No.		Specification	Unit	Rate ₹
6		Supplying and fixing M15 grade precast cement concrete Kerb stones for Roadway, Sidewalls and gutters fixed with CM 1:3 fixed and finished in line as per direction of Engineer in charge. (The cost of PCC shall be paid extra)		
6.1		300 x 250 x 100 mm Kerb Stone	m	239.00
6.2		600 x 200 x 100 mm Kerb Stone	m	217.00
6.3		600 x 300 x 150 mm Kerb Stone	m	423.00
6.4		900 x 250 x 150 mm Kerb Stone	m	353.00
6.5		300 x 300 x 100 mm Kerb Stone	m	269.00
6.6		600 x 300 x 100 mm Kerb Stone	m	238.00
6.7		300 x 300 x 150 mm Kerb Stone	m	325.00
6.8		300 x 200 x 150 mm Kerb Stone	m	301.00
21-B		Concrete Works		
1	MoRTH 602.6.5	Providing and fixing in position 32 mm dia dowel bars precoated with anticorrosive epoxy paint of required Dia. 600 mm. Long and at 300 mm. C/C and wherever directed including handling, straightening, necessary cutting supported by TMT FE 500, chairs with proper alignment by using properly designed assembly of Bulkheads lubricating half length with bituminous paint as directed etc. complete.	No.	480.00
2	MoRTH 602.6.5	Providing and fixing in position 25mm dia dowel bars precoated with anticorrosive epoxy paint of required Dia. 600 mm. Long and at 300 mm. C/C and wherever directed including handling, straightening, necessary cutting supported by TMT FE 500, chairs with proper alignment by using properly designed assembly of Bulkheads lubricating half length with bituminous paint as directed etc. complete.	No.	380.00
3	MoRTH 602.6.4	Providing and fixing in position, tie bars precoated with anticorrosive epoxy paint of 12 mm dia. 700 mm. long and at 300 mm. C/C and wherever directed including handling, straightening wrapping with paper of approved quality for half length, necessary cutting, handling, straightening , supported by assembly of TMT FE 500, chairs with proper alignment etc. complete.	No.	270.00
4	MoRTH 602.6.3	Cutting transverse contraction joints 3 to 4 mm wide and depth 60mm in concrete slab using concrete cutting machine with diamond studded saw within 48 hours of casting of bay / slab etc. complete including subsequent widening of the groove 8 to 10 mm. wide at top having depth of 15 mm. as directed by Engineer incharge.	m	70.00

Sl. No.	Specification	Unit	Rate ₹
5	MoRTH 602.6.3 Providing to contraction joints polysuphide sealent (Pouring grade) confirming to BS : 5212 - 1989 into sawed groove widened at top for sealent reservoir of specified size and shape as per detailed drawing including fixing Polyethylene foam backer rod of required diameter (approx. 25% larger than the initial 3 mm.to 4 mm. joint) overlaid with bond breaking tape as per detailed drawing. Item includes cleaning the joints with water jet / air compressor and allowing joint to become thoroughly dry before sealent is applied and applying primer. (A) Contraction and longitudinal joints (15 mm. deep x 8 mm.wide).	m	165.00
6	IS 3395-1997 Providing and laying 150 micron Low Density Polyethylene (LDPE) sheet confirming to IS 3395 : 1997 below concrete pavement including all materials and labour complete.	m ²	20.00
7	Precast Concrete Pavement		
	Pavement rehabilitation and reconstruction are the major activities taken up in the department. Traffic volumes in Bengaluru city and in other Smart cities have increased tremendously over the decade with increasing traffic disruptions and extended lane closures and to resolve the issue of longer delays, a promising alternative rehabilitation patented strategy 'Prestressed Precast Concrete Pavement' (PPCP) Systems taken up in Nagpur city is proposed by Chief Engineer C&B (N), PWD. In this regard, an attempt is made to frame a specification for executing the work on pilot basis. The rate shall be worked out based on field experiences by competent authority.		
	A) PPCP item M40 grade / upto 1000 CVPD traffic intensity:		
	Design, Construction and Laying of M40 grade Prestressed Precast Concrete Panel (PPCP) pavement, having flexural strength not less than 4.50 MPa and traffic intensity up to 1000 cvpd, casting the PPCP panels as per approved design drawing, in factory or plant with approved methodology in vibratory moulds, providing in position reinforcement conforming to IS:1786 and uncoated stress relieved low relaxation seven ply strand of minimum 12.7 mm diameter conforming to IS:14268, with necessary mechanical pulling arrangement like Rabbit / Bed master including all accessories for stressing and destressing operations as per approved make conforming to IS:1343,prestressing as per approved design and drawing(proof checked) as per technical specifications. The PPCP panels of minimum 200 mm thick shall be cast with concrete prepared in a cement concrete batch mix plant/weigh batcher, as per approved mix design using coarse / fine aggregate conforming to IS:383, with Super		

