



**GOVERNMENT OF CHHATTISGARH
PUBLIC WORKS DEPARTMENT**

SCHEDULE OF RATES
FOR
ROAD WORKS



With Effect From 15th June, 2026

Issued By

**ENGINEER-IN-CHIEF
PUBLIC WORKS DEPARTMENT
NIRMAN BHAWAN, NAVA RAIPUR (C.G.)**

**Price : Rs. 300/-
(Excluding Postage Charges etc.)**

**कार्यालय प्रमुख अभियंता, लोक निर्माण विभाग,
निर्माण भवन, नार्थ ब्लॉक, सेक्टर 19, नवा रायपुर अटल नगर (छ.ग.)**

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ज्ञाप क्रं. 65010/595/एस.ओ.आर./26

नवा रायपुर अटल नगर, दिनांक 15/06/2026

// आदेश //

छत्तीसगढ़ शासन लोक निर्माण विभाग नवा रायपुर के आदेश क्रमांक GENS/16524/2026 PWD SECTION/Nivida नवा रायपुर दिनांक 03.06.2026 के परिपालन में छत्तीसगढ़ लोक निर्माण विभाग के सड़क कार्यों हेतु वर्तमान में दिनांक 01.01.2025 से प्रभावशील दर अनुसूची की दरें पुनरीक्षित कर,, नई दर अनुसूची एतद द्वारा दिनांक 15.06.2026 से प्रभावशील की जाती है। अतः इस कार्यालय के आदेश क्रं. 65010/539/एस.ओ.आर./24 नवा रायपुर अटल नगर दिनांक 26.12.2024 को छत्तीसगढ़ लोक निर्माण विभाग के सड़क कार्यों हेतु वर्तमान में दिनांक 01.01.2025 से प्रभावशील दर अनुसूची जारी किया गया था, जिस पर तत्काल प्रभाव से आगामी आदेश तक रोक लगाई जाती है।

प्रमुख अभियंता

लोक निर्माण विभाग
नवा रायपुर अटल नगर (छ.ग.)

पृ. क्रं. 65010/595/एस.ओ.आर./26

नवा रायपुर अटल नगर, दिनांक 15/06/2026

प्रतिलिपि:-

1. निज सचिव, माननीय मंत्रीजी, छ.ग. शासन, लोक निर्माण विभाग, नवा रायपुर
2. सचिव, छ.ग. शासन, लो.नि.वि., मंत्रालय-महानदी भवन नवा रायपुर अटल नगर,
3. सचिव, छ.ग. शासन, वित्त विभाग, मंत्रालय-महानदी भवन नवा रायपुर अटल नगर,
4. महानिदेशक (सड़क विकास) सड़क परिवहन एवं राजमार्ग मंत्रालय, ट्रांसपोर्ट भवन,
1 संसद मार्ग, नई दिल्ली-110001
5. महालेखाकार, छत्तीसगढ़ रायपुर
6. मुख्य तकनीकी परीक्षक (सर्तकता), छत्तीसगढ़ नवा रायपुर अटल नगर
7. संभाग आयुक्त, रायपुर/दुर्ग/बिलासपुर/अम्बिकापुर/जगदलपुर
8. जिलाधीश - जिला.....छत्तीसगढ़
9. क्षेत्रीय अधिकारी, सड़क परिवहन एवं राजमार्ग मंत्रालय, रा.रा. मार्ग परिसर, पेंशनबाड़ा रायपुर
10. मुख्य अभियंता, लोक निर्माण विभाग,परिक्षेत्र.....
11. अधीक्षण अभियंता, लोक निर्माण विभाग,मण्डल.....
12. कार्यपालन अभियंता, लोक निर्माण विभाग, संभाग.....
13. कार्यपालन अभियंता, नगर निगम रायपुर
14. इस कार्यालय के सर्वर रूम की ओर विभाग के साईट में अपलोड करने हेतु अग्रेषित।
15. इस कार्यालय के निविदा/सामान्य/कार्य/योजना/सर्तकता खण्ड की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित।

सहपत्र :- दर अनुसूची (सड़क कार्य) 15.06.2026

प्रमुख अभियंता

लोक निर्माण विभाग
नवा रायपुर अटल नगर (छ.ग.)

Office of the Engineer in Chief
Public Works Department Chhattisgarh (Nava Raipur)

No. 65010/595/SOR/2026

Nava Raipur Dated : 15.06.2026

Schedule of Rates for Road Works

Preamble

The Schedule of rates published by PWD is an important document as this does not only serve as a useful tool for estimation, evaluation & execution of govt. works by P.W.D. people but also referred to as an authority by other govt., semi government & private entities like builders, architects and consultants.

The Schedule of Rates (SOR) 01.01.2025 for road works was published in 2025.

As per the instructions issued by Government of Chhattisgarh, Public Works Department vide letter no GENS/16524/2026 PWD SECTION/Nivida Nava Raipur Dated 03.06.2026, G.S.T shall be paid as extra. For this purpose rates of all the items have been reduced by 15% from Road SOR 01.01.2025 and now it is modified as Road SOR 15.06.2026, This SOR will be known as ROAD SOR 15.06.2026

Considerable efforts have been made to incorporate the above changes, but there always remains a scope for the betterment. Suggestions in this regard are highly welcomed.

Though every possible care has been taken in preparation of this SOR, but in a work like this, the chances of typographical and other errors can not be ruled out. It will be appreciated, if these could be brought to notice of this office.

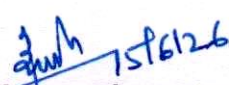
I sincerely express my gratitude and thanks to Shri V.S. Koram, Chief Engineer Shri S. K. Kori, Chief Engineer, Shri Gyaneshwar Kashyap Chief Engineer, Shri R K Ratre Chief Engineer PWD Raipur, who have taken immense pain in inspiring and guiding the entire team for making this document comprehensive and unique.

I would also commend Smt. Arpana Chourpagar (Executive Engineer), Shri Rajeev Nashine (Executive Engineer), Shri P.K. Gupta (Executive Engineer), Shri C.K. Pandey (Executive Engineer), Shri Amit Kashyap (Executive Engineer), Shri K. Vignesh Kumar (Assistant Engineer), Shri Roshan Kumar Sahu (Assistant Engineer), Shri Ashish Nagpure (Assistant Engineer), for their continuous untiring efforts in the above mission.

The work has been made possible with the sincere efforts of several other persons & institutions. It is not possible here to name them all, but we sincerely acknowledge with thanks the help & cooperation extended by them.

This SOR is available on the department website (<https://pwd.cg.nic.in>) also.

Nava Raipur
Date:- 15.06.2026


Vijay Kumar Bhatpahari
E-in-C PWD, Chhattisgarh

OFFICE OF THE ENGINEER-IN-CHIEF
P.W.D. NIRMAN BHAVAN, NORTH BLOCK, SECTOR-19
NAWA RAIPUR, ATAL NAGAR (CHHATTISGARH)
AMMENDMENT NO. 1

No. 65010/596/SOR/

Nawa Raipur Atal Nagar, Dated 15 /06/2026

छत्तीसगढ़ शासन लोक निर्माण विभाग नवा रायपुर के आदेश क्रमांक GENS/16524/2026 PWD SECTION/Nivida नवा रायपुर दिनांक 03.06.2026 द्वारा निर्माण कार्यों में जी.एस.टी. के संबंध में परिपत्र जारी करते हुए लोक निर्माण विभाग में लागू निविदा अनुबंध की कंडिकाओं में Tax Clause में संशोधन जारी किये हैं तथा इस परिपत्र के बिन्दु क्रमांक-2 में निम्नानुसार लेख किया गया है :-

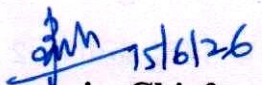
(2) संशोधित निविदा प्रपत्रों (Excluding GST (18%), GST to be paid separately) पर निविदा आमंत्रित करने पर, वर्तमान में प्राप्त हो रहे प्रचलित निविदा दर के संदर्भ में, कार्य के कृत्रिम लागत वृद्धि के प्रभाव को निष्क्रिय (Nullified) करने के लिए निम्नानुसार कार्यवाही किया जावे :-

(A) संशोधित निविदा प्रपत्र (Excluding GST, GST to be paid separately) पर आगामी निविदा आमंत्रण हेतु, पूर्व से स्वीकृत कार्य की अनुमानित लागत, PAC को दर सहित 15.25% (Round off 15.00%) कम करते हुए समायोजित कर लिया जावे, जिससे स्वीकृत कार्यों हेतु GST बाबत अलग से स्वीकृति नहीं लेनी पड़ेगी।

(B) आगामी प्रशासकीय स्वीकृति प्राप्त करने हेतु प्राक्कलन बनाते समय दर को 15.25% (Round off 15.00%) कम करके लिया जावे एवं उस पर अलग से 18% GST जोड़कर प्रशासकीय स्वीकृतियों प्राप्त की जावें।

छत्तीसगढ़ शासन द्वारा जारी उपरोक्त परिपत्र के पालन हेतु छत्तीसगढ़ लोक निर्माण विभाग में प्रचलित सड़क एसओआर 2025 जो प्रमुख अभियंता कार्यालय के आदेश क्रमांक 65010/539/SOR/2024 Nava Raipur Dated 26.12.2024 द्वारा जारी तथा दिनांक 01.01.2025 से प्रभावशील है, इस सड़क एस.ओ.आर. 01.01.2025 के सभी आयटमों के दर में 15 प्रतिशत कम करके संशोधित दर अनुसूची सड़क एस.ओ.आर. दिनांक 15.06.2026 जारी किया जाता है।

जिन कार्यों की प्रशासकीय स्वीकृति सड़क एस.ओ.आर. 2025 से प्राप्त हुई है तथा छत्तीसगढ़ शासन के पत्र क्रमांक File GENS/16524/2026 PWD SECTION/Nivida अटल नगर दिनांक 04.06.2026 के अनुसार दिनांक 20.06.2026 के पश्चात् आमंत्रित की जाने वाली निविदाओं में सड़क एस.ओ.आर. 01.01.2025 के स्थान पर संशोधित सड़क एस.ओ.आर. दिनांक 15.06.2026 के आधार पर तथा छत्तीसगढ़ शासन के परिपत्र दिनांक 03.06.2026 के संशोधन को लागू करते हुए निविदा आमंत्रित किया जावे।


15/6/26
Engineer-in-Chief

Public Works Department

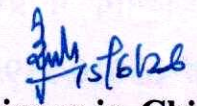
Nawa Raipur, Atal Nagar (C.G.)

No. 65010/596/SOR/

Nawa Raipur Atal Nagar, Dated 15 /06/2026

Copy to the

1. P.A. to honorable Minister of P.W.D.C.G. Govt. Raipur.
2. Secretary, C.G. Govt. P.W.D. Nawa Raipur Atal Nagar.
3. Secretary, Finance Department C.G. Govt. Nawa Raipur Atal Nagar.
4. All Chief Engineers. P.W.D. Chhattisgarh.
5. All Superintending Engineer, P.W.D. Chhattisgarh.
6. Chief Technical Examiner (V) C.G. Nawa Raipur.
7. Accountant General, C.G. Raipur.
8. All Collectors, Chhattisgarh.
9. All Executive Engineer, P.W.D. Chhattisgarh.
10. Website Public Works Department <http://pwd.cg.nic.in>.


15/6/26
Engineer-in-Chief

Public Works Department

Nawa Raipur, Atal Nagar (C.G.)

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GENERAL NOTES

1)	ROAD SOR-15.06.2026 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, have also been included in the new SOR , as these are required and had been provided in the previous SOR , looking to the necessity of execution.	
2)	(a)	"Specifications" would refer to the "Specifications for Road and Bridge works" (V th Revision) published by the Indian roads Congress in April 2013, on behalf of the Government of India, Ministry of Road Transport & Highways.
	(b)	"Clause" would refer to the clauses of the Specifications referred to, in note (a) above.
	(c)	"Engineer-in-Charge" would refer to the Executive Engineer of the division concerned.
	(d)	"Table" would refer to the table of the aforesaid Specifications.
3)	The rates of all items include element of setting out and carrying out the work in narrow or part width of road, where directed.	
4)	In the absence of any stipulation to the contrary, unit rates for different items of works are for completing the works to the specifications i/c full compensation for all operations detailed in the relevant sections of the specifications under "Rates". The rates are to be considered as the full inclusive rate for the finished work covering all labour, material, royalties, lease, rent, wastage, temporary work, plant, equipment, overhead charges and profit, excluding GST, unless specified otherwise.	
5)	Mode of measurements shall be as per provisions contained in the relevant clauses of the specifications, unless specified otherwise.	
6)	The rates in SOR are exclusive of GST charges.	
7)	The rates are inclusive of the element of hire and running charges of all types of plant, machinery and equipment required to complete the work, unless specified otherwise. Royalty, DMF charges and all taxes except GST, are included in the rates.	
8)	The rates do not include the work of boring and trial pits, which are to be measured and paid separately.	
9)	(i)	Bitumen, modified bitumen and bitumen emulsion shall be obtained from approved Govt. petroleum refineries.
	(ii)	Only VG-30 grade bitumen will be used in all bituminous works, unless specified otherwise.
	(iii)	For roads with design traffic in the range of 20 to 50 MSA BC with VG-40 grade bitumen shall be used for surface course. Also, when the highest daily mean temperature exceeds 40°C. VG-40 or modified bitumen of equivalent stiffness are recommended for Bituminous Concrete and top layers of Dense Bituminous Macadam", as per note under Table-4 (selection criteria for grade modified bitumen) of IRC: 111-2009.

10)	A. Theoretical consumption of bitumen has been worked out on the basis of the following compacted densities of mix for preparation of SOR :	
	(i) for Bituminous Macadam	2.20 gm/cc
	(ii) for Dense Bituminous Macadam	2.30 gm/cc
	(iii) for Bituminous Concrete	2.36 gm/cc
	B. During construction, if the density of mix obtained by job mix formula for items mentioned in 8)A above are found less than the densities mentioned above, proportionate cost of bitumen, at basic rate mentioned in SOR shall be recovered from the contractor.	
11)	The rates also include the element of testing of samples of various materials brought by the contractor for use on the work as well as other tests for items of work as stipulated in the specifications as per clause-903 and its sub-clauses of "Specifications for Road and Bridge works" of MORT&H (V th revision). Frequency of such tests to be carried out must not be less than the prescribed frequencies. Copies from Registers containing records of tests shall have to be presented along with running account bills. A record of actual consumption of materials like, bitumen, cement, steel etc. be maintained at site and copy submitted along with each running bill and the same should be cross checked with theoretical consumption before making payment. Register (original) shall have to be submitted along with the final bill. Tests shall have to be conducted for the contractor's material by his Engineers under the supervision of the Engineer-in-Charge or his authorized representatives in the field laboratory established by the contractor. However, the Engineer-in-Charge may direct to carry out tests in the departmental laboratory or any approved laboratory for which the testing charges will be paid by the contractor or may be deducted from bills. Before making any payment, it will be the responsibility of the officer making payment to ensure that all tests as per prescribed frequencies, have been carried out and the results are well within the scope of permissible limits.	
12)	The Section-900 of the specifications mentions " as required " against frequencies of some of the tests. To stave off disputes the following frequencies are specified :-	
	(a) Deleterious constituents.	One test per 500 Cum. or part thereof.
	(b) C.B.R.	----- do -----
13)	For comprehensive items, quantities of aggregates, screenings, granular materials and binding materials etc. indicated in the specifications are loose. No extras on account of any voids or bulkages etc. will be paid separately. Where it is proposed only to supply, transport and stack the mineral aggregates for use in pavement courses, the quantities indicated in the specifications shall be supplied but payment for the same shall be regulated on the basis of volumes to be computed after deductions specified in Clause 520.5 of MoRT&H specifications for Road and Bridge Works (V th Revision). The stacking will have to be in a trapezoidal section having base 1.50 M., top width 0.50 M. and height 0.50 M. The length should be as long as conveniently possible.	
14)	For items Granular Sub-base (mix-in-place method), W.B.M., Surface Dressing, Open Graded Premix Surfacing (by manual means) and Seal Coat type-A & Seal Coat type B (by manual means) the aggregates shall be stacked at site by the contractor which will be recorded in the Measurement Book and 100% check will be affected by the Sub-Divisional Officer prior to their use on work. No separate payment shall be made for stacking as the same is deemed to be included in the rates of these items.	

15)	Metal to be used for all bituminous courses and cement concrete shall be crushed in mechanical crushers.
17)	Rotavator or similar approved equipment capable of mixing the material to the desired degree is compulsory for mixing the graded material.
18)	The Design C.B.R. for Sub-grade soil (500 mm below the Sub-base) shall not be less than 8%. The CBR for borrow material for construction of embankment should have minimum CBR of 5% .
19)	The surface regularity of the completed Sub-grade, Sub-base, Base courses, widening of surfaces and Bituminous courses in the longitudinal and transverse directions shall be within the tolerances indicated in the Table 900-1 of the Specifications. For checking, Specifications Clause 902 shall apply. Failure to rectify the same, will call for similar action as provided for in note 15 above.
20)	The work of shoulders must precede the work of Sub-base and Base courses and succeed the Bituminous courses and Cement Concrete pavement.
21)	The rates for shoulders include the operation of cleaning and scrapping of deleterious material and preparing of surface with required cross fall before laying of material for construction of shoulders.
22)	Rates for the items of Dense Bituminous Macadam, Bituminous Concrete and Semi Dense Bituminous Concrete are based on the bitumen percentage mentioned in these items. Additional bitumen required as per job mix formula shall be deemed to be taken into account and be accommodated in the tender rates by the contractor. No separate payment shall be made on this account. However, if the bitumen percentage in job mix formula works out to be less than the bitumen percentage mentioned in the relevant item than the amount for the difference of bitumen quantity shall be recoverable from the contractor at the rate of bitumen mentioned in the General Notes of SOR.
23)	Some bituminous items, like Semi-Dense Bituminous Concrete and Leveling Course/Profile Corrective Course have been deleted in MoRT&H's "Specifications for Road and Bridge works" (Vth Revision), but these items have been kept in the SOR. Execution of such items, which do not find place in "Specifications for Road and Bridge works" (Vth Revision), but are present in "Specifications for Road and Bridge works" (IVth Revision), shall be as per norms of "Specifications for Road and Bridge works" (IVth Revision). These items shall not be used for works in State Highway/National Highways.
24)	Use of cement of required specifications at the rate of 2% by weight of total aggregate as filler for Bituminous Concrete and Dense Bituminous Macadam is mandatory. Lime shall not be used as filler.
25)	a) Rates of items would also apply for work order/piece work system.
	b) Rates payable for any work to be done departmentally on work order/piece work may either be at-par or below rates in this SOR.
26)	Rates for Transportation in Chapter No. 1 of "Carriage of Materials" include :-
	i) Loading and unloading into transport vehicle with incidental leads up to 100 M. at each place and all lifts.
	ii) Stacking at suitable places as directed by the Engineer-in-Charge, the weights of the container of any material shall be ignored.

27)	The measurement of excavation is to be done as per Clause 301.8. For rock excavation, where cross sectional measurements are not possible due irregular configuration, or where the rock is admixed with other classes of materials, the volume shall be computed on the basis of stack measurements of excavated rubble allowing a deduction of 35% therefrom. For stack measurement of excavated material other than rock, a deduction of 16% of stack volume shall be made.	
28)	The Contractor will carry out dismantling of utilities under the supervision of the concerned department with prior information to the users.	
29)	The girth of trees shall be measured at 1.00 meter (One meter) above ground level.	
30)	All wood obtained from the tree cutting shall be the property of the Government and shall be deposited as directed by Engineer-in-Charge.	
31)	In case of any contradiction in the provisions of the Specifications and this Schedule of Rates, the provisions of the SOR would take precedence.	
32)	The Basic rates of bituminous materials considered in this SOR are as follows :	
	(a) Bitumen VG-40	Rs. 47867.00 per M.T.
	(b) Bitumen VG-30	Rs. 45647.00 per M.T.
	(c) Bitumen VG-10	Rs. 46347.00 per M.T.
	(d) Bitumen Emulsion - Cationic (Grade- RS confirming to IS:8887)	Rs. 47902.00 per M.T.
	(e) Bitumen Emulsion - Cationic (Grade- MS confirming to IS:8887)	Rs. 54663.00 per M.T.
	(f) Bitumen Emulsion - Cationic (Grade- SS confirming to IS:8887)	Rs. 78090.00 per M.T.
	(g) Bitumen Emulsion - Cationic (Grade- SS-1, ASTM)	Rs. 50062.00 per M.T.
	(h) CRMB-60	Rs. 51250.00 per M.T.
	(i) Cement	Rs. 5150.00 per M.T.

CHAPTER- 1

CARRIAGE AND SUPPLY OF MATERIALS

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
	(Volume to be computed as per provisions in clause 520)		
1.1	Transportation of metal i/c loading & unloading		
i)	For a lead upto 1 Km.	Cum.	85.00
ii)	Beyond 1 Kms. and upto 10 Kms. (Add extra for every 1 Km.)	Cum.	4.00
iii)	Beyond 10 Kms. and upto 20 Kms. (Add extra for every 1 Km.)	Cum.	3.00
iv)	Beyond 20 Kms. and upto 50 Kms. (Add extra for every 1 Km.)	Cum.	2.70
v)	Beyond 50 Kms. (Add extra for every 1 Km.)	Cum.	2.50
1.2	Transportation of different other material ic/ loading & unloading		
		Rate as %age of metal transportation rates	
a)	Flag Stone/cut stone	Cum.	40% above
b)	Masonry stones	Cum.	75% above
c)	Rubble	Cum.	15% above
d)	Loose moorum/sand/earth/surkhi/cement/stone dust/hot mix asphalt material/ Fly ash/Pond ash	Cum.	10% below
e)	Excavated/compacted ordinary & other soil measured as per clause 301.8, 304.4 and 305.8	Cum.	20% above
f)	Excavated ordinary rock measured as per clause 304.4	Cum.	90% above
g)	Coal/fuel wood/Iron work/steel/G.I. Sheets/ pipes/ lime/machinery etc.	M.T.	7.5% below
h)	More than 100 mm dia ballies	R.M.	1.5% of metal
i)	Upto 100 mm diameter ballies	R.M.	0.75% of metal
j)	Tar/paints/bitumen etc.	M.T.	5% above
k)	Hume pipe/NP4		
	i) Upto 1000mm dia	R.M.	80% of metal
	ii) Above 1000mm dia	R.M.	110% of metal
1.3	Transportation by trucks on hire		
i)	Trucks hired for full load excluding loading/unloading and stacking for items not covered above for distances:		
	a) Upto 10 kms.	Per Km.	59.00
	b) Beyond 10 Kms. and upto 50 Kms. add extra over a) above	Per Km.	42.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
	c) Beyond 50 Kms. add extra over b) above.	Per Km.	38.00
ii)	Loading on trucks (by manual means)	Cum.	138.00
iii)	Unloading of trucks and stacking (by manual means)	Cum.	138.00
1.4	Hire charges for machineries : (only working hours to be paid and idle hours not to be paid) including fuel and manpower.		
i)	Tractor with trolley	Hour	264.00
ii)	Tractor with ripper	Hour	315.00
iii)	Tractor mounted water tanker	Hour	400.00
iv)	Truck mounted water tanker	Hour	727.00
v)	Crane for lifting		
	a) 40 T capacity	Hour	673.00
	b) 80 T capacity	Hour	880.00
vi)	Hydraulic excavator of 1.0 Cum bucket	Hour	893.00
vii)	Road rollers :		
	(a) Smooth wheeled roller 8 T	Hour	323.00
	(b) Tandem Road roller	Hour	799.00
	(c) Pneumatic Road roller	Hour	893.00
	d) Vibratory roller	Hour	1084.00
viii)	Tipper	Hour	485.00
ix)	Truck	Hour	293.00
x)	Paver Finisher Mechanical	Hour	791.00
1.5	Supply of mineral aggregate like broken stone/crushed stone (crushed in mechanical crusher) as per clause 520 at road site including all lead and stacking etc. complete.		
i)	75 mm standard size broken stone	Cum.	1092.00
ii)	63 mm standard size broken stone	Cum.	1132.00
iii)	45 mm standard size broken stone	Cum.	1172.00
iv)	45 mm standard size Crushed stone	Cum.	1136.00
v)	22.4 mm standard size Crushed stone	Cum.	1142.00
vi)	13.2 mm standard size Crushed stone	Cum.	1000.00
vii)	11.2 mm standard size Crushed stone	Cum.	1010.00
viii)	6.7 mm standard size Crushed stone	Cum.	778.00
1.6	Supply of fine aggregate and filler material as per clause 520 including all lead and stacking etc. complete		
i)	Crusher stone dust	Cum.	747.00
ii)	Sand/Shingle/Kanker/Laterite	Cum.	899.00
iii)	Moorum	Cum.	334.00

CHAPTER – 2

SITE CLEARANCE

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
2.1	Cutting of trees , including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all leads & lifts and filling in depression/pit with suitable soil including compaction in layers at OMC as directed by Engineer-in-charge and as per relevant clauses of section-200 for :-		
i)	Girth from 300 mm to 600 mm	each	276.00
ii)	Girth beyond 600 mm to 900 mm	each	424.00
iii)	Girth beyond 900 mm to 1800 mm	each	750.00
iv)	Girth above 1800 mm	each	1440.00
2.2	Removal of leftover portion of trunk and removal of rootlets after cutting of tree by the forest department or any other agency, including required excavation and all necessary activities for uprooting, stacking of serviceable material and disposal of unserviceable material with all leads & lifts and filling the depression/pit with suitable soil including compaction in layers at OMC as directed by Engineer-in-Charge and as per relevant clauses of section-200 for :-		
i)	Girth from 300 mm to 600 mm	each	216.00
ii)	Girth beyond 600 mm to 900 mm	each	293.00
iii)	Girth beyond 900 mm to 1800 mm	each	636.00
iv)	Girth above 1800 mm	each	1288.00
2.3	Clearing Grass and Removal of Rubbish (clearing grass and removal of rubbish including all leads and lifts)	hectare	16521.00
2.4	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 all leads and lifts removal and disposal of top organic soil not exceeding 150 mm in thickness if required and as per relevant clauses of section-200.		
A	In area of light jungle	hectare	52065.00
B	In area of thorny jungle	hectare	62717.00
2.5	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 including all leads and lifts and as per relevant clauses of section-200 in.		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(i)	Lime / Cement Concrete		
A	Lime Concrete, cement concrete grade M-10 and below	cum	396.00
B	Cement Concrete Grade M-15 & M-20	cum	479.00
C	Prestressed / Reinforced cement concrete grade M-20 & above	cum	1141.00
(ii)	Brick / Tile work		
A	In lime mortar	cum	230.00
B	In cement mortar	cum	313.00
C	In mud mortar	cum	197.00
D	Dry brick pitching or brick soling	cum	180.00
(iii)*	Stone Masonry		
A	Rubble stone masonry in lime mortar	cum	203.00
B	Rubble stone masonry in cement mortar.	cum	252.00
C	Rubble Stone Masonry in mud mortar.	cum	170.00
D	Dry rubble masonry	cum	153.00
E	Stone pitching/ dry stone spalls.	cum	137.00
F	Boulders laid in wire crates including opening of crates and stacking dismantled materials.	cum	170.00
(iv)	Wood work wrought framed and fixed in frames of trusses upto a height of 5 m above plinth level.	cum	468.00
(v)	Steel work in all types of sections upto a height of 5 m above plinth level excluding cutting of rivet.		
A	Including dismembering	tonne	1591.00
B	Excluding dismembering.	tonne	1194.00
C	Extra over item No. (v) A and (v) B for cutting rivets.	each	11.00
(vi)	Scraping of bricks dismantled from brick work including stacking.		
A	In lime/Cement mortar	1000 No.	1233.00
B	In mud mortar	1000 No.	414.00
(vii)	Scraping of Stone from dismantled stone masonry		
A	In cement and lime mortar	cum	458.00
B	In Mud mortar	cum	83.00
(viii)	Scraping plaster in lime or cement mortar from brick/ stone masonry	sqm	14.00
(ix)	Removing all type of Hume Pipes in serviceable condition without damaging the pipe and Stacking with all lifts and lead excluding Earthwork and Dismantling of Masonry Works.		
A	Up to 1000 mm dia	meter	518.00
B	Above 1000 mm dia	meter	621.00
	Note : Pipe removed in damaged/unserviceable condition shall be paid in dismentling of concrete on volume basis in respective items.		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
2.6	Dismantling of flexible pavements and disposal of dismantled materials including all leads, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200.		
A	Bituminous courses	cum	734.00
B	Granular courses	cum	513.00
2.7	Milling of bituminous pavement upto depth of 50 mm by cold milling machine including all levelling and slope sensors, self-loading of milled material by discharge conveyor onto transport vehicle including lead charges of 10 km as directed by Engineer in Charge	Sqm.	60.00
2.8	Milling of bituminous pavement upto depth of 50 to 75 mm by cold milling machine including all levelling and slope sensors, self-loading of milled material by discharge conveyor onto transport vehicle including lead 10 km as directed by Engineer in Charge	Sqm.	64.00
2.9	Milling of bituminous pavement depth of 75 to 100 mm by cold milling machine including all levelling and slope sensors, self-loading of milled material by discharge conveyor onto transport vehicle including lead 10 km as directed by Engineer in Charge	Sqm.	70.00
2.10	Dismantling of cement concrete pavement i/c breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials with all leads, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200.	cum	1123.00
2.11	Dismantling guard rails by manual means and disposal of dismantled material with all leads and lifts, stacking serviceable materials and unserviceable materials separately and as per relevant clauses of section-200.	meter	77.00
2.12	Dismantling kerb stone by manual means and disposal of dismantled material with all leads & lifts and as per relevant clauses of section-200.	meter	13.00
2.13	Dismantling kerb stone channel by manual means and disposal of dismantled material with all leads & lifts and as per relevant clauses of section-200	meter	19.00
2.14	Dismantling of kilometer stone including cutting of earth, foundation and disposal of dismantled material with all leads & lifts and back filling of pit with suitable soil including compaction in layers at OMC as directed by Engineer-in-Charge.		
A	5th KM stone	each	400.00
B	Ordinary KM Stone	each	237.00
C	Hectometer Stone	each	48.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
2.15	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 lead & lifts, stacking serviceable material and unserviceable material separately.	meter	42.00
2.16	Dismantling of CI water pipe line 600 mm dia including disposal with all leads & lifts and stacking of serviceable material and unserviceable material separately under supervision of concerned department.	meter	117.00

