GOVERNMENT OF CHHATTISGARH

PUBLIC WORKS DEPARTMENT

FOR

BRIDGE WORKS

ISSUED ON DATE 10.06.2026

With Effect from 10th June 2026

ISSUED BY
ENGINEER-IN-CHIEF
CHHATTISGARH P.W.D.
NIRMAN BHAWAN
NAWA RAIPUR, ATAL NAGAR (C.G.)

कार्यालय प्रमुख अभियंता, लोक निर्माण विभाग,

निर्माण भवन, नार्थ ब्लॉक, सेक्टर 19, नवा रायपुर अटल नगर (छ.ग)
दूरभाष :– 0771–2512734 ई–मेल :– eincpwd-pb@cg.gov.in

ज्ञाप क्रं. 65010/589/एस.ओ.आर./26 नवा रायपुर अटल नगर, दिनांक 10/06/2026

//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 पुल कार्यों हेतु वर्तमान में दिनांक 01.01.2015 से प्रभावशील दर अनुसूची से GST दर पृथक कर, नई दर अनुसूची एतद् द्वारा दिनांक 10.06.2026 से प्रभावशील की जाती है। अतः इस कार्यालय के आदेश क्रं. 65010/585/एस.ओ.आर./26 नवा रायपुर अटल नगर दिनांक 20.04.2026 को छत्तीसगढ़ लोक निर्माण विभाग के पुल कार्यों हेतु वर्तमान में दिनांक 01.01.2015 से प्रभावशील दर अनुसूची से EXCISE/VAT/GST दर पृथक कर, नई दर अनुसूची जारी किया गया था, जिस पर तत्काल प्रभाव से रोक लगाई जाती है।

सहपत्र :– दर अनुसूची (पुल कार्य) 10.06.2026

10/6/2026

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

पृ. क्रं. 65010/589/एस.ओ.आर./26 नवा रायपुर अटल नगर, दिनांक 10/06/2026

प्रतिलिपिः–

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, ट्रासपोर्ट 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 (पुल कार्य) 10.06.2026

10/6/2026

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

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

No. 65010/589/SOR/2026 **Nava Raipur Dated : 10.06.2026**

Schedule of Rates for Bridge 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) 01.01.2015 for bridge works was published in 2015.

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 Bridge SOR 01.01.2015 and now it is modified as Bridge SOR 10.06.2026, This SOR will be known as BRIDGE SOR 10.06.2026

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 S.K. Kori, Chief Engineer & Shri M.L. Uraon, Chief Engineer, who have taken immense pain in inspiring and guiding the entire team for making this document comprehensive and unique.

I would also commend Shri S.S. Manjhi (Superintending Engineer), Shri D.K. Maheshwari (Superintending Engineer), Shri C.K. Pandey (Executive Engineer), Shri Roshan Kumar Sahu (Assistant Engineer), Shri Sabir Khan (Sub Engineer), Shri Rajiv Mishra (Sub-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.

10/6/2026

Nava Raipur
Date:- 10.06.2026

Vijay Kumar Bhatpahri
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. 5

No. 65010/590/SOR/ Nawa Raipur Atal Nagar, Dated 10/06/2026

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 स्वीकृतियॉ प्राप्त की जावें।

छत्तीसगढ़ शासन द्वारा जारी उपरोक्त परिपत्र के पालन हेतु छत्तीसगढ़ लोक निर्माण विभाग में प्रचलित ब्रिज एसओआर 01.01.2015 जो प्रमुख अभियंता कार्यालय के आदेश क्रमांक 1639/WORK Dated 27.12.2014 द्वारा जारी तथा दिनांक 01.01.2015 से प्रभावशील है, इस ब्रिज एस.ओ.आर. 01.01.2015 के सभी आयटमों के दर में 15 प्रतिशत कम करके संशोधित दर अनुसूची ब्रिज एस.ओ.आर. दिनांक 10.06.2026 जारी किया जाता है।

जिन कार्यों की प्रशासकीय स्वीकृति ब्रिज एस.ओ.आर. 01.01.2015 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 ब्रिज एस.ओ.आर. 01.01.2015 के स्थान पर संशोधित ब्रिज एस.ओ.आर. दिनांक 10.06.2026 के आधार पर तथा छत्तीसगढ़ शासन के परिपत्र दिनांक 03.06.2026 के संशोधन को लागू करते हुए निविदा आमंत्रित किया जावे।

10/6/2026

Engineer-in-Chief
Public Works Department
Nawa Raipur, Atal Nagar (C.G.)

No. 65010/590/SOR/ Nawa Raipur Atal Nagar, Dated 10/06/2026

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 https://pwd.cg.nic.in.

10/6/2026

Engineer-in-Chief
Public Works Department
Nawa Raipur, Atal Nagar (C.G.)

INDEX

Price : Rs. 150/-
Office of the Engineer in Chief
Public Works Department, Nava Raipur Chhattisgarh

GENERAL NOTES

1)	**DEFINITIONS**	
a)	Major Bridge :	Having a total length of above 60 M. measured along the centre line of the bridge between inner faces of the dirt walls.
b)	Minor Bridge :	Having a total length of upto 60 M measured along the centre line of the bridge between inner faces of the dirt walls.
c)	Culverts :	Having a total length 6 M. or less between the inner faces of the dirt walls or extreme vents way boundaries measured at right angles thereof.
2)	**SPECIFICATIONS**	
i)	The specifications of works shall be carried out as per 5th revision of "Specifications for Road and Bridge works" (Ministry of Road Transport & Highway) - subject to such changes as are incorporated in the wording of the items and notes below. The work will be governed by the design considerations and specifications contained in I.R.C. codes of practice for Road/Bridges issued upto the date of receipt of tender.	
ii)	The materials of construction shall be governed as per relevant I.S. Codes.	
iii)	In the matters of interpretation in respect of any provision contained in the documents referred in para (i) to (ii) the decision of the Engineer-in-Chief, P.W.D. shall be final & binding.	
3)	**FOUNDATION**	
i)	All works below ground level or low water level, whichever is higher but not above soffit level shall be termed as foundation work.	
ii)	Low water level shall be the average water level met with at the time of doing the foundation work. The maximum and minimum water levels should be recorded by the Assistant Engineer, just before starting the particular foundation and within a reasonable time at the close of that foundation work, the average of these two levels will be the L.W.L. for that foundation work. In case of major bridges such records will be taken by the Executive Engineer.	

4)	**SUB-STRUCTURE**:
	The part of the bridge structure below the a) Soffit level of the deck slab/beams and or b) Springing level for arch spans, but above the ground level or L.W.L. whichever is higher, shall be termed as sub structure of the bridge part.
5)	**SUPER-STRUCTURE**
	The work above (a)Soffit level for deck slabs/beams and (b)Springing level for arch span, including kerbs, railing, expansion joints, beams, slabs etc. shall be termed as super structure of the bridge part.
6)	**CONCRETE**
a)	The mixing of the concrete, transportation, placing & compaction shall be carried out as per provision made in clause 1708 and 1709 of the specifications of Road and Bridge Works, MORT&H.
b)	For production of concrete-
	i) For overall bridge length of less than 200m. – batch type concrete mixer diesel or electric operated, with a minimum size of 200 liters, automatic water measuring system and integral weigher (hydraulic/pneumatic type). ii) For overall bridge length of 200m. or more - concrete batching and mixing plant fully automatic with minimum capacity of 15 cum. per hour.
c)	Equipment used for production , transportation and compaction of concrete shall be as per provision made in clause 1707 of specifications for Road and Bridge works, MORT&H.
d)	The rates of both ordinary and controlled concrete of any mix is include the cost of preparing and testing concrete cubes as per specifications laid down.
e)	All concrete shall be required compaction to produce dense and homogeneous mass by means of vibrators unless otherwise permitted by the Engineer-in-Charge for exceptional cases, such as concreting under water where use of vibrator is prohibited.
f)	Concrete poured under water shall be required to provide extra cement @10% as per provision made in "Specifications for Roads & Bridges works" Ministry of Road Transport & Highway (5^{th} Revision).

g)	Finishing of concrete by plastering the surface shall not be done without obtaining written permission from the Executive Engineer. No extra for plastering shall be payable. Light touching up and rubbing the uneven surfaces by carborandum stone/Grinding shall be carried out as part of finishing of concrete surface.
h)	The grading, size, quality of coarse aggregates shall be followed strictly as per the specifications for Road and Bridge works" (Ministry of Road Transport & Highway) 5th revision and respective IRC Codes.
i)	The size and quality of aggregate, mixing etc. for plain concrete or R.C.C. work should be as given in "Specification for Road and Bridge works" of MORT&H (5th Revision).
j)	The rates of concreting items include the cost of form work and centering.
k)	Admixtures may be used for the concrete work to improve the workability with minimum water cement ratio and shall be provided as per provision made in clause 1705 of specifications.
7)	**<u>STEEL</u>**
i)	HSD (High Strength Deformed Steel bars) conforming to IS 1786-2008 shall be used as reinforcement. Such steel reinforcement bars shall be obtained from the Rolling Mills having integrated steel manufacturing plant and licensed from B.I.S. to manufacture steel for reinforcement. No. re-rolled steel shall be incorporated in the work. The contractor shall have to produce test certificate in the proforma prescribed/approved by B.I.S. from the manufacturer for every batch of steel brought to the site of work. Test Certificate shall be produced prior to it's use and kept at site.
ii)	If the steel is brought by the contractor, the contractor shall be responsible for ensuring the quality of steel and would be bound to conduct any or all tests at his cost for ensuring its quality as per directions of the Engineer-in-Charge. The theoretical consumption of steel shall be worked out at regular interval and shall be verified with actual steel brought to the site.
iii)	Steel used as reinforcement and other structural steel or H.T. steel shall be measured as per the actual quantity of steel placed in the finished structures as per clause 1608 of specification.