Sl. No.	Specification	Unit	Rate ₹
	Plasticizer conforming to IS:9103 and panels cured by steam / membrane curing / sprinkling water. Double mat reinforcement and tie bars shall be High Strength Deformed steel bar (Fe 500 / Fe 550) conforming to IS:1786, the cost being inclusive of straightening, cutting, bending, hooking, placing in position within casting mould, tying with binding wire etc., complete and providing MS Dowel bars conforming to IS:432, precoated with anticorrosive epoxy paint as per IS:13620 at designed spacing. The work shall include surface texturing/tining of PPCP panels, making necessary slots to accommodate lifting anchors for yard handling, stacking, insertion of dowel / tie bars, transportation of PPCP panels by flat bed trailer (Tandem/ Trident axle with necessary accessories like A frame etc.,) from casting yard laying to the required line, level and alignment over already prepared base (cost for preparation of base to be paid separately) by making all arrangements i.e., cranes, push pull jacks and all other T&P for lifting, placing in alignment of PPCP panels within erection tolerances, post tensioning as per approved design to the required stress, providing 12 mm foam separator sheet pasted at two faces of panels, bed grouting with non shrink highly flowable mortar, grouting dowel/lifting slots using non shrink grout having a minimum of 40 MPa strength in 24 hours, joint sealing with Polysulphide Sealant conforming to IS:11433 (Part I) / BS 5212 – 1990, including cost of all materials, machineries, casting yard, labour etc., complete as per specifications and the direction of Engineer in Charge.		
7.1	-Do- with M40 grade Pavement Quality Concrete (PQC) using 43 grade OPC at 420 kg/m ³ , conforming IS:269		
7.2	-Do- with M40 grade Pavement Quality Concrete (PQC) using 53 grade OPC conforming IS:269 at 315 kg/m ³ and Cementitious material Ground Granulated Blast furnace Slag at 105 kg/m ³ conforming IS:12089.		
7.3	-Do- with M40 grade Pavement Quality Concrete (PQC) using 53 grade OPC conforming IS:269 @ 357 kg/m ³ and cementitious material Fly Ash at 63 kg/m ³ conforming IS:3812.		
	B) PPCP item M40 grade / Above 1000 CVPD traffic intensity:		
	Design, construction and laying of M40 grade Prestressed Precast Concrete Panel (PPCP) pavement, having flexural strength not less than 4.50 MPa and traffic intensity more than 1000 cvpd, casting the PPCP panels as per approved design drawing, in factory or plant with approved methodology in vibratory moulds, providing in position reinforcement conforming to IS:1786 and uncoated stress relieved low		

Sl. No.	Specification	Unit	Rate ₹
	relaxation seven ply strand of minimum 12.7 mm diameter conforming to IS:14268, with necessary mechanical pulling arrangement like Rabbit / Bed master including all accessories for stressing and destressing operations as per approved make conforming to IS:1343, prestressing as per approved design and drawing (proof checked) as per technical specifications. The PPCP panels of minimum 200 mm thick shall be cast with concrete prepared in a cement concrete batch mix plant/ weigh batcher, as per approved mix design using coarse / fine aggregate conforming to IS:383, with Super Plasticizer conforming to IS:9103 and panels cured by steam / membrane curing / sprinkling water. Double mat reinforcement and tie bars shall be High Strength Deformed steel bar (Fe 500 / Fe 550) conforming to IS:1786, the cost being inclusive of straightening, cutting, bending, hooking, lacing in position within casting mould, tying with binding wire etc., complete and providing MS Dowel bars conforming to IS:432, precoated with anticorrosive epoxy paint as per IS:13620 at designed spacing. The work shall include surface texturing/tining of PPCP panels, making necessary slots to accommodate lifting anchors for yard handling, stacking, insertion of dowel / tie bars, transportation of PPCP panels by flat bed trailer (Tandem/ Trident axle with necessary accessories like A frame etc.,) from casting yard laying to the required line, level and alignment over already prepared base (cost for preparation of base to be paid separately) by making all arrangements i.e., cranes, push pull jacks and all other T&P for lifting, placing in alignment of PPCP panels within erection tolerances, post tensioning as per approved design to the required stress, providing 12 mm foam separator sheet pasted at two faces of panels, bed grouting with non shrink highly flowable mortar, grouting dowel/lifting slots using non shrink grout having a minimum of 40 MPa strength in 24 hours, joint sealing with Polysulphide Sealant conforming to IS:11433 (Part I) / BS 5212 – 1990, including cost of all materials, machineries, casting yard, labour etc., complete as per specifications and the direction of Engineer in Charge.		
7.4	-Do- with M40 grade Pavement Quality Concrete (PQC) using 43 grade OPC at 420 kg/m ³ , conforming IS:269		
7.5	-Do- with M40 grade Pavement Quality Concrete (PQC) using 53 grade OPC conforming IS:269 at 315 kg/m ³ and Cementitious material Ground Granulated Blast furnace Slag at 105 kg/m ³ conforming IS:12089.		
7.6	-Do- with M40 grade Pavement Quality Concrete (PQC) using 53 grade OPC conforming IS:269 @ 357 kg/m ³ and cementitious material Fly Ash at 63 kg/m ³ conforming IS:3812.		