***Note: The stone obtained after dismantling of stone masonry shall be taken by the contractor in his possession.**

CHAPTER- 3

EARTH WORK, EROSION CONTROL AND DRAINAGE

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
3.1*	Excavation in Soil (by Manual Means.) Excavation for roadway in soil using including loading in tipper for carrying of cut earth to embankment site and unloading with all leads & lifts as per relevant clauses of section 300.	cum	201.00
3.2	Excavation in Soil (by Mechanical Means.) Excavation for roadway in soil using mechanical means including loading in tipper for carrying of cut earth to embankment site and unloading with all leads & lifts as per relevant clauses of section 300.	cum	88.00
3.3*	Excavation in ordinary rock (by Manual Means) including loading in a truck and carrying of excavated material to embankment site with in all leads & lifts as per relevant clauses of section 300.	cum	287.00
3.4	Excavation in Ordinary Rock by (Mechanical Means using Hydraulic Excavator) Excavation in ordinary rock using hydraulic excavatro including loading in a tipper and carrying of excavated material to embankment site with in all lifts and leads as per relevant clauses of section 300.	cum	145.00
3.5	Excavation in Hard Rock (requiring blasting) Excavation for roadway in hard rock (requiring blasting) by drilling, blasting and breaking, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections, including taking the serviceable material by the contractor in his possession and loading in tipper and disposal of the unserviceable excavated material with in all leads & lifts as per relevant clauses of section 300.	cum	553.00
3.6	Excavation in Hard Rock (blasting prohibited)) Excavation for roadway in hard rock (blasting prohibited) with rock breakers including breaking rock, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections, including taking the serviceable material by the contractor in his possession and loading in tipper and disposal of the unserviceable excavated material with in all leads & lifts as per relevant clauses of section 300.	cum	636.00
3.7	Excavation in Hard Rock (controlled blasting) Excavation for roadway in hard rock with controlled blasting by drilling, blasting and breaking, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections, including taking the serviceable material by the contractor in his possession and loading in tipper and disposal of the unserviceable excavated material with in all leads & lifts as per relevant clauses of section 300.	cum	608.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
3.8	Excavation in Marshy Soil Excavation for roadway in marshy soil with hydraulic excavator including cutting and loading in tippers and disposal with in all leads & lifts, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections as per relevant clauses of Section-300.	cum	93.00
3.9	Removal of Unserviceable Soil Removal of Unserviceable Soil and Disposal with all leads including loading and unloading.	cum	71.00
3.10	Scarifying Existing Granular surface to a Depth of 50 mm Scarifying the existing granular road surface to a depth of 50 mm and disposal of scarified material within all leads & lifts.	sqm	26.00
3.11	Scarifying Existing bituminous surface to a depth of 50 mm Scarifying the existing bituminous road surface to a depth of 50 mm and disposal of scarified material with in all leads & lifts.	sqm	18.00
3.12	Construction of embankment with Material Obtained from Borrow Pits/Borrow Area Construction of embankment with approved material/selected soil having C.B.R. > 5 (unless specified otherwise in the contract) obtained from borrow pits/borrow area with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2.	cum	202.00
3.13	Construction of sub-grade with Material Obtained from Borrow Pits/Borrow Area Construction of sub-grade with approved material/selected soil having C.B.R. > 8 (unless specified otherwise in the contract) obtained from borrow pits/borrow area with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2	cum	228.00
3.14	Construction of Embankment/sub-grade with Material Deposited from Roadway Cutting Construction of embankment/sub-grade with approved materials having required C.B.R. for embankment/sub-grade (unless specified otherwise in the contract) deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2.	cum	70.00
3.15	Surface Drains in Soil Construction of unlined surface drains of average cross sectional area 0.40 sqm in soil to specified lines, grades, levels and dimensions to the requirement of clause 301 and 309. Excavated material to be used in embankment within a lead of 50 meters (average lead 25 meters.	meter	43.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
3.16	Surface Drains in Ordinary Rock Construction of unlined surface drain of average cross sectional area 0.4 sqm in ordinary rock to specified lines, grades, levels and dimensions as per approved design and to the requirement of clause 301 & 309. Excavated material to be used in embankment at site.	meter	88.00
3.17	Sub Surface Drains with Perforated Pipe Construction of subsurface drain with perforated pipe of 100 mm internal diameter of cement concrete closely jointed, perforations ranging from 3 mm to 6 mm depending upon size of material surrounding the pipe, with 150 mm bedding below the pipe and 300 mm cushion above the pipe, cross section of excavation 450 x 550 mm. Excavated material to be utilized in roadway at site.	meter	499.00
3.18	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 utilized in roadway.	meter	136.00
3.19*	Construction of RCC open drain		
(a)	Construction of RCC open drain with width 1.0m or 0.8 m (inside dimension) and average depth from inlet to outlet 1.0m or 0.8m (maintaing slope as per site conditions) with 150 mm thick RCC M-25 walls, 150 mm thick RCC M-25 bottom slab, over 100 mm thick (Av.) levelling course in PCC M-15 including excavation, dressing of sides and bottom, providing HYSD reinforcement consisting of 10mm dia horizontal bars @ 150 mm c/c and U-shaped 10 mm dia bars @ 150 mm c/c including cutting,bending and binding wires, placing in position, providing shuttering and concreting by using cocrete mixer , compaction by vibration etc complete as per drawings and technical specifications.		
(i)	1.0 m width x 1.0 m average depth	meter	5239.00
(ii)	0.8 m width x 0.8 m average depth	meter	4178.00
(b)	Construction of RCC open drain with width 0.60m or 0.45 m (inside dimension) and average depth from inlet to outlet 0.60m or 0.45 m (maintaing slope as per site conditions) with 120 mm thick RCC M-25 walls, 120 mm thick RCC M-25 bottom slab, over 100 mm thick (Av.) levelling course in PCC M-15 including excavation, dressing of sides and bottom, providing HYSD reinforcement consisting of 8 mm dia horizontal bars @ 150 mm c/c and U-shaped 8 mm dia bars @ 150 mm c/c including cutting,bending and binding wires, placing in position, providing shuttering and concreting by using cocrete mixer , compaction by vibration etc complete as per drawings and technical specifications.		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(i)	0.60 m width x 0.60 m average depth	meter	2767.00
(ii)	0.45 m width x 0.45 m average depth	meter	2093.00
(iii)	Providing and laying 15 cm (Average) thickness hammered dressed dry stone V-shaped road side surface drains as per MORT&Hs specifications with all leads and lifts complete. (Refer to Manual for Hill Roads IRC:SP:48)	sqm	488.00
3.20	Providing and laying Pre cast RCC open drain of required size made of grade RCC M-25 as per structural drawing including arrangements for lifting, placing and jointing in drain segments, transportation of pre cast segements to work site excavation, 100mm thick base concrete grade M-15 laid in required slope, placing the drain segements in required slope, aligning to line and length, including joining of the drain segements to each other with cement mortar 1:1 and back filling of haunches including compacting to required density as instructed by Engineer-in-charge as per drawing.		
A	Drain with wall thickness 120mm thick and reinforced with 8mm dia U bars at 150mm c/c and 8mm dia longitudinal bars at 150mm c/c		
(i)	450 mm x 450mm opening	Meter	2320.00
(ii)	600 mm x 600mm opening	Meter	2997.00
B	Drain with wall thickness 150mm thick and reinforced with 10mm dia U bars at 150mm c/c and 10mm dia longitudinal bars at 150mm c/c		
(i)	800 mm x 800mm opening	Meter	4512.00
(ii)	1000 mm x 1000mm opening	Meter	5476.00
3.21 (A)	Add extra in pre-cast RCC drain for every 50mm additional depth of drain section 0.4m x 0.4 m, 0.5m x 0.5m & 0.6m x 0.6m upto additional depth of 0.25 m	Meter	32.00
3.21 (B)	Add extra in pre-cast RCC drain for every 100mm additional depth of drain section 0.8m x 0.8m & 1.0m x 1.0m upto additional depth of 0.3 m	Meter	98.00
3.22	Providing and laying Pre cast RCC slab over RCC drain of required size made of grade RCC M-25 with 50mm dia perforation @ 600mm c/c in two rows in zig-zag pattern as per structural drawing including transportation of pre cast segements to work site and placing over drain as instructed by Engineer-in-charge.		
(i)	Slab with reinforcement 10mm dia at 150mm c/c both ways		
A	690 mm wide and 120mm thick (for drain 450 x 450 mm)	Meter	673.00
B	840mm wide and 150mm thick (for drain 600 x 600 mm)	Meter	976.00
(ii)	Slab with reinforcement 12mm dia main bars at 150mm c/c and 10mm dia distribution bars at 150mm c/c		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
A	1.10 m. wide and 150mm thick (for drain 800 x 800 mm)	Meter	1367.00
B	1.30 m. wide and 150mm thick (for drain 1000 x 1000 mm)	Meter	1650.00
3.23	Construction of Rock fill Embankment Construction of rock fill embankment with broken hard rock fragments obtained from roadway excavation of size not exceeding 300 mm laid in layers not exceeding 500 mm thick including filling of surface voids with stone spalls, blinding top layer with granular material, rolled with vibratory road roller, all complete as per clause 313.	cum	44.00
3.24	Embankment Construction with Fly ash/Pond ash available from coal or lignite burning Thermal Plants as waste material. Construction of embankment with fly ash conforming to table 1 of IRC:SP:58 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 and as per approved plans.		
A	Including Transportation of Fly Ash	cum	455.00
B	Excluding Transportation of Fly Ash	cum	73.00
3.25	Providing and laying aggregate and sand cover for aggregate drains with all leads and lifts as per clause 309.3.6 (only aggregate crushed in mechanical crusher shall be used and measured from outer ends of sand cover.)	cum	1001.00
3.26	Providing Chute drains consisting of NP-2 RCC half round, 300 mm dia pipes , laid over block of C.C. 1:3:6 (20mm and down aggregates) size 450 mm x 265 mm laid over filter media (measured and paid separately) including all false work etc. complete.	meter	1777.00
3.27	Construction of RCC drain/cover slab/chamber		
(i)*	Excavation for drain chamber by Mannual means (Earth work in excavation for drain/chamber as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.)	cum	201.00
(ii)	Construction of RCC drain/chamber/cover , placing in position, providing shuttering and concreting by using concrete mixer, compaction by vibration etc complete as per drawings and technical specifications excluding reinforcement. with RCC M-20	cum	4015.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(iii)	Supplying, Fitting and Placing un-coated HYSD bar Reinforcement in drain/cover/chamber complete as per Drawing and Technical Specifications.	MT	55619.00

Note: Item 3.27 (ii) & (iii) can also be used for minor RCC M-20 work other than drain/chamber cover work.

Note: * This item to be executed with prior permission of Chief Engineer.

CHAPTER - 4

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

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
4.1	Granular Sub-base as per Table:- 400-1 Construction of granular sub-base by providing graded Material, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface watering, rolling and compacting with vibratory power roller at OMC to achieve the desired density, complete as per clause 401.		
	Plant mix method (with Mechanically crushed stone only)		
(a)	For Sub-base cum drainage layer or upper sub-base with		
(i)	Grading- III Material	cum	1333.00
(ii)	Grading- IV Material	cum	1348.00
(b)	For Lower Sub-base with		
(i)	Grading-V Material	cum	1337.00
(ii)	Grading-VI Material	cum	1306.00
4.2	Drainage Layer of Granular Sub-Base for RIGID PAVEMENT		
	Construction of granular sub-base by providing graded granular material mechanically mixed in plant confirming to required grading mentioned in Appendix-VI and Clause 5.7.3.9 of IRC:58-2015 , 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.		
	By Plant mix Method (with mechanically crushed stone only)		
A	For Sub-Base as per AASTHTO 93 : Grading 6 of Table VI-I	cum	1270.00
B	For Sub-Base as per AASTHTO 93 : Grading 7 of Table VI-I	cum	1293.00
4.3	Lime Stabilization for Improving Sub-grade Laying and spreading available soil in the sub-grade on a prepared surface, pulverizing, mixing the spread soil in place with rotavator with 3% slaked lime having minimum content of 70% of CaO, grading with motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved sub- grade as per clause-402.	cum	354.00
4.4	Making 50 mm x 50 mm Furrows Making 50 mm x 50 mm furrows, at 45° inclination to the center line of the road and at one meter interval in the existing thin bituminous wearing coarse including sweeping and disposal of excavated material with all leads.	sqm	09.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
4.5*	Water Bound Macadam Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density as per clause-404.		
A	Grading- I (63 to 45 mm size aggregate)		
(i)	Using Screening Crushable type such as Moorum or Gravel	cum	1492.00
(ii)	Using Screening Type-A (13.2mm Agg.)	cum	1572.00
(iii)	Using Screening Type-B (11.2mm Agg.)	cum	1640.00
B	Grading- II (53 to 22.4 mm size aggregate)		
(i)	Using Screening Crushable type such as Moorum or Gravel	cum	1527.00
(ii)	Using Screening Type-B (11.2mm Agg.)	cum	1675.00
4.6	Wet Mix Macadam Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the material with water at OMC in mechanical mix plant carriage of mixed material by tipper to site, laying in uniform layers with paver in sub-base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density as per clause 406.	cum	1365.00
4.7	Cement Treated Crushed Stone Sub-base (CTSB) (Plant Mix Method) Construction of granular sub-base by providing graded Material, with cement as per mix design, but not less than 3% of the dry weight of the mix, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with Mechanical Paver on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 403.		
A	Plant Mix Method (Using by Mechanical Paver)		
(i)	Cement Treated Crushed Stone Sub-base (Grading-III Material)	Cum	1737.00
(ii)	Cement Treated Crushed Stone Sub-base (Grading-IV Material)	Cum	1722.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
4.8	Cement Treated Crushed Stone Base (CTB) (Plant Mix Method) Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam, with cement as per mix design, but not less than 4% of the dry weight of the mix, mixing 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 complete as per clause 403.	Cum	2024.00
4.9	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.	cum	190.00
4.10	Construction of Median and Island with Soil Taken from Borrow Areas Construction of median and Island above road level with approved material brought from borrow pits, spread, sloped and compacted as per clause 408.	cum	217.00
4.11	Construction of Shoulders Construction of shoulders with selected soil from borrow pits / borrow areas having CBR not less than 12 and shall have L.L. and P.I. not more than 25% and 6% respectively, inclusive of all leads and lifts, including clearing and scrapping of existing surface, providing required cross fall, compacting, watering, rolling etc. complete as per clause 408.		
A	With Vibratory roller	cum	278.00
B	With Smooth wheeled roller	cum	266.00
4.12	Granular Shoulders (Construction of granular shoulder as per clause 408 at top 150mm of earthen shoulder shall be well graded mix of at least 30% of granular sub-base material of grading-III as per clause 401 and moorum/gravel or soil and combination having soaked CBR value of not less than 30%. The granular layer shall be compacted to at least 98% of mix dry density of material as determined as per IS:2720 (Part-B))	Cum	419.00
4.13	Providing paving to shoulders including dressing, leveling to camber and compacting the base etc. with :		
(i)	Hammer dressed 200 mm thick (average) stones, gaps to be filled with spalls hammered and river sand.	sqm	646.00
(ii)	Bricks (laid in 100 to 112 mm thickness) of crushing strength not less than 70 kg/sq cm when tested to Indian Standards with joints filled with river sand .	sqm	377.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
4.14	Providing & laying precast interlocking concrete blocks of required compressive strength with approved size, shape/ pattern over coarse sand bed of thickness 30 +/- 5 mm and joints filled with fine sand including leveling with surface vibrator, temping and sweeping etc. complete as per IRC-SP-63.		
(A)	60mm thick precast interlocking concrete block of C.C. M-30 grade on Footpath/Cycle Track		
i)	Plain precast interlock concrete block	sqm	456.00
ii)	Polymer coated coloured precast interlock concrete blocks	sqm	591.00
(B)	80mm thick precast interlocking concrete block of C.C. M-40 grade on Area of Light Traffic/ residential streets		
i)	80mm thick Plain precast interlock concrete block	sqm	625.00
ii)	80mm thick Polymer coated coloured precast interlock concrete blocks	sqm	740.00
4.15	Removing of existing laid 60mm/80mm thick precast interlocking concrete blocks without any damaged in any shape and pattern, over coarse sand bed with stacking of block in proper manner with in the lead of 100.00 mt inclusive of all labour etc. complete the work	sqm	31.00
4.16	Laying only of 60mm/80mm thick precast interlocking concrete blocks in any shape/pattern, including and over 30 +/- 5 mm thick average coarse sand bed with joints of 3mm thick filled by fine sand including the cost of sand excluding cost of paver block, leveling with surface vibrator, temping and sweeping etc. complete for the work	sqm	96.00
4.17	Footpaths and Separators Construction of footpath/separator by providing a 150 mm compacted granular sub base as per clause 401 and 75 mm thick cement concrete base with PCC grade M-15, over laid with precast cement concrete tiles 25mm thick fixed in 20mm thick cement mortar 1:3 including provision of all drainage arrangements but excluding kerb channel excluding cost of GSB as per clause 410.	sqm	834.00
4.18	Providing and fixing guard stones 200 x 200 x 900 mm made of precast RCC M20 grade fixed at 300 mm into the ground in P.C.C. 1:3:6 blocks of size 400 x 400 x 400 mm and given two coats of paint with white and black bands including excavation.	each	446.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
4.19	Lime, Fly ash stabilized soil sub-base Construction of Sub-base using lime-fly ash admixture with granular soil, free from organic matter/ deleterious material or clayey silts and low plasticity clays having PI between 5 and 20 and liquid limit less than 25 and commercial dry lime, slaked at site or pre-slaked with CaO content not less than 50%, fly ash conforming to gradation as per clause 4.3 of IRC: 88, lime + fly ash content ranging between 10 to 30%, the minimum unconfined compressive strength and CBR value after 28 days curing and 4 days soaking not to be less than 7.5kg/cm ² and 25% respectively, all as specified in IRC: 88.	cum	523.00
4.20	Full Depth Reclamation using Chemical Soil Stabilizer (CSS) and Cement Stabilization of in-situ (existing pavement crust) or soil or otherwise sub base/ base course up to the required depth by cold in-situ recycling using Chemical Soil Stabilizer (CSS) and Cement : Providing pulverizing, spreading, milling and mixing of Chemical Soil Stabilizer (CSS) and Cement at the appropriate rate as per job mix design in accordance with IRC:SP:89 Part-II 2018 and IRC-37-2018. Cementitious additive as per mix design should be spread on the existing pavement using a mobile truck mounted containerized cement/additive spreader with micro processor controlled weighing and spreading system. The additive spreader shall have variable working width as per requirement. The in-situ stabilization process shall be carried out by a mobile and self propelled stabilizer/reclaimer of working as required with a variable working width as per site and minimum engine horse power of 440 kw/330 kw, depth up to 50 cm and automatic mixing space adaptation to the particular working depth, equiped with all sensors, displaying all parameters under operation, automatic electric transverse slope control for levelling the machine. Programmable automatic system for initiating and completing the milling process at the particular working, automatic self calibrating Microprocessor controlled spray bars for OMC. The resultant stabilized mix then would be profiled to the required grade, level and thickness using motor grader and the mix would be compacted using 20 tonne pad foot roller in combination with smooth wheel roller to achieve desired proctor density as per IRC 37-2018 and complete in all respect and curing with water as required including all materials, labour and machinery etc. The entire in-situ process would be carried out in single pass with milling and pulverizing of damaged asphalt pavement/soil/ aggregates/soil-aggregate mixture	Cum	1862.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
	to the desired depth and with simultaneous addition of additives and water with machine integrated spray bars fitted on the wheeled self-propelled and vibratory pad foot roller to achieve the desired proctor density in all respects. The tandem roller be followed by Pneumatic Tyre Roller. The minimum unconfined compressive strength (UCS) of stabilized sub base/ base should be 4.5/7 MPa after 7/28 days of curing as per IRC:SP:79 Part-II 2018 and IRC 37-2018. Also durability aspects (wet-dry cycles) of stabilized sub base should be satisfied as per IRC 37-2018. The gradation mixes and materials should be as per IRC 37- 2018. The train of equipments to be used are: Binder Spreader-Water Tanker truck-Additive Truck-Recycler - Pad Foot Roller (20 ton) + Single Drum Compactor, Grader - Tandem Roller-Pneumatic Tyre Roller (20 ton).		

Note: * This item to be executed with prior permission of Chief Engineer.

CHAPTER- 5

BASES AND SURFACE COURSES (BITUMINOUS)

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
5.1	Prime coat Providing and applying primer coat with oil based bitumen emulsion (SS-1, grade confirming to IS:8887) on prepared surface of granular base including clearing of road surface and spraying primer using mechanical means as per clause 502.		
	(i) on WBM / WMM surface @0.85 kg/ sqm.	sqm	65.00
	(ii) on Stabilized soil @ 1.05 kg/sqm.	sqm	80.00
5.2	Tack coat Providing and applying tack coat with bitumen emulsion (RS-1, grade confirming to IS:8887) using emulsion pressure distributor on the prepared bituminous/granular surface cleaned with mechanical broom and as per clause 503.		
	(i) Bituminous surface @ 0.25 kg / Sqm	sqm	13.00
	(ii) Granular surface treated with primes @ 0.30 kg / Sqm	sqm	15.00
	(iii) Cement concrete @ 0.35 kg/ Sqm	sqm	17.00
5.3	Bituminous Macadam Providing and laying bituminous macadam as per clause 504 with mixed prepared in minimum 40-60 TPH capacity hot mix plant using crushed aggregates of specified grading premixed with bituminous binder, transported to site, laid over a previously prepared surface with paver finisher to the required grade, level and alignment and rolled to achieve the desired compaction.		
A	With Sensor paver finisher		
(i)	for Grading I (40 mm nominal maximum size aggregate, bitumen content 3.30%)	cum	5205.00
(ii)	for Grading II (19 mm nominal maximum size aggregate, bitumen content 3.40%)	cum	5423.00
B	With mechanical paver finisher		
(i)	for Grading I (40 mm nominal maximum size aggregate, bitumen content 3.30%)	cum	5045.00
(ii)	for Grading II (19 mm nominal maximum size aggregate, bitumen content 3.40%)	cum	5262.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
5.4	Dense Graded Bituminous Macadam Providing and laying dense bituminous macadam with minimum 40-60 TPH capacity HMP using crushed aggregates of specified grading, premixed with bituminous binder @ 4.0 to 4.5% by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher 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.		
A	With Sensor paver		
(i)	for Grading I (37.5 mm nominal size aggregate, bitumen content 4.0%)	cum	6328.00
(ii)	for Grading II (26.5 mm nominal size aggregate, bitumen content 4.50%)	cum	6831.00
(iii)	Add extra to the Rate of Dense Bituminous Macadam with bitumen, if Bitumen Grade VG-40 is used instead of Bitumen Grade VG-30 in the items above.	cum	@4%
B	With Mechanical paver		
(i)	for Grading I (37.5 mm nominal size, bitumen content 4.0%)	cum	6145.00
(ii)	for Grading II (26.5 mm nominal size bitumen content 4.50%)	cum	6637.00
(iii)	Add extra to the Rate of Dense Bituminous Macadam with bitumen, if Bitumen Grade VG-40 is used instead of Bitumen Grade VG-30 in the items above.	cum	@4%
5.5	Dense Bituminous Macadam (Providing and laying dense graded bituminous macadam with 100-120 TPH capacity Batch type HMP using crushed aggregates of specified grading, premixed with bituminous binder @ 4.0 to 4.5 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with a hydrostatic 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.		
A	With sensor paver finisher		
(i)	for Grading I (37.5 mm nominal size, bitumen content 4.0%)	Cum	6851.00
(ii)	for Grading II (26.5 mm nominal size bitumen content 4.50%)	Cum	7379.00
(iii)	Add extra to the Rate of Dense Bituminous Macadam with bitumen, if bitumen grade VG-40 is used instead of bitumen grade VG-30 in the items above.	Cum	@4%

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
B	With mechanical paver finisher		
(i)	for Grading I (37.5 mm nominal size, bitumen content 4.0%)	Cum	6383.00
(ii)	for Grading II (26.5 mm nominal size bitumen content 4.50%)	Cum	7211.00
(iii)	Add extra to the Rate of Dense Bituminous Macadam with bitumen, if bitumen grade VG-40 is used instead of bitumen grade VG-30 in the items above.	Cum	@4%
5.6	Recycling of Bituminous Pavement with Central Recycling Batch Mix Plant		
	Recycling pavement by cold milling of existing bituminous layers, planning the surface after cold milling, reclaiming excavated material to the extent of 30 percent 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 @ 70 percent of required quantity including rejuvenators as required, mixing in a Batch mix plant of minimum 100-120 TPH capacity , transporting and laying at site and compacting to the required grade, level and thickness, all as specified in clause 505 and 519. Bitumen to be added as per requirement of the item in fresh material and @ 60 percent of the requirement of fresh mix for the quantity of recycled material.		
	Dense Bituminous Macadam		
A	With sensor paver finisher		
(i)	for Grading-I (37.5 mm nominal size aggregate, bitumen content 4.0%)	Cum	6088.00
(ii)	for Grading-II(26.5 mm nominal size aggregate, bitumen content 4.50%)	Cum	6644.00
(iii)	Add extra to the Rate of Dense Bituminous Macadam with bitumen, if Bitumen Grade VG-40 is used instead of Bitumen Grade VG-30 in the items above.	Cum	@4%
B	With mechanical paver finisher		
(i)	for Grading-I (37.5 mm nominal size aggregate, bitumen content 4.0%)	Cum	5932.00
(ii)	for Grading-II(26.5 mm nominal size aggregate, bitumen content 4.50%)	Cum	6333.00
(iii)	Add extra to the Rate of Dense Bituminous Macadam with bitumen, if Bitumen Grade VG-40 is used instead of Bitumen Grade VG-30 in the items above.	Cum	@4%

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
5.7	Bituminous Concrete Providing and laying bituminous concrete with minimum 40-60 TPH capacity hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder @ 5.0 to 6.0% by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects.		
A	With Sensor paver		
(i)	for Grading I (19 mm nominal size aggregate) with bitumen 5.5 %	cum	7938.00
(ii)	for Grading I(19 mm nominal size aggregate) with CRMB 60- 5.5 %	cum	8639.00
(iii)	for Grading II (13.2 mm nominal size aggregate) with bitumen 6.0 %	cum	8399.00
(iv)	for Grading II (13.2 mm nominal size aggregate) with CRMB 60- 6.0 %	cum	9164.00
(v)	Add extra to the Rate of Bituminous Concrete with bitumen, if Bitumen Grade VG-40 is used instead of Bitumen Grade VG-30 in the items above.	cum	@4%
B	With Mechanical paver		
(i)	for Grading I (19 mm nominal size aggregate) with bitumen 5.5 %	cum	7716.00
(ii)	for Grading I(19 mm nominal size aggregate) with CRMB 60- 5.5 %	cum	8401.00
(iii)	for Grading II (13.2 mm nominal size aggregate) with bitumen 6.0 %	cum	8166.00
(iv)	for Grading II (13.2 mm nominal size aggregate) with CRMB 60- 6.0 %	cum	8914.00
(v)	Add extra to the Rate of Bituminous Concrete with bitumen, if Bitumen Grade VG-40 is used instead of Bitumen Grade VG-30 in the items above.	cum	@4%
5.8	Bituminous Concrete (Providing and laying bituminous concrete with minimum 100-120 TPH capacity Batch type HMP using crushed aggregates of specified grading, premixed with bituminous binder @ 5.0 to 6.0% by weight of total mix and filler, transporting the hot mix to work site, laying with a hydrostatic 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)		
A	With sensor paver finisher		
(i)	for Grading-I (19 mm nominal size) with bitumen 5.5 %	Cum	8494.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(ii)	for Grading I (19 mm nominal size) with CRMB 60- 5.5 %	Cum	9227.00
(iii)	for Grading II (13.2 mm nominal size) with bitumen 6.0 %	Cum	8975.00
(iv)	for Grading II (13.2 mm nominal size) with CRMB 60- 6.0 %	Cum	9775.00
(v)	Add extra to the Rate of Bituminous Concrete with bitumen, if bitumen grade VG-40 is used instead of bitumen grade VG-30 in the items above.	Cum	@4%
B	With mechanical paver finisher		
(i)	for Grading-I (19 mm nominal size) with bitumen 5.5 %	Cum	8301.00
(ii)	for Grading I (19 mm nominal size) with CRMB 60- 5.5 %	Cum	9018.00
(iii)	for Grading II (13.2 mm nominal size) with bitumen 6.0 %	Cum	8809.00
(iv)	for Grading II (13.2 mm nominal size) with CRMB 60- 6.0 %	Cum	9490.00
(v)	Add extra to the Rate of Bituminous Concrete with bitumen, if bitumen grade VG-40 is used instead of bitumen grade VG-30 in the items above.	Cum	@4%
5.9	Bituminous Concrete with waste plastic (Providing and laying bituminous concrete using waste plastic with 120-200 TPH higher capacity batch type hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder VG-40 and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 & 112 complete in all respects)		
	With sensor paver finisher		
(i)	for Grading-I (19 mm nominal size) with bitumen @ 4.8 % of mix & waste plastic @ 8 % of bitumen	cum	7859.00
(ii)	for Grading-II (13.2 mm nominal size) with bitumen @ 5.0 % of mix & waste plastic @ 8 % of bitumen	cum	8032.00
5.10*	Surface Dressing Providing and laying surface dressing as wearing course in single coat using crushed stone aggregates of specified size on a layer of bituminous binder laid on prepared surface and rolling with pneumatic type roller to give proper surface finish as per clause 509.		
(i)	19 mm nominal size chipping with bitumen @ 1.2kg/m ²	sqm	82.00
(ii)	13 mm nominal size chipping with bitumen @ 1.0kg/m ²	sqm	65.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
5.11	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 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 smooth wheeled roller 8-10 tonne capacity, finished to required level and grades as per clause 510.		
(i)	Mechanical method using Penetration grade Bitumen and 40-60 HMP of appropriate capacity not less than 35 tonnes/hour .	sqm	102.00
(ii)	Mechanical method using cationic Bitumen Emulsion Medium Setting complying to IS:8887.	sqm	151.00
5.12	Close Graded Premix Surfacing/Mixed Seal Surfacing Mechanical means using minimum 40-60 TPH capacity of HMP. Providing, laying and rolling of close-graded premix surfacing material of 20 mm thickness using bitumen to the required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a Smooth wheeled roller 8-10 tonne capacity, and finishing to required level and grade, complete as per clause 508.		
I.	With sensor paver finisher		
A	With bitumen		
i)	Type A (11.2 mm to 0.09 mm size aggregates)	sqm	139.00
ii)	Type B (13.2 mm to 0.09 mm size aggregates)	sqm	125.00
B	With CRMB-60		
i)	Type A (11.2 mm to 0.09 mm size aggregates)	sqm	150.00
ii)	Type B (13.2 mm to 0.09 mm size aggregates)	sqm	135.00
II.	With mechanical paver finisher		
A	With bitumen		
i)	Type A (11.2 mm to 0.09 mm size aggregates)	sqm	134.00
ii)	Type B (13.2 mm to 0.09 mm size aggregates)	sqm	121.00
B	With CRMB-60		
i)	Type A (11.2 mm to 0.09 mm size aggregates)	sqm	146.00
ii)	Type B (13.2 mm to 0.09 mm size aggregates)	sqm	132.00
5.13	Seal Coat Providing and laying seal coat for sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall including rolling and finishing using Type A and B seal coats as per clause 511.		
A	Type A (Providing and laying liquid seal coat comprising of an application of a layer of binder followed by a cover of stone chips of 6.7mm size)	sqm	52.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
B	Type B i) Providing and laying of premix sand seal coat with minimum 40-60 TPH HMP of appropriate capacity using crushed stone chipping (passing through 2.36mm size sieve) and with bitumen as binder.	sqm	39.00
	ii) Providing and laying of premix sand seal coat using crushed stone chipping (passing through 2.36mm size sieve) and with Cationic Emulsion Medium Setting complying to IS:8887 as binder, by mechanical means.	sqm	56.00
5.14	Slurry Seal Providing and laying slurry seal consisting of a mixture of mineral aggregates, Portland cement filler, bituminous emulsion and water on a road surface including cleaning of surface, mixing of slurry seal in a suitable mobile plant, laying and compacting to provide even riding surface complete as per clause 512 for following types as given in table 500-25.		
(i)	Type-I (Thickness 2 - 3 mm)	sqm	45.00
(ii)	Type-II (Thickness 4 - 6 mm)	sqm	63.00
(iii)	Type-III (Thickness 6 - 8 mm)	sqm	72.00
5.15	Fog Spray Providing and applying low viscosity bitumen emulsion SS-1 ASTM Grade, for sealing cracks less than 3 mm wide or incipient fretting or disintegration in an existing bituminous surfacing complete as per clause 513.	Sqm	37.00
	Add extra if blinded with grit of 3 mm size & under coated with 2% of the emulsion by weight.	sqm	05.00
5.16	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 sprayed at the rate of 9 kg per 10 sqm and spreading 5.6 mm crushed stone aggregates @ 0.11 cum per 10 sqm with hydraulic chip spreader, sweeping the surface for uniform spread of aggregates and surface finished complete as per clause 517)	sqm	53.00
(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, sprayed at the rate of 11 kg per 10 sqm and spreading 11.2 mm crushed stone aggregates @ 0.12 cum per 10 sqm, sweeping the surface for uniform spread of aggregates and surface finished complete as per clause 517)	sqm	65.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(iii)	Stress Absorbing Membrane (SAM) crack width above 9 mm and cracked area above 50% (Providing and laying a single coat of a stress absorbing membrane over a cracked road surface, with crack width above 9 mm and cracked area above 50 % after cleaning with a mechanical broom, using modified binder sprayed at the rate of 15 kg per 10 sqm and spreading 11.2 mm crushed stone aggregates @ 0.12 cum per 10 sqm, sweeping the surface for uniform spread of aggregates and surface finished complete as per clause 517)	sqm	87.00
5.17	Open-Graded Premix Surfacing (By manual means) Providing, laying and rolling of open-graded premix surfacing of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates using bitumen/cationic emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing, laying and rolling with a smooth wheeled roller 8-10 tonne capacity, finished to required level and grades. Work shall be executed as per clause 510 except laying by manual means instead of mechanical mixing and laying.		
(i)	Case – I:- Using Bitumen	sqm	105.00
(ii)	Case –II :-Using Bitumen Emulsion MS grade Medium Setting complying to IS:8887.	sqm	153.00
5.18	Seal Coat Type- B (By Manual means) Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall using Type-B seal coat using crushed stone chipping passing through 2.36mm size sieve, using bitumen / cationic emulsion as binder. Work shall be executed as per clause 511 except laying by manual means instead of mechanical mixing and laying.		
(i)*	Case – I:- Using Bitumen	sqm	40.00
(ii)	Case –II :- Using cationic Bitumen Emulsion Medium Setting complying to IS:8887.	sqm	65.00
5.19	Micro-surfacing Type-II: Providing and laying 4 to 6 mm thick micro-surfacing layer as wearing course in single layer using crushed aggregates @ 9.0 Kg/Sqm manufactured Sand (Crushed stone dust with coarse aggregates as per required grading) with specific size as per table-3 of IRC:SP:81-2008 using Modified Cationic Bitumen @13.5% by weight of aggregates as per Table 8 of IRC:SP:81-2008, Break Control Additive @2% by weight of aggregate, purified water with pH 6-7 @ 12% by weight of aggregate & mineral filler @ 2.0% by weight of aggregate using specialized micro-surfacing Paver finisher and other materials, machinery etc complete as per clause 514.	sqm	145.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
5.20	Micro-surfacing Type-III: Providing and laying 6 to 8 mm thick micro-surfacing layer as wearing course in single layer using crushed aggregates @ 12.0 Kg/Sqm manufactured Sand (Crushed stone dust with coarse aggregates as per required grading) with specific size as per table-3 of IRC:SP:81-2008 using Modified Cationic Bitumen @13% by weight of aggregates as per Table 8 of IRC:SP:81-2008, Break Control Additive @2% by weight of aggregate, purified water with pH 6-7 @ 12% by weight of aggregate & mineral filler @ 2.0% by weight of aggregate using specialized micro-surfacing Paver finisher and other materials, machinery etc complete as per clause 514.	sqm	185.00
5.21#	Providing and laying leveling course / profile corrective course with bituminous macadam		
	With minimum 40-60 TPH capacity hot mix plant using crushed aggregates of Grading-1 premixed with bituminous binder @ 3.1% transported to site and laid over a previously prepared surface with paver finisher to the required grade, level and alignment and rolled as per clause-501.6 and 501.7 to achieve the desired compaction complete in all respect and as per relevant clause section 500.		
A	With Sensor paver	cum	4703.00
B	With Mechanical paver	cum	4562.00
5.22#	Semi-Dense Bituminous Concrete Providing and laying semi-dense bituminous concrete with minimum 40-60 TPH capacity using crushed aggregates of specified grading, premixed with bituminous binder @ 4.50 to 5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORT&H specification clause No. 508 complete in all respects.		
A	With Sensor paver		
(i)	for Grading I (13 mm nominal size aggregate) with bitumen 4.5 %	Cum	6784.00
(ii)	for Grading I (13 mm nominal size aggregate) with CRMB 60- 4.5 %	Cum	7352.00
(iii)	for Grading II (10 mm nominal size aggregate) with bitumen 5.0 %	Cum	7283.00
(iv)	for Grading II (10 mm nominal size aggregate) with CRMB 60 - 5.0%	Cum	7914.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
B	With Mechanical paver		
(i)	for Grading I (13 mm nominal size aggregate) with bitumen 4.5 %	Cum	6589.00
(ii)	for Grading I (13 mm nominal size aggregate) with CRMB 60- 4.5 %	Cum	7144.00
(iii)	for Grading II (10 mm nominal size aggregate) with bitumen 5.0 %	Cum	7076.00
(iv)	for Grading II (10 mm nominal size aggregate) with CRMB 60 - 5.0%	Cum	7693.00

Note:

- * This item to be executed with prior permission of Chief Engineer.
- # These items can be used for construction of roads other than National Highways. The works shall be executed as per the norms and methodology specified in MORT&H “Specifications for Road & Bridge works” (IVth Revision).