iv)	If the steel is issued by the department the contractor shall be paid for labour charges for steel on the quantity measured as per note above (i) Quantity as per theoretical requirement plus 10% (ten) shall be issued to the contractor and deductions will be made for the extra quantity (up to 10%) at rates specified in the N.I.T./Agreement if the steel is supplied by department. If the steel is brought by the contractor, the contractor is held responsible for the quality of the steel. He should use tested steel for which no extra payment is made for tests. If the steel is brought by the contractor measurement shall be recorded as per clause 1608 of specifications for Road and Bridges (MORT&H, 5th Revision).
8)	**<u>CEMENT</u>**
i)	If the cement is brought by the contractor, the contractor shall be responsible for ensuring the quality of cement and would be bound to conduct all tests at his cost for ensuring its quality as per directions of the Engineer-in-Charge. The theoretical consumption of cement shall be worked out at regular interval and shall be verified with actual cement brought to the site
ii)	The cement, if supplied by department at issue rate to the contractor shall not be more than the theoretical consumption plus 2%. If cement more than this is issued, recovery for the extra quantities shall be made at issue rate plus 10% or prevailing market rate whichever is higher.
iii)	The theoretical consumption of cement should be worked out after including all contingent works i.e., cement godowns, casting plat forms, bed blocks etc. which are necessary for the work in the opinion of Engineer-in-Charge and have actually been constructed, but shall not include items, which are executed for setting right the imperfections in work. This shall be applicable if cement is supplied by the department.
9)	**<u>MASONRY WORK</u>**
i)	All the stone masonry work shall be strictly as per detailed specifications given in "Specification for Road & Bridge works" of MORT&H (5th Revision).
ii)	In case stone headers are not available, precast headers of M-15 concrete shall be used. Cast-in situ headers are not permitted. Concrete headers may be permitted with the following conditions:

	a) If the cement is supplied departmentally and the cost of cement is recoverable from the contractor due allowance for the actual quantity of cement consumed in the use of cement concrete headers shall be permitted in cement consumption statement but no extra payment for providing cement concrete, headers shall be payable. b) If cement is brought by the contractor no extra payment shall be made for providing concrete headers in place of stone headers.
iii)	Generally for all stone masonry subjected to exposure of water flow (e.g. piers, abutments, returns etc.) C.R. Masonry first sort shall be used unless otherwise provided in the approved drawing.
iv)	In case where width of stone masonry is more than one meter, the central portion of stone masonry (Hearting) shall be done with un-coursed random rubble masonry. Payment for the C.R. Masonry will be limited to 1/2 meter width on either faces and the balance will be paid as un-coursed Random Rubble Masonry.
10)	Cost of Transportation of all materials from the place of delivery up to site of work: i) Is included in the rates of the item of this Schedule of Rates. ii) Materials, as may be required to be issued to the contractor by department shall be specified in the N.I.T. with place of delivery and their issue rates. iii)
11)	**<u>LEAD AND LIFTS</u>**
	The rates in all items of this S.O.R. are inclusive of all lead, lift and transportation of material. No extra on this account is payable unless otherwise specifically mentioned in any particular item.
12)	**<u>ROYALTY AND OTHER TAXES</u>**
	The rates for all items of work is excluding GST unless clearly specified otherwise, and include cost of all labour, materials, machinery, testing charges, royalty & other inputs involved in the execution of the items.

13)	**DISMANTLING**
	The rates include the complete cost of dismantling and shifting away the dismantled material to place at site of work as directed by Engineer-in-Charge and also the rates include the serviceable dismantled material to be properly stacked at river bank at a location directed by the Engineer-in-Charge.
14)	**STORAGE OF MATERIALS:** Storage of construction materials at site shall be as per clause 1014 & 1604 of the specifications.
15)	**MODE OF MEASUREMENTS:** The mode of measurements shall be as per provisions contained in the relevant clauses of the specifications unless specified otherwise.
16)	The rate includes the element of hire & operational charges of all types of plants, machinery and equipment required to complete the work unless specified otherwise.
17)	Rates include provisions of necessary precautionary devices and other arrangements etc. for traffic control, e.g. provision of caution boards, red lights, watchmen flags and flagmen but do not include construction of temporary diversion.
18)	The rates do not include the work of trial pits, which are to be measured and paid separately.
19)	The contractor is bound to install at the site of work a test laboratory capable of conducting all specified field tests as per direction of Engineer-in-Charge and the specified tests of material would be conducted in the presence of department's supervisory staff.
20)	Detailed measurements for steel and concrete for items of R.C.C. approach slab, R.C.C. Railing and R.C.C. wearing coat shall also be recorded in M.B. However the payment shall be regulated as per the item and rates given in the S.O.R.
21)	The measurements of rock excavation are to be done as per clause specified in the Book "Specification of Road and Bridge works" of MORT&H. All serviceable rock excavated shall be issued to the contractor at the rate of Rs. 250/- per cum.
22)	The basic rates for important materials considered in this S.O.R. are as follows :- **(a) Cement :- Rs. 5100.00 per M.T.** **(b) Steel (HSD bar) :- Rs. 41500.00 per M.T.** **(c) Structural Steel :- Rs. 43000.00 per M.T.** **(d) High Tensile Steel wires/strands :- Rs. 70000.00 per M.T**

CHAPTER –I

SITE CLEARANCE AND DISMANTLING

Item No.	Descriptions	Unit	Rate (Rs)
1.1	**Cutting of trees**, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all lifts and up to a lead of 1000 mtrs and earth filling in the depression/pit and as per relevant clauses of section-200 for :-		
i)	Girth from 300 mm to 600 mm	each	167
ii)	Girth beyond 600 mm to 900 mm	each	300
iii)	Girth beyond 900 mm to 1800 mm	each	581
iv)	Girth above 1800 mm	each	1101
1.2	**Clearing Grass and Removal of Rubbish** (clearing grass and removal of rubbish up to a distance of 50 meters outsite the periphery of the area)	hectare	11422
1.3	**Clearing and grubbing** road land including uprooting rank vegetation, grass, bushes, shrubs, saplings and trees girth up to 300 mm, removal of stumps of trees cut earlier and disposal of unserviceable materials and stacking of serviceable material to be used or auctioned up to a lead of 1000 meters including 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	34578
B	In area of thorny jungle	hectare	46311
1.4	**Dismantling of existing structures** like culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts and lead upto 1000 meters and as per relevant clauses of section-200 in		
(i)	**Lime / Cement Concrete**		
A	Lime Concrete, cement concrete grade M-10 and below	cum	250
B	Cement Concrete Grade M-15 & M-20	cum	296
C	Prestressed / Reinforced cement concrete grade M-20 & above	cum	772
(ii)	**Brick / Tile work**		
A	In lime mortar	cum	159
B	In cement mortar	cum	204
C	In mud mortar	cum	140
D	Dry brick pitching or brick soling	cum	131
(iii)	**Stone Masonry**		
A	Rubble stone masonry in lime mortar	cum	177
B	Rubble stone masonry in cement mortar.	cum	204
C	Rubble Stone Masonry in mud mortar.	cum	159
D	Dry rubble masonry	cum	150
E	Stone pitching/ dry stone spalls.	cum	140
F	Boulders laid in wire crates including opening of crates and stacking dismantled materials.	cum	159

Item No.	Descriptions	Unit	Rate (Rs)
(v)	Steel work in all types of sections upto a height of 5 m above plinth level excluding cutting of rivet.		
A	Including dismantling	**tonne**	**972**
B	Excluding dismantling.	**tonne**	**723**
C	Extra over item No (V) A and (V) B for cutting rivets.	**each**	**7**
(vi)	**Scraping of bricks dismantled from brick work including stacking.**		
A	In lime/Cement mortar	**1000 No.**	**800**
B	In mud mortar	**1000 No.**	**286**
(vii)	**Scraping of Stone from dismantled stone masonry**		
A	In cement and lime mortar	**cum**	**321**
B	In Mud mortar	**cum**	**68**
(viii)	**Scraping plaster in lime or cement mortar from brick/ stone masonry**	**sqm**	**10**
(ix)	Removing all type of hume pipes and stacking within a lead upto 1000 meters including earthwork and dismantling of masonry works around pipes.		
A	Up to 1000 mm dia	**meter**	**340**
B	Above 1000 mm dia	**meter**	**451**
1.5	**Dismantling of flexible pavements** and disposal of dismantled materials up to a lead of 1000 meters, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200.		
A	Bituminous courses	**cum**	**461**
B	Granular courses	**cum**	**332**
1.6	**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 lead upto 1000 meters, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200.	**cum**	**938**
1.7	**Dismantling guard rails** by manual means and disposal of dismantled material with all lifts and lead upto 1000 meters, stacking serviceable materials and unserviceable materials separately and as per relevant clauses of section-200.	**meter**	**50**
1.8	**Dismantling kerb stone** by manual means and disposal of dismantled material with all lifts and lead upto 1000 meter and as per relevant clauses of section-200.	**meter**	**9**
1.9	**Dismantling kerb stone channel** by manual means and disposal of dismantled material with all lifts and lead upto 1000 meter and as per relevant clauses of section-200.	**meter**	**14**