Sl. No.		Specification	Unit	Rate ₹
21-C		Traffic Signages & Other Appurtenant Works		
1	MoRTH 806	Supplying and Fixing of Molded Shank Raised Pavement Markers / Cat's Eye made of polycarbonate and ABS moulded body and reflective panels with micro prismatic lens capable of providing total internal reflection of the light entering the lens face and shall support a load of 16000 kg tested in accordance to ASTM D 4280 Type H and complying to Specifications of Category A of MORTH Circular No RW/NH/33023/10-97 DO III Dt 11.06. 1997. The height, width and length shall not exceed 50 mm, 100 mm and 102 +/- 2 mm and with minimum reflective area of 13 cm ² on each side and the slope to the base shall be 35 +/- 5 degree. The strength of detachment	No.	500.00
		of the integrated cylindrical shanks, (of diameter not less than 19 +/- 2 mm and height not less than 30 +/- 2 mm) from the body is to be a minimum value of 500 Kg. Fixing will be by drilling holes on the road for the shanks to go inside, without nails and using epoxy resin based adhesive as per manufacturer's recommendation and complete as directed by the engineer. The contractor shall submit a two year warranty for satisfactory field performance including stipulated retro-reflectance of the reflecting panel, to the Engineer.		
2	MoRTH 806	Providing and Fixing of Median Marker that are made of tough, high impact resistant, injection-molded, thermoplastic body with an isosceles trapezoidal structure of length, width and height not less than 15cm, 10cm and 10cm respectively and thickness not less than 1.8mm, the body structure shall be rounded at its acute angle, all the corners and edges. The plastic used for molding the Median Marker shall have a minimum Notched Izod Impact strength value of 600 J/m at room temperature, when tested in accordance with ASTM D256 and shall retain at least 70% of this value when subjected to accelerated weathering for 1000hrs as per ASTM G155 or UL746C. The logo of the manufacturer shall be embossed on either side of the body in the injection molding process. The Median Marker shall have rectangular-shaped, fluorescent yellow color retro- reflective sheeting of size not less than 8.5cm*8.5cm and with fully reflective micro prismatic cube corners as its retro-reflective elements as per IRC 67 2010 and ASTM D4956 type XI specifications reflectivity values. The retro-reflective sheeting shall be one or 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 be fixed by a combination of epoxy adhesive and grouting as per MoRTH specification 806	No.	650.00

Sl. No.	Specification	Unit	Rate ₹
3	MoRTH 806 Providing Vertical Delineator having wide angle cube corner micro prismatic non metallic reflective sheeting confirming to Type XI of ASTM D4956 -09 with White Color and Red Color combination and having minimum of retro reflective exposed area of 125 Sq CM on top slots and 35 cm ² on bottom slots and no edges shall be exposed for tampering. This tubular delineator shall have a core and shell construction, shell shall be made of tough, high impact resistant, injection-molded, thermoplastic outer body and the inner core shall consist of powder coated or painted Mild steel of minimum thickness 1.0mm.and core-shell structure shall be of height not less than 800 mm above the ground and width not less than 80 mm. The metallic core of the delineator shall extend 300mm beyond the shell length from bottom for installing in the ground. The extended portion shall have slots to insert anchoring rods for enhancing the concrete grip. The logo of the manufacturer shall be embossed on either side of the body in the injection molding process. The engineering thermoplastic used for making the delineator body shall have minimum initial mechanical properties of be fixed by a combination of epoxy adhesive and grouting as per MoRTH specification 806	No.	2,900.00
4	MoRTH 804 Providing and fixing board displaying information, such as 'Name of work, Tender cost, Name of Contractor, Work completion and liability period etc', having rectangular shape of 1.20m x 0.90m size made out 18 gauge (1.25mm) thick mild steel sheet painted with one coat of Zinc chromate stoving primer and two coats of enamel paint on front side and grey stove enamel on back side and border / messages / symbols etc. with approved colour shade paint complete, on M.S.angle of size 35 x 35 x 3 mm frame with properly cross braced M.S. angles of size 35mmx35mmx3mm duly painted including Two M.S. angle iron posts of size 65 mm x 65 mm x 6 mm, 3.65 m long painted with alternate black and white bands of 25 cm width including all fixtures etc.and fixing the boards in 1:4:8 concrete block of size 60 cm x 60 cm x 75 cm including, excavation, refilling, transportation, and labour etc complete. Spec. No. As directed by Engineer in Charge & MoRTH specification 804	No.	9,000.00
5	MoRTH 806 Providing and fixing steel pipe delineators of 100 mm. in diameter and total height of 1300 mm, provided with 2 strips of white retroreflective sheeting of size 50 mm. x 3250 mm. each fixed horizontally and 2 strips of red retroreflective sheeting each having size 50 mm. x 3250 mm. fixed horizontally at top, with M.S. round cap having diameter 11 cm. and wire mesh at top (10 guage thick) and height of wire mesh 15 cm, M.S. hold fast 6 mm thick with 35 cm. in length, fixing the delineators in C.C. 1:4:8 concrete block of size 250 mm. x 250 mm. x 450 mm. with necessary excavation etc. complete.	No.	1,100.00