CHAPTER- 6

CEMENT CONCRETE PAVEMENTS

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
6.1	Dry Lean Cement Concrete Sub- base Construction of dry lean cement concrete Sub-base as per IRC:SP-49 over a prepared sub-grade with coarse and fine aggregate conforming to IS: 383, the size of coarse aggregate not exceeding 26.5 mm, aggregate cement ratio not to exceed 15:1, aggregate gradation after blending to be as per table 600-1, cement content not to be less than 150 kg/cum, optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, laid with a paver with electronic sensor, compacting with 8-10 tonnes vibratory roller, finishing and curing as per clause 601.	Cum	2178.00
6.2	Cement Concrete Pavement Construction of unreinforced, dowel jointed, plain cement concrete pavement as per IRC:58 over a prepared sub-base, coarse and fine aggregate conforming to IS:383 and graded as per table 600-3 mixed in a batching and mixing plant as per approved mix design, transported to site, laid with slip form / fixed form paver, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing as per clause 602.		
A	Using Slip Form Paver		
(i)	With Cement concrete grade M-40 and minimum cement content @ 400 kg/cum.	Cum	4531.00
(ii)	With Cement concrete grade M-30 and minimum cement content @ 375 kg/cum.	Cum	4389.00
B	Using Fixed Form Paver		
(i)	With Cement concrete grade M-40 and minimum cement content @ 400 kg/cum.	Cum	4285.00
(ii)	With Cement concrete grade M-30 and minimum cement content @ 375 kg/cum.	cum	4149.00
6.3	Providing and laying cement concrete for plain concrete/ reinforced concrete i/c form work, shuttering complete in as per drawings and specifications.(For Village roads)		
(i)	P.C.C. M-10	cum	2932.00
(ii)	P.C.C. M-15	cum	3665.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
6.4	Providing and laying Un-reinforced Cement Concrete without Dowel bars including formwork and expansion, contraction & longitudinal joints as per design and as per IRC-62, over a prepared base as per approved mix design and finishing to lines and grade as per Drawing for Pavement thickness less than 200mm in Low Volume Roads. With Cement concrete grade M-30 and minimum cement content @ 375 kg/cum	cum	4036.00
6.5	Construction roller compacted concrete pavement over a prepared sub-base, coarse and fine aggregate conforming to IS:383, and graded as per table 600-3, mixed as per approved mix design at site, laid, spread, vibrated, compacted with vibratory roller of the double drum wheel type (80-100 kn) and finished in a continuous operation including separation membrane, sealant primer, joint sealant, de-bonding strip, admixtures as approved, curing compound, finishing to lines and grades as per drawing (as per IRC SP:68)		
	A) With Cement concrete grade M-40 and minimum cement content @ 400 kg/cum	cum	4345.00
	B) With Cement concrete grade M-30 and minimum cement content @ 375 kg/cum	cum	4208.00
6.6	Providing and laying White Topping as per IRC-SP 76-2015 over bituminous surface (Existing bituminous surface preparation to be done if necessary either by milling or levelling course with BM/DBM/DLC to correct surface profile and to be paid separately) with unreinforced M-40 grade pavement quality concrete using OPC/PPC/PSC at 400 Kg/cum, coarse aggregate, fine aggregate and Admixture conforming to IS 9130-1999 (R-2004) polymeric synthetic fibre as per ASTM (1116) such as polyester / polyethylene / polypropylene at 1.20 kg/cum, mixed in batching and mixing plant or weigh batcher as per approved mix design to achieve minimum flexural strength or modulus of rupture of concrete 4.50 MPa at 28 days limiting maximum water cement ratio to 0.40, transported to site, laid with mechanical paver finisher, spread, vibrated, compacted and finished in a continuous operation to the lines and grades as per drawing, including cost of dowel bar and tie bar as per design requirements, texture finishing of surface, spraying two layers of curing compound, curing with water sprayed on hessian cloth covered over concrete surface, groove cutting to a depth of 1/3 of the thickness and of width 3-5 mm as per design including cost of all material, side form work, labour and HOM of machineries etc. complete as per specifications. Thickness 100 mm to 200 mm.	cum	4806.00

CHAPTER- 7 GEOSYNTHETICS

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
7.1	Sub-Surface Drain with Geotextiles		
	Construction of sub surface drain 200 mm dia using geotextiles treated with carbon black with physical properties as given in clause 702.2.3 formed in to a stable network and a planar geocomposite structure, joints wrapped with geotextile to prevent ingress of soil, all as per clause 702 and approved drawings including excavation and backfilling.	RM	898.00
7.2	Narrow Filter Sub-Surface Drain		
	Construction of a narrow filter sub-surface drain consisting of porous or perforated pipe laid in narrow trench surrounded by a geotextile filter fabric, with a minimum of 450 mm overlap of fabric and constructed as per clause 702.3 and 309.3.5 including excavation and backfilling.	RM	791.00
7.3	Laying Paving Fabric Beneath a Pavement Overlay (Providing and laying paving fabric as per clause 708 with physical requirements as per table: 700-16 over a tack coat of paving grade Bitumen of VG-10, laid at the rate of 1 kg/ sqm over thoroughly cleaned and repaired surface to provide a water resistant membrane and crack retarding layer. Paving fabric to be free of wrinkling and folding and to be laid before cooling of tack coat, brooming and rolling of surface with pneumatic roller to maximize paving fabric contact with pavement surface)	sqm	188.00

CHAPTER- 8

TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.1	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 PCC M20 grade on PCC M15 grade foundation 150 mm thick, foundation having 50 mm projection beyond kerb stone, kerb concrete to be laid with kerb casting machine, foundation concrete laid manually, all complete as per clause 409.	meter	215.00
8.2	Cast in Situ Cement Concrete M20 Kerb with Channel Construction of cement concrete kerb with channel with top and bottom width 115 and 165 mm respectively, 250 mm high in M20 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.	meter	415.00
8.3	Printing new letters and figures of any shade. Printing new letters and figures of any shade with synthetic enamel paint, Black or other approved colour to give an even shade as per clause 800.		
(i)	Hindi: (Matras, Comas and the like not to be measured and paid for half letter shall be counted as half letter.)	per cm Height per letter	0.60
(ii)	English and Roman :(Hyphens and the like not to be measured)	per cm Height per letter	0.425
8.4	Retro- reflectorized Traffic signs as per Clause 801 Providing and fixing of retro- reflectorized cautionary, mandatory and informatory sign digitally printed over reflectorized sheeting of required grade conforming to ASTM D 4956 including covering with transparent sheeting (lamination sheeting) to protect from fading and damage due to wheather effect as per Clause 6 of IRC:67-2022 made of retro-reflective type sheeting fixed over Aluminum/ Aluminium Composite Material (ACM) sheeting including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, supported on a mild steel back frame of ISA 40 x 40 x 5 mm and mild steel angle iron post 75 mm x75 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45cm x 60cm, as per approved drawing and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating and the part of post below ground shall be painted with 3 coats of redoxide paint as per clause 7.2 of IRC:67-2022. (Note: The details of manufacturer, type of sheeting, month and year of installation, project details and other details along with QR code as detailed in clause 13.2 and Annexure-VII of IRC:67-2022 shall be printed on back side of the sign board.)		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(I)	With Aluminium Sheeting		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type XI confirming to Table 6.9 of IRC:67-2022 (for National Highways and State Highways)		
a)	With Aluminium Sheeting of 2 mm thickness		
(i)	1200 mm equilateral triangle	Each	6826.00
(ii)	900 mm equilateral triangle	Each	4327.00
(iii)	900 mm x 750 mm rectangular	Each	7131.00
(iv)	800 mm x 600 mm rectangular	Each	5617.00
(v)	1200 mm high octagon	Each	12080.00
(vi)	900 mm high octagon	Each	7365.00
(vii)	750 mm high octagon	Each	5587.00
(viii)	900 mm circular	Each	6925.00
(ix)	750 mm circular	Each	5375.00
(x)	600x1550 mm rectangular for Double Chevron	Each	8976.00
b)	With Aluminium Sheeting of 1.5 mm thickness		
(i)	600 mm equilateral triangle	Each	2763.00
(ii)	600 mm circular	Each	3778.00
(iii)	600 mm x 600 mm square	Each	4298.00
B	Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV confirming to Table 6.6 of IRC:67-2022 (for MDR)		
a)	With Aluminium Sheeting of 2 mm thickness		
(i)	900 mm equilateral triangle	Each	3674.00
(ii)	800 mm x 600 mm rectangular	Each	4572.00
(iii)	900 mm high octagon	Each	5789.00
(iv)	750 mm high octagon	Each	4516.00
(v)	900 mm circular	Each	5475.00
(vi)	750 mm circular	Each	4367.00
b)	With Aluminium Sheeting of 1.5 mm thickness		
(i)	600 mm equilateral triangle	Each	2508.00
(ii)	600 mm circular	Each	3223.00
(iii)	600 mm x 500 mm rectangular	Each	3319.00
(iv)	600 mm x 600 mm square	Each	3624.00
C	Made of Class-A High Intensity Micro Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)		
a)	With Aluminium Sheeting of 2 mm thickness		
(i)	900 mm equilateral triangle	Each	3465.00
(ii)	800 mm x 600 mm rectangular	Each	4236.00
(iii)	900 mm high octagon	Each	5278.00
(iv)	750 mm high octagon	Each	4170.00
(v)	900 mm circular	Each	5003.00
b)	With Aluminium Sheeting of 1.5 mm thickness		
(i)	600 mm equilateral triangle	Each	2415.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(ii)	600 mm circular	Each	3016.00
(iii)	600 mm x 500 mm rectangular	Each	3109.00
(iv)	600 mm x 600 mm square	Each	3372.00
(II)	With Aluminium Composit Material (ACM) Sheeting confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 (composed of thermoplastic core of Low Density Polyethylene (LDPE) between aluminium skins of required thickness)		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type XI confirming to Table 6.9 of IRC:67-2022 (for National Highways and State Highways)		
a)	Aluminum Composite Material (ACM) sheeting 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
(i)	1200 mm equilateral triangle	Each	6450.00
(ii)	900 mm equilateral triangle	Each	4145.00
(iii)	900 mm x 750 mm rectangular	Each	6721.00
(iv)	800 mm x 600 mm rectangular	Each	5325.00
(v)	1200 mm high octagon	Each	10564.00
(vi)	900 mm high octagon	Each	6926.00
(vii)	750 mm high octagon	Each	5288.00
(viii)	900 mm circular	Each	6520.00
(ix)	750 mm circular	Each	5093.00
(x)	600x1550 mm ractangular for Double Chevron	Each	8412.00
b)	Aluminum Composite Material (ACM) sheeting 3 mm thickness (with aluminium skin thickness of 0.25mm to 0.3mm on either sides)		
(i)	600 mm equilateral triangle	Each	2708.00
(ii)	600 mm circular	Each	3658.00
(iii)	600 mm x 600 mm square	Each	4152.00
B	Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV confirming to Table 6.6 of IRC:67-2022 (for MDR)		
a)	Aluminum Composite Material (ACM) sheeting 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
(i)	900 mm equilateral triangle	Each	3471.00
(ii)	800 mm x 600 mm rectangular	Each	4247.00
(iii)	900 mm high octagon	Each	5296.00
(iv)	750 mm high octagon	Each	4182.00
(v)	900 mm circular	Each	5026.00
(vi)	750 mm circular	Each	4053.00
b)	Aluminum Composite Material (ACM) sheeting 3 mm thickness (with aluminium skin thickness of 0.25mm to 0.3mm on either sides)		
(i)	600 mm equilateral triangle	Each	2451.00
(ii)	600 mm circular	Each	3097.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(iii)	600 mm x 500 mm rectangular	Each	3192.00
(iv)	600 mm x 600 mm square	Each	3471.00
C	Made of Class-A High Intensity Mirco Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)		
a)	With ACM Sheeting of 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
(i)	900 mm equilateral triangle	Each	3249.00
(ii)	800 mm x 600 mm rectangular	Each	3896.00
(iii)	900 mm high octagon	Each	4761.00
(iv)	750 mm high octagon	Each	3818.00
(v)	900 mm circular	Each	4531.00
b)	With ACM Sheeting of 3 mm thickness (with aluminium skin thickness of 0.25mm to 0.3mm on either sides)		
(i)	600 mm equilateral triangle	Each	2350.00
(ii)	600 mm circular	Each	2878.00
(iii)	600 mm x 500 mm rectangular	Each	2970.00
(iv)	600 mm x 600 mm square	Each	3205.00
8.5	Retro- reflectorized Traffic signs as per Clause 801 Providing and fixing of retro- reflectorized cautionary, mandatory and informatory sign over reflectorized sheeting of required grade confirming to ASTM D 4956 as per IRC:67-2022 made of retro-reflective type sheeting fixed over Aluminium Sheeting/Aluminum Composite Material (ACM) sheeting including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, supported on a mild steel back frame of ISA 40 x 40 x 5 mm and mild steel angle iron post 75 mm x75 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45cm x 60cm, as per approved drawing and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating and the part of post below ground shall be painted with 3 coats of redoxide paint as per clause 7.2 of IRC:67-2022) (Note: The details of manufacturer, type of sheeting, month and year of installation, project details and other details along with QR code as detailed in clause 13.2 and Annexure-VII of IRC:67-2022 shall be printed on back side of the sign board.)		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(I)	With Aluminium Sheeting		
A	Made of Class-A High Intensity Mirco Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)		
a)	With Aluminium Sheeting of 2 mm thickness		
(i)	900 mm equilateral triangle	Each	3249.00
(ii)	800 mm x 600 mm rectangular	Each	3892.00
(iii)	900 mm high octagon	Each	4684.00
(iv)	750 mm high octagon	Each	3818.00
(v)	900 mm circular	Each	4531.00
b)	With Aluminium Sheeting of 1.5 mm thickness		
(i)	600 mm equilateral triangle	Each	2322.00
(ii)	600 mm circular	Each	2818.00
(iii)	600 mm x 500 mm rectangular	Each	2910.00
(iv)	600 mm x 600 mm square	Each	3132.00
(II)	With Aluminium Composit Material (ACM) Sheeting confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 (composed of thermoplastic core of Low Density Polyethylene (LDPE) between aluminium skins of required thickness)		
A	Made of Class-A High Intensity Mirco Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)		
a)	With ACM Sheeting of 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
(i)	900 mm equilateral triangle	Each	3067.00
(ii)	800 mm x 600 mm rectangular	Each	3601.00
(iii)	900 mm high octagon	Each	4257.00
(iv)	750 mm high octagon	Each	3519.00
(v)	900 mm circular	Each	4127.00
b)	With ACM Sheeting of 3 mm thickness (with aluminium skin thickness of 0.25mm to 0.3mm on either sides)		
(i)	600 mm equilateral triangle	Each	2261.00
(ii)	600 mm circular	Each	2683.00
(iii)	600 mm x 500 mm rectangular	Each	2773.00
(iv)	600 mm x 600 mm square	Each	2968.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.6	Direction and Place Identification signs upto 0.9 sqm size board as per Clause 8.1. Providing and erecting direction and place identification retro-reflectORIZED sign Digitally Printed over reflectORIZED sheeting of required grade confirming to ASTM D 4956 including covering with transparent sheeting (lamination sheeting) to protect from fading and damage due to weather effect as per IRC:67-2022 made of retro-reflective type sheeting fixed over Aluminum sheeting / Aluminium Composit Material (ACM) Sheeting including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, supported on a mild steel back frame of ISA 40 x 40 x 5 mm and mild steel angle iron post 75 mm x 75 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45cm x 60cm, 60 cm below ground level as per approved drawing and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating and the part of post below ground shall be painted with 3 coats of redoxide paint as per clause 7.2 of IRC:67-2022. (Note: The details of manufacturer, type of sheeting, month and year of installation, project details and other details along with QR code as detailed in clause 13.2 and Annexure-VII of IRC:67-2022 shall be printed on back side of the sign board.)		
(I)	With Aluminium Sheeting 2mm thick		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type XI confirming to Table 6.9 of IRC:67-2022 (for National Highways and State Highways)	Sqm	10231.00
B	Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV confirming to Table 6.6 of IRC:67-2022 (for MDR)	Sqm	8055.00
C	Made of Class-A High Intensity Micro Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)	Sqm	7347.00
(II)	With Aluminium Composit Material (ACM) Sheeting confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 (composed of thermoplastic core of Low Density Polyethylene (LDPE) between aluminium skins of 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type XI confirming to Table 6.9 of IRC:67-2022 (for National Highways and State Highways)	Sqm	9624.00
B	Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV confirming to Table 6.6 of IRC:67-2022 (for MDR)	Sqm	7377.00
C	Made of Class-A High Intensity Micro Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)	Sqm	6639.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.7	Direction and Place Identification signs upto 0.9 sqm size board as per Clause 8.1. Providing and erecting direction and place identification retro- reflectorized sign over reflectorized sheeting of required grade confirming to ASTM D 4956 as per IRC:67-2022 made of retro-reflective type sheeting fixed over Aluminum sheeting / Aluminium Composit Material (ACM) Sheeting including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, supported on a mild steel back frame of ISA 40 x 40 x 5 mm and mild steel angle iron post 75 mm x75 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45cm x 60cm, as per approved drawing and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating and the part of post below ground shall be painted with 3 coats of redoxide paint as per clause 7.2 of IRC:67-2022. (Note: The details of manufacturer, type of sheeting, month and year of installation, project details and other details along with QR code as detailed in clause 13.2 and Annexure-VII of IRC:67-2022 shall be printed on back side of the sign board.)		
(I)	With Aluminium Sheeting 2mm thick		
A	Made of Class-A High Intensity Mirco Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)	Sqm	6639.00
(II)	With Aluminium Composit Material (ACM) Sheeting confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 (composed of thermoplastic core of Low Density Polyethylene (LDPE) between aluminium skins of 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
A	Made of Class-A High Intensity Mirco Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)	Sqm	6149.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.8	Direction and Place Identification signs with size more than 0.9 sqm size board as per Clause 8.1. Providing and erecting direction and place identification retro- reflectorized sign digitally printed over reflectorized sheeting of required grade confirming to ASTM D 4956 including covering with transparent sheeting (lamination sheeting) to protect from fading and damage due to wheather effect as per IRC:67-2022 made of retro-reflective type sheeting fixed over Aluminum sheeting / Aluminium Composit Material (ACM) Sheeting including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, supported on a mild steel back frame of ISA 40 x 40 x 5 mm and mild steel angle iron post 75 mm x75 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45cm x 60cm, as per approved drawing and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating and the part of post below ground shall be painted with 3 coats of redoxide paint as per clause 7.2 of IRC:67-2022. (Note: The details of manufacturer, type of sheeting, month and year of installation, project details and other details along with QR code as detailed in clause 13.2 and Annexure-VII of IRC:67-2022 shall be printed on back side of the sign board.)		
(I)	With Aluminium Sheeting 2mm thick		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type XI confirming to Table 6.9 of IRC:67-2022 (for National Highways and State Highways)	Sqm	10370.00
B	Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV confirming to Table 6.6 of IRC:67-2022 (for MDR)	Sqm	8200.00
C	Made of Class-A High Intensity Mirco Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)	Sqm	7491.00
(II)	With Aluminium Composit Material (ACM) Sheeting confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 (composed of thermoplastic core of Low Density Polyethylene (LDPE) between aluminium skins of 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type XI confirming to Table 6.9 of IRC:67-2022 (for National Highways and State Highways)	Sqm	9767.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
B	Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV confirming to Table 6.6 of IRC:67-2022 (for MDR)	Sqm	7522.00
C	Made of Class-A High Intensity Micro Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)	Sqm	6783.00
8.9	Direction and Place Identification signs with size more than 0.9 sqm size board as per Clause 8.1. Providing and erecting direction and place identification retro- reflectorized sign over reflectorized sheeting of required grade confirming to ASTM D 4956 as per IRC:67-2022 made of retro-reflective type sheeting fixed over Aluminum sheeting / Aluminium Composit Material (ACM) Sheeting including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, supported on a mild steel back frame of ISA 40 x 40 x 5 mm and mild steel angle iron post 75 mm x75 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45cm x 60cm, as per approved drawing and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating and the part of post below ground shall be painted with 3 coats of redoxide paint as per clause 7.2 of IRC:67-2022. (Note: The details of manufacturer, type of sheeting, month and year of installation, project details and other details along with QR code as detailed in clause 13.2 and Annexure-VII of IRC:67-2022 shall be printed on back side of the sign board.)		
(I)	With Aluminium Sheeting 2mm thick		
A	Made of Class-A High Intensity Micro Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)	Sqm	6783.00
(II)	With Aluminium Composit Material (ACM) Sheeting confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 (composed of thermoplastic core of Low Density Polyethylene (LDPE) between aluminium skins of 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
A	Made of Class-A High Intensity Micro Prismatic Engineering Grade Sheeting of Type I confirming to Table 6.3 of IRC:67-2022 (for ODR & Village Roads)	Sqm	6175.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.10	Providing & Fixing; Object Marker of size 30 cm equilateral Triangle made of made of retro-reflective sheeting Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV vide clause 801.3, fixed over Aluminum Sheeting/ Aluminum Composite Material (ACM) sheeting including application of fluorocarbon coating applied work exposed surface of aluminium to ensure corrosion resistance, with 0.75m high post of angle size 50X50X6 mm of and fixing the same in M 15 concrete block of size 30X30X30 cm including transportation etc. complete		
	With Aluminium Sheeting 1.5mm thick	each	1101.00
(I)	With Aluminium Composit Material (ACM) Sheeting confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 (composed of thermoplastic core of Low Density Polyethylene (LDPE) 3 mm thick (with aluminium skin thickness of 0.25mm to 0.3mm on either sides)	each	1084.00
8.11	Providing & Fixing Hazard Marker Partial Reflective hazard marker as per clause 15.66 of IRC 67-2022, made of 16 gauge (1.6 mm) thick mild steel sheet Confirming to IS: 2062 Painted with one coat of Zinc Chromate Stoving Primer and two coats of Black Stove Enamel (Oven Baked) paint with 10 cm alternative bands of yellow Retro- Reflective Sheeting of Micro Prismatic Grade pasted as per IRC:79 and black paint, including back frame made of angle iron 25x25x3mm mounted over one MS angle Iron post of size 50X50X6 mm of 1.65 meter long duly painted with synthetic enameled paint block including bolts and fixing the same in M-15 concrete black of size 30X30X30 cm Including transportation etc. Complete		
(I)	One Way Object Hazard Marker Size 300x900mm		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type XI (for National Highways and State Highways)	each	1147.00
B	Made of Class-B Micro Prismatic Grade Sheeting of Type XI (for MDR, ODR & Village Roads)	each	1100.00
(II)	Two Way Object Hazard Marker Size 450x900mm		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type XI (for National Highways and State Highways)	each	1453.00
B	Made of Class-B Micro Prismatic Grade Sheeting of Type XI	each	1277.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
	(for MDR, ODR & Village Roads)		
8.12	Providing and fixing of Route Marker Sign Board Route Marker Sign digitally printed over of Class-C Micro Prismatic Grade Retro-reflective Sheeting of Type XI including lamination to protect from fading due to wheather effect as per IRC:67-2022 vide clause 801.3, fixed over Aluminum Sheeting/Aluminum Composite Material (ACM) sheeting including application of fluorocarbon coating applied work exposed surface of aluminium to ensure corrosion resistance, supported on a mild steel back frame of ISA 40 x 40 x 5 mm and mild steel angle iron post 75 mm x75 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45cm x 60cm, 60 cm below ground level as per approved drawing and painting all components of the signs and supports as per relevant clauses of IRC:67-2022) The Route Marker board and Definition board shall be as per clause 22 of IRC:67-2022 and of sizes 600mmx800mm and 300mmx250mm respectively.		
(I)	With Aluminium Sheeting 2mm thick		
(A)	Route Marker Sign Board With Definition Plate	each	6249.00
(B)	Route Marker Sign Board Without Definition Plate	each	5512.00
(II)	With Aluminium Composit Material (ACM) Sheeting confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 (composed of thermoplastic core of Low Density Polyethylene (LDPE) between aluminium skins of 4 mm thickness (with aluminium skin thickness of 0.4mm to 0.5mm on either sides)		
(A)	Route Marker Sign Board With Definition Plate	each	5913.00
(B)	Route Marker Sign Board Without Definition Plate	each	5221.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.13	Overhead Signs as per Clause 8.2. Providing and erecting overhead sign including fixing of retro- reflectorized sheeting digitally printed of Class-C Micro Prismatic Grade Sheeting of Type-XI confirming to ASTM D 4956 including covering with transparent sheeting (lamination sheeting) to protect from fading and damage due to wheather effect as per IRC:67-2022 made of retro-reflective type sheeting vide clause 801.3, fixed over Aluminum sheeting of overall thickness 2mm including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, with appropriately supported by a mild steel back frame of ISA 40 x 40 x 5 mm including all panels supported by diagonal members and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating as per clause 7.2 of IRC:67-2022) and erecting the sign board mounted over back supoport frame with vertical and lateral clearance as per clause 802.2 and 802.3 and relevant clauses and installed over a designed support system as per clause 802.6 of aluminum alloy or galvanized steel trestles and trusses of sections and typer as per structural design requirements and approved plans. (Note: The details of manufacturer, type of sheeting, month and year of installation, project details and other details along with QR code as detailed in clause 13.2 and Annexure-VII of IRC:67-2022 shall be printed on back side of the sign board.		
A	Truss and Vertical Support of aluminium alloy or galvanised steel	Tonne	93441.00
B	Add Extra, if circular/polygonal aluminium alloy/ galvanised steel post is used instead of built-up section of angle/channel/flat etc. for the vertical support of the truss and sign board. (only the weight of posts shall be taken for this additional rate).	Tonne	10558.00
C	Class-C Microprismatic Grade sheeting of Type XI, fixed over 2mm thick Aluminium sheet as detailed above, for over head sign	Sqm	9378.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.14	Multi-Directional Sign Board with Central Post as per Clause 801 & 802. Providing and erecting Multi-Directional Sign Board with a Central Post and mounting four or three faces with retro-reflectORIZED sheeting including writing and direction marking, as directed by Engineer-in-Charge, digitally printed of Class-C Micro Prismatic Grade Sheeting of Type-XI confirming to ASTM D 4956 including covering with transparent sheeting (lamination sheeting) to protect from fading and damage due to wheather effect as per IRC:67-2022 made of retro-reflective type sheeting fixed over Aluminum sheeting of overall thickness 2mm including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, supported on a mild steel back frame of ISA 40 x 40 x 5 mm with un supported length of sheet not exceeding 0.9m in any direction and required diagonal members including cost of sign boards and their back frames and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating as per clause 7.2 of IRC:67-2022) and erecting the sign board mounted over back supoort frame with vertical and lateral clearance as per clause 802.2 and 802.3 and relevant clauses and installed over a designed support system as per clause 802.6 of aluminum alloy or galvanized steel trestles and trusses of sections and typer as per structural design requirements and approved plans. The work shall be carried out as per structural drawing requirements with following structural components:- Central post: 300mm internal dia, 8mm thick and 7.20m High (6.80m 1.20m), covered at top with 8 mm thick plate. Bottom Base Plate: 750mm x 750 mm 16mm thick anchor with 8 Nos. 25mm diameter J-Bolts to the Foundation platform, excluding cost of foundation Top Base Plates: 750mm x 750 mm 14mm thick-2 Nos., welded to top of lower post of 6.0m height and bottom of upper post of 1.20m height, firmly connected together with bolts and nuts of 20mm dia. Top and bottom frames, Vertical connectors and Diagonal connectors for both frames ISA 50x50x6mm, including providing 5mm thick gusset plates of size 200mmx200mm at all conrnrs of top and bottom frame. Back frame of board of ISA 40x40x5mm including making all arrangements for stability of structure, (Drawing is annexed as Annexure-1) (Note: The details of manufacturer, type of sheeting, month and year of installation, project details and other details along with QR code as detailed in clause 13.2 and Annexure-VII of IRC:67-2022 shall be printed on back side of the sign board.)		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
A	Sign boards of size 3.00m x 1.20m on all the Four Faces (for fourway junctions)	Each	250968.00
B	Sign boards of size 3.00m x 1.20m on Three Faces	Each	213508.00
8.15	Overhead Sign Board on Ram Van Gaman Marg Providing and erecting Overhead Sign Board as per Clause 801 & 802, on two faces as per detailed architectural drawings and structural drawings with retro- reflectorized sheeting including writing and direction marking and image printing, digitally printed on Class-C Micro Prismatic Grade Sheeting of Type-XI confirming to ASTM D 4956 including covering with transparent sheeting (lamination sheeting) to protect from fading and damage due to wheather effect as per IRC:67-2022 made of retro-reflective type sheeting fixed over Aluminum sheeting of overall thickness 2mm including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance, including providing and fixing of 4mm thick Aluminium Composite Material ornamental jali pasted with high-intensity retro-reflective sheeting of Class-C Micro Prismatic Grade Sheeting of Type XI/Cast Iron Jali machine finished and painted with premium quality synthetic enamel paint. The signage shall be supported on a mild steel back frame of ISA 40 x 40 x 5 mm with un supported length of sheet not exceeding 0.9m in any direction and requred diagonal members including cost of sign boards and their back frames and painting all exposed components of the signs and supports with primer and 2 coats of epoxy paints or powder coating as per clause 7.2 of IRC:67-2022) and errecting the sign board mounted over back suppoort frame with vertical and lateral clearance as per clause 802.2 and 802.3 and relevant clauses and installed over a designed support system as per clause 802.6 of aluminum alloy or galvanized steel trestles and trusses of sections and typer as per structural design requirements and approved plans with all structural components as shown in drawings, all connections nuts and bolts, gusset plates, extra supports and members in case of fabrication in parts and assembling at work site, welding/rivetting the joints as per requirements and meeting with all architectural requirements, including making all arrangements for the stability of the structure. as directed by Engineer-in-Charge, including cost of foundation, as per minimum dimensions as shown in foundation drawing enclosed (Drawings are Annexed).		
A	For 16.15M Span Sign Board As per Drawing No. 1A, 1B and 1C		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
	(i) Using Aluminum Composite Material Ornamental Jali	Each	1188824.00
	(ii) Using Cast Iron Ornamental Jali	Each	1092992.00
B	For 14.40M Span Sign Board As per Drawing No. 2A, 2B and 2C		
	(i) Using Aluminum Composite Material Ornamental Jali	Each	933434.00
	(ii) Using Cast Iron Ornamental Jali	Each	867037.00
C	For Cantilever Sign Board As per Drawing No. 3A, 3B and 3C		
	(i) Using Aluminum Composite Material Ornamental Jali	Each	361139.00
	(ii) Using Cast Iron Ornamental Jali	Each	355073.00
8.16	Providing and fixing Direction Marking Signage on Ram Van Gaman Marg with aluminium alloy/galvanized steel post of 5mm thickness and diameter 250 mm, 200 mm and 150 mm, as shown in the enclosed drawing No. 5(A) with two numbers place identification boards and and one number direction marking arrow with digitally printed on Class-C Micro Prismatic Grade Sheeting of Type-XI confirming to ASTM D 4956 on both the faces including covering with transparent sheeting (lamination sheeting) to protect from fading and damage due to wheather effect as per IRC:67-2022 made of retro-reflective type sheeting vide clause 801.3, fixed over Aluminum Composite Material (ACM) sheeting of overall thickness 4mm (composed of thermoplastic core of Low Density Polyethylene (LDPE) between aluminium skins of 0.4 to 0.5mm thickness on either sides) confirming to clause 6.5.2 and table 6.1 of IRC:67-2022 including application of fluorocarbon coating applied on exposed surface of aluminium to ensure corrosion resistance including fixing with 25mm dia GI pipe frame and making arrangements for fixing the signages and arrow to the post with fixing logo as per design, made of 4mm thick cast iron/3mm thick laser cut MS sheet fixed at the top and painting with premium quality synthetic enamel paint including cost of foundation as shown in enclosed drawing 5(B) with all arrangements for stability of the complete signage, as directed by Engineer-in-Charge. (Drawings are Annexed)	Each	27761.00
8.17	Painting on Concrete Surfaces		
A	Two coats on new surfaces (Painting two coats after filling the surface with synthetic enamel paint in all shades on new plastered concrete surfaces)	sqm	71.00
B	One coat on old surfaces (Painting one or two coats after cleaning all dirt & dust, filling the surface with synthetic enamel paint in all shades on old concrete surfaces)	sqm	60.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.18	Painting on Steel Surfaces (Providing and applying two coats of ready mix paint of approved brand on steel surface after through cleaning of surface to give an even shade)	sqm	60.00
8.19	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.	sqm	66.00
8.20	Painting Lines, Dashes, Arrows etc on Roads in Two Coats on New Work (Painting lines, dashes, arrows etc on roads in two coats on new work with ready mixed road marking paint conforming to IS:164 on bituminous surface, including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control)		
(i)	Over 10 cm in width	sqm	128.00
(ii)	Up to 10 cm in width	sqm	110.00
8.21	Painting Lines, Dashes, Arrows etc on Roads in Two Coats on Old Work (Painting lines, dashes, arrows etc on roads in two coats on old work with ready mixed road marking paint confirming to IS:164 on bituminous surface, including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control)		
(i)	Over 10 cm in width	sqm	88.00
(ii)	Up to 10 cm in width	sqm	95.00
8.22	Road Marking with Hot Applied Thermoplastic Compound with Reflectorizing Glass Beads on Bituminous Surface Providing and laying of hot applied thermoplastic compound as per MoRTH Grade 2.5 mm thick including reflectorizing glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35-1997. The finished surface to be level, uniform and free from streaks and holes.	Sqm	533.00
8.23	Kilo Meter Stone (Reinforced cement concrete M15grade kilometer stone of standard design as per IRC:8-1980, fixing in position including painting and printing etc)		
(i)	5th kilometer stone (precast)	each	2632.00
(ii)	Ordinary Kilometer stone (Precast)	each	1555.00
(iii)	Hectometer stone (Precast)	each	445.00
8.24	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 as per clause 807.	each	366.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.25	Providing painting figuring and numbering as per IRC specification complete for		
(i)	5th kilometer stone	each	296.00
(ii)	Ordinary Kilometer stone	each	129.00
(iii)	Hectometer stone	each	20.00
(iv)	Boundary stone	each	24.00
8.26	Providing painting figuring and numbering to culverts upto 6 m span complete as per IRC specifications.	each	261.00
8.27	Providing painting figuring and numbering to minor bridge up to 30 m linear waterway complete as per IRC specifications.	each	201.00
8.28	Providing painting figuring and numbering to major bridge, linear waterway exceeding 30 m complete as per IRC specifications.	each	231.00
8.29	Supply and Installation of Road delineators (Road way Delineators). The structure shall be manufactured of mild steel with pure polyester powder coating in black colour with minimum thickness of 40 micron for protection against corrosion. The delineator shall have retro-reflective sheeting of white colour with Type-XI specifications as per IRC:67-2022 and ASTM D 4956 on both the faces to ensure the clear visibility of the road alignment during night time to achieve enhanced visibility of the curved portion of the road. To prevent complete vandalism of above, the reflective sheeting shall be housed with concealed edges. The delineator shall conform to clause 3 of IRC:79-2019, it shall have an ellipsoidal or circular design and shall be 800 to 900 mm above the ground and shall extend 200 to 300 mm below the ground fixed in foundation of 300 x 300 x 400 mm size block of cement concrete M-15. The execution shall be as per clause 806 of MoRTH Specifications for Road and Bridge works.	each	988.00
8.30	Providing & Fixing tree studs in Square/ Round shape of 4" side/diameter made of Grade-C retro-reflective sheeting of Type-XI fixed on 2 mm aluminum sheeting (Confirming to IS:736-Material Designation 24345 or 1900) as specified in section 801.3 of MORT&H and fixing the same with four Nos. high strength nails confirming to IS:1367 on trees at site each.	each	63.00
8.31	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 meters high above ground, 2 m centre to centre, complete as per approved drawings.	meter	1611.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.32	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 M-20 grade RCC vertical posts 1.8 meters high (1.2 m above GL) with 3 holes 50 mm dia for pipe, fixed 2 meters centre to centre, complete as per approved drawing.	meter	1161.00
8.33	Providing and fixing Solar Blinker Light 300 mm dia, LED Aspect made of FRP/Poly carbonate with battery backup of 48 hours fitted on 100 mm dia MS pipe - 3.5 metre long from the ground level, firmly fixed to the ground by mean of properly designed foundation with M-15 grade cement concrete 60cm x 60cm x 90cm, below ground level.	Each	14775.00
8.34	Providing and fixing 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 0oC to 70oC. Color of lighting could be provided in red or yellow (amber) as per requirement and typical frequency of blinking is 1Hz. There should be current losses of less than 20 micro-amperes at 2.4 V in sleep-charging 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 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 Kilograms. 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.	Each	2353.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.35	Flexible Median Marker Supply and Fixing of Flexible Median Marker made of tough, high impact resistant, injection-moulded, thermoplastic body with property of flexibility to provide high durability and U shape structure having rebound/bounce back property the marker body shall be neutral black in colour and the retro reflective element shall be fluorescent yellow colour with sheeting confirming to Type-XI as per IRC:67-2022. The reflective area shall not be less than 90 cm ² . It shall have a minimum height of 180mm width 120mm and body thickness 6.5mm and Shank length shall not be less than 30mm and dia not less than 20mm. The exposed body structure should be cornered rounded for better aesthetics. It shall bounce back to original position after 750 numbers of hits using pendulum of 1.8 kg conforming to ASTM D 256 and shall have Adhesion between the body and outer casing body of FMM shall withstands Kgf tensile loads conforming to ASTM D 638 method. It shall be fixed by drilling and grouting with the use of epoxy adhesive as directed by Engineer-in-Charge.	Each	340.00
8.36	Anti - Glare Devices in Median		
A	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 mtr 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.)	metre	5497.00
B	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° 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 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)	metre	821.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.37	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 HYSD reinforcement conforming to IRC:21-2000 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.	meter	2814.00
8.38	Metal Beam Crash Barrier		
A	Type - A, "W" : Metal Beam Crash Barrier Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanized 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 811.3.	meter	2848.00
B	Type - B, "THRIE" : Metal Beam Crash Barrier Providing and erecting a "Thrie" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 85 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 2 m high with 1.15 m below ground level, all steel parts and fitments to be galvanized 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 811.3.	meter	4018.00
8.39	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 M15 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 M15 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 45° 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.	meter	2594.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.40	Bahu-Balli Bamboo Crash Barrier (Kooch Kavach) Providing and fixing of Bahu-Balli Bamboo Crash Barrier (Kooch Kavach) which comprising of bamboo beam clubbing of 4 Bahu-Balli bamboo beam rail having 3 beam rail of 80mm ($\pm$ 10mm) external dia each in back and 1 beam rail of 100mm ($\pm$ 10mm) external dia and wall thickness of 10mm to be fixed on the vertical post with a spacer of 110 mm external dia and 300 mm long to fix on clubbing of 3 Bahu-Balli bamboo poles having 90mm ($\pm$ 10mm) external dia each and 0.85m above road/ground level, spacing of 1.80 m. height Bahu-Balli bamboo vertical post center to center or post to post at 1.60 m and 0.95 m below ground/road level including excavation, beam and post tied with 8mm (19*6 core) GI Wire rope with clamps and Aluminum ferul locking all steel parts and fitments with M10 Nuts & Bolts to be galvanised by hot dip process, all fittings conform to 4.8 grade steel, all nuts & bolts should be welded at the end. All bamboo poles, beams & spacer by using Bamboo species of Bambusa Balcoaa or Bambusa Bambos are well seasoned, treated with VPI and HDPE coating thickness 1.5 mm (+ 0.5mm). End portion of bamboo crash barrier shall be flared outside by 1.25 m., department side shall be terminated by trailing terminal (TT) arrangement as shown in figure 9.13 of the IRC:SP:73-2018, end portion of bamboo crash barrier shall be flared outside by 0.35 m. distance of 6.40 m. in last section, fixing of white retro-reflective tape (made of Class-C Microprismatic Grade sheeting of Type-XI) 50mm wide on front member of beam and 100mm wide on front post etc. complete as per drawing annexed and as directed by Engineer-in-Charge.	RM	2797.00
8.41	Bahu-Balli Bamboo Fence (Suraksha Kavach) 1.20 Meter Height on Divider: Providing and fixing sustainable Bahu-Balli Fence (Suraksha Kavach), Economical Guard Railing of property, seasoned, creosote oil treated and High Density Poly-Ethylene (HDPE) 1mm coated bamboo post of 60mm external dia fixing in PCC M-15 Grade including excavation in circular size of 250mm dia or square size of 225x225 mm, 1200mm height above ground level and at least 300mm embedded on existing dividers, horizontal member of 40mm external dia & vertical members 25mm external dia fixing with GI nut, bolts & SDS (4.8 grade) bamboo fence by using bamboo species of B.Balcoaa/B.Bambos/ B.Pallida/ B.Tulsa/ B.Strictus/ B.Nutans to prevent trespassing of human & cattle, painting with 2 coats of approved yellow (for strips of yellow & black) paint, fixing of 50mm wide white retro-reflective tape (made of Class-C Microprismatic Grade Sheeting of Type-XI) on vertical members as per Typical Drawing-A1 annexed etc. complete and as directed by Engineer-in-Charge.	RM	1402.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.42	Bahu-Balli Fence (Suraksha Kavach) 1.20 Meter Height above Ground: Providing and fixing sustainable Bahu-Balli Fence (Suraksha Kavach), Economical Guard Railing of property, seasoned, creosote oil treated and High Density Poly-Ethylene (HDPE) 1mm coated bamboo post of 60mm external dia fixing in PCC M-15 Grade including excavation in circular size of 250mm dia, 1200mm height above ground level and at least 600mm embedded in ground, parallel to the road, horizontal member of 40mm external dia & vertical members 25mm external dia fixing with GI nut, bolts & SDS (4.8 grade) bamboo fence by using bamboo species of B.Balcoaa/ B.Bambos/B.Pallida/ B.Tulsa/ B.Strictus/B.Nutans to prevent trespassing of human & cattle, painting with 2 coats of approved yellow (for strips of yellow & black) paint, fixing of 50mm wide white retro-reflective tape (made of Class-C Microprismatic Grade Sheeting of Type-XI) on vertical members as per Typical Drawing-A2 annexed etc. complete and as directed by Engineer-in-Charge.	RM	1498.00
8.43	Bahu-Balli Bamboo Fence (Suraksha Kavach) 1.50 Meter Height above Ground: Providing and fixing sustainable Bahu-Balli Fence (Suraksha Kavach), Economical Guard Railing of property, seasoned, creosote oil treated and High Density Poly-Ethylene (HDPE) 1mm coated bamboo post of 70mm external dia fixing in PCC M-15 Grade including excavation in circular size of 250mm dia, 1500mm height above ground level and at least 800mm embedded in ground, parallel to the existing road, horizontal member of 40mm external dia at top & bottom and 50mm external dia at mid & vertical members 25mm dia fixing with GI nut, bolts & SDS (4.8 grade), bamboo fence by using bamboo species of B.Balcoaa/ B.Bambos/ B.Pallida/ B.Tulsa/ B.Strictus/ B.Nutans to prevent trespassing of human & cattle, painting with 2 coats of approved yellow (for strips of yellow & black) paint, fixing of 50mm wide white retro-reflective tape (made of Class-C Microprismatic Grade Sheeting of Type-XI) on vertical members as per Typical Drawing-B annexed etc. complete and as directed by Engineer-in-Charge.	RM	1980.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.44	Bahu-Balli Bamboo Fence (Suraksha Kavach) 1.80 Meter Height above Ground: Providing and fixing sustainable Bahu-Balli Fence (Suraksha Kavach), Economical Guard Railing of property, seasoned, creosote oil treated and High Density Poly-Ethylene (HDPE) 1mm coated bamboo post of 80mm external dia fixing in PCC M-15 Grade including excavation in circular size of 250mm dia, 1800mm height above ground level and at least 800mm embedded in ground, parallel to the existing road, horizontal member of 40mm external dia at top & bottom and 50mm external dia at mid & vertical members 25mm dia fixing with GI nut, bolts & SDS (4.8 grade), bamboo fence by using bamboo species of B.Balcooa/ B.Bambos/ B.Pallida/ B.Tulsa/ B.Strictus/ B.Nutans to prevent trespassing of human & cattle, painting with 2 coats of approved yellow (for strips of yellow & black) paint, fixing of 50mm wide white retro-reflective tape (made of Class-C Microprismatic Grade Sheeting of Type-XI) on vertical members as per Typical Drawing-C annexed etc. complete and as directed by Engineer-in-Charge.	RM	2156.00
8.45	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, all as per BIS: 873.	each	698.00
8.46	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 450, 'A' frame painted with 2 coats of yellow paint, complete as per IRC:SP:55.	each	2761.00
8.47	Permanent Type Barricade in Construction Zone		
A	With Steel Components (Construction of a permanent type barricade made of steel components, 1.5 m high from road level, fitted with 3 horizontal rails 200 mm wide and 4 m long on 50 x 50 x 5 mm angle iron vertical support, painted with yellow and white strips, 150 mm in width at an angle of 450, complete as per IRC:SP:55)	each	4351.00
B	With Wooden Components (Construction of a permanent type barricade made of wooden components, 1.5 m high from road level, fitted with 3 horizontal planks 200 mm wide and 3.66 m long on 100 x 100mm wooden vertical post, painted with yellow and white stirrups, 150 mm in width at an angle of 450, complete as per IRC:SP:55).	each	2433.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
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	11342.00
8.48	Drum Delineator in Construction Zone (Provision of metal drum, 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)	each	479.00
8.49	Providing and fixing Raised Pavement Markers made of polycarbonate 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 MORT&H(RW/NH-33023/ 10/97-DO III Dtd. 11.06.1997). The pavement markers will be auto moulded by dual polymer shanks and must comply with all the MoRT&H specifications. The height, width and length shall not exceed 50 mm, 100 mm and 100 mm respectively and with minimum reflective area of 13 Sq.cm. on each side and slope to the base shall be 35 +/-5 degree. The strength of detachment 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 kgf. Fixing will be by drilling holes on road for the shanks to go inside, without nails and using epoxy resin based adhesive and complete as directed by the Engineer-in-charge.	each	315.00
8.50	Providing and fixing concrete sign boards resting on ground pre-cast/ cast-in-situ in PCC M20 grade with surface reinforcement of 8 mm dia bars @ 155 mm c/c over 300 mm thick PCC M15 grade foundation concrete with 50mm offset all round as per drawing i/c cost of excavation, plastering with CM 1:3 & finishing with neat slurry cement, painting two or more coats to give an even shade and figuring as directed by Engineer-in-charge.		
(i)	Type A : Village boards (600 mm long, 300 mm wide at bottom & 100 mm wide at top, and height 600 mm above 500 mm thick block of size 700 x 400 x 500 mm with both faces inclined)	each	3177.00
(ii)	Type B : Destination boards (700 mm long, 300 mm wide at bottom & 100 mm wide at top, and height 800 mm above 500 mm thick block of size 800 x 400 x 500 mm with one face vertical)	each	3940.00
(iii)	Type C : Cautionary boards (500 x 500 x 500 mm at bottom & 500 x (500+100)/2 x 500 mm at top over 300 mm thick block of size 500 x 500 x 300 mm with one face vertical)	each	4114.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
8.51	Providing and fixing of empty maxphalt drums on road sides, filling it with earth/moorum / boulders etc. including making holes with pick axes available within 50 m lead, white washing two coats etc complete.	each	299.00
8.52	Construction of boulder / stone masonry wall 60 cm thick and 80 cm height in mud mortar including white washing 3 coats on one side of the wall for temporary diversion / guard walls including all materials complete.		
	(i) In mud mortar	RM	702.00
	(i) In cement mortar CM 1:6	RM	934.00
8.53	Construction of R.R. masonry walls 0.45 m thick and 0.60 m height in CM 1: 3 including excavation , white washing two coats on one side of wall for guard wall / protection wall over 100 mm thick base concrete of PCC 1:3:6 etc complete.	RM	1083.00
8.54	G.I Barbed wire Fencing 1.2 meter high (Providing and fixing 1.2 meters high GI barbed wire fencing with 1.8 m angle iron posts 40 mm x 40 mm x 6 mm placed every 3 meters center to center founded in M15 grade cement concrete, 0.6 meter below ground level, every 15th post, last but one end post and corner post shall be strutted on both sides and end post on one side only and provided with 9 horizontal lines and 2 diagonals interwoven with horizontal wires, fixed with GI staples, turn buckles etc complete as per clause 808.	meter	256.00
8.55	G.I Barbed wire Fencing 1.8 meter high Providing and fixing 1.8 meters high GI barbed wire fencing with 2.4 m angle iron posts 50 mm x 50 mm x 6 mm placed every 3 meters center to center founded in M15 grade cement concrete, 0.6 meter 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.	meter	420.00