Item No.	Descriptions	Unit	Rate (Rs)
1.10	**Dismantling of kilometer stone** including cutting of earth, foundation and disposal of dismantled material with all lifts and lead upto 1000 m and backfilling of pits.		
A	5th KM stone	**each**	**247**
B	Ordinary KM Stone	**each**	**145**
C	Hectometer Stone	**each**	**29**
1.11	**Dismantling of barbed wire fencing/ wire mesh fencing** including posts, foundation concrete, back filling of pit by manual means including disposal of dismantled material with all lifts and up to a lead of 1000 meters, stacking serviceable material and unserviceable material separately.	**meter**	**32**
1.12	**Dismantling of CI water pipe line** 600 mm dia including disposal with all lifts and lead upto 1000 meters and stacking of serviceable material and unserviceable material separately under supervision of concerned department.	**meter**	**81**

CHAPTER –II

FOUNDATION

1. The excavation shall be paid as per the area of foundation concrete block, multiplied by the depth below average ground level at the location of foundation. The rates include the extra quantity of excavation required for providing the excavation in steps or slope as per direction of Engineer-in-Charge.

2. The rates of dewatering in a foundation are inclusive of any coffer damming or diversion of water course required to facilitate the bailing out of water in the particular foundation pit inclusive of all required machinery such as pumps compressors etc. including their hire and running charges, pay staff and P.O.L. etc. complete in all respects.

   The volume of dewatering payable shall be measured by multiplying the area of foundation block of the particular foundation with the height of average water level met with during the excavation of the particular foundation. The average water level shall be the average of water level met in excavation pit during excavation or water level in channel whichever is lower and the same observed on completion of excavation. The payment of this item shall be made only after the foundation structure is raised above water level or G.L. whichever is higher. The rate of this item shall not be reduced if coffer-damming or diversion of water course is not done, and dewatering is carried out by employing pumps and/or manually.

3. Excavated hard rock shall be stacked at suitable places at the bank as directed by Engineer-in-Charge. No extra for stacking lead, lift and transportation shall be payable.

4. Back filling up to original bed level shall be done as per clause 304.3.7 of "Specification for Road and Bridges". No extra shall be payable on this account.

5. The concrete mix used in bottom plug of wells shall have a minimum cement content of 330 kg/cum. & a slump of about 150 mm. the concrete shall be placed by tremie under still water condition & cement content of mix be increased by 10%.

6. A levelling coarse of 150mm thickness (Av.) in M-15 shall be provided before laying open foundations.

7. The rates of well sinking include the charges of labour, plant, cost of P.O.L. and other materials and accessories. The rates also include the cost of diversion of channel, making of island, if required to be done for laying the cutting edge, kerb and steining. the permissible tilt and shift in well in its final position shall be as per IRC-78-2014. The rates include the cost of rectification of tilt and shift in excess of permissible limit. No extra over these rates are payable for sinking of well.

8. For the purpose of the computation of the volume in well sinking, the cubic content of well shall be measured by the portion contained in outer diameter of well steining. Projection of R.C.C. kerb, if any shall not be measured.

9. The rates of concreting in all types of foundation include also the cost of formwork, staging etc. complete.

CHAPTER- II			
FOUNDATIONS			
Item No.	**Descriptions**	**Unit**	**Rate (Rs)**
2.1	**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 including dewatering etc. complete.		
I	**Ordinary soil**		
(i)	Upto 3 m depth	**cum**	**124**
(ii)	3 m to 6 m depth	**cum**	**142**
(iii)	Above 6 m depth	**cum**	**174**
	Add extra 20% in the rates of above items for dewatering (Assessment of dewatering shall be made as per site condition)		
	The cost of shoring and shuttering, where needed, be added @ 1 percent on cost of excavation for open foundation.		
II	**Ordinary rock (not requiring blasting)**	**cum**	**209**
	Add extra 20% in the rates of above items for dewatering (Assessment of dewatering shall be made as per site condition)		
III	**Hard rock (requiring blasting)**	**cum**	**576**
	Add extra 20% in the rates of above items for dewatering (Assessment of dewatering shall be made as per site condition)		
IV	**Hard rock (blasting prohibited)**	**cum**	**682**
	Add extra 20% in the rates of above items for dewatering (Assessment of dewatering shall be made as per site condition)		
V	**Marshy soil**		
	upto 3 m depth	**cum**	**417**
	Add extra 30% in the rates of above items for dewatering (Assessment of dewatering shall be made as per site condition)		
	Add extra for shoring and shuttering where needed.		
VI	**Back Filling in Marshy Foundation Pits as per specifications**	**cum**	**254**
2.2	**Filling Annular Space Around Footing in Rock** (Lean cement concrete M15 nominal mix.	**cum**	**3921**
2.3	**Sand Filling in Foundation Trenches** as per Drawing & Technical Specifications.	**cum**	**1049**
2.4	**Brick masonry work** in cement mortar 1:3 in foundation complete excluding pointing and plastering, as per drawing and technical specifications.	**cum**	**4336**
2.5	**Stone masonry** work in cement mortar 1:3 in foundation complete as drawing and Technical Specifications and as per clauses of section 1500,1700 and 2100.		
(i)	Square Rubble Coursed rubble masonry (first sort)	**cum**	**3278**
(ii)	Random Rubble Masonry Coursed / uncoursed	**cum**	**3366**
2.6	**Plain/Reinforced cement concrete in open foundation** complete as per drawing and technical specifications.		
A	**Using concrete mixer**		

Item No.	Descriptions	Unit	Rate (Rs)
(i)	PCC Grade M15	**cum**	**3921**
(ii)	PCC Grade M20	**cum**	**4460**
(iii)	PCC Grade M25	**cum**	**5033**
(iv)	PCC Grade M30	**cum**	**5063**
(v)	RCC Grade M20	**cum**	**4502**
(vi)	RCC Grade M25	**cum**	**5082**
(vii)	RCC Grade M30	**cum**	**5093**
(viii)	RCC Grade M35	**cum**	**5177**
B	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	PCC Grade M20	**cum**	**4521**
(ii)	PCC Grade M25	**cum**	**5091**
(iii)	PCC Grade M30	**cum**	**5116**
(iv)	RCC Grade M20	**cum**	**4558**
(v)	RCC Grade M25	**cum**	**5137**
(vi)	RCC Grade M30	**cum**	**5149**
(vii)	RCC Grade M35	**cum**	**5232**
2.7	**Well Foundation** (Providing and constructing temporary island for construction of foundation for Well.)		
(i)	Depth of water 1.0 m and height of island to be 1.25m.	**each**	**32593**
(ii)	Depth of water 5.0 m and height of island 5.5 m.	**each**	**223491**
(iii)	Providing and constructing one span service road to reach island location from one pier location to another pier location	**meter**	**1496**
2.8	**Providing and laying cutting edge of mild steel** weighing 40 kg per meter for well foundation complete as per drawing and technical specifications per relevant clause of section 1200 and 1900.	**MT**	**68541**
2.9	**Plain/Reinforced cement concrete, in well foundation** complete as per drawing and technical specification as per clauses of section 1200,1500 and 1700.		
A	**Well curb**		
(a)	**Using concrete mixer**		
(i)	RCC Grade M25	**cum**	**5879**
(ii)	RCC Grade M35	**cum**	**6032**
(b)	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	RCC Grade M25	**cum**	**5942**
(ii)	RCC Grade M35	**cum**	**6096**
B	**Well steining**		
(a)	**Using concrete mixer**		
(i)	PCC Grade M15	**cum**	**4148**
(ii)	PCC Grade M20	**cum**	**4718**
(iii)	PCC Grade M25	**cum**	**5336**
(iv)	PCC Grade M30	**cum**	**5409**
(v)	RCC Grade M20	**cum**	**4763**
(vi)	RCC Grade M25	**cum**	**5388**
(vii)	RCC Grade M30	**cum**	**5415**