Sl. No.		Specification	Unit	Rate ₹
6	MoRTH	Providing and erecting W Beam crash Barrier system (MASH TL3/EN1317 H1 complaint) installed by Pile Driving Machine as per MoRTH Circular RW/NH-29023/02/2019-S&R(P&B) dated 01.01.2020. The same should be hot Dip Galvanized as per Indian standard with 550 GSM coating on beams and post and all fittings to conform according to IS 1367 and IS 1364.	m	3,355.00
7	MoRTH	Providing and erecting a Thrie Beam crash Barrier (MASH TL4/EN1317 H2 complaint) Installed by Pile Driving Machine as per MoRTH Circular RW/NH-29023/02/2019-S&R(P&B) dated 01.01.2020. The same should be hot Dip Galvanized as per Indian standard with 550 GSM coating on beams and post and all fittings to conform according to IS 1367 and IS 1364.	m	4,549.00
21-D		Road testing & Maintenance		
1	IRC 81-1997	Design of overlay for existing B.T. surface with carrying out testing by Benkelman Beam method as per guide lines in IRC 81:1997 including design and testing at site. The charges for transportation of Benkelman Beam, loaded truck, labour for testing and traffic control are not included.	km	6,300.00
2	CRRI, New Delhi	Carrying out roughness index / road unevenness test with car mounted / jeep towed ARUR machine (Automatic road unevenness Recorder) Calibrated from C.R.R.I. New Delhi (Central Road Research Institute) or any other equivalent authority including taking observations, feeding data and giving computerized test result including usage charges of all machinery and labour completed. i) Road surface single lane (B.TW,B.M.) 3.75 m Width.	km	570.00
3	CRRI, New Delhi	Carrying out roughness index / road unevenness test with car mounted / jeep towed ARUR machine (Automatic road unevenness Recorder) Calibrated from C.R.R.I. New Delhi (Central Road Research Institute) or any other equivalent authority including taking observations, feeding data and giving computerized test result including usage charges of all machinery and labour completed. i) Road surface single lane (B.TW, BM) 5.5m to 7.00m width	km	1,100.00
4	CRRI, New Delhi	Carrying out roughness index / road unevenness test with car mounted / jeep towed ARUR machine (Automatic road unevenness Recorder) Calibrated from C.R.R.I. New Delhi (Central Road Research Institute) or any other equivalent authority including taking observations, feeding data and giving computerized test result including usage charges of all machinery and labour completed. i) Road surface single lane (B.TW,B.M.) Each additional lane Width.	km	570.00
5	IRC-67: 2012	Carrying out Retro-reflectivity testing of traffic sign boards as per IRC-67:2012	No.	800.00

Sl. No.	Specification	Unit	Rate ₹
21-E	Bridge Maintenance & Testing		
1	Providing and fixing 25mm diameter steel anchor dowel in hard rock including drilling hole of 32 mm diameter up to 0.75 mtrs depth, placing the dowel in position and effectively grouting the hole with CM 1:1 proportion etc. complete.	No.	1,250.00
2	Dewatering on BHP basis by using water pump including diversion of stream, providing cofferdams, earthen bunds etc. as may be necessary for foundation and other parts of the the works and pumping out water during and after excavation as may be required by using 3.0 BHP pump etc. complete. (prior approval of Superintending Engineer will be necessary)	hr	160.00
3	Dewatering on BHP basis by using water pump including diversion of stream, providing cofferdams, earthen bunds etc. as may be necessary for foundation and other parts of the the works and pumping out water during and after excavation as may be required by using 5.0 to 9.0 BHP pump etc. complete. (prior approval of Superintending Engineer will be necessary)	hr	175.00
4	Dewatering on BHP basis by using water pump including diversion of stream, providing cofferdams, earthen bunds etc. as may be necessary for foundation and other parts of the the works and pumping out water during and after excavation as may be required by using 10.0 to 19.0 BHP pump etc. complete. (prior approval of Superintending Engineer will be necessary.	hr	200.00
5	Providing and injecting epoxy grout including structuring of crack in the body of slab girder by sand blasting, fixing inlet tube arrangement including cost of materials, machinery required for the work and labour charges etc. complete.	kg	1300.00
6	Providing and injecting epoxy grout including structuring of cracks in the body of slab girder, fixing inlet tube arrangement including cost of materials, machinery required for the work labour charges etc. (2kg of grout is considered per hole)	No.	2,500.00
7	Providing fixing of dowel rod of 16 mm dia in the river bed for 400 mm depth @ 1000 mm c/c in single layer and grouting with underwater epoxy grout includes the cost of usage charges of all machineries, barge, boat, cost of all tools and all labour charges etc., complete.	No	4,000.00
8	Providing fixing of shear links of 12 mm dia in the periphery of the well wall for 100 mm mm depth @ 500 mm c/c bothway and grouting with underwater epoxy grout includes the cost of usage charges of all machineries, barge, boat, cost of all tools and all labour charges etc., complete.	No	750.00