CHAPTER- 9

PIPE CULVERTS

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
9.1	Excavation for Structures Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material as per Clause 304, loading the unserviceable material in tipper and unloading with all leads & lifts as directed by Engineer-in-Charge.		
	Ordinary soil		
	upto 3 m depth	cum	111.00
9.2	Providing and laying Reinforced Cement Concrete pipe NP 4 / prestressed concrete pipe on first class bedding Laying Reinforced cement concrete pipe NP4/prestressed concrete pipe complying to IS:458, with ends casted as per the requirements of flush jointing of pipes, for culverts on first class bedding of granular material including joints duly filled and finished with cement mortar 1:2 and bedding as per clause 2904 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets.		
A	600 mm dia	meter	2604.00
B	900 mm dia	meter	4492.00
C	1000 mm dia	meter	5764.00
D	1200 mm dia	meter	8119.00
9.3	Providing and laying Reinforced Cement Concrete pipe NP 4 / prestressed concrete pipe Laying Reinforced cement concrete pipe NP4 /prestressed concrete pipe complying to IS:458, with ends casted as per the requirements of flush jointing of pipes for culverts including joints duly filled and finished with cement mortar 1:2 but excluding bedding below pipe, excavation, protection works, backfilling, concrete and masonry works in head walls and parapets.		
A	600 mm dia	meter	2455.00
B	900 mm dia	meter	4342.00
C	1000 mm dia	meter	5614.00
D	1200 mm dia	meter	7956.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
9.4	Providing and laying Reinforced Cement Concrete pipe NP 3 / prestressed concrete pipe on first class bedding Laying Reinforced cement concrete pipe NP3 /prestressed concrete pipe complying to IS:458, with ends casted as per the requirements of flush jointing of pipes for culverts on first class bedding of granular material including joints duely filled and finished with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets.		
<i>A</i>	450 mm dia	meter	1403.00
<i>B</i>	600 mm dia	meter	2074.00
<i>C</i>	900 mm dia	meter	3898.00
<i>D</i>	1000 mm dia	meter	4746.00
<i>E</i>	1200 mm dia	meter	6295.00
9.5	Providing and laying Reinforced Cement Concrete pipe NP 3 / prestressed concrete pipe. Laying Reinforced cement concrete pipe NP3 /prestressed concrete pipe complying to IS:458, with ends casted as per the requirements of flush jointing of pipes for culverts including joints duely filled and finished with cement mortar 1:2 but excluding bedding below pipes, excavation, protection works, backfilling, concrete and masonry works in head walls and parapets.		
<i>A</i>	450 mm dia	meter	1283.00
<i>B</i>	600 mm dia	meter	1924.00
<i>C</i>	900 mm dia	meter	3749.00
<i>D</i>	1000 mm dia	meter	4482.00
<i>E</i>	1200 mm dia	meter	6133.00
9.6	Providing 1st class bedding below pipes with graded sand or other granular materials passing through 5.6 mm sieve as per clause 2904.	cum	637.00
9.7	Providing and laying of a reinforced cement concrete pipe duct, 300 mm dia complying to IS:458, across the road (new construction), extending from drain to drain in cuts and toe of slopes to toe of slopes in fills, excluding constructing head walls at ends, providing a fill of granular material over top and sides of RCC pipes, bedded on a 0.3 m thick layer of granular material free of rock pieces , outer to outer distance of pipes 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 and approved drawings.		
A)	NP-3 Pipe		
(i)	Single row for one utility service 300 mm dia	Meter	949.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(ii)	Double row for two utility service 300 mm dia	Meter	1816.00
(iii)	Triple row for three utility service 300 mm dia	Meter	2681.00
B)	Add Extra For NP-4 Pipe instead of NP-3 Pipe detailed above		
(i)	Single row for one utility service 300 mm dia	Meter	43.00
(ii)	Double row for two utility service 300 mm dia	Meter	85.00
(iii)	Triple row for three utility service 300 mm dia	Meter	128.00
9.8	Plain cement concrete complete as per drawing and Technical Specifications		
(i)	PCC Grade M 15	cum	3243.00
(ii)	PCC Grade M 20	cum	3617.00
9.9	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 as per clause 2503.	cum	1838.00
9.10	Providing and laying Pitching Stone/Boulder 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 as per clause 2504.	cum	2113.00
9.11	Providing and laying Filter material underneath pitching in slopes complete as per drawing and Technical specification including trimming of slopes to proper profile and preparation of bed and as per clause 2504.	cum	1897.00
9.12	Providing and laying Precast box culvert of required size made of grade RCC M-30 as per typical drawing as approved in SOP as per IRC:122-2017 structural drawing including arrangements for lifting, placing and jointing in box segments, transportation of precast segments of 2m length each to work site over 100mm thick base concrete grade M-15 laid in required slope, placing the box segments in required slope, aligning to line and length, including joining of the box segments to each other with cement mortar 1:1 as instructed by Engineer-in-charge as per drawing.		
(i)	2m x 2m	RM	22176.00
(ii)	3m x 3m	RM	43270.00

CHAPTER- 10

MAINTENANCE OF ROADS

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
10.1	Restoration of Rain Cuts 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.	cum	161.00
10.2	Filling Pot-holes and Patch Repairs with Granular Sub-Base as per Table:- 400-1		
	Filling pot holes with granular sub-base by providing graded Material, carriage of mixed material to work site, spreading by mechanical or mannual means as per size of the patch on prepared surface watering, rolling and compacting with vibratory power roller at OMC to achieve the desired density, complete as per clause 401		
A	By Plant mix Method (with mechanically crushed stone only)		
a)	For lower sub-base with Grading-III Material	cum	1300.00
b)	For sub-base cum drainage layer or upper sub-base layer with Grading-V Material	cum	1301.00
10.3	Filling Pot-holes and Patch Repairs with Wet Mix Macadam (WMM)		
	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, spreading by mechanical or mannual means as per size of the patch on well prepared surface and compacting with vibratory roller to achieve the desired density.as per clause 406	cum	1362.00
10.4	Maintenance of Direction and Place Identification Signs Board of any shape upto 0.9 sqm Size.		
	Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorized sign as per IRC:67 made of retro-reflective type sheeting and vide clause 801.3, fixed over Aluminum Composite Material (ACM) sheeting 4 mm thick (with aluminium skin thickness of 0.4mm on one side & 0.5mm thickness on other side), composed of thermoplastic core of Low Density Polyethylene (LDPE) between two thick skins of aluminium) including application of fluorocarbon coating applied work exposed surface of aluminium to ensure corrosion resistance, with area not exceeding 0.9 sqm and fixing on a existing mild steel back frame, supported on a mild steel single angle iron post, firmly fixed to the ground.		

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
A	Made of Class-C Micro Prismatic Grade Sheeting of Type IX (for National Highways and State Highways)	Each	7248.00
B)	Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV (for MDR)	Each	4811.00
C	Made of Class-A High Intensity Micro Prismatic Grade Sheeting of Type I (for ODR & Village Roads)	Each	3361.00
10.5	Maintenance of Direction and Place Identification Signs Board of any shape for more than 0.9 sqm size Board.		
	Direction and Place Identification signs with size more than 0.9 sqm size board. (Providing and erecting direction and place identification sign as per IRC:67 made of retro-reflective type sheeting and vide clause 801.3, fixed over Aluminum Composite Material (ACM) sheeting 4 mm thick (with aluminium skin thickness of 0.4mm on one side & 0.5mm thickness on other side), composed of thermoplastic core of Low Density Polyethylene (LDPE) between two thick skins of aluminium including application of fluorocarbon coating applied work exposed surface of aluminium to ensure corrosion resistance, with area exceeding 0.9 sqm and fixing on a existing mild steel back frame, supported on a mild steel angle iron posts, firmly fixed to the ground.		
A	Made of Class-C Micro Prismatic Grade Sheeting of Type IX (for National Highways and State Highways)	Each	7271.00
B)	Made of Class-B High Intensity Micro Prismatic Grade Sheeting of Type IV (for MDR)	Each	4850.00
C	Made of Class-A High Intensity Micro Prismatic Grade Sheeting of Type I (for ODR & Village Roads)	Each	3463.00
10.6	Filling Pot-holes and Patch Repairs with Close Graded Premix Surfacing / Mixed Seal Surfacing (Type A with 11.2 to 0.09mm size aggregate) 20mm thick 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 512, compacting with smooth wheeled roller, trimming and finishing the surface to form a smooth continuous surface, all as per clause 3004.2 i/c tack coat.	sqm	147.00
10.7	Crack Filling (Filling of crack using slow - curing bitumen emulsion and applying crusher dust in case crack are wider than 3mm.)	meter	4

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
10.8	Dusting (Applying crusher dust to areas of road where bleeding of excess bitumen has occurred.)	sqm	1.30
10.9	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)	meter	166
10.10	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)	meter	29
10.11	Hill Side Drain Clearance (Removal of earth from the choked hill side drain and disposing it on the valley side manually)	meter	24
10.12	Land Slide Clearance in soil (Clearance of land slides in soil and ordinary rock by a bull-dozer D 80 A-12, 180 HP and disposal of the same on the valley side)	cum	45.00
10.13	Land slide Clearance in Hard Rock Requiring Blasting (Clearing of land slide in hard rock requiring blasting for 50% of the boulders and disposal of the same on the valley side.)	cum	117.00

CHAPTER- 11 HORTICULTURE

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
11.1	Maintenance of Lawns or Turfing of Slopes (Maintenance of lawns or Turfing of slopes (rough grassing) for a period of one year including watering etc)	sqm	127.00
11.2 (a)	Planting Permanent Hedges including Digging of Trenches Planting permanent hedges including digging of trenches, 60 cm wide and 45 cm deep, refilling the excavated earth mixed with farmyard manure, supplied at the rate of 4.65 cum per 100 meters and supplying and planting hedge plants at 30 cm apart.	meter	170.00
(b)	Maintenance of Hedge for one year	meter	138.00
11.3	Planting and Maintaining of Flowering Plants and Shrubs		
(a)	Planting flowering plants and shrubs in central verge i/c digging trenches, filling earth & farm manure.	km	36628.00
(b)	Maintenance of flowering plants and shrubs in central verge for one year	km	123496.00
11.4	Planting of Trees and their Maintenance for one Year (Planting of trees by the road side (Avenue trees) in 0.60 m dia. holes, 1 m. deep dug in the ground, mixing the soil with decayed farm yard/sludge manure, planting the saplings, backfilling the trench, watering, fixing the tree guard and maintaining the plants for one year)	each	787.00
11.5	Half Brick Circular Tree Guard, in 2nd class Brick, internal diameter 1.25 meters, and height 1.2 meters, above ground and 0.20 meter below ground (Half brick circular tree guard, in 2nd class brick, internal diameter 1.25 meters, and height 1.2 meters, above ground and 0.20 meter below ground, bottom two courses laid dry, and top three courses in cement mortar 1:6 (1 cement : 6 sand) and the intermediate courses being in dry honey comb masonry, as per design complete)	each	1354.00
11.6	Edging with 2nd class Bricks, laid dry lengthwise (Edging with 2nd class bricks, laid dry lengthwise, including excavation, refilling, consolidation, with a hand packing and spreading nearly surplus earth within a lead of 50 meters.)	meter	30.00
11.7	Making Tree Guard 53 cm dia and 1.3 m high as per design from empty bitumen drum (Making tree guard 53 cm dia. and 1.3 m high as per design from empty bitumen drum, slit suitably to permit sun and air, (supplied by the department at stock issue rate) including providing and fixing 2 nos. MS sheet rings 50 x 0.5 mm with rivets, complete in all respect)	each	362.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
11.8	Making Tree Guard 53 cm dia and 2 meters high as per design from empty bitumen drums (Making tree guard 53 cm dia and 2 meters high as per design from empty bitumen drums, slit suitably to permit sun and air, (supplied by the department at stock issue rate) including providing and fixing four legs 40 cm long of 30 x 3 mm MS riveted to tree guard and providing and fixing 2 nos. MS sheet rings 50 x 0.5 mm with rivets complete in all respects.)	each	695.00
11.9	Tree Guard with MS Angle Iron and Steel Wire (Providing and fixing tree guard 0.60 meter square, 2.00 meter high fabricated with MS angle iron 30 x 30 x 3 mm, MS iron 25 x 3 mm at 100mm centre to centre and steel wire 3 mm dia. welded and fabricated as per design in two halves bolted together, fixed in ground with P.C.C M-10 of dimensions 150x150x200mm.)	each tree guard	2319.00

CHAPTER- 12
ARBORICULTURE AND ROAD BEAUTIFICATION

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
12.1	Manufacturing, supply & fixing of precast RCC collar of size 50 cm. inner dia. and 50 cm. height, 7.50 cm. thickness with & gauge 4 mm thick MS wire casted with M-20 concrete of approved design, i/c transportation, labour & all material complete.	Each	1054.00
12.2	Manufacturing, supply & fixing of precast RCC jaali for tree guard of size 75 cm. width and 120 cm. height, 5.0 cm. thickness with & gauge 4 mm thick MS wire casted with M-20 concrete of approved design, i/c cost of all material complete.	One RCC jaali tree guard	2406.00
12.3	Fabricating, supply & fixing of MS circular tree guard of 75 cm. dia. and 120 cm. height (above GL), MS tree guard made with 3 no. 25 x 25 x 5 mm MS angle iron 150 cm. long fixed vertically and 3 nos. 20 x 5 mm MS flat fixed circumferentially around MS angle, with support of MS angle and flat 13 gauge MS wire mesh welded in square grid pattern with an opening of 2" x 2". This item includes finished by filling putty and applying primer coat of zinc chromate including cost of all materials & labour complete including fixing in ground with P.C.C M-10 of dimensions 150x150x200mm.)	Each	1986.00
12.4	Providing and fixing of 600 mm dia. clear opening Granite finish U.V. stabilized abrasion resistance top layer composite rein manhole cover with frame reinforcement with high performance glass fibre load designation EHD-40 (40 Ton load capacity) confirming to testing procedure as per IS:1726. Deflection at full load should not be more than 12mm.	Each	16227.00
12.5	Manufacturing, supply & fixing of precast kerb stone of size 400mmx259mmx200mm thick made of M-20 concrete rectangular in shape with one corner chamfered by 100 mm x 100 mm as approved design i/c cost of all material, labour and curing etc. complete.	Each	113.00
12.6	Providing and planting of 3'0" to 4'0" heighted wasingtonia, filipheria/bismarkia novelist plam plants with 1'6" x 1'6" depth pit formation and soil preparation, (Mixing organic manure and plant's protection insecticide). Up to 4 month maintenance.	Each	755.00
12.7	Providing and planting of 4'0" to 5'0" heighted Ficus prestige/Blackiana plants with 1'6" x 1'6" depth pit formation and soil preparation, (Mixing organic manure and plant's protection insecticide). Up to 4 month maintenance.	Each	533.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
12.8	Providing and planting of Bogenbelia dwarf, chandni dwarf, kaner dwarf vr flower bearing plants with 0'9" x 0'9" depth pit formation and soil preparation work's, (Mixing organic manure and plant's protection insecticide). Up to 4 month maintenance.	Each	71.00
12.9	Providing and planting of dwarf red Ekalyha plants showing mass effect view with 0'9" x 0'9"x1'0" depth pit formation and soil preparation work's, (Mixing organic manure and plant's protection insecticide). Up to 4 month maintenance.	Each	58.00
12.10	Providing and planting of plumeria (Champa) 2'0" to 3'0" heightened plants with 1'0" x 1'0"x1'6" depth pit formation and soil preparation work's, (Mixing organic manure and plant's protection insecticide). Up to 4 month maintenance.	Each	307.00
12.11	Providing and planting of Golden durenta multi branches plants for showing mass effect in 0'6" x 0'6" distance with soil preparation work's, (Mixing organic manure and plant's protection insecticide). Up to 4 month maintenance.	Each	147.00
12.12	Providing and planting maxican carpet grass in mount with soil preparation (with organic manure and plants protection insecticide) and escaping works. Up to 4 month maintenance.	Sqm.	36.00
12.13	Human and other sculptures		
	(a) 5 to 7 feet	Each	60563.00
	(b) 2 to 5 feet	Each	24225.00
12.14	Cement art Mural work	Sqm.	2826.00

CHAPTER- 13

SURVEY AND TESTING OF ROAD & TRAFFIC

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
13.1	Deploying Automated Traffic Count and classification (ATCC) system on Road in both direction at designated traffic count post by using High Definition Cameras for 7 days & 7 night (24 hrs x 7 days). Collecting the Non Editable Data In DVR System with necessary electronic and electrical arrangements or inventor of required capacity Classification of data as per vehicle category as required with the help of software and submitting the reports to the concerned department in hard copies as well as in soft copy, including using necessary technical manpower etc. complete. confirming to clause 6.2 of IRC:SP:19-2001 and Guidance may be taken from IRC:9, etc. complete.	each location	94690.00
13.2	Axle load Survey on (upto four lane) using Portable electronic weigh bridges for minimum one day(24hrs) including mobilisation, transportation, report preparation and submission in hard and soft copies etc complete. confirming to clause 6.7 of IRC:SP:19-2001 and Guidance may be taken from IRC:9, etc. complete	each location	60180.00
13.3	Falling weight Deflectometer (FWD) Test (upto four lane) using Portable electronic weigh bridges for minimum one day(24hrs) including mobilization, demobilization, transportation, report preparation and submission in hard and soft copies etc complete. confirming to IRC:115-2014, etc. complete		
a)	for new roads (4 points per lane km)	each point	1615.00
b)	for old roads (8 points per lane km)	each point	1726.00
13.4	To carryout linear Drone survey agencies will usefully autonomous professional survey grade drone and in post process for aerial triangulation required ground control points and benchmarks will be collected by using survey grade dual frequency DGPS-PPK system. After post processing agency will deliver following final output. 1.Geotagged images in JPG format with resolution of 4-5cm/pixel with 70% overlap 2. GCP values in .CSV format. 3. 3D point cloud cover in .las format. 4. digital surface model (DSM) in .tiff format. 5.2D orthorectified images in .tiff format with 5cm resolution which gives capability to capture detailed features. For Linear UAV Survey, etc. complete.	Running kilometer	7225.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
13.5	DGPS Survey (Enumeration of forest area for diversion under FCA-1980 for Road Project and survey of identified land and Compensatory afforestation land for preparation of FCA Proposal of MoEF & CC including Machineries, logistic of team and overall management of work, Mapping on SOI, Revenue, Toposheet, General of KML & shape files, Preparation of land scheduled, preparation of maps on 1:50000 scale, preparation of DGPS report including printing and stationaries etc., Demarcation of Patch boundary with Pillars as per MoEF&CC Norms including excavation, grouting fixing, painting and marking with DGPS cordinales etc. complete.)		
A	For Linear survey		
(i)	For 1 to 10 Hectare Area	Per Hect.	14661.00
(ii)	For 10 to 30 Hectare Area	Per Hect.	13168.00
(iii)	For 30 to 49 Hectare Area	Per Hect.	10550.00
(iv)	For 50 to 70 Hectare Area	Per Hect.	9253.00
(v)	For above 70 Hectare Area	Each	8673.00
B	For each individual location		
(i)	For upto 20 Hecrate Open Land	Per Hect.	5864.00
(ii)	For upto 40 Hecrate Open Land	Per Hect.	3260.00
(iii)	For upto 50 Hecrate Open Land	Per Hect.	4413.00
(iv)	For upto 100 Hecrate Open Land	Per Hect.	3052.00
(v)	For above 100 Hecrate Open Land	Each	2952.00
13.6	Diversion of Forest Land under FCA-1980 of MoEF & CC for road project (preparation of proposal, online registration of proposal, prepartion of 7 copies of 45 points proposal and submission to Nodal Officer Forest Department for approval and recommendation of DFO, CCF & APCCF (Land Management), compliance to State Govt. & FCA Committee Regional Officer of MoEF & CC, compliance of observations while processing of proposal at above mentioned officials department of Central & State Govt. Assistant in deposition of funds and compliance of all quarries upto approval of Stage-I & Stage-II etc. complete)		
(i)	Data collection, preparation of proposal and online registration	Each	220881.00