Item No.	Descriptions	Unit	Rate (Rs)
(b)	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	PCC Grade M25	**cum**	**5398**
(ii)	PCC Grade M30	**cum**	**5465**
(iii)	RCC Grade M20	**cum**	**4821**
(iv)	RCC Grade M25	**cum**	**5447**
(v)	RCC Grade M30	**cum**	**5474**
C	**Bottom Plug**		
(a)	**Using concrete mixer**		
(i)	PCC Grade M20	**cum**	**4859**
(ii)	PCC Grade M25	**cum**	**5279**
(iii)	PCC Grade M30	**cum**	**5321**
(b)	**Using Batching Plant, Transit Mixer and Crane/concrete pump**		
(i)	PCC Grade M20	**cum**	**4939**
(ii)	PCC Grade M25	**cum**	**5356**
(iii)	PCC Grade M30	**cum**	**5402**
D	**Intermediate plug**		
(a)	**Using concrete mixer**		
(i)	PCC Grade M20	**cum**	**4853**
(ii)	PCC Grade M25	**cum**	**5052**
(b)	**Using Batching Plant, Transit Mixer and Crane/concrete pump**		
(i)	PCC Grade M20	**cum**	**4938**
(ii)	PCC Grade M25	**cum**	**5136**
E	**Top plug**		
(a)	**Using Concrete Mixer**		
(i)	PCC Grade M15	**cum**	**3771**
(ii)	PCC Grade M20	**cum**	**4289**
(iii)	PCC Grade M25	**cum**	**4852**
(b)	**Using Batching Plant, Transit Mixer and Crane/concrete pump**		
(i)	PCC Grade M25	**cum**	**4908**
F	**Well cap**		
(a)	**Using concrete Mixer**		
(i)	RCC Grade M25	**cum**	**5082**
(ii)	RCC Grade M30	**cum**	**5093**
(iii)	RCC Grade M35	**cum**	**5177**
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	RCC Grade M25	**cum**	**5138**
(ii)	RCC Grade M30	**cum**	**5148**
(iii)	RCC Grade M35	**cum**	**5232**
(iv)	RCC Grade M40	**cum**	**5324**
2.10	**Sinking of 6 m external diameter well** (other than pneumatic method of sinking) through all types of soil and rock complete as per drawing and technical specifications as per section 1200 in (the rate include removal of all type of obstructions).		

Item No.	Descriptions	Unit	Rate (Rs)
A	**Sandy / Clayey Soil**		
(i)	**Depth below bed level upto 3.0 M**	**cum**	**389**
(ii)	**Beyond 3m upto 10m depth**	**cum**	**763**
(iii)	**Beyond 10 m upto 20 m**		
	Notes		
a)	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
(iv)	**Beyond 20m upto 30 m**		
a)	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
B	**Soft rock (6m dia well)**	**Cum**	**882**
C	**Hard rock (6m dia well)**	**Cum**	**938**
2.11	**Sinking of 7 m external diameter well** (other than pneumatic method of sinking) through all types of soil and rock complete as per drawing and technical specifications as per section 1200 in (the rate include removal of all type of obstructions).		
A	**Sandy / Clayey Soil**		
(i)	**Depth below bed level upto 3.0 M**	**Cum**	**419**
(ii)	**Beyond 3m upto 10m depth**	**Cum**	**567**
(iii)	**Beyond 10 m upto 20 m**		
	Notes		
a)	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
(iv)	**Beyond 20m upto 30 m**		
a)	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
B	**Soft rock (7m dia well)**	**Cum**	**618**
C	**Hard rock (7m dia well)**	**Cum**	**780**
2.12	**Sinking of 8 m external diameter well** (other than pneumatic method of sinking) through all types of soil and rock complete as per drawing and technical specifications as per section 1200 in (the rate include removal of all type of obstructions).		
A	**Sandy / Clayey Soil**		
(i)	**Depth upto 3.0 M**	**Cum**	**392**
(ii)	**Beyond 3m upto 10m depth**	**Cum**	**444**
(iii)	**Beyond 10 m upto 20 m**		
	Notes		
a)	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
(iv)	**Beyond 20m upto 30 m**		
a)	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
B	**Soft rock (8m dia well)**	**Cum**	**527**
C	**Hard rock (8m dia well)**	**Cum**	**598**
2.13	**Sinking of 9 m external diameter well** (other than pneumatic method of sinking) through all types of soil and rock complete as per drawing and technical specifications as per section 1200 in (the rate include removal of all type of obstructions).		
A	**Sandy / Clayey Soil**		
(i)	**Depth below bed level upto 3.0 M**	**Cum**	**325**
(ii)	**Beyond 3m upto 10m depth**	**Cum**	**379**

Item No.	Descriptions	Unit	Rate (Rs)
(iii)	**Beyond 10 m upto 20 m**		
	Notes		
a)	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
(iv)	**Beyond 20m upto 30 m**		
a)	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
B	**Soft rock (9m dia well)**	**Cum**	**514**
C	**Hard rock (9m dia well)**	**Cum**	**563**
2.14	**Sinking of 10 m external diameter well** (other than pneumatic method of sinking) through all types of soil and rock complete as per drawing and technical specifications as per section 1200 in (the rate include removal of all type of obstructions).		
A	**Clayey soil (10m dia. Well)**		
(i)	**Depth below bed level upto 3.0 M**	**Cum**	**282**
(ii)	**Beyond 3m upto 10m depth**	**Cum**	**295**
(iii)	**Beyond 10 m upto 20 m**		
	Notes		
A	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
B	**Add for dewatering @ 5% of cost, if required.**		
(iv)	**Beyond 20m upto 30 m**		
A	Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
B	**Soft rock (10m dia well)**	**Cum**	**452**
C	**Hard rock (10m dia well)**	**Cum**	**510**
2.15	**Sand filling in wells** complete as per drawing and technical specifications as per section 1210.	**cum**	**1049**
2.16	**Providing steel liner** 10 mm thick for curbs and 6mm thick for steining of wells including fabricating and setting out as per detailed drawing and specifications as per section 1200 and 1900.	**MT**	**61659**
2.17	**Bored cast-in-situ M35 grade R.C.C. pile** excluding reinforcement complete as per drawing and technical specifications and removal of excavated earth with all lifts and lead upto 1000 m as per section 1100 and 1700.		
(i)	Pile diameter-750 mm	**meter**	**6656**
(ii)	Pile diameter-1000 mm	**meter**	**10706**
(iii)	Pile diameter-1200 mm	**meter**	**13339**
2.18	**Driven cast-in-place vertical M35 grade R.C.C. pile** excluding reinforcement complete as per drawing & Technical Specification as per section 1100 and 1700.		
(i)	Pile diameter-750 mm	**meter**	**4822**
(ii)	Pile diameter-1000 mm	**meter**	**7505**
(iii)	Pile diameter-1200 mm	**meter**	**10997**
2.19	**Driven precast vertical M35 grade R.C.C. piles** excluding reinforcement complete as per drawing & Technical Specification as per section 1100 and 1700.		
(i)	Pile diameter-500 mm	**meter**	**2431**
(ii)	Pile diameter-750 mm	**meter**	**3772**

Item No.	Descriptions	Unit	Rate (Rs)
(iii)	Pile diameter-1000 mm	**meter**	**6022**
2.20	**Driven precast vertical M35 grade R.C.C. piles** excluding reinforcement complete as per drawing & Technical Specification as per section 1100 and 1700.		
(i)	Size of pile - 300 mm x 300 mm	**meter**	**1848**
(ii)	Size of pile - 500 mm x 500 mm	**meter**	**2676**
(iii)	Size of pile - 750 mm x 750 mm	**meter**	**4673**
2.21	**Pile Load Test on single Vertical Pile in accordance with IS:2911(Part-IV) in static load method only**		
(i)	Initial and routine load test	**Tonne**	**1275**
(ii)	Lateral load test	**Each Test**	**63750**
2.22	**Cement concrete for reinforced concrete in pile cap** complete as per drawing and Technical Specifications per clause 1100,1500 and 1700.		
A	**Using concrete mixer**		
(i)	RCC Grade M25	**cum**	**4855**
(ii)	RCC Grade M30	**cum**	**4903**
(iii)	RCC Grade M35	**cum**	**5003**
(iv)	RCC Grade M40	**cum**	**5296**
(v)	RCC Grade M45	**cum**	**5545**
(vi)	RCC Grade M50	**cum**	**5722**
B	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	RCC Grade M25	**cum**	**4918**
(ii)	RCC Grade M30	**cum**	**4978**
(iii)	RCC Grade M35	**cum**	**5066**
(iv)	RCC Grade M40	**cum**	**5350**
(v)	RCC Grade M45	**cum**	**5598**
(vi)	RCC Grade M50	**cum**	**5776**
2.23	**Levelling course for Pile cap** (Providing and laying of P.C.C.M-15 levelling course 100mm thick below the pile cap.)	**cum**	**3841**
2.24	**Supplying, fitting and placing HSD (High Strength Deformed Steel) bar reinforcement in foundation** complete as per drawing and technical specifications as per section 1600.	**MT**	**58389**
2.25	**Taking exploratory boring 100 mm dia.** at the location of piers and abutments or for high embankments in approaches in all types of strata as per I.R.C. 78-2014 and section 2400 of specifications for collection of samples at different depth (rock sample and undisturbed soil sample) and test including preserving core samples as per specifications.		
(i)	Upto 1.0 m below bed level	**each**	**5058**
(ii)	Beyond 1.0 m upto 5.0 m depth	**meter**	**1105**
(iii)	Beyond 5.0 m depth	**meter**	**1254**