Sl. No.		Specification	Unit	Rate ₹
9		Surface Preparation of Bridge for maintenance: Crack surface shall be cleaned using underwater jet to remove the fungal growth and other foreign materials to enable a clean and visible surface. The item includes the cost of hire charges of all equipment, diving equipment and all charges for divers etc., complete.	m	700.00
10		Crack Groove Cutting: Groove shall be cut using hand held electrically operated concrete cutting machine of size of 50 mm wide and 75 mm deep on each side of the crack to form as "V" groove all along the crack to fill the polyester resin/ Epoxy putty (horizontal and vertical cracks). After the groove cutting, the concrete shall be removed from the groove using the pneumatic concrete chipping machine to form "V" groove. The item includes the cost of hire charges for all machineries, tools and barges and all labour charges etc., complete.	m	750.00
11		Crack Sealing/Filling using epoxy mortar: Base and hardener of the high strength repair mortar . Epoxy putty shall be mixed using the slow speed heavy duty mixing machine to obtain a uniform mix. The mixed materials shall be placed all along the prepared "V" groove and finished smoothly using the putty blade/ trowel within 30 minutes by using the divers. The finished surface shall be allowed for curing minimum of 24 hours to attain the strength. The item includes the cost of usage charges of all equipment , tools and plants and all labour charges etc	kg	1,100.00
12		Providing Repairing of honeycombs and minor damages with Polymer Modified Mortar to Bridges including material, labour complete in all respect	kg	150.00
13		Exploratory drilling of Boreholes down to required depth, drilling of 150mm diameter boreholes in all type of soils except hard rock and large boulders (boulder core more than 30 mm), including refilling, reinstating surface and disposing off surplus material including use of mechanical rigs with power operated winches as well as percussion / chiselling tool for advancing through occasional seams of hard strata to be employed where necessary in River bed area including standing/flowing water with all necessary arrangements except making of platform under water which shall be paid extra.		
	A	0 m to 10 m	m	1,278.00
	B	10 m to 20 m	m	1,342.00
	C	20 m to 30 m	m	1,412.00
	D	30 m to 40 m	m	1,533.00
	E	40 m to 50 m	m	1,766.00

Sl. No.		Specification	Unit	Rate ₹
	F	50 m to 60 m	m	2,087.00
	G	60 m to 70 m	m	2,247.00
	H	Extra for 150mm dia. bore in hard Rock/large Boulder at all levels	m	1,992.00
14	84	Drilling of NX size borehole (75mm dia.) in all types of hard rock and collection of rock core samples from boreholes and preserving in boxes		
	A	0 m to 10 m	m	3,055.00
	B	10 m to 20 m	m	3,209.00
	C	20 m to 30 m	m	3,422.00
	D	30 m to 40 m	m	3,667.00
	E	40 m to 50 m	m	3,793.00
	F	50 m to 60 m	m	4,088.00
	G	60 m to 70 m	m	4,415.00
15	85	Conducting in-situ full size Plate Load Test (PLT) at selected location as per IS:1888 including making loading arrangements & casting of RCC/cast in-situ concrete footing as per codal provisions including excavation and refilling of trial pit		
	A	Plate size 30cm x 30cm	Each	20,069.00
	B	Plate size 45cm x 45cm	Each	24,082.00
	C	Plate size 60cm x 60cm	Each	28,765.00
16	86	Taking out 100mm dia. & 450mm long undisturbed samples of soil from bore holes, including provision of air tight containers for packing and, labeling incl. transporting the samples to laboratory. Piston sampler shall be used for extracting undisturbed samples where necessary. Samples shall be collected as per IS:2720.	Each	137.00
17	87	Taking out 100mm dia. & 450mm long disturbed samples of soil from bore holes, including provision of air tight containers for packing, labeling and transporting the samples to laboratory. Samples shall be collected as per IS:2720.	Each	147.00
18	88	Conducting standard penetration test as per IS:2131 at approximate 1.5m intervals in bore holes, as directed by the Engineer in charge	Each	802.00

APPENDIX

Appendix I - Material Co-efficients

Sl. No.	Item No.	Description	Co-efficient / Application Rate
		Bitumen Related Items	
1	5.1	Prime Coat over WMM/WBM (SS1)	0.90 kg/m ²
2	5.2	Prime Coat over Stabilised soil base / Crusher Run Macadam	0.90 kg/m ²
3	5.3	Tack coat on Bituminous surface (RS1)	0.20 kg/m ²
4	5.4	Tack coat on Granular surface treated with primer	0.25 kg/m ²
5	5.5	Tack coat on Cement concrete pavement	0.30 kg/m ²
6	5.6	Bituminous Macadam Grading - I	3.3%
7	5.8	Bituminous Macadam Grading - II	3.4%
8	5.10	Dense Graded Bituminous Macadam Grading - I	4.0%
9	5.12	Dense Graded Bituminous Macadam Grading - II	4.5%
10	5.14	Bituminous Concrete Grading I	5.2%
11	5.16	Bituminous Concrete Grading II	5.4%
12	5.18	Surface dressing	1.2 kg/m ²
13	5.19	Open - Graded Premix Surfacing	1.46 kg/m ²
14	5.20	Close Graded Premix Surfacing/Mixed Seal Surfacing	1.09 kg/m ²
15	5.22	Mastic Asphalt	10.2% by wt. of mix
16	5.23	Slurry Seal	13% by wt. of mix
17	5.24	Recycling of Bituminous Pavement with Central Recycling Plant	
18	A (i)	Bituminous Macadam Grading - I	---
19	A (ii)	Bituminous Macadam Grading - II	---
20	B (i)	Bituminous Macadam Grading - I	---
21	B (ii)	Dense Graded Bituminous Macadam Grading - II	---
22	C (i)	Bituminous Concrete Grading - I	---
23	C (ii)	Bituminous Concrete Grading - II	---
24	5.25	Fog Spray	---
25	5.26	Bituminous Cold Mix	---
26	5.27	Sand Asphalt Base Course	---