Item No.	Descriptions	Unit	Rate (Rs.)
1	2	3	4
(ii)	Submission of 7 set proposal file & submission in Forest Department	Each	220881.00
(iii)	Stage-I approval i/c compliances etc. complete	Each	147254.00
(iv)	Stage-II approval i/c compliances etc. complete	Each	147254.00
13.7	Detailed survey of existing road including chaining, levelling, with cross sections at 25 m intervals and closing survey each day's work, fixing of bench marks, painting, taking trialpits and submission of road cross sections, L-sections , quantity statements and details of all cross drainage works in computerised prints in five copies in proper files and all types of compliance required by the Engineer-in -charge.	Per Km.	12325.00
13.8	NSV Survey of Road & preparation of report as per relevant circular of the MoRTH, etc. complete and submission hard copy & successfully uploading of soft copy in portal of the MoRTH.	Per lane Km.	3825.00
13.9	Taking the trial pit for roads , alignment, C.D. Works in earth soil of all sorts, sands gravel or soft murum, including stacking the excavated material including all lifts and necessary back filling.		
A	Upto depth 1.5 meters	Cum	361.00
B	Upto depth 3.0 meters	Cum	390.00
13.10	Fixing survey pegs in earth and all sorts Soil, Sand, Gravel, Soft Murum, etc. including conveying, fixing etc. complete.	Each	09.00
13.11	Providing and Fixing Wooden survey pegs including White washing, etc. complete.	Each	38.00
13.12	Design of junctions including detail layout of traffic signs , informatory boards traffic islands. Breaks in median verge including working levels at junctions as per IRC standards etc. complete.		
A	Major Junction	Each	23941.00
B	Minor Junction	Each	13103.00
13.13	Preparation of initial design of flyovers with preparing General Arrangement drawing with dimensions etc. complete and preparation of rough estimate for all components of bridge. Including supplying four copies of coloured drawings and copy of drawing on C.D. (excluding geotechnical and structural design part.)	RM	653.00

**PUBLIC WORKS DEPARTMENT,
CHHATTISGARH**

ROAD SOR 15-06-2026

**STANDARD
TABLES &
USEFUL DATA**

FIELD LABORATORY EQUIPMENT

121.3 Laboratory equipment

The following items of laboratory equipment shall be provided in the field laboratory

121.3.1 General

(i)	Oven - Electrically operated, thermoplastic ally controlled range upto 200°C sensitivity 1°C	1 No.
(ii)	Platform balance 300 kg capacity	1 No.
(iii)	Electronic 20 kg capacity-self indicating type	1 No.
(iv)	Electronic Balance 5 kg capacity accuracy 0.5 gm	2 Nos.
(v)	Water bath-electrically operated and thermoplastically controlled with adjustable shelves, sensitivity 1°C	1 No.
(vi)	Thermometers : Mercury-in-glass thermometer range 0° to 250°C Mercury-in-steel thermometer with 30 cm stem, range upto 300°C	
(vii)	Kerosene or gas stove or electric hot plate	1 No.
(viii)	Glassware, spatulas, wire gauzes, steel scales, measuring tape, casseroles, karahis, enameled trays of assorted sizes, pestle-mortar, porcelain, dishes, gunny bags, plastic bags, chemical, digging tools like pickaxes, shovels etc.	
(ix)	Set of IS sieves with lid and pan: 450 mm diameter 63 mm, 53 mm, 37.5 mm, 26.5 mm, 13.2 mm, 9.5 mm, 6.7 mm and 4.75 mm size	1 set
	200 mm diameter: 2.36 mm, 2.0 mm, 1.18 mm, 600 micron, 425 micron, 300 micron, 150 micron and 75 micron	2 sets
(x)	Water testing kit	1 set
(xi)	First aid box	1 set

121.3.2 For soils and aggregates

(i)	Riffle Box	1 No.
(ii)	Atterberg Limits (liquid and plastic limits) determination apparatus	1 set
(iii)	Compaction Test Equipment both 2.5 kg and 4.5 kg rammers (Light and Heavy compactive efforts)	1 set
(iv)	dry Bulk Density Test apparatus (sand pouring cylinder, tray, can etc.) complete	1 set
(v)	Speedy Moisture Meter complete with chemicals	1 set
(vi)	Post hole Auger with extensions	1 set
(vii)	Core cutter apparatus 10 cm dia, 10/15 cm height, complete with dolly, rammer etc.	1 set
(viii)	Aggregate Impact Value Test apparatus/LosAngeles Abrasion Test apparatus	1 set
(ix)	Flakiness and Elongation Test Gauges	1 set
(x)	Standard measures of 30, 15 and 3 litres capacity along with standard tamping rod	1 set
(xi)	California Bearing ratio test apparatus	1 set
(xii)	Unconfined compression test apparatus	1 set

121.3.3 For bitumen and bituminous mixes

(i)	Penetrometer with standard needles	1 set
(ii)	Riffle box - small size	1 No.
(iii)	Centrifuge type bitumen extractor, hand operated, complete with petrol/commercial benzene	1 set
(iv)	Marshall stability test apparatus, complete with all accessories	1 set
(v)	Filed density bottle along with cutting tray, chisel, hammer and standard sand	2 Nos.
(vi)	3 m straight edge	1 No.
(vii)	Camber board	1 No.
(viii)	core cutting machine with 10 cm dia diamond cutting edge	1 set
(ix)	Vacuum pump and 3 specific gravity bottles	1 set

121.3.4 For cement and cement concrete

(i)	Vicat apparatus for testing setting times	1 set
(ii)	slump testing apparatus	4 sets
(iii)	Compression and Flexural strength testing machine of 200 tonne capacity with additional dial for flexural testing	1 No.
(iv)	Needle Vibrator	2 Nos.
(v)	Air Meter	1 No.
(vi)	Vibrating hammer for vibrating dry mix as for Dry Lean Cement concrete sub-base	1 No.

STANDARD TABLES
EARTH WORK, EROSION CONTROL AND DRAINAGE

Table 300-1
Density Requirements of Embankment and Sub-Grade Materials.

S.No.	Type of work	Maximum laboratory dry unit weight when tested as per IS:2720 (Part 8)
1	Embankments upto 3 m height, not subjected to extensive flooding.	Not less than 15.2 kN/m ³
2.	Embankments exceeding 3 m height or embankments of any height subject to long periods of inundation	Not less then 16.0 kN/m ³
3.	Sub-grade and earthen shoulders/verges/ backfill	Not less then 17.5 kN/m ³

Note : 1. This table is not applicable for lightweight fill materials, e.g. cinder, fly ash etc.
 2. The material to be used in subgrade shall be non-expansive and shall satisfy design CBR at the specified dry density and moisture content. In case the available materials fail to meet the requirement of CBR, use of stabilization methods in accordance with Clause 403 and 404 or by any stabilization method approved by the Engineer shall be followed.

Table 300-2
Compaction Requirements for Embankment and Sub-grade.

S.No.	Type of work	Relative compaction as percentage of Max. laboratory dry density as per IS:2720 (Part 8)
1	Sub-grade and earthen shoulders.	Not less than 97%
2.	Embankments.	Not less then 95%
3.	Expansion clays. (a) Sub-grade and 500mm portion just below the sub-grade. (b) Remaining portion of embankment	Not allowed Not less than 90 - 95%

The contractor shall, at least 7 working days before commencement of compaction, submit the following to the Engineer for approval.

- i) The values of maximum dry density and optimum moisture content obtained in accordance with IS:2720 (Part 8), appropriate for each of the fill materials he intends to use.
- ii) A graph of dry density plotted against moisture content from which each of the values in (i) above of maximum dry density and optimum moisture content were determined.

EARTH WORK, EROSION CONTROL AND DRAINAGE**Table 300-03****Grading Requirement for Filter Material Percentage Passing by Weight**

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

TABLE 300-4**GRADING REQUIREMENTS FOR AGGREGATE DRAINS**

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

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

TABLE 400-1
Grading for Granular Sub-base Materials

IS Sieve Designation	Percentage by weight passing the IS sieve					
	Grading I	Grading II	Grading III	Grading IV	Grading V	Grading VI
75 mm	100	-	-	-	100	-
53 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

Table VI-I Gradations and Permeability of Granular Subbase for Drainage as per US Practice as per IRC:58-2015 Appendix-VI

Gradation of drainage layer of GSB under Rigid Pavement

Sieve Size, mm	AASHTO57 Cement/Bitumen Treated	California Bitumen Treated	Wisconsin Cement Treated	New Jersey Bitumen Treated	Vignia Cement Treated	AASHTO 93, Page I-19 Grading 4,5 and 6 (Unstablised)		
	1	2	3	4	5	6	7	8
53								
37.5	100							
25.4	95-100	100	100	100	100			
19.5		96-100	90-100	95-100		100	100	100
12.5	25-60	35-65		85-100	25-60	81.5	79.5	75
9.5		20-45	20-55	60-90		72.5	69.5	63
4.75	0-10	0-10	0-10	15-25	0-10	49	43.5	32
2.36	0-5	0-5	0-5	2-10	0-5	29.5	22	5.8
1.18						16	5	0
0.30						0	0	0
0.075	0-2	0-2	0-5	2-5		0	0	0
Permeability Approximately (Average m/perday)	6600 m/day	5000 m/day	3000 m/day	300 m/day	3000 m/day	350 m/day	850 m/day	950 m/day

TABLE 400-2
Physical Requirements for Materials for Granular Sub-base

Aggregate Impact Value (AIV)	IS: 2386 (Part 4) or IS : 5640	40 maximum
Liquid Limit	IS : 2720 (Part 5)	Maximum 25
Plasticity Index	IS : 2720 (Part 5)	Maximum 6
CBR at 98% dry density (at IS : 2720 - Part 8)	IS 2720 (Part 5)	Minimum 30 unless otherwise specified in the Contract

TABLE 400-8
PHYSICAL REQUIREMENTS OF COARSE AGGREGATES FOR
WATER BOUND MACADAM FOR SUB-BASE/BASE COURSED

Test	Test method	Requirements
1. *** Los Angeles Abrasion value Or Aggregate Impact Value	IS : 2386 (Part-4) IS:2386 (Part-4) or IS:5640*	40 per cent (Max) 30 per cent (Max)
2. Combined Flakiness and Elongation Indices (Total) **	IS:2386 (Part-I)	35 per cent (Max)

* Aggregates which get softened in presence of water shall be tested for impact value under wet condition in accordance with IS:5640.

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

*** In case water bound macadam is used for sub-base, the requirements in respect of Los Angeles value and Aggregate Impact value shall be relaxed to 50 % and 40% maximum respectively.

TABLE 400-9
Grading Requirements of Coarse Aggregates

Grading No.	Size Range	IS Sieve Designation	Percent by weight Passing
1)	63 mm to 45 mm	75 mm	100
		63 mm	90 - 100
		53 mm	25 - 75
		45 mm	0 - 15
		22.4 mm	0 - 5
2)	53 mm to 22.4 mm	63 mm	100
		53 mm	95 - 100
		45 mm	65 - 90
		22.4 mm	0 - 10
		11.2 mm	0 - 5

TABLE 400-10
Grading for Screenings

Grading Classification	Size of Screenings	IS Sieve Designation	Percent by weight Passing the Sieve
A	13.2 mm	13.2 mm	100
		11.2 mm	95 - 100
		5.6 mm	15 - 35
		180 micron	0 - 10
B	11.2 mm	11.2 mm	100
		9.5 mm	80 - 100
		5.6 mm	50 - 70
		180 micron	5 - 25

TABLE 400-11
Approximate Quantities of Coarse Aggregates and Screenings Required for 75 mm Compacted Thickness of Water Bound Macadam (WBM) Sub-Base / Base Course for 10 m² Area

Classification	Size Range	Compacted Thickness	Loose Qty.	Screenings			
				Stone Screening		Crushable Type Such as Moorum or Gravel	
				Grading Classification & Size	For WBM Sub-base / Base Course (Loose Quantity)	Grading Classification & Size	Loose Qty.
Grading 1	63 mm to 45 mm	75 mm	0.91 to 1.07 m ³	Type A 13.2 mm	0.12 to 0.15 m ³	Not uniform	0.22 to 0.24 m ³
-do-	-do-	-do-	-do-	Type B 11.2 mm	0.20 to 0.22 m ³	-do-	-do-
Grading 2	53 mm to 22.4 mm	75 mm	-do-	-do-	0.18 to 0.21 m ³	-do-	-do-

TABLE 400-12
Physical Requirements of Coarse Aggregates for Wet Mix Macadam for Sub-base / Base Courses

S. No.	Test	Test Method	Requirements
1)	Los Angeles Abrasion value or Aggregate Impact value	IS : 2386 (Part-4) IS : 2386 (Part-4) or IS : 5640	40 percent (Max.) 30 percent (Max.)
2)	Combined Flakiness and Elongation indices (Total)	IS : 2386 (Part-1)	35 percent (Max.)*

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

TABLE 400-13
Grading Requirements of Aggregates for Wet Mix Macadam

IS Sieve Designation	Percent by weight passing the IS Sieve
53.00 mm	100
45.00 mm	95 - 100
26.50 mm	-
22.40 mm	60 - 80
11.20 mm	40 - 60
4.75 mm	25 - 40
2.36 mm	15 - 30
600.00 micron	8 - 22
75.00 micron	0 - 5

BASE AND SURFACE COURSES (BITUMINOUS)

**TABLE 500-1
SELECTION CRITERIA FOR VISCOSITY - GRADED (VG) PAVING BITUMENS
BASED ON CLIMATIC CONDITIONS**

Lowest Daily Mean Air Temperature, °C	Highest Daily Mean Air Temperature, °C		
	Less than 20 °C	20 to 30 °C	More than 30 °C
More than - 10 °C	VG-10	VG-20	VG-30
-10°C or lower	VG-10	VG-10	VG-20

**TABLE 500-2
MIXING, LAYING AND ROLLING TEMPERATURES FOR BITUMINOUS MIXES
(DEGREE CELCIUS)**

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

* Rolling must be completed before the mat cools to these minimum temperatures.

**TABLE 500-6
PHYSICAL PROPERTIES OF COARSE AGGREGATE**

Property	Test	Requirement	Test Method
Cleanliness	Grain size analysis	Max 5 % passing 75 micron	IS:2386 Part I
Particle Shape	Flakiness and Elongation Indices	Max. 35%	IS:2386 Part I
Strength	Los Angeles Abrasion Value or Aggregate Impact Value	Max. 40%	IS:2386 Part IV
		Max. 30%	IS:2386 Part IV
Durability	Soundness (Sodium or Magnesium)	5 cycles	IS:2386 Part V IS:2386 Part V
	Sodium Sulphate	Max. 12%	
	Magnesium Sulphate	Max. 18%	
Water Absorption	Water Absorption	Max. 2%	IS:2386 Part III
Stripping	Coating and Stripping of Bitumen Aggregate	Min. Retained Coating 95%	IS:6241
Water Sensitivity	Retained tensile Strength*	Min. 80%	AASHTO 283

* If the minimum retained tensile strength falls below 80 percent, use of anti stripping agent is recommended to meet the minimum requirements.

TABLE 500-7
Aggregate Grading and Bitumen Content

Grading	1	2
Nominal maximum aggregate size*	40 mm	19 mm
Layer thickness	80-100 mm	50-75 mm
IS Sieve size (mm)	Cumulative % by weight of total aggregate passing	
45	100	
37.5	90-100	
26.5	75-100	100
19	-	90-100
13.2	35-61	56-88
4.75	13-22	16-36
2.36	4-19	4-19
0.3	2-10	2-10
0.075	0-8	0-8
Bitumen content** percent by mass of total mix	3.3**	3.4**

* Nominal maximum aggregate size is the largest specified sieve size upon which any of the aggregate material is retained.

** Corresponds to specific gravity of the Aggregate being 2.7. In case aggregates have specific gravity more than 2.7, bitumen content can be reduced proportionately. Further, for regions where highest daily mean air temperature is 30⁰C or lower and lowest daily mean air temperature is -10⁰C or lower, the bitumen content may be increased by 0.5 percent.

TABLE 500-8
PHYSICAL REQUIREMENTS FOR COARSE AGGREGATE
FOR DENSE BITUMINOUS MACADAM

Property	Test	Requirement	Method of Test
Cleanliness (dust)	Grain size analysis	Max 5 % passing 75 micron	IS:2386 Part I
Particle Shape	Combined Flakiness and Elongation Indices*	Max. 35%	IS:2386 Part I
Strength	Los Angeles Abrasion Value or Aggregate Impact Value	Max. 35%	IS:2386 Part IV
		Max. 27%	
Durability	Soundness either : Sodium Sulphate or Magnesium Sulphate	Max. 12% Max. 18%	IS:2386 Part V
Water Absorption	Water Absorption	Max. 2%	IS:2386 Part III
Stripping	Coating and Stripping of Bitumen Aggregate Mix	Min. Retained Coating 95%	IS:6241
Water Sensitivity	Retained tensile Strength**	Min. 80%	AASHTO 283

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

** If the minimum retained tensile test strength falls below 80 percent, use of anti stripping agent is recommended to meet the requirement.

TABLE 500-9
Grading Requirements for Mineral Filler.

IS Sieve (mm)	Cumulative percent passing by weight of total aggregate
0.6	100
0.3	95-100
0.075	85-100

TABLE 500-10
Composition of Dense Graded Bituminous Macadam

Grading	1	2
Nominal Aggregate size*	37.5 mm	26.5 mm
Layer Thickness	75 - 100 mm	50-75 mm
IS Sieve (mm)	Cumulative % by weight of total aggregate passing	
45	100	-
37.5	95-100	100
26.5	63-93	90-100
19	-	71-95
13.2	55-75	56-80
9.5	-	-
4.75	38-54	38-54
2.36	28-42	28-42
1.18	-	-
0.6	-	-
0.3	7-21	7-21
0.15	-	-
0.075	2-8	2-8
Bitumen content % by mass Of total mix	Min 4.0**	Min 4.5**

* The nominal maximum particle size is the largest specified sieve size upon which any of the aggregate is retained.

** Corresponds to specific gravity of aggregates being 2.7. In case aggregate have specified gravity more than 2.7, the minimum bitumen content can be reduced proportionately. Further the region where highest daily mean air temperature is 30⁰C or lower and lowest daily air temperature is - 10⁰C or lower, the bitumen content may be increased by 0.5 percent.

TABLE 500-11
Requirements for Dense Graded Bituminous Macadam

Properties	Viscosity Grade Paving Bitumen	Modified bitumen		Test Method
		Hot climate	Cold cimате	
Compaction level	75 blows on each face of the specimen			
Minimum stability (kN at 600C)	9.0	12.0	10.0	AASHTO T245
Marshall flow (mm)	2-4	2.5-4	3.5-5	AASHTO T245
Marshall Quotient Stability Flow	2-5	2.5-5		MS-2 and ASTM D2041
% air voids	3-5			
% Void Filled with Bitumen (VFB)	65-75			
Coating of aggregate particle	95% minimum			IS:6241
Tensile Strength ratio	80% minimum			AASHTO T283
% Voids in Mineral Aggregate (VMA)	Minimum percent voids in mineral aggregate (VMA) are set out in Table 500-13			

TABLE 500-12
Minimum percent Voids in Mineral Aggregate (VMA).

Nominal Maximum Particle size ¹ (mm)	Minimum VMA, percent related to Design Percentage Air Voids		
	3.0	4.0	5.0
26.5	11.0	12.0	13.0
37.5	10.0	11.0	12.0

Note:1. Interpolate minimum voids in the mineral aggregate (VMA) for design percentage air voids values between those listed.

TABLE 500-13
Permissible Variations in the Actual Mix from the Job Mix Formula.

Description	Base/Binder course
Aggregate passing 19mm sieve or larger	± 8%
Aggregate passing 13.2mm, 9.5 mm	± 7%
Aggregate passing 4.75 mm	± 6%
Aggregate passing 2.36mm, 1.18mm, 0.6mm	± 5%
Aggregate passing 0.3mm, 0.15 mm	± 4%
Aggregate passing 0.075 mm	± 2%
Binder content	± 0.3%
Mixing temperature	± 10 °C

TABLE 500-15
(Specifications for Road & Bridge Works IVth Revision)
Composition of Semi-Dense Bituminous Concrete Pavement Layers.

Grading	1	2
Nominal Aggregate size	13 mm	10 mm
Layer Thickness	35- 40 mm	25-30 mm
IS Sieve ¹ (mm)	Cumulative % by weight of total aggregate passing	
45	-	-
37.5	-	-
26.5	-	-
19	100	-
13.2	90-100	100
9.5	70-90	90-100
4.75	35-51	35-51
2.36	24-39	24-39
1.18	15-30	15-30
0.6	-	-
0.3	9-19	9-19
0.15	-	-
0.075	3-8	3-8
Bitumen content % by mass Of total mix ²	Min 4.5	Min 5.00
Bitumen grade	VG-30	VG-30

Note: 1. The combined aggregate grading shall not vary from the low limit on one sieve to the high limit on the adjacent sieve.
2. Determined by the Marshall method.

TABLE 500-16
(Specifications for Road & Bridge Works IVth Revision)
Requirements for Semi-Dense Bituminous Pavement Layers.

Minimum stability kN at 60°C	8.2
Minimum flow (mm)	2
Maximum flow (mm)	4
Compaction level (Number of blows)	75 blows on each of the two faces of the specimen
Percent air voids	3-5
Percent voids in mineral aggregate (VMA)	See Table 500-12
Percent voids filled with bitumen (VFB)	65-78

TABLE 500-16
Physical Requirements for Coarse Aggregate for Bituminous Concrete

Property	Test	Specification	Method of Test
Cleanliness	Grain size analysis	Max 5% passing 0.075 mm sieve	IS:2386 Part I
Particle shape	Combined Flakiness and Elongation Indices	Max 35%	IS:2386 Part I
Strength	Los Angeles Abrasion Value or Aggregate Impact Value	Max 30% Max 24%	IS:2386 Part IV
Durability	Soundness either : Sodium Sulphate or Magnesium Sulphate	Max 12% Max 18%	IS:2386 Part V
Polishing	Polished Stone Value	Min 55	BS : 812 - 114
Water Absorption	Water Absorption	Max 2%	IS:2386 Part III
Stripping	Coating and Stripping of Bitumen Aggregate Mix	Minimum retained coating 95%	IS:6241
Water Sensitivity	Retained Tensile Strength*	Min 80%	AASHTO 283

* If the minimum retained tensile test strength falls below 80 percent, use of anti stripping agent is recommended to meet the requirement.

TABLE 500-17
Composition of Bituminous Concrete Pavement Layers.

Grading	1	2
Nominal Aggregate size*	19 mm	13.2 mm
Layer Thickness	50 mm	30 - 40 mm
IS Sieve (mm)	Cumulative % by weight of total aggregate passing	
45	-	-
37.5	-	-
26.5	100	-
19	90-100	100
13.2	59-79	90-100
9.5	52-72	70-88
4.75	35-55	53-71
2.36	28-44	42-58
1.18	20-34	34-48
0.6	15-27	26-38
0.3	10-20	18-28
0.15	5-13	12-20
0.075	2-8	4-10
Bitumen content % by mass of total mix	Min 5.2**	Min 5.4**

Notes :-

* The nominal maximum particle size is the largest specified sieve size up on which any of the aggregate is retained.

** Corresponds to specific gravity of aggregate being 2.7. In case aggregate have specific gravity more than 2.7, the minimum bitumen content can be reduced proportionately. Further the region where highest daily mean air temperature is 30°C or lower and lowest daily air temperature is - 10°C or lower, the bitumen content may be increased by 0.5 percent.

TABLE 500-18
Permissible Variations in the Plant Mix from the Job Mix Formula.

Description	Base/Binder course
Aggregate passing 19mm sieve or larger	± 7%
Aggregate passing 13.2mm, 9.5 mm	± 6%
Aggregate passing 4.75 mm	± 5%
Aggregate passing 2.36mm, 1.18mm, 0.6mm	± 4%
Aggregate passing 0.3mm, 0.15 mm	± 3%
Aggregate passing 0.075 mm	± 1.5%
Binder content	± 0.3%
Mixing temperature	± 10 °C

TABLE 500-19
Aggregate Gradation

IS Sieve Designation (mm)	Cumulative Percent by Weight of Total Aggregate Passing	
	Type A	Type B
13.2 mm	-	100
11.2 mm	100	88-100
5.6 mm	52-88	31-52
2.8 mm	14-38	5-25
0.090 mm	0-5	0-5

TABLE 500-20
Recommended Nominal Size of Aggregate (mm)

Type of Surface	Traffic Intensity in Terms of Number of Vehicles Per Day in the Lane Under Consideration		
	1000-2000	200-1000	20-200
Very hard	10	6	6
Hard	13	10	6
Normal	13	10	6
Soft	19	13	13
Very Soft		19	13

TABLE 500-21
Grading requirements for Aggregates for Surface Dressing.

IS Sieve Designation (mm)	Cumulative percent by weight of total aggregates passing for the following nominal sizes (mm)			
	19	13	10	6
26.5	100	-	-	-
19.0	85-100	100	-	-
13.0	0-40	85-100	100	-
9.5	0-7	0-40	85-100	100
6.3	-	0-7	0-35	85-100
4.75	-	-	0-10	-
3.35	-	-	-	0-35
2.36	0-2	0-2	0-2	0-10
0.60	-	-	-	0-2
0.075	0-1.5	0-1.5	0-1.5	0-1.5
Minimum 65% By weight of Aggregate	Passing 19 mm retained 13.2mm	Passing 13.2mm retained 9.5mm	Passing 9.5mm retained 6.3mm	Passing 6.3mm retained 3.35mm

TABLE 500-23
Quantities of Materials Required for 10 Sqm. of Road surface for 20mm Thick Open Graded Premix Surfacing Using Bitumen

Materials		Quantity
Aggregates	(a) Nominal Stone size 13.2mm (passing 22.4mm sieve and retained on 11.2mm sieve)	0.18 m ³
	(b) Nominal Stone size 11.2mm (passing 13.2mm sieve and retained on 5.6mm sieve)	0.09 m ³
Total		0.27 m³
Binder	(a) For 0.18m ³ of 13.2mm nominal size stone of 52 kg bitumen per m ³	9.5 kg
	(b) For 0.09 m ³ of 11.2mm nominal size stone of 56 kg bitumen per m ³	5.1 kg
Total		14.6 kg.

TABLE 500-24
Quantities of Materials Required for 10 Sqm. of Road surface for 20mm Thick Open Graded Premix Surfacing Using Cationic Bitumen Emulsion

Aggregates		
(a)	Coarse aggregate nominal 13.2mm size, passing IS 22.4mm sieve and retained on IS 11.2mm sieve.	0.18 m ³
(b)	Coarse aggregate nominal 11.2mm size (passing IS 13.2mm sieve and retained on IS 5.6mm sieve)	0.09 m ³
Binder		20 to 23 kg

TABLE 500-25
Different Types of Slurry Seals

Items	Type I (2-3 mm)	Types II (4-6 mm)	Type III (6-8 mm)**
Application	Filling of hair cracks	Filling of surface cracks 1-3 mm and preventive / renewal treatment (upto 450 CVPD)***	Filling of surface cracks 3-6 mm and preventive / renewal treatment (upto 1500 CVPD)***
Quantity* of slurry (kg/m ²)	4.3 to 6.5	8.4 to 9.8	10.1 to 12
Residual binder (% by weight of dry aggregate)	10 to 16	7.5 to 13.5	6.5 to 12

* In terms by weight of dry aggregate.

** Indicative only.

*** CVPD : Commercial Vehicles per day

TABLE 500-26
Properties of Aggregates for Slurry Seal

Properties	Test Method	Specification
Sand Equivalent Value	IS:2720 (Part 37)	Min 50 percent
Water absorption*	IS:2386 (Part 3)	Max 2 percent
Soundness with - Sodium sulphate Magnesium sulphate	IS:2386 (Part 5)	Max 12 percent Max 18 percent

* In case water absorption exceeds 2% but is less than 4%, same may be permitted subject to conformity of soundness test and wet stripping test.

TABLE 500-27
Size requirements for Coarse Stone Aggregates Slurry Seal

Sieve Size (mm)	Percentage by Mass Passing (Minimum Layer Thickness)		
	Type I (2-3 mm)	Type II (4-6 mm)	Type III (6-8 mm)
9.5	-	-	100
6.3	-	100	90-100
4.75	100	90-100	70-90
2.36	90-100	65-90	45-70
1.18	65-90	45-70	28-50
0.600	40-65	30-50	19-34
0.300	25-42	18-30	12-25
0.150	15-30	10-21	7-18
0.075	10-20	5-15	5-15

BASE AND SURFACE COURSES (BITUMINOUS)

TABLE 500-28
Tolerances for Slurry Seal

Description	Tolerance
Aggregate passing 4.75 mm	± 5%
Aggregate passing 2.36mm, 1.18mm, 0.6mm	± 5%
Aggregate passing 0.3mm	± 4%
Aggregate passing 0.15 mm	±3%
Aggregate passing 0.075 mm	± 2%

TABLE 500-29
Mix Design Criteria for Slurry Seal Mix

Requirement	Specifications	Test Method
Mix Time, minimum	180 seconds	Appendix 1 IRC:SP:81
Consistency, maximum	3 cm	Appendix 3 IRC:SP:81
Wet cohesion, pass % minimum	20 kg. cm	Appendix 4 IRC:SP:81
Wet stripping, Pass %, minimum	90	Appendix 5 IRC:SP:81
Wet Track abrasion loss, (one hour soak) maximum	800 g/m ²	Appendix 6 IRC:SP:81

TABLE 500-30
Indicative Quantity of Ingredients Slurry Seal

Ingredients	Limits (Percent by Weight of Dry Aggregates)
Cationic Bitumen Emulsion	10 to 16 for type I 7.5 to 13.5 for Type II 6.5 to 12 for Type III
Water	6 to 12
Filler	1.0 to 2.0
Additive	0.5 to 2.0

TABLE 500-31
Types of Micro-Surfacing and Rate of Application

Items	Type II (4 to 6mm)**	Type III (6 to 8 mm)**
Application	Preventive and Renewal Treatment for Roads Carrying <1500 CVPD	Preventive and Renewal Treatment for Roads Carrying 1500 to 4500 CVPD
Quantity of mix* (kg/m ²)	8.4 to 10.8	11.1 to 16.3
Residual binder (percentage by weight of dry aggregate)	6.5 to 10.5	5.5 to 10.5

* By weight of dry aggregate ** Indicative only.

TABLE 500-32
Requirement of Modified Bitumen Emulsion for Micro-Surfacing

Requirements	Specifications	Method of test
Residue on 600 micron IS sieve (percent by mass), maximum	0.05	IS:8887
Viscosity by Say bolt Furol Viscometer, at 25°C, in second	20-100	IS:8887
Coagulation of emulsion at low temperature	Nil	IS:8887
Storage stability after 24 h (168 h), % maximum	2(4)	IS:8887
Particle charge, + ve/ -ve	+ ve	IS:8887
Test on residue:		
a) Residue by evaporation, % minimum	60	IS:8887
b) Penetration at 25°C/100 g/5 s	40-100	IS:1203
c) Ductility at 27°C, cm, minimum	50	IS:1208
d) Softening point, in °C, minimum	57	IS:1205
e) Elastic recovery*, %, minimum	50	IS:15462
f) Solubility in tri-chloreothylene, % minimum	97	IS:1216

* In case, elastic recovery is tested for Torsional Elasticity Recovery as per Appendix-8 of IRC:81, the minimum value shall be 20 percent.

TABLE 500-33
Mix Design Criteria for Micro-Surfacing Mix

Requirements	Specifications	Method of test as given in IRC:SP:81
Mix time, minimum	120 s	Appendix-1
Consistency, maximum	3 cm	Appendix-3
Wet Cohesion, within 30 min, minimum	12 kg cm	Appendix-4
Wet Cohesion, within 60 min, minimum	20 kg cm	Appendix-4
Wet stripping, pass %, minimum	90	Appendix-5
Wet track abrasion loss (one hour soak), maximum	538 g/m ²	Appendix-6

TABLE 500-39
Requirements for Physical Properties of Binder for Mastic Asphalt

Property	Test Method	Requirements
Penetration at 25°C	IS:1203	15 $\pm$ 5*
Softening point, °C	IS:1205	65 $\pm$ 10
Loss on heating for 5h at 163°C, % by mass Max.	IS:1212	2.0
Solubility in trichloroethylene, % by mass Min.	IS:1216	95
Ash (mineral matter), % by mass Max.	IS:1217	1.0

* In cold climate regions (temperature < 10°C) VG-40 Grade Bitumen may be used.

TABLE 500-40
Grade and Thickness of Mastic Asphalt Paving and Grading of Coarse Aggregate.