Item No.	Descriptions	Unit	Rate (Rs)
2.25 A	Taking trial boring 100 mm dia. For detailed investigation with diamond drill double tube in all type of Hard Rock including all materials such as casing pipes, accessories, grease and other such materials and or as required including conveying such materials and machinery to site of work preserving the loos sample and core sample serially numberd at the site of work and conveying the same to the head quaters of concerned office as directed and submission of detailed bore log sheet as per I.R.C. 78-2014 and section 2400 includind testing and preserving rock core sample in core boxes as per specifications.	**meter**	**4127**
2.25 B	Taking trial boring 100 mm dia. For detailed investigation with diamond drill double tube in all shft soil, moorum, gravels, boulders and soft rock including all materials such as casing pipes, accessories, grease and other such materials and or as required including conveying the loos sample and core sample serially numberd at the site of work and conveying the same to the head quaters of concerned office as directed and submission of detailed bore log sheet as per I.R.C. 78-2014 and section 2400 includind testing of sample as per specifications.	**meter**	**1980**
2.26	**Providing and laying 1.5 m deep in rock and 1.5 m above rock 25 mm dia Tor Steel dowel bars in foundation** including drilling 65mm dia bore hole in rock necessary bending, hooking, tying, reinforcement in position and grouting etc. complete as per drawings and specifications.	**each**	**863**

CHAPTER –III

SUB-STRUCTURE

1. The rates of bearing are inclusive of the charges required for testing of bearing, procurement, transport, if required greasing while storing and at the time of fixing etc. all complete.

2. The use of A.C. Pipes for weep holes is permitted only in PCC/RCC/Brick masonry sub-structure. In stone masonry inbuilt weep holes of size 80mm x 150mm shall be constructed and no extra for this work is payable. No deduction for the recess or for pipes due to weep holes shall be made in the measurement of stone/brick masonry, PCC and RCC.

3. The rates of concreting in all items include the cost of form work and staging.

4. For elastomeric bearing pads the concrete surface shall be leveled such that the variation is not more than 1.5mm from the straight edge placed in any direction across the area.

5. The bearings should be procured only from those manufactures who have not been disqualified by MORT&H. Only finished weight of bearings as brought to the site and fixed in position shall be taken into account for measurement.

6. Use of plate compactor is mandatory for compaction of back fill behind the abutment and returns and filter media shall be provided as per provision MORT & H clause 2504 and table No. 300-3.

CHAPTER – III

SUB-STRUCTURE

Item No.	Descriptions	Unit	Rate (Rs)
3.1	**Brick masonry work in 1:3 in sub-structure** complete excluding pointing and plastering, as per drawing and technical specifications as per section 1300 and 2200.	**cum**	**4552**
3.2	Add extra to item above if fly ash brick work are used.	**cum**	**456**
3.3	P**ointing with cement mortar (1:3) on brick work in substructure** as per Technical specifications section 1300 and 2200.	**sqm**	**44**
3.4	**Plastering with cement mortar (1:3) on brick work in sub-structure** as per Technical specifications section 1300 and 2200.	**sqm**	**94**
3.5	**Stone masonry work in cement mortar 1:3 for substructure** complete as per drawing and Technical Specifications section 1400 and 2200.		
(i)	Random Rubble Masonry	**cum**	**3373**
(ii)	Coursed rubble masonry (first sort)	**cum**	**3514**
(iii)	Ashlar masonry (first sort)	**cum**	**4149**
3.6	**Providing and laying Plain/Reinforced cement concrete in sub-structure** complete as per drawing and technical specifications section 1500, 1700 and 2200 (Newly laid concrete shall be covered by gunny bags).		
A	**Height upto 5m**		
(a)	**Using concrete Mixer**		
(i)	P.C.C. Grade M-15	**cum**	**4148**
(ii)	P.C.C. Grade M-20	**cum**	**4718**
(iii)	P.C.C. Grade M-25	**cum**	**5336**
(iv)	P.C.C. Grade M-30	**cum**	**5409**
(b)	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	P.C.C. Grade M-25	**cum**	**5398**
(ii)	P.C.C. Grade M-30	**cum**	**5465**
B	**Height 5m to 10m**		
(a)	**Using concrete Mixer**		
(i)	P.C.C. Grade M-25	**cum**	**5531**
(ii)	P.C.C. Grade M-30	**cum**	**5605**
(b)	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	P.C.C. Grade M-25	**cum**	**5595**
(ii)	P.C.C. Grade M-30	**cum**	**5664**
C	**Height above 10m**		
(a)	**Using concrete Mixer**		
(i)	P.C.C. Grade M-25	**cum**	**5773**
(ii)	P.C.C. Grade M-30	**cum**	**5851**
(b)	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	P.C.C. Grade M-25	**cum**	**5840**

Item No.	Descriptions	Unit	Rate (Rs)
(ii)	P.C.C. Grade M-30	**cum**	**5913**
D	**Height upto 5m**		
(a)	**Using concrete Mixer**		
(i)	R.C.C. Grade M-20	**cum**	**4763**
(ii)	R.C.C. Grade M-25	**cum**	**5388**
(iii)	R.C.C. Grade M-30	**cum**	**5415**
(iv)	R.C.C. Grade M-35	**cum**	**5529**
(v)	R.C.C. Grade M-40	**cum**	**5590**
(vi)	R.C.C. Grade M-45	**cum**	**5851**
(vii)	R.C.C. Grade M-50	**cum**	**6039**
(viii)	R.C.C. Grade M-55	**cum**	**6333**
(b)	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	R.C.C. Grade M-20	**cum**	**4821**
(ii)	R.C.C. Grade M-25	**cum**	**5447**
(iii)	R.C.C. Grade M-30	**cum**	**5474**
(iv)	R.C.C. Grade M-35	**cum**	**5589**
(v)	R.C.C. Grade M-40	**cum**	**5817**
(vi)	R.C.C. Grade M-45	**cum**	**6087**
(vii)	R.C.C. Grade M-50	**cum**	**6281**
(viii)	R.C.C. Grade M-55	**cum**	**6583**
E	**Height 5m to 10m**		
(a)	**Using concrete Mixer**		
(i)	R.C.C. Grade M-20	**cum**	**4936**
(ii)	R.C.C. Grade M-25	**cum**	**5565**
(iii)	R.C.C. Grade M-30	**cum**	**5567**
(iv)	R.C.C. Grade M-35	**cum**	**5650**
(v)	R.C.C. Grade M-40	**cum**	**5687**
(vi)	R.C.C. Grade M-45	**cum**	**5926**
(vii)	R.C.C. Grade M-50	**cum**	**6089**
(viii)	R.C.C. Grade M-55	**cum**	**6355**
(b)	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	R.C.C. Grade M-20	**cum**	**4996**
(ii)	R.C.C. Grade M-25	**cum**	**5624**
(iii)	R.C.C. Grade M-30	**cum**	**5628**
(iv)	R.C.C. Grade M-35	**cum**	**5710**
(v)	R.C.C. Grade M-40	**cum**	**5917**
(vi)	R.C.C. Grade M-45	**cum**	**6164**
(vii)	R.C.C. Grade M-50	**cum**	**6333**
(viii)	R.C.C. Grade M-55	**cum**	**6607**
F	**Height above 10m**		
(a)	**Using concrete Mixer**		
(i)	R.C.C. Grade M-20	**cum**	**5153**
(ii)	R.C.C. Grade M-25	**cum**	**5829**

Item No.	Descriptions	Unit	Rate (Rs)
(iii)	R.C.C. Grade M-30	**cum**	**5833**
(iv)	R.C.C. Grade M-35	**cum**	**5831**
(v)	R.C.C. Grade M-40	**cum**	**5869**
(vi)	R.C.C. Grade M-45	**cum**	**6011**
(vii)	R.C.C. Grade M-50	**cum**	**6176**
(viii)	R.C.C. Grade M-55	**cum**	**6448**
(b)	**With Batching Plant, Transit Mixer and Concrete Pump**		
(i)	R.C.C. Grade M-20	**cum**	**5216**
(ii)	R.C.C. Grade M-25	**cum**	**5892**
(iii)	R.C.C. Grade M-30	**cum**	**5921**
(iv)	R.C.C. Grade M-35	**cum**	**6069**
(v)	R.C.C. Grade M-40	**cum**	**6107**
(vi)	R.C.C. Grade M-45	**cum**	**6253**
(vii)	R.C.C. Grade M-50	**cum**	**6423**
(viii)	R.C.C. Grade M-55	**cum**	**6703**
3.7	**Supplying, fitting and placing HSD (High Strength Deformed Steel) bars reinforcement in sub-structure** complete as per drawing and technical specifications section 1600 and 2200.	**MT**	**58652**
3.8	**Providing weep holes in Brick masonry/ Plain/ Reinforced concrete abutment, wing wall/return wall** with 100 mm dia. AC pipe, extending through the full width of the structure with slope of 1 V: 20 H towards drawing face. Complete as per drawing and Technical specifications section 2706 and 2200.	**meter**	**273**
3.9	**Back filling behind abutment**, wing wall and return wall complete as per drawing and Technical specification 710.1.4 of I.R.C. 78 and 2200. (i) Granular material	**cum**	**769**
3.10	**Providing and laying of Filter media** with granular materials/stone crushed aggregates satisfying the requirements laid down in clause 2504.2.2. of MORT&H specifications to a thickness of not less than 600 mm with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and technical specifications 710.1.4 of I.R.C. 78 and 2200.	**cum**	**1637**
3.11	**Supplying, fitting and fixing in position true to line and level cast steel rocker bearing** conforming to IRC: 83(Pt.-1) section IX and clause 2003 of MORT&H specifications complete including all accessories as per drawing and Technical Specifications section 2000, 1000 and 2200.	**Per tonne capacity**	**383**
3.12	**Supplying, fitting and fixing in position true to line and level forged steel roller bearing** conforming to IRC: 83(Pt.-1) section IX and clause 2003 of MORT&H specifications complete including all accessories as per drawing and Technical Specifications section 2000, 1000 and 2200.	**Per tonne capacity**	**451**