27	5.29	Bituminous Concrete using waste plastic	
28	A	Grading - I	B = 4.78 % WP = 8% of Bitu- men mix
29	B	Grading - II	B = 4.78 % WP = 8% of Bitu- men mix
30	5.30	Hot Recycling in place of Bituminous pavement with Bituminous Concrete	
31	A	Grading - I	---
32	B	Grading - II	---
33	21-A (1)	Semi Dense Bituminous Concrete	5.2%
34	21-A (3)	Tack coat on Bituminous surface (VG-10)	0.20 kg/m ²
35	21-A (4)	Tack coat on Granular surface treated with primer (VG-10)	0.25 kg/m ²
36	21-A (5)	Tack coat on Concrete Pavement (VG-10)	0.30 kg/m ²
37	10.4	Filling potholes with OGPC	1.46 kg/m ²
38	10.5	Filling potholes with BC	
39	A	Grading - I	5.2%
40	B	Grading - II	5.4%
		Cement Concrete Related Items	Cement Content
41	3.30	Under ground drainage at edge of pavement	320 kg
42	6.1	Dry Lean Cement Concrete Sub-base	150 kg/m ³
43	6.2	Cement Concrete Pavement with OPC / PPC / PSC	420 kg/m ³
44	6.3	Cement Concrete Pavement with OPC / GGBS	315 kg/m ³
45	6.4	Flyash Dry Lean cement concrete Sub-Base	150 kg/m ³
46	6.5	Thin White Topping with OPC / PPC / PSC	420 kg/m ³
47	6.6	Thin White Topping with OPC & GGBS	315 kg/m ³
48	6.7	Thin White Topping with OPC & Fly Ash	357 kg/m ³
49		Bored Cast Insitu pile with M35 grade Concrete	
50	12.38	Pile dia 750 mm	390 kg/m ³
51	12.39	Pile dia 1000 mm	390 kg/m ³
52	12.40	Pile dia 1200 mm	390 kg/m ³
53	12.41	Pile dia 1500 mm	390 kg/m ³
54		Driven Cast In place vertical Pile with M35 grade Concrete	

55	12.42	Pile dia 750 mm	390 kg/m ³
56	12.43	Pile dia 1000 mm	390 kg/m ³
57	12.44	Pile dia 1200 mm	390 kg/m ³
58		Driven Precast vertical Pile with M35 grade Concrete	
29	12.45	Pile dia 500 mm	
60	12.46	Pile dia 750 mm	390 kg/m ³
61	12.47	Pile dia 1000 mm	390 kg/m ³
62	12.48	Size of Pile 300 x 300 mm	390 kg/m ³
63	12.49	Size of Pile 500 x 500 mm	390 kg/m ³
	12.50	Size of Pile 750 x 750 mm	390 kg/m ³
64		Steel Related Items	
65	9.3	TMT Fe 500 for foundation / sub structure pipe culverts	---
66	12.55	TMT Fe 500 for foundation	---
67	12.56	Mild steel for foundation	---
68	13.1	TMT Fe 500 for Substructure	---
69	13.2	Mild steel for Substructure	---
70	13.15	Structural Steel for Substructure	
71	14.1	TMT for Super structure	---
72	14.2	Hightensile steel wires / strands	---
	14.24	Structural Steel for Superstructure	---
73		RDPR Related Items	
74	20.13	Mix seal surfacing by Manual Means	1.9 kg/m ²
75	20.14	Seal coat by Manual Means	0.68 kg/m ²
76	20.15	Roller Compacted concrete cement	310 kg/m ³
77	20.28	M20 Grade Cement Concrete Pavement	320 kg/m ³
78	20.29	M30 Grade Cement Concrete Pavement	360 kg/m ³

Note : Quarterly Issue rates or as specified in Sl. No. (2) preface for Cement, Steel and Bitumen shall be issued for the above items.

Appendix II - Terms & Definitions

Sl. No.	Terms	Definitions
A. ROADS		
1.	Track	A path on the land much trodden by persons and animals.
2.	Cart Track	A land way for use by carts.
3.	Road	A way on land with a right of way for the public.
4.	Urban Road	A road within the limits of the area of Municipality, Military Cantonment, Port or Railway Authority.
5.	Project Road	A road within the limits of the area of a development project of a public authority for the exploitation of resources such as forest, irrigation, electricity, coal, sugarcane, steel, etc.
B. HIGHWAY CLASSES BY FUNCTION		
1.	Expressways	Expressways offer superior highway facility with higher specifications. It provides for more lanes, better surface, divided carriageway, controlled access grade separations at cross-roads and fencing etc. Expressways permits only fast moving vehicles and are meant to carry through traffic. The Expressway may be owned by the Central Government or State Government depending upon whether the route is a National Highway or a State Road.
2.	National Highways	The arterial roads of the country for inter-state movements of goods and passengers. They traverse the length and width of the country connecting the National and State capitals, major ports and rail junctions and link up with border roads and foreign highways.
3.	State Highways	The arterial roads in a State for inter-district movements. They traverse the length and width of a state connecting the state capital, district headquarters and important towns and cities and link up with the National Highways and adjacent State Highways.
4.	District Roads	The branch roads of the State and National Highways to serve as the main roads for intra-district movements. They traverse the length and breadth of a district to connect the area of production and marketing in the district to one another and to the National Highways.
5.	Village Roads	These roads serve as the feeder roads as well as the roads for inter village movements. They pass through rural areas connecting the village to one another and to the nearest road of higher category viz. District Roads, State Highways, National Highways, etc.
C. HIGHWAY CLASSES BY WIDTH		
1.	Below Standard Single Lane(BSSL)	Surfaced roads having clear carriageway width of below 3.75 m.