Application	Thickness Range (mm)	Nominal size of coarse aggregate (mm)	Coarse aggregate content, % by mass of total mix
Roads and bridge decks	25-50	13	40 $\pm$ 10
Heavily stressed areas i.e. junctions and toll plazas	40-50	13	45 $\pm$ 10
Nominal size of coarse aggregate	13 mm		
IS Sieve (mm)	Cumulative % passing by weight		
19	100		
13.2	88-96		
2.36	0-5		

TABLE 500-41
Grading of Fine Aggregate (Inclusive of Filler) for Mastic Asphalt

IS Sieve	Percentage by weight of aggregate
Passing 2.36 mm but retained on 0.600 mm	0-25
Passing 0.600 mm but retained on 0.212 mm	10-30
Passing 0.212 mm but retained on 0.075 mm	10-30
Passing 0.075 mm	30-55

TABLE 500-42
Composition of Mastic Asphalt Blocks without Coarse Aggregate

IS Sieve	Percentage by Weight of Mastic Asphalt	
	Minimum	Maximum
Passing 2.36 mm but retained on 0.600 mm	0	22
Passing 0.600 mm but retained on 0.212 mm	4	30
Passing 0.212 mm but retained on 0.075 mm	8	18
Passing 0.075 mm	25	45
Bitumen Content % by mass	14	17

TABLE 500-43
Quantity of Materials Required for 10 sq.m of Road Surface for Stress Absorbing Membrane

S. No.	Type and Width of Crack	Specification of SAM to be Applied	Quantity of Binder Kg/10m ²	Quantity of Chipping
1)	Hair cracks and map cracks upto 3 mm width	Single coat SAM or 2 nd coat of two coat SAM	8-10	0.10 m ³ of 5.6 mm chips
2)	Map cracks or alligator cracks 3 mm to 6 mm width	single coat SAM	10-12	0.11 m ³ of 5.6 mm chips
3)	Map cracks or alligator cracks 6 mm to 9 mm width	Two coat SAM 1 st coat 2 nd coat	12-14 8-10	0.12m ³ of 5.6 mm and 11.2 mm chips in 1:1 ratio 0.10 m ³ of 5.6mm chips
4)	Cracks above 9 mm width and cracked area above 50 percent	Two coat SAM 1 st coat 2 nd coat	14-16 8-10	0.12m ³ of 11.2 mm 0.10 m ³ of 5.6mm chips
5)	All types of cracks with crack width below 6 mm	single coat SAM I	8-10	0.10 m ³ of 5.6mm chips
6)	All types of cracks with crack width above 6 mm	Single Coat SAM I	10-12	0.10 m ³ of 11.2mm chips

TABLE 500-49
Size Requirement for Coarse Stone Aggregates as per Nominal Size

S. No.	Nominal Size of Aggregate	Designation of Sieve Through which the Aggregates shall Wholly Pass	Designation of Sieve on which the Aggregates shall Wholly Retained
1)	75 mm	106 mm	63 mm
2)	63 mm	90 mm	53 mm
3)	45 mm	53 mm	26.5 mm
4)	26.5 mm	45 mm	22.4 mm
5)	22.4 mm	26.5 mm	13.2 mm
6)	13.2 mm	22.4 mm	11.2 mm
7)	11.2 mm	13.2 mm	6.7 mm
8)	6.7 mm	11.2 mm	2.8 mm

TABLE 500-50
Percent Reduction in Volume of Aggregates (As per Clause-520)

S. No.	Standard of Aggregates	Percentage Reduction in Volume Computed by Stack Measurements to Arrive at the Volume to be Paid for
1)	75 mm and 63 mm	12.5
2)	45 mm and 26.5 mm	10.0
3)	22.4mm, 13.2 mm, 11.2 mm and 6.7mm	5.0
4)	Fine aggregate	5.0

QUALITY CONTROL FOR ROAD WORKS
TABLE 900-1
Tolerances in Surface Levels.

1.	Sub-Grade	$\pm 20\text{mm}$
2.	Sub-base a) Flexible pavement b) Concrete Pavement	$\pm 10\text{mm}$ $\pm 6\text{mm}$
3.	Base Course for flexible pavement. a) Bituminous Base/ Binder Course b) Granular i) Machine laid ii) Manually laid.	$\pm 6\text{mm}$ $\pm 10\text{mm}$ $\pm 15\text{mm}$
4.	Wearing course for flexible pavement. i) Machine laid ii) Manually laid.	$\pm 6\text{mm}$ $\pm 10\text{mm}$
5.	Cement Concrete pavement	$\pm 5\text{mm}$

TABLE 900-2
Maximum Permitted number of Surface Irregularities.

	Surface of carriageways and paved shoulders				Surface of Laybys, Service Areas and all Bituminous Base Course			
Irregularity	4mm		7 mm		4 mm		7mm	
Length (m)	300	75	300	75	300	75	300	75
Number of Surface Irregularities on National Highways/ Expressway*	15	9	2	1	40	18	4	2
Number of Surface Irregularities on Road of Lower category*	40	18	4	2	60	27	6	3

* Category of each section of road as described in the contract.

The maximum allowable difference between the road surface and underside of a 3m straight edge when placed parallel with, or at right angles to the center line of the road at points decided by the Engineer shall be :

(i)	For Pavement surface (bituminous and cement concrete)	3mm
(ii)	For Bituminous base courses.	6mm
(iii)	For Granular sub-base/base courses.	8mm
(iv)	For Sub-base under concrete pavements	10mm
(v)	For subgrade	15mm

TABLE 900-3
Control Tests and their Minimum Frequency for Sub-Bases and Bases
(Excluding Bitumen Bound Bases)

S. No.	Type of Construction	Test	Frequency (Min.)
1.	Granular	(i) Gradation (ii) Atterberg Limits (iii) Moisture content prior to compaction. (iv) Density of compacted layer (v) Deleterious constituents (vi) CBR	One test per 400 m ³ One test per 400 m ³ One test per 400 m ³ One test per 1000 m ³ As required As required
2.	Lime/Cement Stabilised Soil Sub- base	(i) Quality of Lime/Cement (ii) Lime/Cement Content (iii) Degree of pulverization (iv) CBR or unconfined compressive strength test on a set of three specimens. (v) Moisture content prior to compaction (vi) Density of compacted layer (vii) Deleterious constituents	One test for each consignment subject to a minimum of one test per 5 tonnes. Regularly through procedural checks. Periodically as considered necessary As required One set of two tests per 500 m ² One set of two tests per 500 m ² As required
3.	Water Bound Macadam	(i) Aggregate impact value (ii) Grading of aggregate (iii) Combined Flakiness and Elongation indices. (iv) Atterberg limits of binding material (v) Atterberg limits of screenings	One test Per 1000 m ³ of aggregate One test per 250 m ³ One test per 500 m ³ of aggregate One test per 50 m ³ of binding material. One test per 100 m ³ of aggregate
4.	Wet Mix Macadam	(i) Aggregate impact value (ii) Grading of aggregate (iii) Combined Flakiness and Elongation indices (iv) Atterberg limits of portion of aggregate passing 425 micron sieve. (v) Density of compacted layer	One test per 1000 m ³ of aggregate One test per 200 m ³ of aggregate One test per 500 m ³ of aggregate One test per 200 m ³ of aggregate One set of three test per 1000 m ²

TABLE 900-4
Control Tests for Bituminous Works and their Minimum Frequency

S. No.	Type of Construction	Test	Frequency (Min.)
1.	Primer Coat/ Tack Coat/Fog spray	(i) Quality of binder (ii) Binder temperature for application (iii) Rate of spread of binder	No. of samples per lot and tests as per IS:73, IS:217 and IS:8887 as applicable At regular close intervals Three tests per day
2.	Seal coat/ Surface dressing	(i) Quality of binder (ii) Aggregate Impact value/ Los Angles Abrasion Value (iii) Combined Flakiness and Elongation indices (iv) Stripping value of aggregates (Immersion Tray Test) (v) Water absorption of aggregate (vi) Water sensitivity of mix (vii) Grading of aggregates (viii) Soundness (Magnesium and Sodium Sulphate) (ix) Polished stone value (not applicable for SAM/ SAMI) (x) Temperature of binder in boiler, aggregate in dryer and mix at the time of laying and compaction (xi) Rate of spread of materials (xii) Percentage of fractured faces	Same as mentioned under Serial No.1 One test per 200 m ³ of each source and whenever there is change in the quality of aggregate One test per 100 m ³ of aggregate for each source and whenever there is change in the quality of aggregate One test of each source and whenever there is change in the quality of aggregate -do- -do- Two tests per day One test for each source and whenever there is change in the quality of aggregate -do- At regular intervals Same as mentioned under Serial No.1 One test per 100 cu.m of aggregate.

TABLE 900-4
Control Tests for Bituminous Works and their Minimum Frequency.

S. No.	Type of Construction	Test	Frequency (Min.)
3.	Open-graded Premix Surfacing/ Close-graded Premix Surfacing	(i) Quality of binder (ii) Aggregate Impact Value/ Los Angeles Abrasion Value (iii) Combined Flakiness and Elongation indices (iv) Stripping Value (v) Water absorption of aggregates (vi) Water sensitivity of mix (vii) Grading of aggregates (viii) Soundness (Magnesium and Sodium Sulphate) (ix) Polished stone value (x) Temperature of binder at application (xi) Binder content (xii) Percentage of fractured faces	Same as mentioned under Serial No.1 Same as mentioned under Serial No.2 Same as mentioned under Serial No.2 Same as mentioned under Serial No.2 Same as mentioned under Serial No.2 Same as mentioned under Serial No.2 Same as mentioned under Serial No.2 Same as mentioned under Serial No.2 Same as mentioned under Serial No.2 At regular intervals Two tests per day per plant Same as mentioned under Serial No.2

4.	Bituminous Macadam	(i)	Quality of binder	Same as mentioned under Serial No.1
		(ii)	Aggregate Impact Value/ Los Angeles Abrasion Value	Same as mentioned under Serial No.2
		(iii)	Combined Flakiness and Elongation indices	One test per 350 cu.m for each source
		(iv)	Stripping Value	Same as mentioned under Serial No.2
		(v)	Water sensitivity of mix	Same as mentioned under Serial No.2
		(vi)	Grading of aggregates	Same as mentioned under Serial No.2
		(vii)	Water absorption of aggregates	Same as mentioned under Serial No.2
		(viii)	Soundness (Magnesium and Sodium Sulphate)	Same as mentioned under Serial No.2
		(ix)	Percentage of fractured faces	Same as mentioned under Serial No.2
		(x)	Binder content	Same as mentioned under Serial No.3
		(xi)	Control of temperature of binder and aggregate for mix and of the mix at the time of laying and rolling.	Same as mentioned under Serial No.2
		(xii)	Density of Comp layer	One test per 700 sq. m area
		(xiii)	Rate of spread of mixed material	At regular intervals

TABLE 900-4
Control Tests for Bituminous Works, and their Minimum Frequency.

S. No.	Type of Construction	Test	Frequency (Min.)
5.	Dense Bituminous Macadam Bituminous Concrete	(i) Quality of binder	Number of samples per lot and tests as per IS:73 or IRC:SP:53, IS:15362
		(ii) Aggregate Impact Value/ Los Angeles Abrasion Value	One test per 350 m ³ of aggregate for each source and whenever there is change in the quality of aggregate
		(iii) Flakiness and Elongation Indices	One test per 350 m ³ of aggregate for each source and whenever there is change in the quality of aggregate
		(iv) Soundness (Magnesium and Sodium Sulphate test)	One test for each source and whenever there is change in the quality of aggregate
		(v) Water absorption of aggregates	One test for each source and whenever there is change in the quality of aggregate
		(vi) Sand equivalent test	One test for each source and whenever there is change in the

		(vii) Plasticity Index (viii) Polished stone value (ix) Percentage of fractured faces (x) Mix grading (xi) Stability and voids analysis of mix including theoretical maximum specific of loose mix (xii) Moisture Susceptibility of mix (AASHTO T283) (xiii) Temperature of binder in boiler, aggregate in dryer and mix at the time of laying and compaction (xiv) Binder Content (xv) Rate of spread of mixed material (xvi) Density of compacted layer	quality of aggregate One test for each source and whenever there is change in the quality of aggregate One test for each source and whenever there is change in the quality of aggregate One test per 350 cu.m of aggregate when crushed gravel is used One set for individual constituent and mixed aggregate from dryer for each 400 tonnes of mix subject to minimum of two tests per day per plant. Three tests for stability, flow value, density and void contents for each 400 tonnes of mix subject to minimum of two tests per day per plant One test for each mix type whenever there is change in the quality or source of coarse or fine aggregate At regular intervals One set for each 400 tonnes of mix subject to minimum of two sets per day per plant After every 5th truck load One test per 700 sq.m area
Note:- For Semi Dense Bituminous Concrete Tests & Frequencies mentioned in Specifications for Road & Bridge Works IVth Revision shall be followed.			

TABLE 900-4
Control Tests for Bituminous Works, and their Minimum Frequency.

S. No.	Type of Construction	Test	Frequency (Min.)
6.	Slurry seal and Micro surfacing	(i) Quality of Aggregate Sand Equivalent Value ,Water Absorption, Soundness Test (Sodium/ Magnesium Sulphate Test) (ii) Quality of Emulsion (iii) Aggregate Moisture (iv) Aggregate Gradation (v) Binder Content (vi) Calibration of Machine (vii) Quantity of Slurry (By weight of aggregate)	One per source / site One per lot of 20 t as per IS:8887 Two per day Two per day at site Two per lane per Km Once per Project Daily (Travel time of Machine)
7.	Mastic asphalt	(i) Quality of binder (ii) Aggregate Impact Value and Los Angeles Abrasion Value (iii) Combined Flakiness and Elongation Indices (iv) Stripping value (v) Water sensitivity of mix (vi) Grading of aggregates (vii) Water absorption of aggregates (viii) Soundness (Magnesium and Sodium Sulphate) (ix) Percentage of fractured faces (x) Binder content and aggregates grading (xi) Control of temperature of binder in boiler, aggregate in the dryer and mix at the time of laying and rolling (xii) Rate of spread of mixed material (xiii) Hardness number	Same as mentioned under Serial No.5 Same as mentioned under Serial No.5 Same as mentioned under Serial No.5 Same as mentioned under Serial No.2 Same as mentioned under Serial No.5 Two tests per day per plant on the individual constituent and mixed aggregates from the dryer Same as mentioned under Serial No.5 Same as mentioned under Serial No.5 Same as mentioned under Serial No.5 Same as mentioned under Serial No.3 At regular close intervals Regular control through check of layer thickness. Minimum two tests per day
8.	Constrol Tests for Geotextiles		The requirements of Section 700 shall apply

MATERIALS FOR STRUCTURE

TABLE 1000-1
GRADING REQUIREMENTS OF COARSE AGGREGATE

IS Sieve Size	Percentage Passing for Graded Aggregate of Nominal Size		
	40 mm	20 mm	12.5 mm
63 mm	-	-	-
40 mm	95-100	100	-
20 mm	30 -70	95-100	100
12.5 mm	-	-	90-100
10 mm	10-35	25-55	40-85
4.75 mm	0-5	0-10	0-10

TABLE 1000-2
GRADING REQUIREMENTS OF FINE AGGREGATE

IS Sieve Size	Percent Passing for		
	Grading Zone I	Grading Zone II	Grading Zone III
10 mm	100	100	100
4.75 mm	90 - 100	90 - 100	90 - 100
2.36 mm	60 - 95	75 - 100	85 - 100
1.18 mm	30 - 70	55 - 90	75 - 100
600 micron	15 - 34	35 - 59	60 - 79
300 micron	5 - 20	8 - 30	12 - 40
150 micron	0 - 10	0 - 10	0 - 10

TABLE 1000-3
Grades of Reinforcing Bars

Grade Designation	Bar Type Conforming to Governing IS Specifications	IS Characteristic Strength fy MPa	Elastic Modulus GP
Fe240	IS:432 Part I Mild Steel	240	200
Fe 415	IS:1786 High Strength Deformed Steel Bars (HSD)	415	200
Fe 500 or Fe 500D	IS:1786 High Strength Deformed Steel Bars (HSD)	500	200
Fe 550 or Fe 550D	IS:1786 High Strength Deformed Steel Bars (HSD)	550	200
Fe 600	IS:1786 High Strength Deformed Steel Bars (HSD)	600	200

Note :- If any grade of steel given in the above table is not available steel of next higher grade may be used.

1010 WATER

Water used for mixing and curing shall be clean and free from oils, acids, alkalis, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel.

pH value of water shall not be less than 6. Potable water is generally considered satisfactory for mixing concrete.

As a guide, the following concentrations represent the maximum permissible values:

- (a) To neutralize 200 ml sample of water, using phenolphthalein as an indicator, it should not require more than 2 ml of 0.1 normal NaOH. For details of test refer IS:3025 (Part 22)
- (b) To neutralize 100 ml sample of water, using mixed indicator, it should not require more than 25 ml of 0.02 normal H_2SO_4 . For details of test refer IS : 3025 (Part 23)
- (c) The permissible limits for solids shall be as follows

	Tested as per	Permissible Limit max
Organic	IS:3025 (Pt. 18)	200 mg/lit
Inorganic	IS:3025 (Pt. 18)	3000 mg/lit
Sulphates (SO_3)	IS:3025 (Pt. 28)	400 mg/lit
Chlorides (Cl)	IS:3025 (Pt. 32)	2000 mg/lit for concrete work not containing embedded steel and 500 mg/lit for prestressed/reinforced concrete work
Suspended matter	IS:3025 (Pt. 17)	2000 mg/lit

All samples of water (including potable water) shall be tested and suitable measures taken, where necessary, to ensure conformity of the water to the requirements stated herein.

1012. CONCRETE ADMIXTURES

1012.3.1. Information Required from the Manufacturer

- a) Normal dosage and detrimental effects, if any, on under dosage and over dosage.
- b) The chemical names of the main ingredients.
- c) The chloride content, if any, expressed as a percentage by the weight of the admixture.
- d) Values of dry material content, ash content and relative density which can be used for Uniformity Tests.
- e) Whether it leads to the entrainment of air when used as per the manufacturer's recommended dosage, and if so to what extent.
- f) Confirmation regarding its compatibility with type of cement.
- g) Whether it increases the risk of corrosion of reinforcement or other embedments.
- h) Whether it affects the durability of concrete adversely.

1012.3.2. Physical and Chemical Requirements

- (a) " Plasticizers " and "Super-Plasticizers" shall meet the requirements indicated for " Water reducing Admixture"
- (b) Except where resistance to freezing and thawing and to disruptive action of deicing salts is required, the air content of freshly mixed concrete in accordance with the pressure method given in IS:1199 shall not be more than 2 per cent higher than that of the corresponding control mix and in any case not more than 3 per cent of the test mix.
- (c) The chloride content of the admixture shall not exceed 0.2 per cent when tested in accordance with IS:6925. In addition, the maximum permissible limit of chloride content of all the constituents as indicated in Section 1700 of these Specifications shall also not be exceeded.
- (d) Uniformity tests on the admixtures are essential to compare qualitatively the composition of different samples taken from batch to batch or from the same batch at different times.

The tests that shall be performed along with: permissible variations are as follows:

- i) Dry Material Content : within 3 percent and 5 percent of liquid and solid
- ii) Ash content : within 1 percent of the value stated by the manufacturer.
- iii) Relative Density (for liquid admixtures) : within 2 percent of the value stated by the manufacturer .
- (e) All tests relating to the concretes admixtures shall be conducted periodically at and independent laboratory and compared with the data given by the manufacturer.

1508. REMOVAL OF FORMWORK

The scheme for removal of form work (i.e. de-shuttering and decentering) shall be planned in advance and furnished to the Engineer for scrutiny and approval. No formwork or any part thereof shall be removed without prior approval of the Engineer.

The Formwork shall be so removed as not to cause any damage to concrete. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually to avoid any shock or vibration.

Form work shall not be released unless the concrete has achieved strength of at least twice the stress the concrete may be subjected at the time of the removal of formwork. When no test is conducted for determination of strength of concrete and where the time of removal of formwork is not specified, the same shall be as under :

a)	Walls, piers, abutments, columns and vertical faces of structural members	12 to 48 hours as may be decided by the Engineer
b)	Soffits of Slabs (with props left under)	3 days
c)	Props (left under slabs)	14 days
d)	Soffit of Girders (with props left under)	7 days
e)	Props (left under girders)	21 days

The above time schedule is applicable when ordinary Portland Cement is used without any admixtures at an ambient temperature exceeding 10°C.

Where there are re-entrant angles in the concrete sections, the formwork should be removed at these sections as soon as possible after the concrete has set, in order to avoid cracking due to shrinkage of concrete.

STRUCTURAL CONCRETE**TABLE 1700 - 1
Grades of Concrete**

Type of Concrete / Grade Designation			Characteristic Strength in MPa
Nominal Mix Concrete	Standard Concrete	High Performance Concrete	
M15	M15		15
M20	M20		20
	M25		25
	M30	M30	30
	M40	M35	35
	M45	M40	40
	M50	M45	45
		M50	50
		M55	55
		M60	60
		M65	65
		M70	70
		M75	75
		M80	80
		M85	85
		M90	90

**TABLE 1700-2 :
Requirement of Concrete for Different Exposure Condition using 20 mm Aggregate**

Exposure Condition	Maximum Water Cement Ratio	Minimum Cement Content , kg/m³	Minimum Grade of Concrete
Moderate	0.45	340	M25
Severe	0.45	360	M30
Very Severe	0.40	380	M40

Note :-

- All three provisions given in the above table for a particular exposure condition, shall be satisfied.
- The term cement for maximum w/c ratio and minimum cement content shown in Table includes all cementitious materials mentioned in Clause 1715.2. The maximum limit of flyash and ground granulated blast furnace slag in the blended cement shall be as specified in IS:1489 (Part 1) and IS:455 respectively.
- For plain cement concrete, with or without surface reinforcement, the minimum grade of concrete can be lowered by 5 MPa and maximum water/cement ratio exceeded by 0.05.

Cement content shown in the above table shall be increased by 40 kg/m³ for use of 12.50 mm nominal size aggregates and decreased by 30 kg/m³ for use of 40 mm nominal size aggregates.

TABLE 1700-4.
Requirements of Consistency

type	Slump(mm)
1 (a) Structures with exposed inclined surface requiring low slump concrete to allow proper compaction	25
(b) Plain cement concrete	25
2. RCC structures with widely spaced reinforcements; e.g. solid columns, piers, abutments, footings, well steining	40 - 50
3. RCC structures with fair degree of congestion of reinforcement; e.g. pier and abutment caps, box culverts, well curb, well cap, walls with thickness greater than 300 mm	50 - 75
4. RCC and PSC structures with highly congested reinforcements e.g. deck slab girders, box girders, walls with thickness less than 300 mm	75 - 125
5. Underwater concreting through tremie e.g. bottom plug, cast-in-situ piling	150 - 200

TABLE 1700-2
Requirements of Concrete for Different Exposure Condition using 20 mm Aggregate

Exposure Condition	Maximum Water Cement Ratio	Minimum Cement Content, kg/m³	Minimum Grade of Concrete
Moderate	0.45	340	M25
Sever	0.45	360	M30
Very Severe	0.40	380	M40

TABLE 1700-5
Current Margin for Initial Design Mix

Concrete Grade	Current Margin (MPa)	Target Mean Strength (Mpa)
M 15	10	25
M 20	10	30
M 25	11	36
M 30	12	42
M 35	12	47
M 40	12	52
M 45	13	58
M 50	13	63
M 55	14	69
M 60	14	74
M 65	15	80
M 70	15	85
M 75	15	90
M 80	15	95
M 85	16	101
M 90	16	106

TABLE 1700-6
Requirements for Nominal Mix Concrete

Concrete Grade	Total Quantity of Dry Aggregate by Mass per 50 kg of Cement to be taken as the Sum of Individual Masses of Fine and Coarse Aggregate (kg)	Proportion of Fine to Coarse Aggregate (by Mass)	Maximum Quantity of Water for 50 kg of Cement (Litres)	
			PCC	RCC
M 15	350	Generally 1:3, subject to upper limit 1:1.5 and lower limit of 1:2.5	25	
M 20	250		25	22

TABLE 1700 - 9
MINIMUM FREQUENCY OF SAMPLING

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

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

USEFUL DATA**1. Areas & Weights of Steel****a) Mild Steel Round Bars**

Dia in mm	Area Sq. cm.	Weight Kg/M	Perimeter Cms.
6	0.283	0.222	1.887
8	0.503	0.395	2.514
10	0.785	0.617	3.143
12	1.131	0.888	3.771
16	2.011	1.578	5.028
18	2.545	2.000	5.657
20	3.142	2.466	6.286
22	3.801	2.984	6.914
25	4.909	3.853	7.857
28	6.157	4.830	8.800
32	8.042	6.313	10.057
40	12.566	9.684	12.571

b) High Tensile Steel

Dia in mm	Area Sq. cm.	Weight Kg/M	Perimeter Cms.
3	0.070	0.056	0.943
5	0.196	0.154	1.571
7	0.385	0.302	2.200
8	0.503	0.395	2.514

c) H.T. Cables each containing 12 wires

Dia of wire in mm	Total area of H.T. Sq. Cm.	Weight Kg/M
3	2.352	1.848
5	4.620	3.624
8	6.036	4.740

d) Structural steel (Sections which are normally required in bridge works)

Types Section	Size in M.M.	Weight Kg./M.
Angle	40 x 40 x 6	3.500
	50 x 50 x 6	4.500
	75 x 75 x 6	6.800
	75 x 75 x 10	11.000
	100 x 100 x 6	11.000
	100 x 100 x 10	14.900
	130 x 130 x 10	19.700
Tee	130 x 130 x 12	23.400
	100 x 100 x 10	15.00
Channel	75 x 40 x 6	5.700

e) Structural Flats (Sections which are normally required in bridge works)

Thickness of Plate	Weights Kg./M.
1 M.M.	0.00078
2 M.M.	0.00156
3 M.M.	0.00235
6 M.M.	0.00470
10 M.M.	0.00783
12 M.M.	0.00940
20 M.M.	0.01566
25 M.M.	0.01957

2. **Weight of Materials for construction (as per IS:875 (Part I) 1987)**

S.No.	Material	Unit Metric	Weights in Kg.
1.	Cement	Cum.	1440
2.	Steel		
	a) Mild Steel	Cu.Cm.	0.0078
	b) Cast Steel	Cu.Cm.	0.0078
	c) H.T. Steel	Cu.Cm.	0.0078
3.	Stainless Steel	Cu.Cm.	0.0078
4.	Lead	Cu.Cm.	0.0113
5.	Copper	Cu.Cm.	8.79 to 8.94
6.	Plain Cement Concrete	Cum.	1600 to 2400
7.	PSC	Cum.	2400
8.	RCC	Cum.	2310 to 2700
9.	Stones		
	a) Lime	Cum.	2400 to 2640
	b) Sand	Cum.	2240 to 2400
10.	Stone Masonry Rubble	Cum.	2100
11.	Bricks	Cum.	1600 to 1920
12.	Brick Masonry	Cum.	1920 to 2240
13.	Timber	Cum.	650 to 720

3. **Conversion Factors.**

Top Convert	Into	Multiply by	
Inch	Millimeter	25.40	0.039
Inch	Centimeter	2.540	0.3937
Foot	Meter	0.3048	3.2808
Mile	Kilometer	1.609	0.621
Square Inch	Sq. Centimeter	6.4516	0.155
Square Foot	Square Meter	0.0929	10.764
Acre	Hectare	0.4047	2.471
Sq.Mile	Sq. Kilometer	2.590	0.386
Cubic Inch	Cu. Centimeter	16.387	0.0161
Cubic Foot	Cubic Meter	0.0283	35.3147
Gallon (Imp.)	Litre	4.546	0.220
Pound	Kilogram	0.4536	2.2046
Ton	Tonne	1.0160	0.9842
Lbs. Per Sq. Inch	Kg. Per Sq. Cm.	0.0703	14.223
Ton Per Sq. Foot	Tonne Per Sq. M.	10.937	0.0914
To obtain	From		Multiply by

MAINTENANCE OF BITUMINOUS SURFACING

The type of defects in bituminous surfacing are grouped under four categories.

- a) Surface defects which include fatty surfaces smooth surfaces, streaking and hungry/dry surfaces.
- b) Cracks which cover hairline cracks, alligator cracks, longitudinal cracks, edge cracks, shrinkage cracks and reflection cracks.
- c) Deformation defects, which comprise of slippage rutting, corrugation, shoving, shallow depressions and settlements.
- d) A disintegration defect, which consists of stripping, loss of aggregates, releveling, pot-holes and edge breaking.

The general cause and remedies for these defects are given as below :

a) Surface Defects

Natural Defect	Cause	Remedy
<i>Fatty surfaces</i>	<i>Excess bitumen, soft grad of bitumen, non-uniform spraying and loss of cover aggregates as in surface dressing, heavy axle loads.</i>	<i>Apply hot dry cover aggregates or sand and roll gently for removal of excess binder; burn it, if necessary or relay area affected.</i>
<i>Smooth surfaces</i>	<i>Polishing of aggregates by traffic, excess binder.</i>	<i>Resurface with premix carpet using hard aggregates or with slurry seal.</i>
<i>Streaking (alternate lean and rich lines of bitumen in surface dressing) in longitudinal/ transverse direction. Hungry / Dry surfaces.</i>	<i>Non-uniform application of binder, low temperature of binder, manual spraying, mechanical faults during spraying. Use of insufficient binder, use of absorptive aggregates, loss of aggregates from surface.</i>	<i>Apply new surface dressing with proper care in spraying of bitumen. Apply slurry seal, or for emergency repair apply for seal.</i>

b) Cracks

<i>Hair-line cracks (fine cracks at close intervals)</i>	<i>Insufficient bitumen, excess filler, compacting when too hot, over compaction</i>	<i>Apply fog-seal with bitumen, cutback bitumen or bitumen emulsion</i>
<i>Alligator cracks (intercorrected cracks forming a series of blocks)</i>	<i>Excessive movement of base or sub-base layer, base saturation, excessive leads over weathered surfacing, inadequate pavement thickness.</i>	<i>Fill crack with bitumen emulsion or cutback bitumen and apply slurry seal or sand-bitumen mix, install drainage.</i>
<i>Longitudinal cracks (at the joint between pavement and shoulder or at the joint between two paving lanes)</i>	<i>Contraction or movement of sub-grade beneath shoulder, lane joint crack due to weak joint or differential frost heave along centre-line.</i>	<i>Fill and seal cracks with cutback bitumen or bitumen emulsion, apply sand-bitumen mix, if cracks are wider than 3mm.</i>
<i>Edge cracks (parallel to outer edge of pavement 0.3 to 0.5m. inside)</i>	<i>Lack of lateral support from shoulder, poor surface drainage, base saturation shrinkage, frost heave inadequate pavement width.</i>	<i>Rectify drainage system, provide hard and paved shoulders, fill cracks and lay premix carpe with seal-coat,</i>

		<i>if edge of the pavement has settled, bring it upto the desired grade with plant mix patching material</i>
<i>Shrinkage cracks (transverse direction or inter-connected cracks in large blocks)</i>	<i>Shrinkage of bituminous layer caused by volume change of bituminous mix with high content of hard bitumen, lack of traffic.</i>	<i>Apply slurry seal or sand-bitumen mix for filling such cracks.</i>
<i>Reflection cracks (usually in over lays over cement concrete or badly cracked bituminous base)</i>	<i>Due to joints and cracks in the pavement layer underneath.</i>	<i>Fill cracks and seal suitably depending on size of crack. Apply a crack relief layer for prevention of such cracks.</i>

c) Deformation defects

<i>Slippage (between top layer and layer below accompanied by crescent-shaped. Cracks in direction of the thrust of wheels).</i>	<i>Lack of bond between layers due to omission or inadequacy of tack coat or prime coat, dust or moisture in between layers, heavy thrust by traffic.</i>	<i>Remove affected area, apply tack coat and punch with premix.</i>
<i>Rutting (Longitudinal depressions or grooves in wheel tracks)</i>	<i>Heavy Channelized traffic, low stability of mix due to inadequate compaction, weak pavement, high intensity of load stress as from bullock carts, plastic deformation.</i>	<i>Full ruts with premix carpet and compact. Relay affected portion with bituminous mix of good stability if necessary.</i>
<i>Corrugations (Regular undulations causing shallow wavy surface).</i>	<i>Lack of stability in mix, excess binder/fines, soft bitumen, poor aggregate interlock, oscillations set up by vehicles, frequent braking of vehicles, faulty laying of mix.</i>	<i>Scarify and relay the surface, cut high spots and fill low spots. Use heater-planner to rectify defects.</i>
<i>Shoving (plastic movement within surface resulting in localized bulging of surface, occurring commonly at bus stops, intersections, sharp curves, steep gradients).</i>	<i>Lack of stability of mix, excess binder/fines, softer grade of bitumen, lack of bond between layers, heavy traffic with frequency braking, sharp negotiation of curves and gradients</i>	<i>Remove affected portion and relay with-premix carpet and compact.</i>

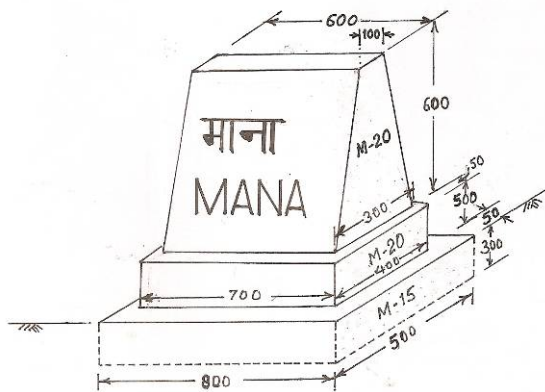
<i>Shallow depressions (localized and limited in size) dipping about 25mm or more below desired profile.</i>	<i>Heavier traffic, settlement of lower pavement layers, poor construction method.</i>	<i>Fill with premix carpet and compact to desired grade and profile.</i>
<i>Settlement (large localized deformation which may or may not be generally followed by extensive cracks)</i>	<i>Poor compaction of fill, poor drainage ion lower layer, inadequate pavement thickness, frost heave or swelling effect of moisture on expansive soil.</i>	<i>Excavate defective fill, reconstruct under controlled conditions to required thickness, provide adequate drainage, strengthen the pavement if required.</i>

d) Disintegration defects

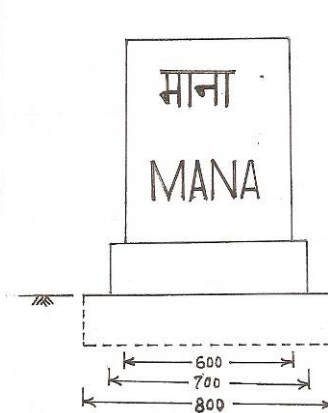
<i>Stripping (loss of adhesion between binder and aggregates in presence of water)</i>	<i>Softer grade bitumen, siliceous type of aggregates, rain, soon after laying of surface.</i>	<i>Use anti- stripping agent in suitable doses in case of siliceous aggregates, use of proper grade of bitumen for coating, and provide adequate surface drainage.</i>
<i>Loss aggregates (as in surface-dressing)</i>	<i>Non uniform spraying of binder, delayed spreading of aggregates, traffic soon after laying, insufficient binder, ageing of binder.</i>	<i>Apply liquid seal, fog-seal or slurry-seal. Relay, if necessary with liquid seal with proper quality control.</i>
<i>Raveling (progressive disintegration of premix carpet by loss of aggregates)</i>	<i>Insufficient binder, ageing of binder, overheated bituminous mix, improper coating, inferior aggregates, lack of compaction while laying, construction during cold weather.</i>	<i>If raveling if not extensive provide surface dressing, sand bitumen mix or slurry seal. For extensive raveling, apply renewal coat of premix carpet.</i>
<i>Pot-holPes (bowl shaped holes of varying sizes on surface and extending to base course resulting from localized disintegration)</i>	<i>Poor surface drainage, localized defects in bituminous mix, insufficient binder, insufficient layer thickness.</i>	<i>Fill pot holes with premix carpet, after cutting these to regular size and applying tack coat. Fill deep pot holes with bituminous penetration macadam or storable mix.</i>
<i>Edge breaking (frayed edges)</i>	<i>Infiltration of water, softening of foundation, worn-out shoulders with insufficient side support, inadequate thickness at edge.</i>	<i>Relay shoulders with good materials and compact provide adequate drainage.</i>