Item No.	Descriptions	Unit	Rate (Rs)
3.13	**Supplying, fitting and fixing in position true to line and level sliding plate bearing** with PTFE surface sliding on stainless steel complete including all accessories as per drawing and Technical Specifications and BS: 5400, section 9.1 & 9.2 (for PTFE) and clause 2004 of MORT&H Specifications section 2000 and 2200.	**Per tonne capacity**	**402**
3.14	**Supplying, fitting and fixing in position true to line and level elastomeric bearing** conforming to IRC: 83 (Part-II) section IX and clause 2005 of MORT&H specifications complete including all accessories as per drawing and Technical Specifications section 2000 and 2200.	**Per cubic centimeter**	**0.85**
3.15	**Supplying, fitting and fixing in position true to line and level sliding plate bearing** with stainless steel plate sliding on stainless steel plate with mild steel matrix complete including all accessories as per drawing and Technical Specifications section 2000 and 2200.	**Per tonne capacity**	**362**
3.16	**Supplying, fitting and fixing in position true to line and level POT-PTFE bearing** consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, complete assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC: 83 part-I & II respectively and other parts conforming to BS: 5400, section 9.1 & 9.2 and clause 2006 of MORT&H Specifications complete asper drawing and approved technical specifications.	**Per tonne capacity**	**265**
3.17	**Providing and fixing in position tar paper bearing** for slab as per approved drawings and specification.	**sqm**	**56**
3.18 (a)	Casting and jacking precast R.C.C box of M-35 grade controlled concrete of approved design mix below Railway tracks under running traffic conditions by pushing technique including providing thrust bed as per design providing drag sheet of mild steel in front and rear shield in end of box segment and providing intermediate jacking stations etc., complete in all respect including the cost of necessary excavation (including all types of soils & rock). lead, lift, all temporary works (including dewatering). making the joints of boxes water tight by synthetic base mechanically mixed epoxy grouting with all plant and machinery with all labour and material including cost of cement and steel, structural steel, binding wire as required for RCC box thrust bed and for temporary works eic., complete in all respect as per approved design and drawing including curing etc. Epoxy paintings of approved make in two coats on outer 3 surfaces of entire Pre-cast box.	**cum**	**18594**

Item No.	Descriptions	Unit	Rate (Rs)
3.18 (b)	Supply and spreading of machine broken clean hard angular and durable stone ballast to latest Railways specification and stacking at suitable location near at site and as approved by the Engineer-in-charge at site. (The rate will include all lead and lift, loading and unloading, providing tools and plants, labour and screen of approved mesh and dimensions required for inspection and passing at the time of measurement). The contractor should make ground level to enable levels being taken by Engincer-in-charge at site prior to stacking. The rate shall also include spreading uniformly in specified depth and width and maintaining profile including all operations like dressing of formation as required and as directed by Engineer-in-charge	**cum**	**1233**
3.18 (c)	Providing & fixing in position high density polyethylene pipe of approved quality to fit around the dowel bars of 32 mm dia. left at the end of expansion joints duly grease inside the pipe and around the bars, and the pipe duly capped at the end with glass wool and cap as directed. (The HDPE pipe shall be 30 cms in length)	**Nos**	**26**

CHAPTER –IV
SUPER-STRUCTURE

1. The rates of concreting include the cost of form work, centering staging etc. complete.

2. For super structure only steel form work will be accepted. The thickness of steel plate shall not be less than 3 mm. The form work shall be adequately stiffened by brackets and angles not more than 15 cm. apart in such a manner that it is free from distortion during handling and vibration of concrete. No extra for form work shall be payable.

3. Centering made up of steel trusses below soffit shall not be supported in recess made in sub-structure. The contractor may provide steel trusses supported on suitably designed bracket, anchored to the pier/pier-cap. Providing safe centering shall be solely contractor's responsibility. The contractor shall remove all bolts, anchors protruding beyond the pier/pier-cap after removal of centering. No extra for centering shall be payable.

4. Contractor shall have the option to adopt launching of super-structure but in such cases prior permission of the department be obtained by getting launching arrangement initially approved. No deduction in the rate of concrete would be done nor any extra would be paid in case the launching is resorted to.

5. The rate of prestressing of H.T. steel is complete rate including hire and running expenses of plant and machineries, labour involved in stressing operations, anchorages and ducts or sheathing etc., complete including grouting.

6. The rates of wearing coat are inclusive of reinforcement provided, construction joints between panels and the form work at the panels. Construction joints in panel shall be 10 mm. wide and shall be filled with premoulded joint filler. Filling of expansion joints between span over piers/abutment or at articulation is not included in the rate.

7. The payment of railing includes the construction of required intermediate posts and end posts. The length of railing for payment purposes on each side separately, be measured from the outer edges of end posts.

8. New type expansion joints may be obtained from prequalified suppliers by MORT&H and the firm will have to give warranty of 10 years of trouble free performance.

CHAPTER- IV			
SUPER-STRUCTURE			
Item No.	**Descriptions**	**Unit**	**Rate (Rs)**
4.1	**Furnishing and Placing Reinforced/Prestressed cement concrete in super-structure as per drawing and Technical Specification sections 1500, 1600 and 1700 (Newly laid concrete shall be covered by gunny bags).**		
A	**RCC Grade M25**		
I	**For Solid Slab Super Structure**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**5845**
(ii)	Height 5m to 10m	**cum**	**6089**
(iii)	Height above 10m	**cum**	**6333**
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**5913**
(ii)	Height 5m to 10m	**cum**	**6160**
(iii)	Height above 10m	**cum**	**6406**
II	**For T-beam & slab**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**6089**
(ii)	Height 5m to 10m	**cum**	**6333**
(iii)	Height above 10m	**cum**	**6576**
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**6160**
(ii)	Height 5m to 10m	**cum**	**6406**
(iii)	Height above 10m	**cum**	**6653**
B	**RCC Grade M 30**		
I	**For Solid Slab Super Structure**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**5927**
(ii)	Height 5m to 10m	**cum**	**6174**
(iii)	Height above 10m	**cum**	**6421**
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**5977**
(ii)	Height 5m to 10m	**cum**	**6226**
(iii)	Height above 10m	**cum**	**6475**
II	**For T-beam & slab**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**6174**
(ii)	Height 5m to 10m	**cum**	**6421**
(iii)	Height above 10m	**cum**	**6667**

Item No.	Descriptions	Unit	Rate (Rs)
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**6226**
(ii)	Height 5m to 10m	**cum**	**6475**
(iii)	Height above 10m	**cum**	**6724**
C	**RCC/PSC Grade M35**		
I	**For Solid Slab Super Structure**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**5952**
(ii)	Height 5m to 10m	**cum**	**6204**
(iii)	Height above 10m	**cum**	**6456**
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**5997**
(ii)	Height 5m to 10m	**cum**	**6251**
(iii)	Height above 10m	**cum**	**6505**
II	**For T-beam & slab**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**6204**
(ii)	Height 5m to 10m	**cum**	**6456**
(iii)	Height above 10m	**cum**	**6708**
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**6251**
(ii)	Height 5m to 10m	**cum**	**6505**
(iii)	Height above 10m	**cum**	**6759**
III	**For Box Girder and Balanced Cantilever**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**6961**
(ii)	Height 5m to 10m	**cum**	**7465**
(iii)	Height above 10m	**cum**	**7969**
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**7013**
(ii)	Height 5m to 10m	**cum**	**7522**
(iii)	Height above 10m	**cum**	**8029**
D	**PSC Grade M-40**		
I	**For Solid Slab Super Structure**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**6153**
(ii)	Height 5m to 10m	**cum**	**6410**
(iii)	Height above 10m	**cum**	**6666**