2.	Standard Single Lane(SSL)	Surfaced roads having clear carriageway width between 3.75 m and below 7.0 m.
3.	Standard Double Lane (SDL)	Surfaced roads having clear carriageway width between 7.0 m and below 10.5 m.
4.	Standard Multi Lane (SML)	Surfaced roads having clear carriageway width of 10.5 m and above.
D. ROAD SURFACE		
1.	Bitumen or Tar Macadam	A type of construction in which the fragments of coarse aggregate are bound together by bitumen applied either premix or grouting method.
2.	Bitumen Concrete Surfacing	A type of construction in which coarse and fine mineral aggregates are mixed with bitumen and laid not to the desired thickness.
3.	Black Top Surface	The surface of roads made with bitumen as a binder.
4.	Brick Paving	A paving composed of bricks laid in regular courses.
5.	Cement Bound Macadam	A surface in which a matrix of a cement sand mixture is interposed between two layers of road metal spread on the road and the whole mass watered and consolidated so that the matter works into the interstices of the road metal to produce a compact mass.
6.	Cement Concrete	A surface obtained by placing and consolidating cement concrete to required thickness.
7.	Earth Road	A road with the carriageway composed of natural soil.
8.	Gravel Road	A road with the carriageway composed of a consolidated layer of gravel.
9.	Water Bound Macadam	A type of surfacing in which stone fragments are first inter locked by rolling and then bound with smaller stone gravel etc. which enforced into the intersection by brimming, watering and rolling.
10.	Motorable	For Plain Areas: Surfaced or unsurfaced road of minimum 3.0 m Carriageway width is motorable. For Hilly Areas: Surfaced or unsurfaced road of minimum 3.0 m Carriageway width having no horizontal curve of radii less than 14 m and grade not steeper than 7% is motorable. A bridle path is non motorable.

Source : MORTH Transport Research Wing Publication 2019

Appendix III - Photos of Major executed Road & Bridge Works



Veer Savarkar Flyover, Bengaluru



Development Works at K. R. Circle, Bengaluru



Improvements to Sindhanur - Kushtagi via Tavaragera Road (SH-30)



Gulbarga Airport in Karnataka - Airbus A-320 Aircraft



Hudco Loan Project :-
Kudligi – Sandur - Torangal road



World Bank Co-Finance Project :-
Bidar – Chincholi road (WCP-2)



Nayakarahalli Hudukula road in Kolar District (PMGSY)



PPP- DBFOT- VGF (Toll) project:
Ginigere- Gangavathi - Sindhanoor road



Improvements to Road from Bidar to Chincholi - (WCP-2) on Design, Build, Finance, Operate, Maintain, and Transfer (DBFOMT)- Hybrid Annuity Basis



Improvement to Road from Hungund to Talikota Road (WCP-7) on Design, Build, Finance, Operate, Maintain, and Transfer (DBFOMT)- Hybrid Annuity Basis



Road connecting Devarayanadurga Hills
in Tumakuru District



Improvements to Yelahanka - Andhra Pradesh border
connecting (SH-09) road from
Ch.13.80 to 89.417 km



Gurupadaswamy Road,
Vidyananyapuram, Mysuru



Akka Mahadevi Road, Mysuru



Road Safety work on Bangarapet Bagepalli Road
(SH-15) from Ch. 21.20
to 21.60 km and 39.20 to 39.40
in Kolar Taluk, Kolar District



Road Safety Works on KGF State Fund Road near
five light circle in Bangarpet Taluk, Kolar District.



Construction of Bridge
at ch.11.00 km of Sagar – Pattaguppa Road in
Hosanagar Taluk in Shimoga District



ಮೈಸೂರು ಜಿಲ್ಲೆಯ ಕೆ.ಆರ್.ಎಸ್. ಹಿನ್ನೀರಿನಲ್ಲಿ,
ಸಾಗರಕಟ್ಟೆ ಹತ್ತಿರ, ಲಕ್ಷ್ಮಣ ತೀರ್ಥ ನದಿಗೆ
ಅಡ್ಡಲಾಗಿ ಸೇತುವೆ ನಿರ್ಮಾಣ



ಮೈಸೂರು ಜಿಲ್ಲೆ ಟಿ. ನರಸೀಪುರ ತಾಲ್ಲೂಕಿನ
ಹೊಳೆಸಾಲು ಹತ್ತಿರ ಕಾವೇರಿಪುರ ಗ್ರಾಮದ ಬಳಿ
ಕಾವೇರಿ ನದಿಗೆ ಅಡ್ಡಲಾಗಿ ಸೇತುವೆ ನಿರ್ಮಾಣ