ELEVATION

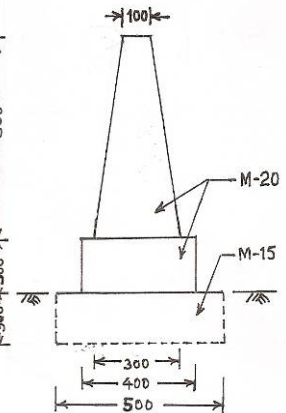
TYPE DESIGN FOR CONCRETE BOARDS (TYPE – A) VILLAGE BOARDS :



PERSPECTIVE VIEW

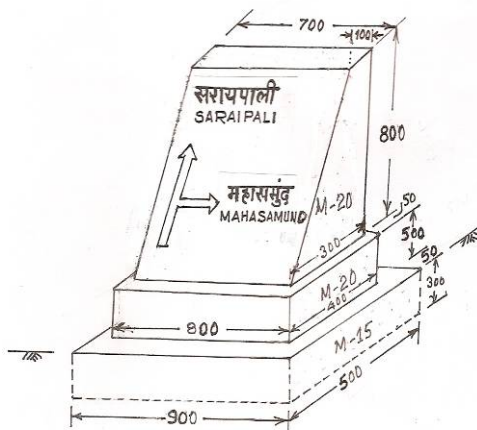


ELEVATION

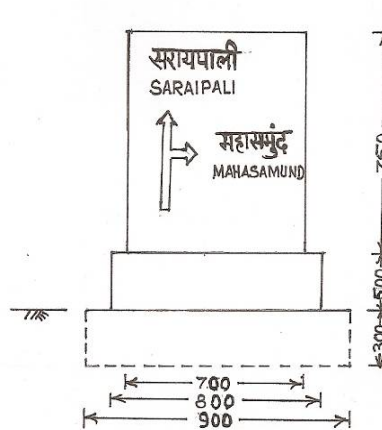


SIDE VIEW

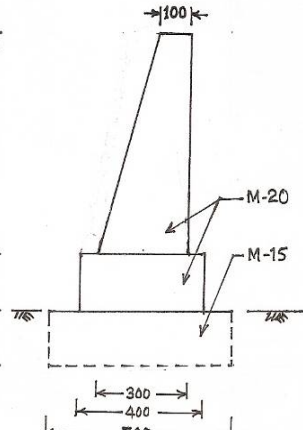
TYPE DESIGN FOR CONCRETE BOARDS (TYPE – B) DESTINATION BOARDS :



PERSPECTIVE VIEW

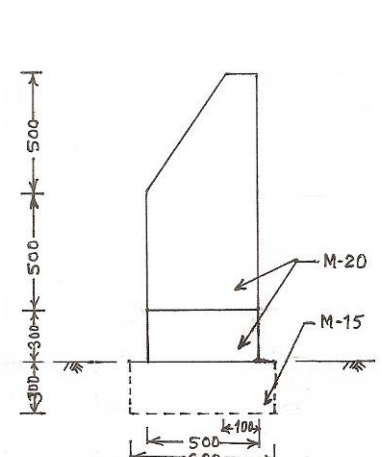
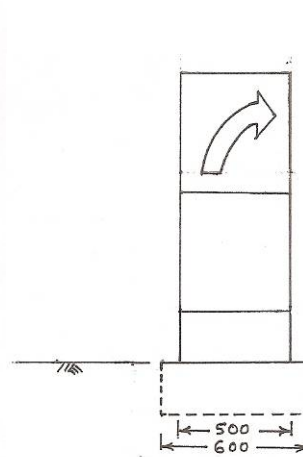
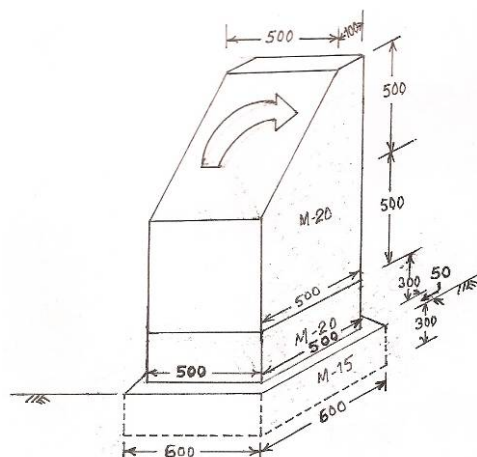


ELEVATION



SIDE VIEW

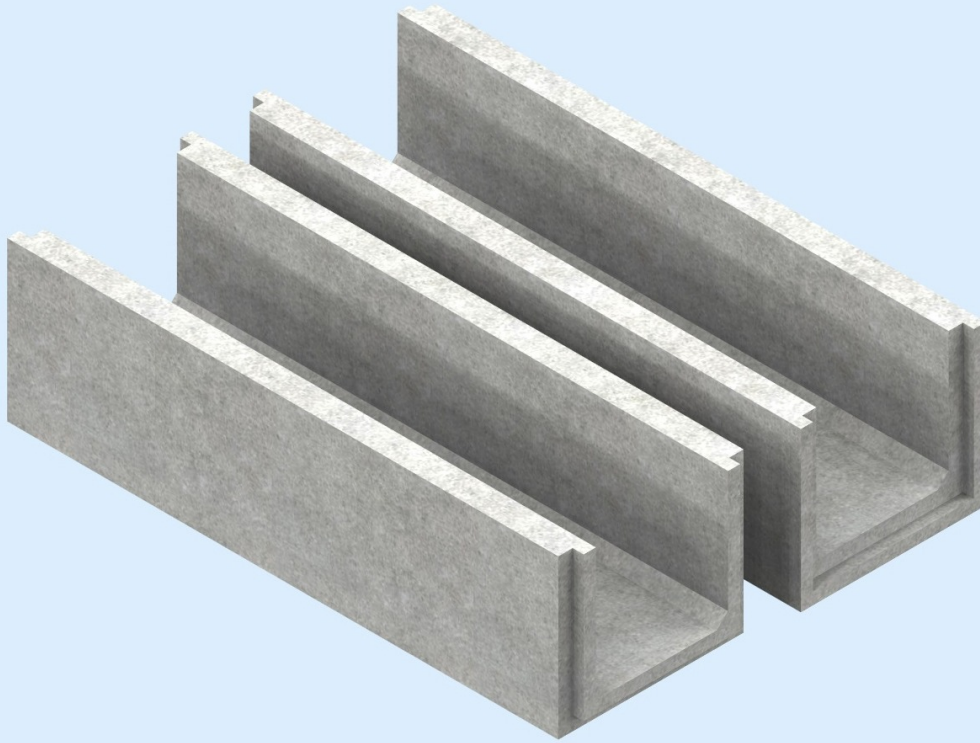
TYPE DESIGN FOR CONCRETE BOARDS (TYPE – C) CAUTIONARY BOARDS :



PERSPECTIVE VIEW

ELEVATION

SIDE VIEW



PRECAST RCC DRAIN SEGMENT

PRECAST RCC BOX CULVERT 2M X 2M

GENERAL NOTES

1. PLEASE REFER GENERAL ARRANGEMENT DRAWING FOR ANY OTHER DETAILS.
2. JOINTS ON LAPPING OF BARS SHALL BE SUTABLE, V. STAGGERED AS PER IS: 112-2020
3. CONCRETE GRADE FOR:
BOX CELL STRUCTURE: M-30
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
5. GRADE OF STEEL: Fe-500
6. LAP LENGTH FOR M-30 GRADE OF CONCRETE SHALL BE:
a. 57.5 BAR DIA. FOR FAVORABLE BOND CONDITION.
b. 61.7 BAR DIA. FOR UNFAVORABLE BOND CONDITION.
7. MINOR REINFORCEMENT LENGTH FOR M-30 GRADE OF CONCRETE SHALL BE:
a. 40 x BAR DIA. FOR FAVORABLE BOND CONDITION.
b. 55 x BAR DIA. FOR UNFAVORABLE BOND CONDITION.
8. CLEAR COVER

CLEAR COVER TO ANY REINFORCEMENT BAR SHALL BE AS PER FOLLOWING

DETAILS:

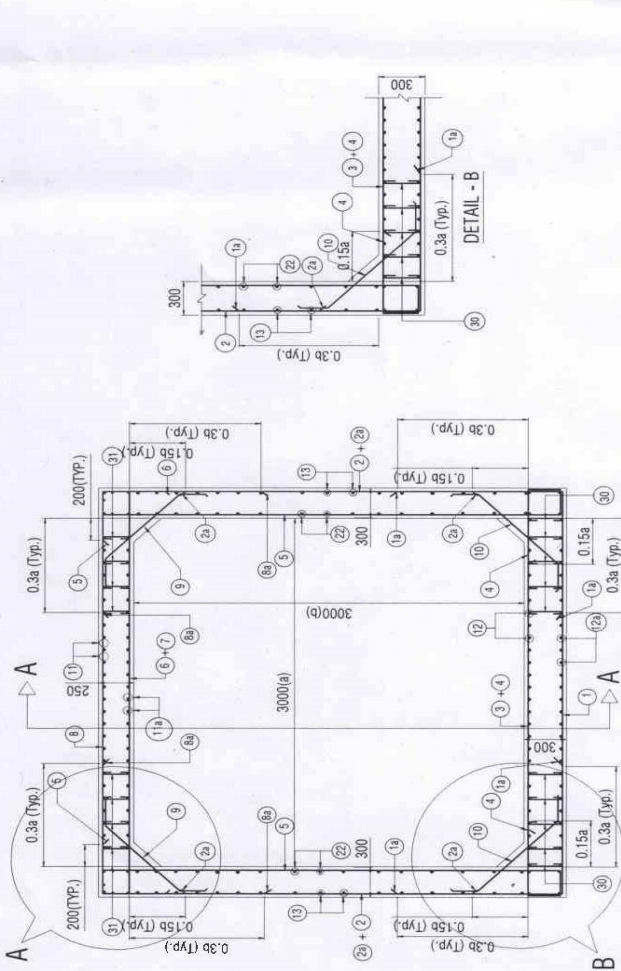
- 1) AT EARTH FACE : 75mm
- 2) OTHER FACE / WATER SIDE FACE : 45mm

LEGEND

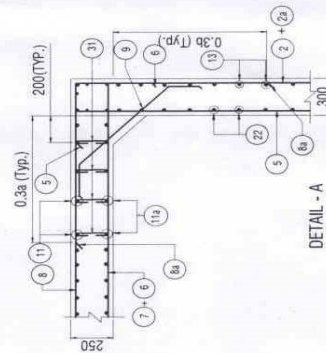
TOP FACE BARS /
OUTER FACE BARS
BOTTOM FACE BARS
INNER FACE BARS

BBS FOR BOX CULVERT OF SIZE-1X3X3

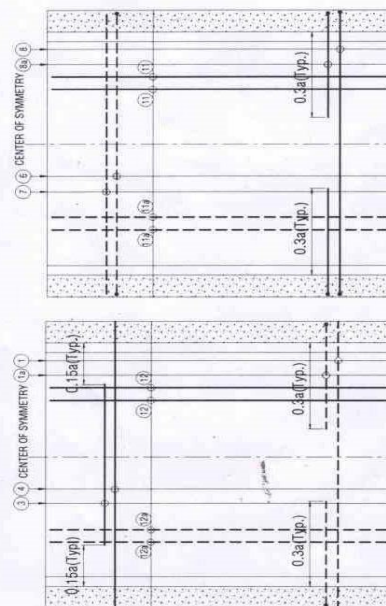
BAR NUMBER	SHAPE OF BAR	DATA OF BAR IN MM	SPACING IN MM	REINFORCEMENT TYPE
1		12	200	BOTTOM SLAB BOTTOM MAIN STEEL
1A		12	200	CORNER STEEL AT BOTTOM SLAB
2		12	200	SIDE WALL EARTH FACE MAIN STEEL
2A		NOT USED		SIDE WALL EARTH FACE ADDITIONAL MAIN STEEL
4		10	200	BOTTOM SLAB TOP MAIN STEEL
3		12	200	ADDITIONAL BOTTOM SLAB TOP MAIN STEEL
5		10	200	SIDE WALL OTHER FACE MAIN STEEL
6		12	200	TOP SLAB TOP MAIN STEEL
8A		12	200	CORNER STEEL AT TOP SLAB
6		10	200	TOP SLAB BOTTOM MAIN STEEL
7		10	300	ADDITIONAL TOP SLAB BOTTOM MAIN STEEL
9		8	200	RAILING STEEL TOP SLAB SIDE WALL
10		8	200	RAILING STEEL BOTTOM SLAB SIDE WALL
11		8	250	TOP SLAB TOP DISTRIBUTION STEEL
11a		8	250	TOP SLAB BOTTOM DISTRIBUTION STEEL
13		8	225	SIDE WALL EARTH FACE DISTRIBUTION STEEL
12		8	225	BOTTOM SLAB TOP DISTRIBUTION STEEL
12a		8	225	BOTTOM SLAB BOTTOM DISTRIBUTION STEEL
22		8	225	SIDE WALL OTHER FACE DISTRIBUTION STEEL
30		8	200	SHEAR LINKS FOR BOTTOM SLAB
31		8	200	SHEAR LINKS FOR TOP SLAB



REINFORCEMENT DETAILS FOR SINGLE CELL BOX CULVERT

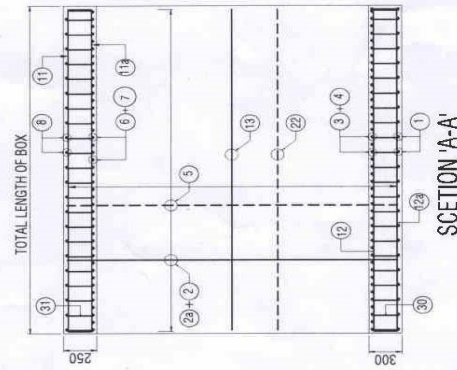


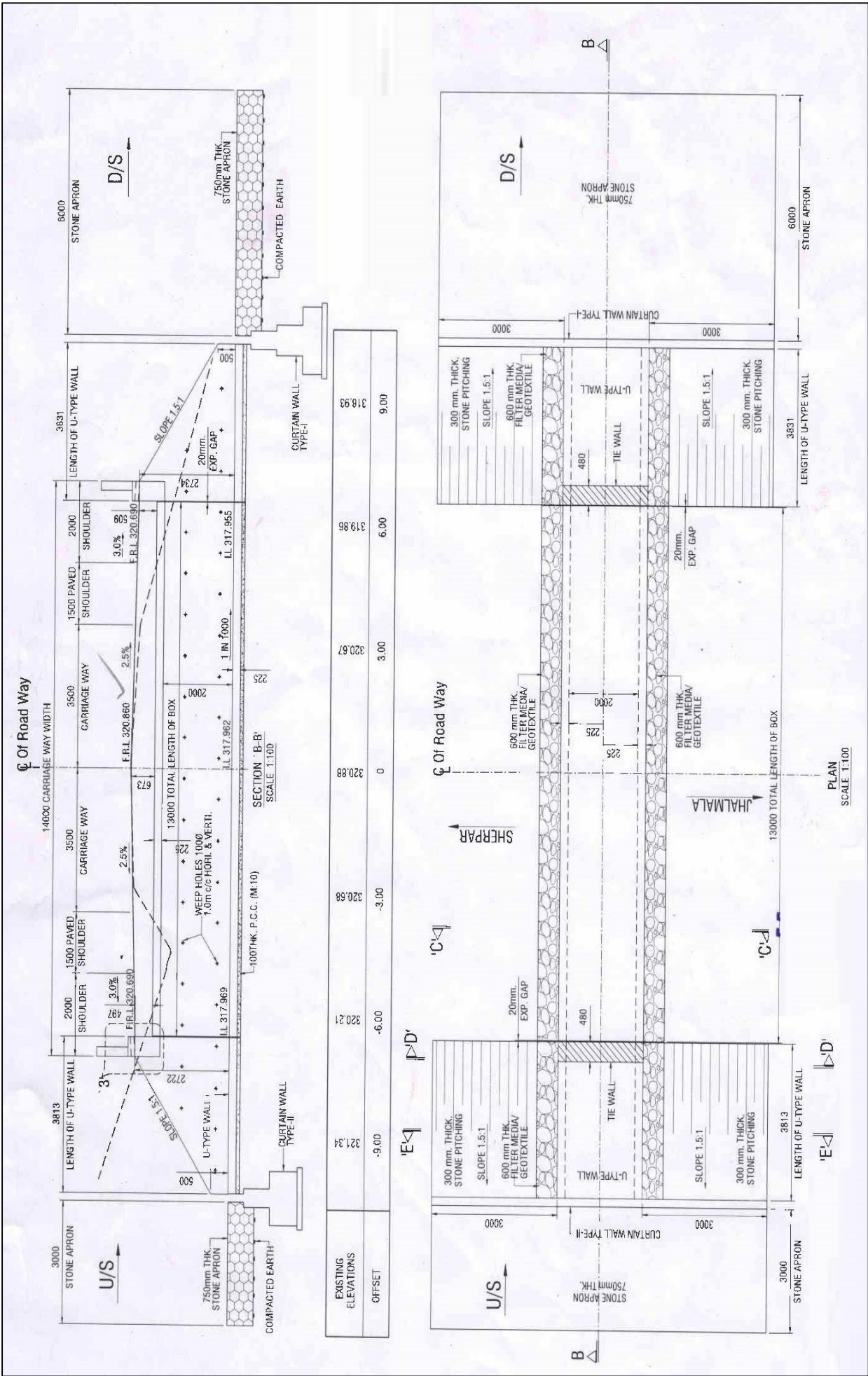
DETAIL - A



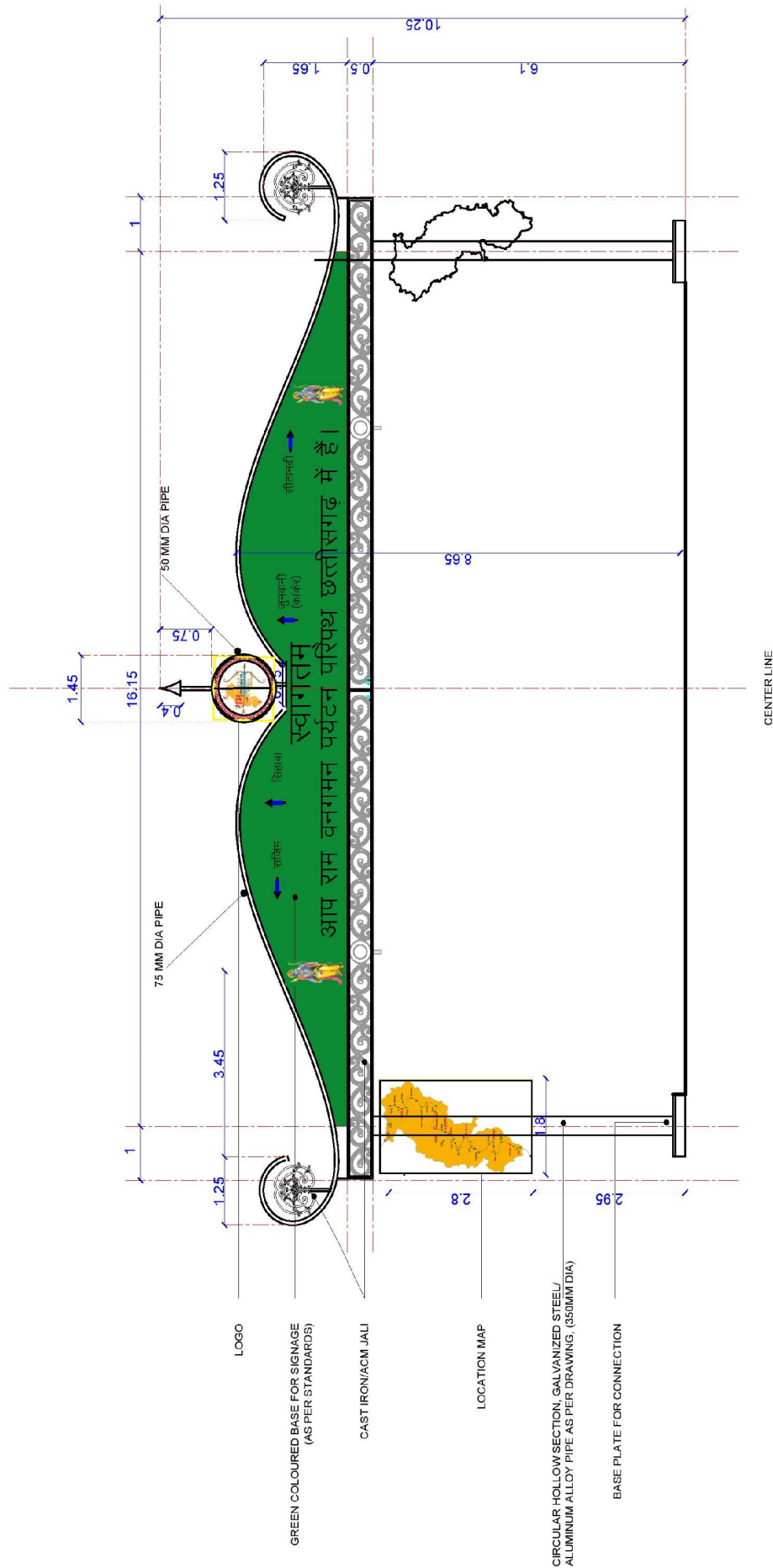
BOTTOM SLAB REINFORCEMENT PLAN
(bar mark (30) not shown for clarity)

TOP SLAB REINFORCEMENT PLAN
(bar mark 31; not shown for clarity)

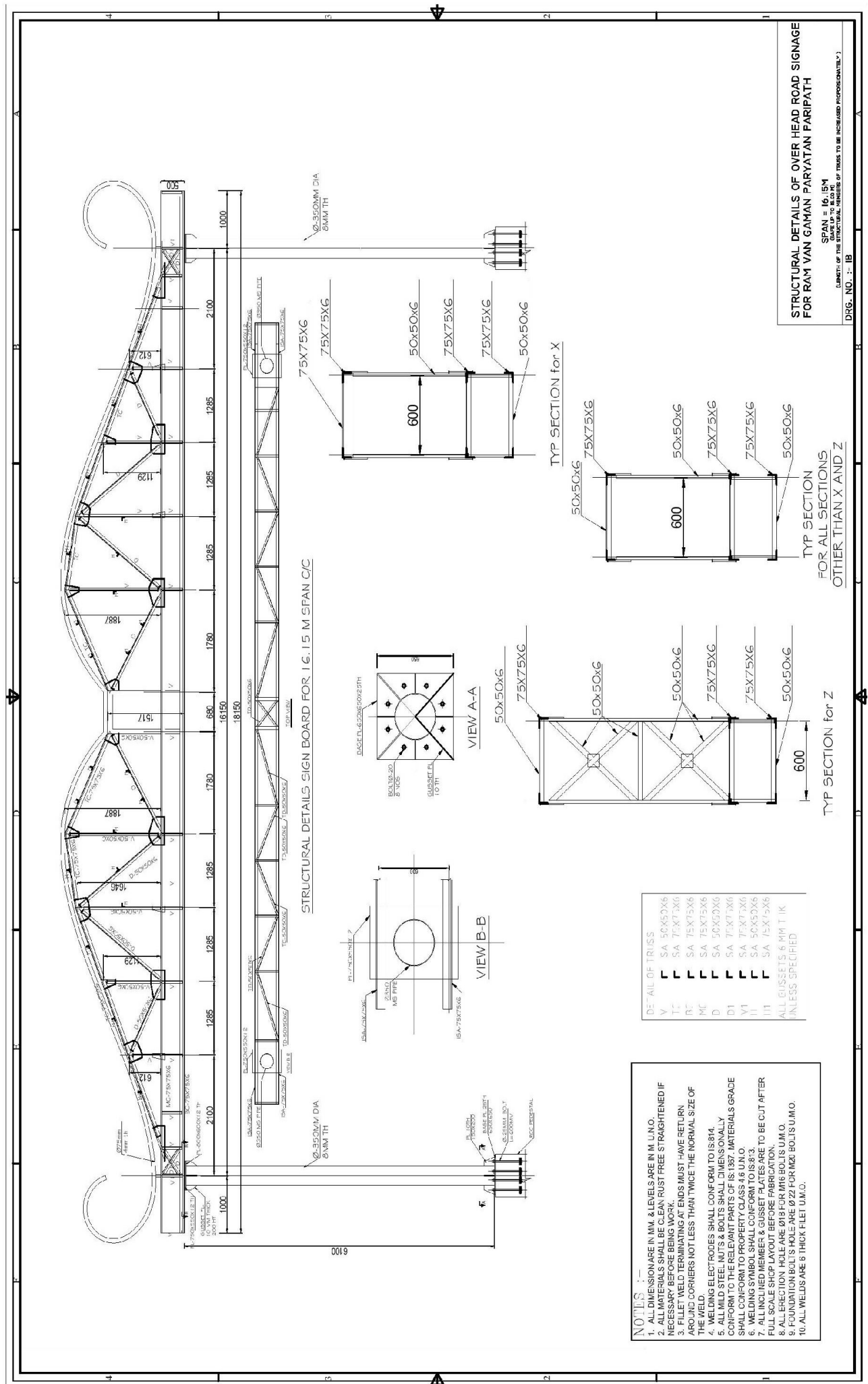


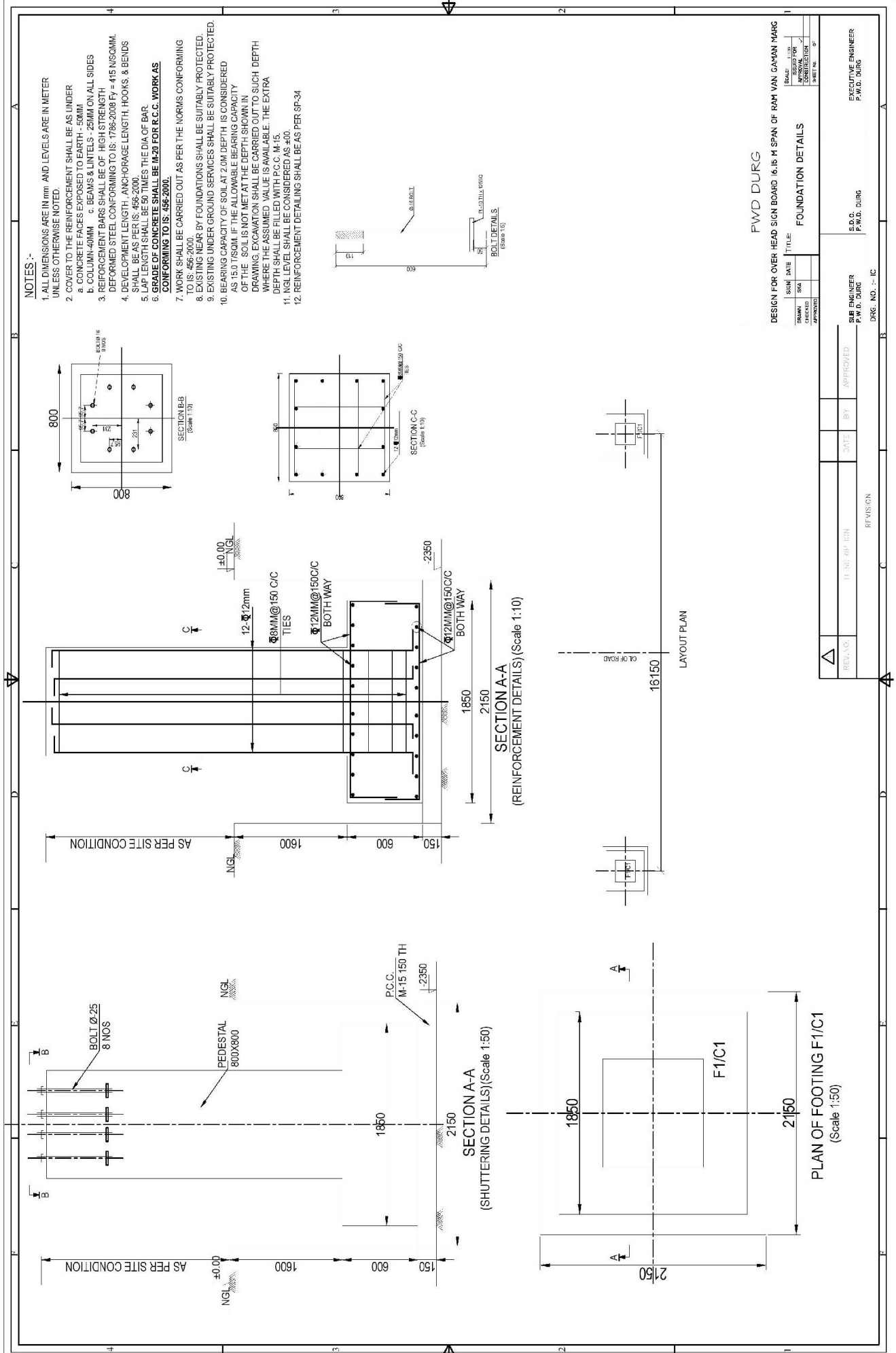


SIGNAGE DESIGN FOR 16.15 M SPAN



**RAM VAN GAMAN WELCOME BOARD : TYPE -1
DRAWING NO. 1A**





DESIGN FOR OVER HEAD SIGN BOARD 16.15 M SPAN OF RAM VAN GAMAN MARG

PWD DURG

DATE	SHEET NO.	OF
15/06/2026	01	01

FOUNDATION DETAILS

EXECUTIVE ENGINEER
P.W.D. DURG

S.D.O.
P.W.D. DURG

DRG. NO. - IC

REVISION

REV. NO.