Item No.	Descriptions	Unit	Rate (Rs)
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**6066**
(ii)	Height 5m to 10m	**cum**	**6322**
(iii)	Height above 10m	**cum**	**6579**
II	**For T-beam & slab**		
(a)	**Using Concrete Mixer**		
(i)	Height upto 5m	**cum**	**6410**
(ii)	Height 5m to 10m	**cum**	**6666**
(iii)	Height above 10m	**cum**	**6922**
(b)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**6322**
(ii)	Height 5m to 10m	**cum**	**6579**
(iii)	Height above 10m	**cum**	**6837**
III	**For cast in situ Box Girder, Segment Construction and Balanced Cantilever**		
	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	**cum**	**7093**
(ii)	Height 5m to 10m	**cum**	**7608**
(iii)	Height above 10m	**cum**	**8122**
E	**PSC Grade M-45**		
I	**For solid slab/voided slab super-structure**		
(a)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**6240**
(ii)	Height 5m to 10m	**cum**	**6508**
(iii)	Height above 10m	**cum**	**6777**
II	**For T-beam & slab including launching of precast girders by launching truss upto 40 m span**		
(a)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**6508**
(ii)	Height 5m to 10m	**cum**	**6777**
(iii)	Height above 10m	**cum**	**7047**
III	**For cast-in-situ box girder, segmental construction and balanced cantilever**		
(a)	**Using Batching Plant, Transit Mixer and Concrete Pump**		
(i)	Height upto 5m	**cum**	**7315**
(ii)	Height 5m to 10m	**cum**	**7853**
(iii)	Height above 10m	**cum**	**8391**

Item No.	Descriptions	Unit	Rate (Rs)
F	**PSC Grade M-50**		
	For cast-in-situ box girder, segmental construction and balanced cantilever Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	**cum**	**7492**
(ii)	Height 5m to 10m	**cum**	**8047**
(iii)	Height above 10m	**cum**	**8602**
G	**PSC Grade M-55**		
	For cast-in-situ box girder, segmental construction and balanced cantilever		
	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	**cum**	**7852**
(ii)	Height 5m to 10m	**cum**	**8435**
(iii)	Height above 10m	**cum**	**9016**
4.2	**Supplying, fitting and placing HSD (High Strength Deformed Steel) bar reinforcement** in super-structure complete as per drawing and technical specifications	**MT**	**59586**
4.3	**High tensile steel wires/strands including all accessories for stressing**, stressing operations and grouting complete as per drawing and Technical Specifications	**MT**	**136346**
4.4	**Providing and laying Cement concrete wearing coat M-30 grade** including reinforcement complete as per drawing and Technical Specifications as per relevant clause of section 2700.	**cum**	**10070**
4.5	**Construction of precast RCC railing of M30 Grade**, aggregate size not exceeding 12 mm, true to line and grade, tolerance of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications as per relevant clauses of section 1500, 1600, 1700 and 2703 (vide drawing No. SD/202, SD/304)	**meter**	**1593**
4.6	**Construction of RCC railing of M30 Grade in-situ with 20 mm** nominal size aggregate, true to line and grade, tolerance of vertical RCC post not to exceed 1 in 500, centre to centre spacing between vertical post not to exceed 2000 mm, leaving adequate space between vertical post for expansion, complete as per approved drawings and technical specifications. (vide drawing No. SD/201, SD/304)	**meter**	**1546**
4.7	**Providing, fitting and fixing mild steel railing** complete as per drawing and Technical Specification and as per relevant clauses of section 1900 and 2703.2	**meter**	**2519**

Item No.	Descriptions	Unit	Rate (Rs)
4.8	**Providing and Fixing in position collapsible pipe railing** of approved design including 2 coats painting etc. complete with channel post ISMC 100x50mm (0.95m high) and 48.4mm outer dia lighter type class "A" **G.I. pipe** excluding cost of end concrete post.	**meter**	**1301**
4.8 (a)	**Providing and Fixing in position channel post and 48.4mm outer dia lighter type class A G.I. pipe railing** including 2 coats painting etc. complete including cost of cement but excluding end concrete post as per approved department drawing & specifications.	**RM**	**1465**
4.9	**Drainage Spouts** complete as per drawing and Technical specifications of section 2705	**Each**	**1706**
4.10	**PCC M15 Grade leveling course below approach** slab complete as per drawing and Technical specification and as per relevant section 2700	**Cum**	**3771**
4.11	**Providing and laying M-30 grade Reinforced cement concrete** approach slab including reinforcement and formwork complete as per drawing and Technical specification and as per relevant sections 1500, 1600, 1700 and 2704	**Cum**	**8302**
4.12	**Providing anti-corrosive treatment to HSD (High Strength Deformed Steel) reinforcement** with Fusion Bonded Epoxy Coating (FBEC) (To be taken as per the prevailing market rates.)	**tonne**	**20757**
4.13	**Providing and fixing Helical pipes of 600mm dia in voided concrete slabs** including 20mm dia tie rod and sealing joints etc. as per section 1700 and 1800.	**M**	**570**
4.14	**Filler joint**		
A	Providing & fixing 2 mm thick corrugated copper plate (12 m long x 25 cm wide) in expansion joint complete as per drawing & Technical Specification.	**sqm**	**18581**
B	Providing & fixing 20 mm thick compressible fiber board (12 m long x 25 cm deep) in expansion joint complete as per drawing & Technical Specification.	**sqm**	**1023**
C	Providing and fixing in position 20 mm thick premoulded joint filler (12 m long x 30 cm deep) in expansion joint for fixed ends of simply supported spans not exceeding 10 m to cater for a horizontal movement upto 20 mm, covered with sealant complete as per drawing and technical specifications.	**Sqm**	**581**
D	Providing and filling joint sealing compound (12 m long x 100 mm wide x 10 mm deep recess) as per drawings and technical specifications with coarse sand and 6% bitumen by weight	**Sqm**	**187**

Item No.	Descriptions	Unit	Rate (Rs)
4.15	**Asphaltic Plug joint** (Providing and laying of asphaltic plug joint to provide for horizontal movement of 25 mm and vertical movement of 2 mm, depth of joint varying from 75 mm to 100 mm, width varying from 500 mm to 750 mm (in traffic direction), covered with a closure plate of 200mm x 6mm of wieldable structural steel conforming to IS: 2062, asphaltic plug to consist of polymer modified bitumen binder, carefully selected single size aggregate of 12.5 mm nominal size and a heat resistant foam caulking/backer rod, all as per approved drawings and specifications section 2600)	**meter**	**1669**
4.16	**Elastomeric Slab Steel Expansion** Joint Providing and laying of an elastomeric slab steel expansion joint, catering to right or skew (less than 20 deg., moderately curved with maximum horizontal movement upto 50 mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorized representative ensuring compliance to the manufacturer's instructions for installation and clause 2606 of MORT&H specifications for road & bridge works.	**meter**	**17119**
4.17	**Compression Seal Joint**	**meter**	**9939**
	Providing and laying of compression seal joint consisting of steel armoured nosing at two edges of the joint gap suitably anchored to the deck concrete and a preformed chloroprene elastomer or closed cell foam joint sealer compressed and fixed into the joint gap with special adhesive binder to cater for a horizontal movement upto 40 mm and vertical movement of 3 mm.		
4.18	**Strip Seal Expansion Joint** (Providing and laying of a strip seal expansion joint catering to maximum horizontal movement upto 70 mm, complete as per approved drawings and standard specifi cations to be installed by the manufacturer/supplier or their authorized representative ensuring compliance to the manufacturer's instructions for installation.)	**meter**	**9455**
4.19	**Modular Strip / Box Seal Joint**		
A	(Providing and laying of a modular strip Box steel expansion joint including anchorage catering to a horizontal movement beyond 70 mm and upto 140mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation.)	**meter**	**14844**
B	**Providing and laying of a modular strip box seal expansion joint** catering to a horizontal movement beyond 140mm and upto 210mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorised representative ensuring compliance to the manufacturer's instructions for installation.)	**meter**	**16087**

Item No.	Descriptions	Unit	Rate (Rs)
4.20	**Painting on kerbs** in black and yellow alternate bands including cost of material and labour complete as per drawings and specifications as per clause 803.		
	With Road Marking Paint	**RM**	**48**
4.21	**Painting on concrete surface of R.C.C. Railing** (Providing and applying 2 coats of water based cement paint to unplastered concrete surface after cleaning the surface of dirt, dust, oil, grease, efflorescence and applying paint @ of 1 litre for 2 Sq.m.)	**Sqm**	**128**
4.22	**Providing and Fixing of Av. 20mm thick marble plate** i/c cutting and polishing and inscribed details as per approved drawing i/c engraving the matter as desired.	**each**	**4250**
4.23	**Providing and Fixing of Av. 20mm thick Granite plate** including cutting and polishing and inscribed details as per approved drawing i/c engraving the matter as desired.	**each**	**5610**
4.24	**Testing of span of bridge for deflection** due to live load with platform for loading arrangements, apparatus for measurement etc. complete as per drawing and specifications (As per IRC : SP-51)	**tonne**	**723**
4.25	**Performing detailed survey and investigation** and collection of hydraulic datas (essential design data as per IRC special publication No. 13) consisting of catchment area, L-section of road and stream, cross section of stream at the point of crossing, at up-stream and down stream site, as well as trial pit section result ascertaining and marking of H.F.L., O.F.L., transferring and fixing of pucca bench marks at site etc. complete i/c cost of necessary materials and labour required for survey work.(Sub-Engineer to be engaged from regular establishment) .		
(i)	**For catchment areas less than 1.25 sq Km.**	**each**	**2655**
(ii)	**For catchment areas 1.25 to 2.5 sq.Km.**	**each**	**3235**
(iii)	**For catchment areas 2.5 to 10 sq.Km.**	**each**	**3908**
4.26	**Providing & fixing in position structural steel expansion joint** i/c. cutting riveting bolting welding as per MORT&H Std. drawing No. BD/1-69 'B' and specification as per section 1000, 1900 and 2600.	**metre**	**2125**
4.27	**Providing and fixing for hand railing top of crash barrier** including cost of material complete as per approved drawing.	**metre**	**510**
4.28	**Providing & filling 37/40 mm. wide expansion joint** between spans in wearing coat with premoulded joint filler, primer coat and joint sealing compound as per MORT&H standard drawing No. BD/1-69 'B' and specifications as per section 2600 in:-		
(i)	R.C.C. 75 mm deep wearing coat	**metre**	**128**
(ii)	Asphaltic concrete 56 mm. deep wearing coat.	**metre**	**102**