ಸುಳ್ಯ ತಾಲ್ಲೂಕಿನ ಸುಬ್ರಹ್ಮಣ್ಯ - ಉಡುಪಿ ರಾಜ್ಯ ಹೆದ್ದಾರಿ -
37ರ ಕಿ.ಮೀ. 1.80 ರಲ್ಲಿ ಕುಮಾರಧಾರ ನದಿಗೆ
ಅಡ್ಡಲಾಗಿ ಸೇತುವೆ ನಿರ್ಮಾಣ



Bridge across Shimsha river
near Vaidyanathapura



Construction of bridge across
Bheema river in the middle of the
Hipparagi - Kona -Saradagi

Appendix IV - Contact details of PWD officers

Sl No	CONTACT DETAILS	E-Mail – Office Address.
1	Secretary, PWD	secytech-pwd@karnataka.gov.in O/o Secretary, Public Works Department, Room No. 334, 3rd Floor, Vikasa Soudha, Bengaluru -560001 # 080-22251548 080-22034852 080-22034834
2	Engineer in Chief, Planning & Road Asset Management Centre	cepramc@kpwd.gov.in eicpramc@gmail.com O/o Engineer in Chief, Planning and Roads Asset Management Centre (PRAMC), K.R Circle, Bengaluru – 560001 # 080-22117302
3	Chief Engineer, C& B (S)	cecbs@kpwd.gov.in O/o Chief Engineer, C&B (S), KR Circle, Bengaluru – 560001 # 080-22212830
4	Chief Engineer, C& B (N)	cecbn@kpwd.gov.in O/o Chief Engineer, C&B (N), Dharwad- 580001 # 0836-2447900
5	Chief Engineer, C& B (NE)	cecbned2017@gmail.com O/o The Chief Engineer, C & B North-East Zone, PWD, Near Public Graden, Kalaburagi – 585103 # 08472-233918
6	Chief Engineer, C& B (C)	cectlsmsg@gmail.com O/o The Chief Engineer, C & B Central Zone, Shivamogga– 577201 # 08182-279898
7	Chief Engineer National Highways	cenhpwd@gmail.com / cenhpwd@yahoo.co.in O/o The Chief Engineer, National Highways, PWD Annexe Building, Floor-2, K.R. Circle, Bengaluru – 560001 # 080-22276601

8	Chief Engineer Rural Development & Panchayath Raj Engineering Department	cepred09@gmail.com O/o The Chief Engineer, Rural Development & Panchayath Raj Engineering Department Grameenabhivruddhi Bhavan, Anand Rao Circle, Bengaluru – 560001 #080-28015424
9	Superintending Engineer, PWD Bengaluru Circle	sebgl@kpwd.gov.in/sebglkpwd@gmail.com O/o Superintending Engineer, PWD Bengaluru Circle, Ananda Rao, Bengaluru – 560009 # 080-22875794
10	Superintending Engineer, PWD Mysuru Circle	semys@kpwd.gov.in/sepwdmysore@gmail.com O/o Superintending Engineer, PWD Mysuru Circle, Nazarabad, Mysuru– 570010 # 0821-2446851
11	Superintending Engineer, PWD Hassan Circle	sehsn@kpwd.gov.in O/o Superintending Engineer, PWD Hassan Circle, N.R Circle, Hassan 573201 # 08172-268385
12	Superintending Engineer, PWD Mangaluru Circle	semng@kpwd.gov.in O/o Superintending Engineer, PWD Mangaluru Circle, Hampankatta, Mangaluru 575001 # 0824-2423516
13	Superintending Engineer, PWD Shivamogga Circle	sesmg@kpwd.gov.in/sesmgpwmw@gmail.com O/o Superintending Engineer, PWD Shivamogga Circle, Shivamogga 577201 # 08182-225641
14	Superintending Engineer, PWD Dharwad Circle	sepwddha@gmail.com O/o Superintending Engineer, PWD Dharwad Circle, Dharwad 580001 # 0836-2747500
15	Superintending Engineer, PWD Belagavi Circle	sebgm@kpwd.gov.in O/o Superintending Engineer, PWD Belagavi Circle, Belagavi Fort Area, Belagavi 590016 # 0831-2420153

16	Superintending Engineer, PWD Kalaburgi Circle	seglb@kpwd.gov.in O/o Superintending Engineer, PWD Kalaburgi Circle, Aween-e-shahi, Kalaburgi 585101 # 08472-220272
17	Superintending Engineer, PWD Ballari Circle	sebly@kpwd.gov.in/seblykpwd@gmail.com O/o The Superintending Engineer, PWD Circle, Anantapur road, Bellary -583103 # 08392-274301
18	Superintending Engineer, National Highways Circle Bengaluru	cenhcbng@yahoo.co.in O/o The Superintending Engineer, National Highways Circle, PWD Annexe Building, Floor-2, K.R. Circle, Bengaluru – 560001 # 080-22215855
19	Superintending Engineer, National Highways Circle Dharwad	senhcdwr@gmail.com O/o The Superintending Engineer, National Highways Circle, Near DC Compound, Dharwad – 580001 # 0836-2448545
20	Superintending Engineer, Rural Development & Panchayath Raj Engineering Circle Bengaluru	rdedsebng@yahoo.com O/o The Superintending Engineer, Rural Development & Panchayath Raj Engineering Department Grameenabhivruddhi Bhavan, Anand Rao Circle, Bengaluru – 560001 #080-22874816