DATE

BY

APPROVED

IN CHARGE

DATE

BY

APPROVED

IN CHARGE

DATE

BY

APPROVED

IN CHARGE

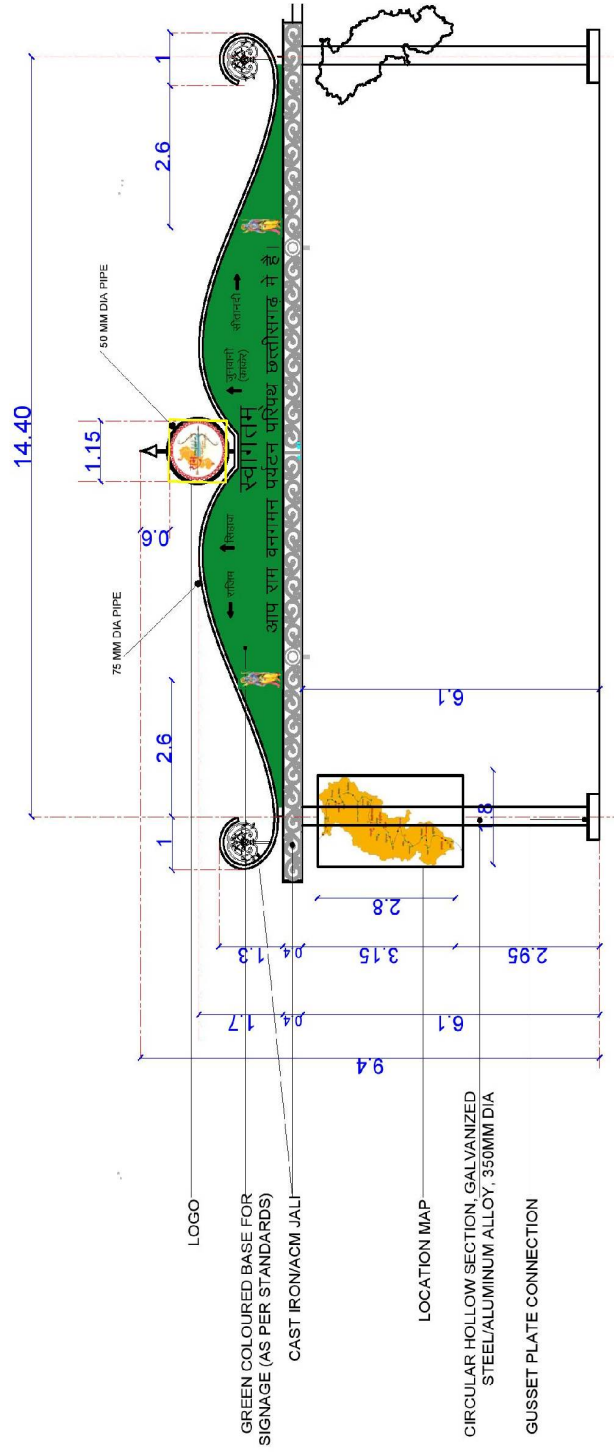
DATE

BY

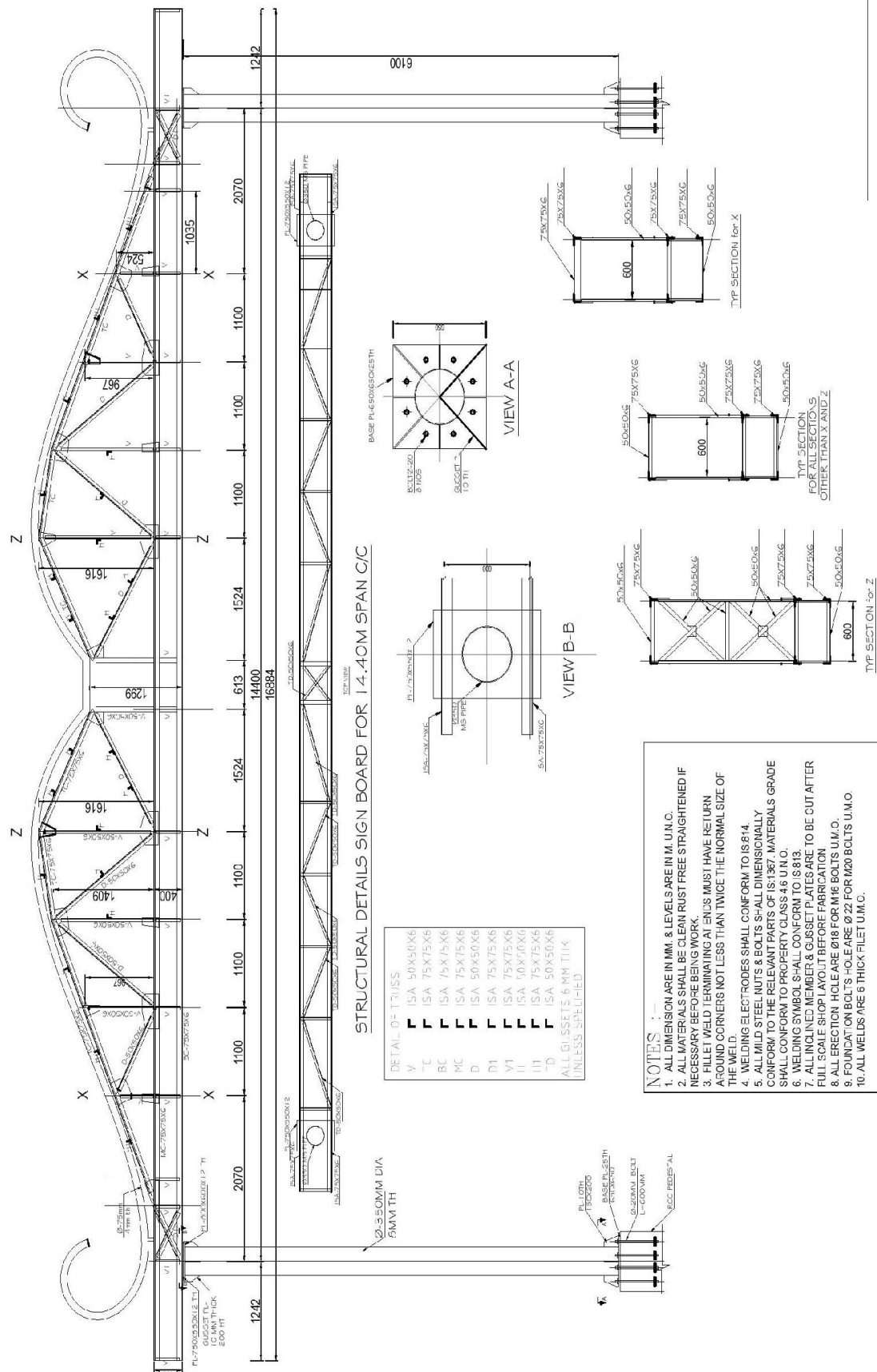
APPROVED

IN CHARGE

SIGNAGE DESIGN FOR 14.40 M SPAN



RAM VAN GAMAN WELCOME BOARD : TYPE -2
DRAWING NO. 2A



**STRUCTURAL DETAILS OF OVER HEAD ROAD SIGNAGE
FOR RAM VAN GAMAN PARYATAN PARIPATH**

SPAN = 14.40M

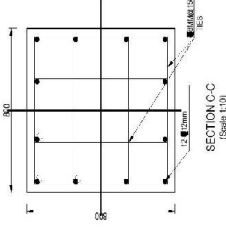
UNITS OF THE STRUCTURAL MEMBERS OF TRUSS TO BE INCREASED PROPORTIONATELY

DRG. NO. - 28

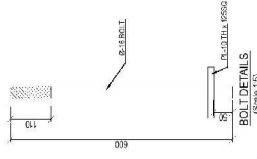
1. ALL DIMENSIONS ARE IN mm AND LEVELS ARE IN METER UNLESS OTHERWISE NOTED.

-

(Scale 1:10)



(011 6422)



150 600 1600

AS PER SITE CONDITION

NGI

1700 2000

12- Φ 12mm

Φ 8mm@150 C/C

TIES

Φ 12mm@150 C/C BOTH WAY

Φ 12mm@150 C/C BOTH WAY

-2350

±0.00 NGI

[illegible]

Technical drawing of a rectangular plate with overall dimensions of 2000 mm by 2000 mm. The plate features a central rectangular hole with dimensions of 1700 mm by 1700 mm. The drawing includes a section line A-A and a label F1/C1.

PLAN OF FOOTING F1/C1
(Scale 1:50)

DESIGN FOR OVER HEAD SIGN BOARD 14 M SPAN OF RAM VAN GAMAN MARG

SCALE: 1/8" = 1'-0"	ISSUED FOR APPROVAL	CONSTRUCTION
DRAWN: ☐ CHECKED: ☒		
SIGN: ☐ DATE: ☐		
TITLE: FOUNDATION DETAILS		

**EXECUTIVE ENGINEER
P.W.D. DURG**

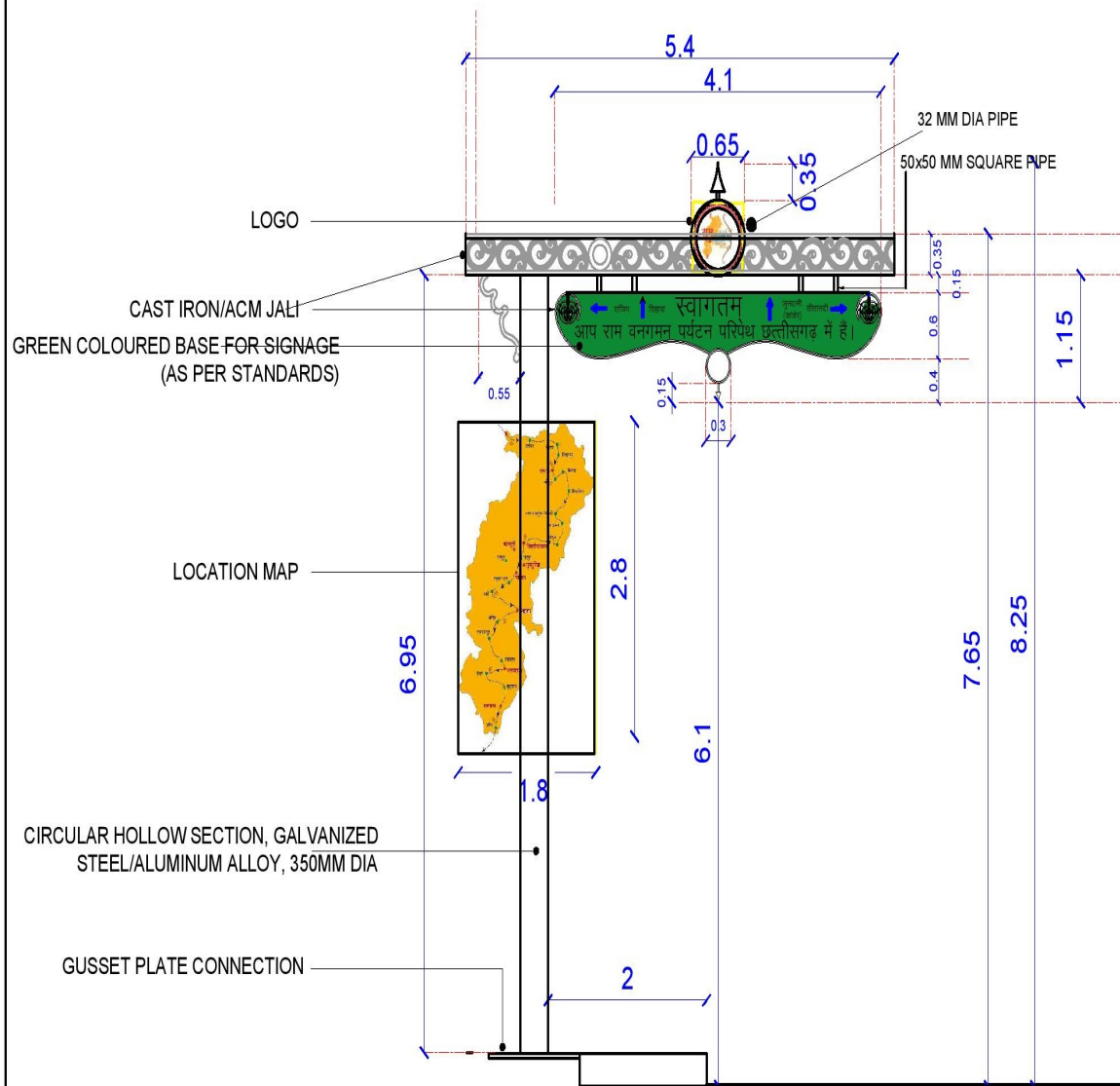
S.D.O.
P.W.D., DURG

— SUB ENGINEER
— P. W. D. DURG

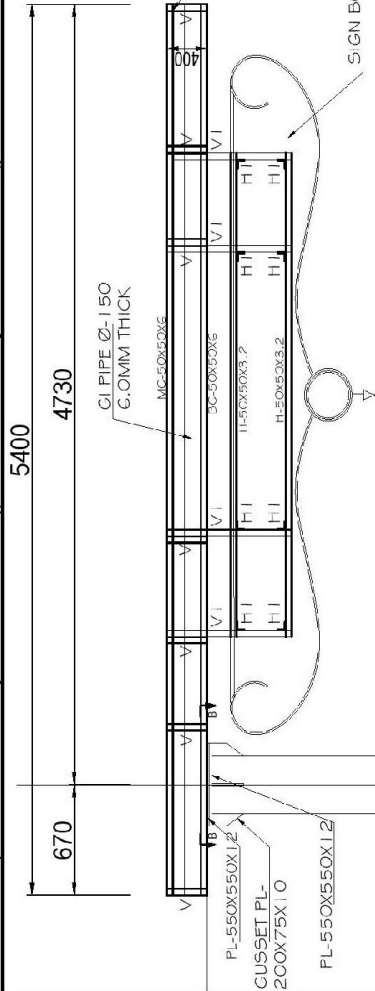
DRG. NO. :- 2C

REVISION

PROPOSED CANTILIVER SIGNAGE DESIGN

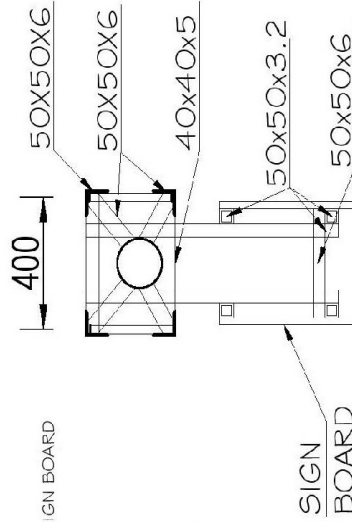


RAM VAN GAMAN WELCOME BOARD : TYPE -3
DRAWING NO. 3A



DETAIL OF TRUSS

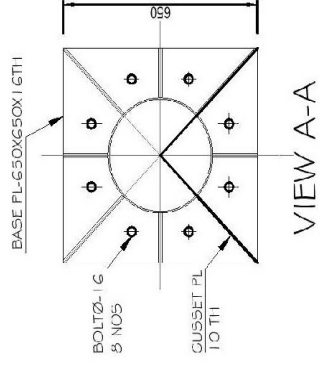
V	ISA-40X40X5
TC	ISA 50X50X6
BC	ISA-50X50X6
V'	HSS-50X50X3.2
T	HSS-50X50X3.2
T1	ISA-50X50X6



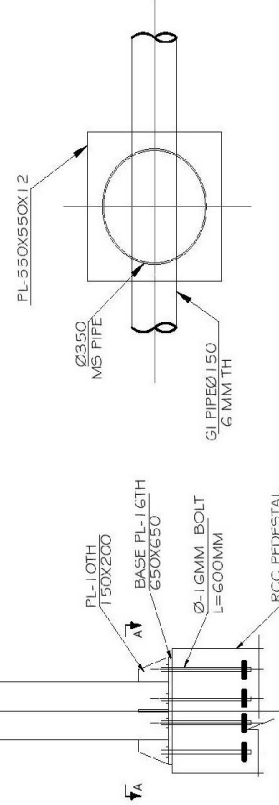
TYP SECTION

NOTES :-

1. ALL DIMENSION ARE IN MM. & LEVELS ARE IN M. U.N.O.
2. ALL MATERIALS SHALL BE CLEAN RUST FREE STRAIGHTENED IF NECESSARY BEFORE BEING WORK.
3. FILLET WELD TERMINATING AT ENDS MUST HAVE RETURN AROUND CORNERS NOT LESS THAN TWICE THE NORMAL SIZE OF THE WELD.
4. WELDING ELECTRODES SHALL CONFORM TO IS:814.
5. ALL MILD STEEL NUTS & BOLTS SHALL DIMENSIONALLY CONFORM TO THE RELEVANT PARTS OF IS:1367. MATERIALS GRADE SHALL CONFORM TO PROPERTY CLASS 4.6 U.N.O.
6. WELDING SYMBOL SHALL CONFORM TO IS:813.
7. ALL INCLINED MEMBER & GUSSET PLATES ARE TO BE CUT AFTER FULL SCALE SHOP LAYOUT BEFORE FABRICATION.
8. ALL ERECTION HOLE ARE Ø18 FOR M16 BOLTS U.M.O.
9. FOUNDATION BOLTS HOLE ARE Ø22 FOR M20 BOLTS U.M.O.
10. ALL WELDS ARE 6 THICK FILET U.M.O.



VIEW A-A



VIEW B-B

STRUCTURAL DETAILS OF OVER HEAD ROAD SIGNAGE FOR RAM VAN GAMAN PARYATAN PARIPATH

CANTILEVER SPAN 5.40M

(SAFE UP TO 6.50 M)

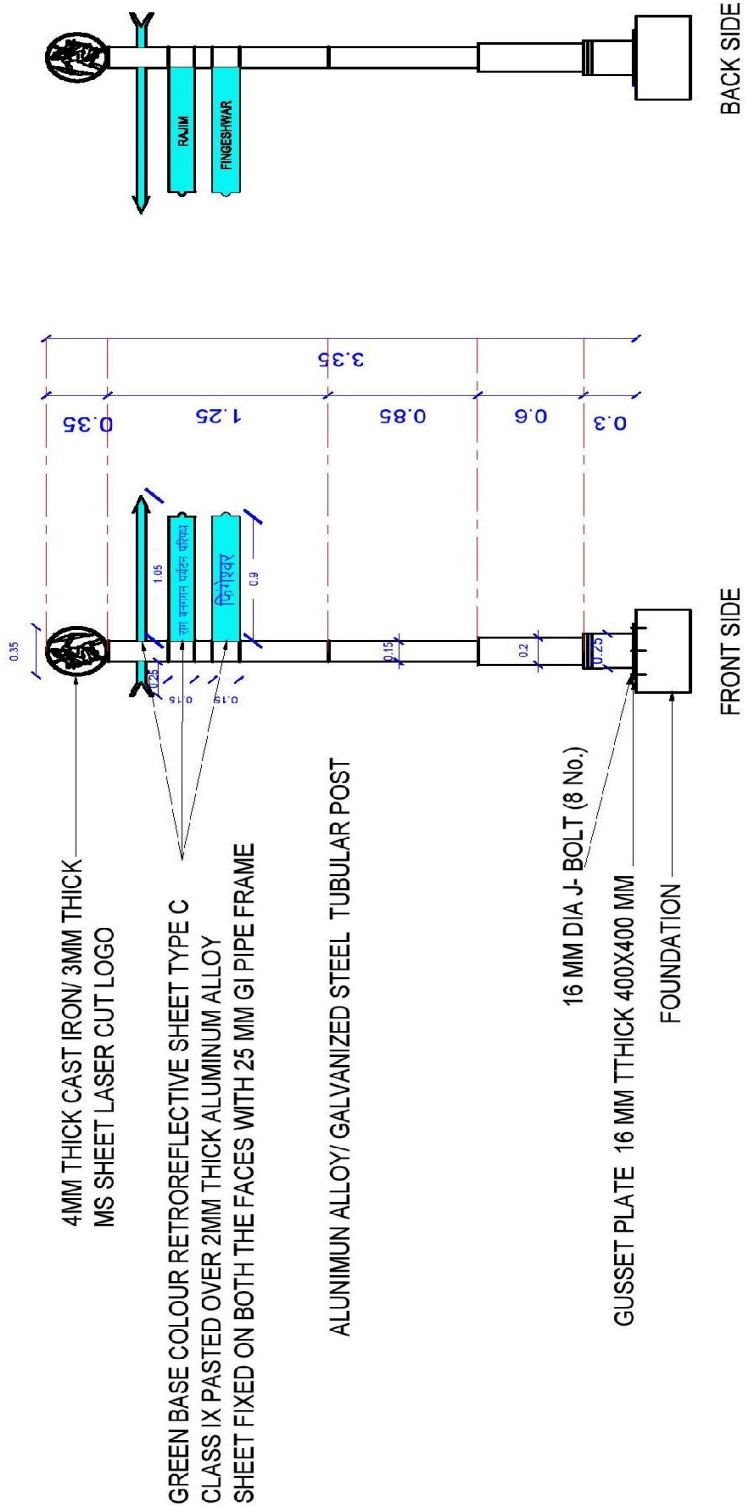
(LENGTH OF THE STRUCTURAL MEMBERS OF TRUSS TO BE INCREASED PROPORTIONATELY)

DRG. NO. :- 3B

MM 100 1001000015000000 100

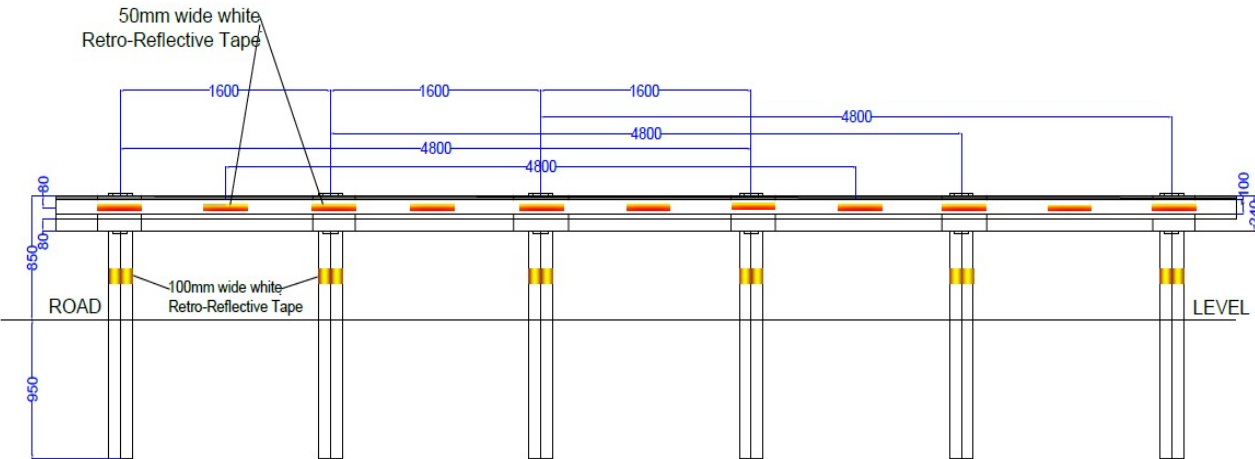


PROPOSED DIRECTION MARKING BOARD



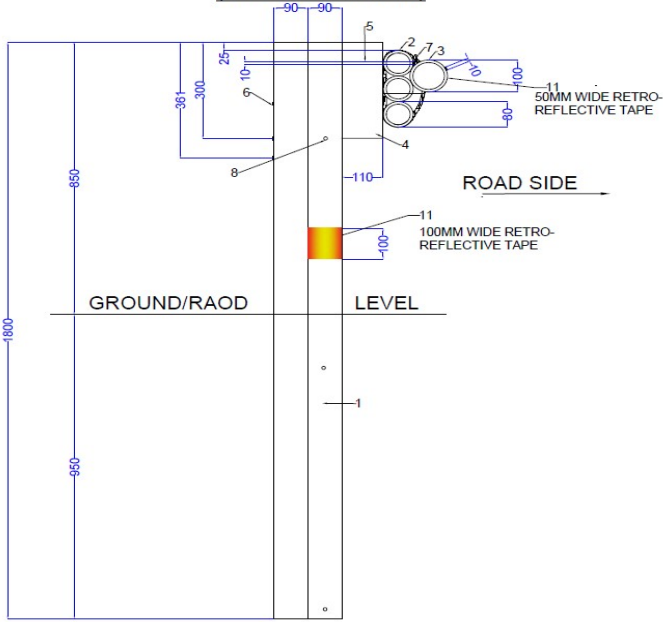
RAM VAN GAMAN DIRECTION BOARD : TYPE -5
DRAWING NO. 5A

TYPICAL DRAWING OF BAHU-BALLI BAMBOO CRASH BARRIER (KOOCH KAVACH)



FRONT VIEW FROM ROAD SIDE

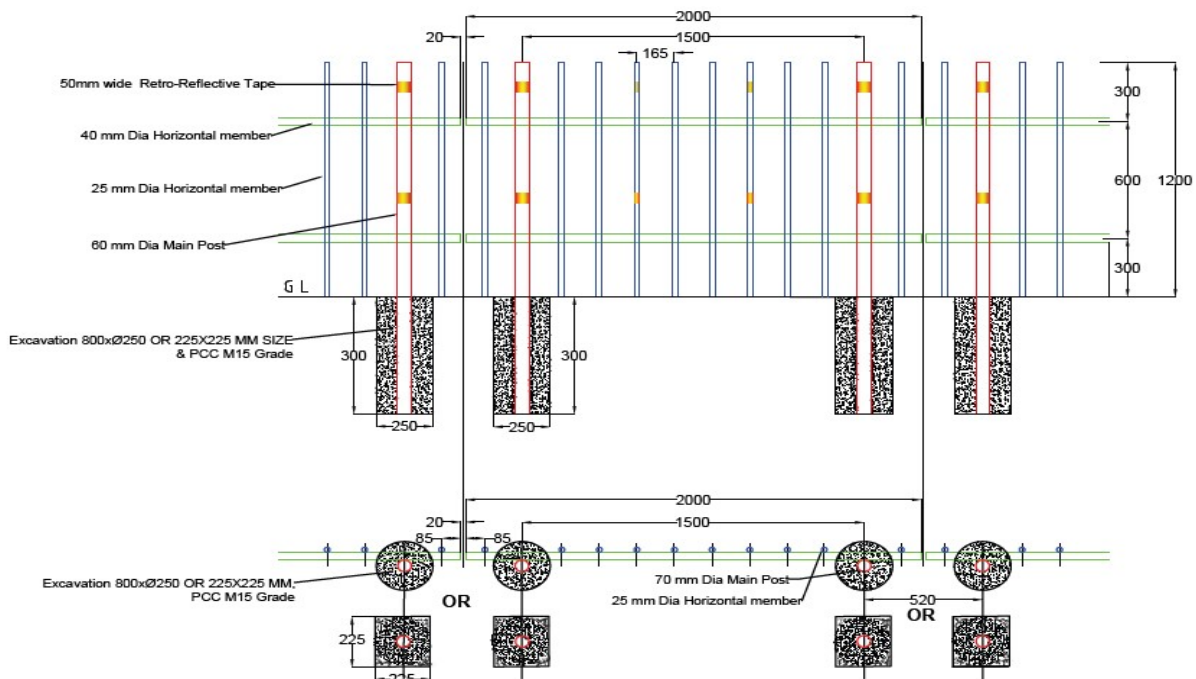
TYPICAL DRAWING OF BAHU-BALLI BAMBOO CRASH BARRIER (KOOCH KAVACH)



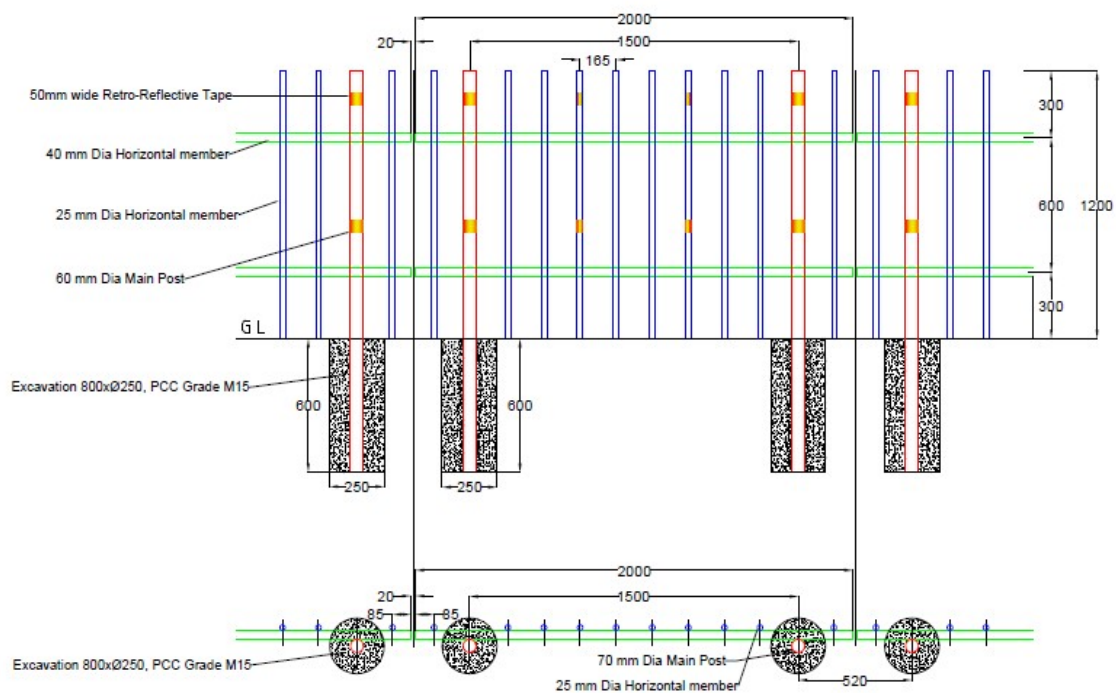
SIDE VIEW

SECTIONAL LABEL	DESCRIPTION	DIA	LENGTH
1	POST ELEMENTS	90 MM	1800 MM
2	BEAM ELEMENTS	80 MM	4800 MM
3	FRONT CUSHIONING ELEMENT	100 MM	1422 MM
4	SPACER	110 MM	300 MM
5	BEAM- POST CONNECTOR	M10	360 MM
6	BEAM- SPACER- POST CONNECTOR	M10	280 MM
7	WIRE ROPE	8 MM	52000 MM
8	POST BOLTS	M10	190 MM
9	BEAM BOLTS	M10	250 MM
10	WASHER	10 MM	1.5 MM
11	WHITE RETRO-REFLECTIVE TAPE	-	50MM WIDE & 200 MM LONG ON FRONT BEAM AND 100 MM WIDE & 285 MM LONG ON CIRCUMFERENCE OF FRONT POSTS

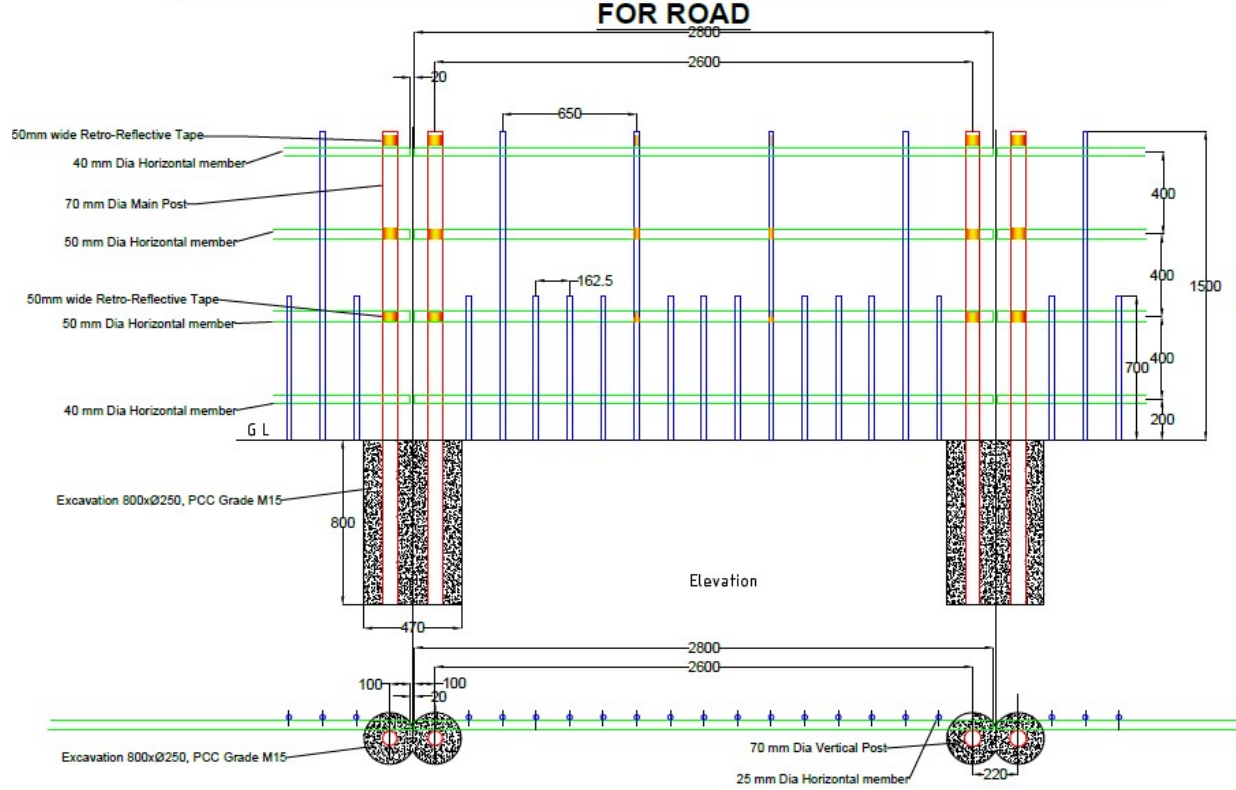
TYPICAL DRAWING-A1: BAHU-BALLI BAMBOO FENCE 1200 MM HEIGHT FOR ROAD DIVIDER



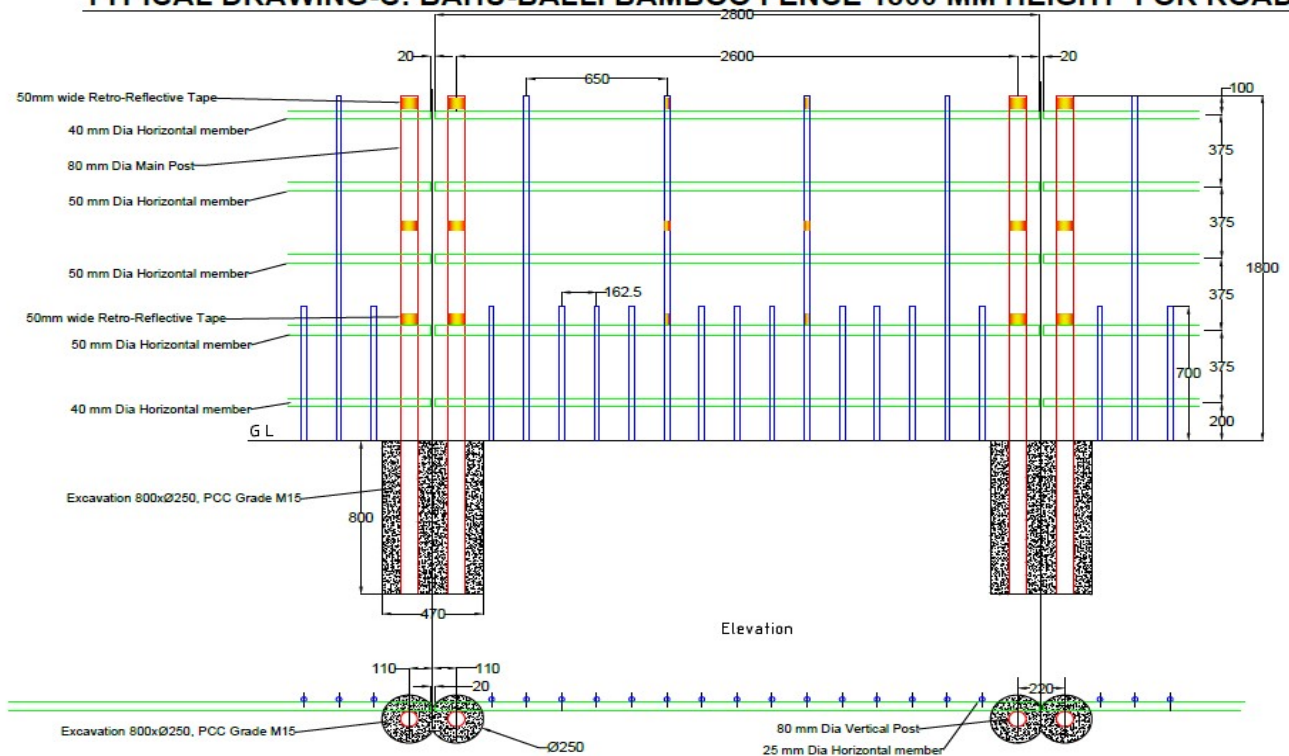
TYPICAL DRAWING-A2: BAHU-BALLI BAMBOO FENCE 1200 MM HEIGHT FOR ROAD FENCE



TYPICAL DRAWING-B: BAHU-BALLI BAMBOO FENCE 1500 MM HEIGHT FOR ROAD



TYPICAL DRAWING-C: BAHU-BALLI BAMBOO FENCE 1800 MM HEIGHT FOR ROAD





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