Item No.	Descriptions	Unit	Rate (Rs)
4.29 (a)	Fabrication of steel girders spans as per approved drawings for composite construction i.e. (Steel + RCC) of superstructure of the Road Over Bridge with mild steel confirming to IS:2062-1992 with all rivets, nuts bolts etc. with materials, fabrication, machinery, templates, masterplates, jigs, fixtures, equipments tools and of approval quality, ISI mark paint, transportation, skilled/ unskilled labour, i/c all taxes, all leads & lifts, descent, loading, unloading, crossing one or more Railway track if required etc. complete and as per technical specifications section 1900 of MORTH. The rate is inclusive of transportation of fabricated girder parts to site by all means and cost. The rate shall also be inclusive of cold straightening of deformed and bent girder parts before their assembly and painting, 1st priming coat Zinc chromate yellow (IS 104 latest revision). After fabrication in workshop first primer coat zinc chrome yellow (IS 104 latest revision) will be applied to all parts except flooring system. The rate shall also be inclusive of sand blasting and metalizing as per IRS BI-2001 Appendix VII IS 6585, The 2nd primer coat of zinc chrome red oxide IS 2074 and 1st finishing coat of Aluminium paints to IS 2339 will be applied on the girder parts before transportation of girder parts in all respect. **NOTE:-** • The Girder shall be fabricated by the approved vendors of RDSO only and as per approved QAP & WPSS. from Railways • All weld are to be made by approved welder using approved welding procedures. • The rates are deemed to include cost of rivets, drifts, bolts & nuts reverting/welding etc. • The rate shall be inclusive of any temporary arrangement strengthening of members if required in connection with launching of girders and restoring it back as per original standard drawing. • The rate shall be inclusive of any temporary arrangement strengthening of members if required in connection with launching of girders and restoring it back as per original standard drawing. • On completion of work the contractor shall clear all temporary staging and other arrangements, obstruction and restore it to its original position. • Contractor has to ensure proper camber as per drawing, irrespective of launching scheme.	**MT**	**106250**

Item No.	Descriptions	Unit	Rate (Rs)
	• The rate are deemed to include all labour, tools, plant, equipment, machinery, cranes etc. all leads lifts. fuel electric charge etc. complete for all materials unless specified otherwise. • All butt welds are to be examined radio graphically. All other welds may be examined by radiographic or any other non-destructive flaw detection method or by magnetic particle flaw detection method as per IS 3658 and 3703. • Detailed launching scheme along with design of form work should be got done from a reputed design consultant having past experience of similar type of work and to be submitted to the railways approval and nothing extra will be paid on this account. • All layers of painting should be separately got approved as per approved QAP & WPSS nominated representatives. • All Structural steel shall confirm to Grade 'B' specifications except for rolled sections (Angles, Channels, I-sections). For Rolled sections Grade 'A' steel may be used.		
4.29 (b)	Assembling, riveting, wherever required with all rivet materials, weld materials, bolts, service bolts, erection and launching of Steel girder span to Railways approved drawings with other ancillary steel structures fixed to the girder where necessary in proper level and alignment and as per technical specifications section 1900 of MORTH. The rate shall be inclusive of supply, erection and dismantling of staging and scaffolding and other temporary arrangements required for the purpose of assembly, erection and launching of girders. The rate shall be inclusive of cold straightening of deformed and bent girder parts before/after their assembly. All the girder parts will be given 2nd finishing coat of aluminium paint (IS:2339 latest revision) after assembling and erection at the site and after touching up the primer and finishing coat if damaged in transit with all labours, tools and plants, materials, paint and primer etc. complete as required.	**MT**	**22440**
4.30 (a)	Providing and fixing in position Anodizing Aluminium profile as per detailed drawing and specifications 3mm thick i/c all fittings complete (Frame to be paid separately)	**sqm**	**2213**
4.30 (b)	Add extra for job work for laser cutting on aluminium sheet for 3 mm thick as per approved design & pattern.	**sqm**	**2641**
4.30 (c)	Add extra for job work for laser cutting on aluminium composite panels for 4mm thick as per approved design & pattern.	**sqm**	**888**

CHAPTER- V			
RIVER TRAINING AND PROTECTION WORKS			
Item No.	**Description**	**Unit**	**Rate (Rs)**
5.1	**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 relevant clauses of section 2503	**cum**	**2051**
5.2	**Providing and laying of boulder apron laid in wire crates** made with 4mm dia GI wire conforming to IS: 280 & IS:4826 in 100mm x 100mm mesh (weaved diagonally) including 10% extra for laps and joints laid with stone boulders weighing not less than 40 kg each.	**cum**	**3171**
5.3	**Providing and laying of apron with cement concrete** blocks of size 0.5x0.5x0.5 m cast in-situ and made with nominal mix of M-15 grade cement concrete with a minimum cement content of 250 kg/cum as per specification.	**cum**	**3999**
5.4	**Providing and laying Pitching on slopes laid over** prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications as per section 2504.		
A	Stone/Boulder	**cum**	**2051**
B	**Cement Concrete blocks of size 0.3x0.3 x0.3 m cast in cement concrete of Grade M15**	**cum**	**3999**
5.5	**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 as per section 2504.	**cum**	**1767**
5.6	**Laying of a geotextile filter between pitching and embankment** slopes on which pitching is laid to prevent escape of the embankment material through the voids of the stone pitching/cement concrete blocks as well as to allow free movement of water without creating any uplift head on the pitching as per any relevant section 700 and 2504 of specifications.	**sqm**	**338**
5.7	**Providing and laying Flooring** complete as per drawing and Technical specifications laid over cement concrete bedding as per section 2505		
A	Rubble stone laid in cement mortar 1:3	**cum**	**4695**
B	Cement Concrete blocks Grade M15	**cum**	**5267**
5.8	**Construction of Dry rubble Flooring** at cross drainage works for relatively less important works as per section 2506 of specifications.	**cum**	**2316**
5.9	**Curtain wall complete as per drawing and Technical specification as per section 2507.2**		
A	Coursed Rubble masonry (1^{st} sort)	**cum**	**3278**
B	Cement concrete Grade M15	**cum**	**3921**

Item No.	Descriptions	Unit	Rate (Rs)
5.10	**Construction of flexible apron 1 m thick** comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.	**cum**	**2105**
5.11	**Providing and construction of a gabain structure** for retaining earth with segments of wire crates of size 7 m x 3 m x 0.6 m each divided into 1.5 m compartments by cross netting, made from 4 mm galvanized steel wire @ 32 kg per 10 sqm having minimum tensile strength of 300 Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into mesh with double twist, mesh size not exceeding 100 x 100 mm, filled with boulders with least dimension of 200 mm, all loose ends to be tied with 4 mm galvanised steel wire	**cum**	**3385**
5.12	**Providing and constructing gabain structures** for erosion control, river training works and protection works with wire crates of size 2 m x 1 m x 0.3 m each divided into 1m compartments by cross netting, made from 4 mm galvanized steel wire @ 32 kg per 10 sqm having minimum tensile strength of 300 Mpa conforming to IS:280 and galvanizing coating conforming to IS:4826, woven into mesh with double twist, mesh size not exceeding 100 mm x 100 mm, filled with boulders with least dimension of 200 mm, all loose ends to be securely tied with 4 mm galvanized steel wire.	**cum**	**5242**
5.13	**Providing and laying brick on edge flooring with 1st class bricks** including cement slurry in cement sand mortar 1:4 complete as per drawing and specifications as per section 1000 & 1300.	**sqm**	**242**
5.14	**Providing cement pointing 1:2 flush on brick on edge floor** complete as per drawing and specifications as per section 1000 & 1300.	**sqm**	**53**
5.15	**Providing cement plaster 12 mm thick in cement mortar 1:3** complete as per drawing and specifications as per section 1000 & 1300.	**sqm**	**85**
5.16	**Providing "Antirust Chemical coating" on the work of reinforcement** (Providing antirust corrosive treatment to HSD (High Strength Deformed Steel) reinforcement with antirust chemical -Zinc rich epoxy resin coating as per section 1600).	**MT**	**829**
5.17	**Grouting with C.M. 1:4 in Pitching** as per drawing and technical specification.	**cum**	**850**

CHAPTER- VI
REPAIR AND REHABILITATION

Item No.	Description	Unit	Rate (Rs)
6.1	**Removal of existing cement concrete** wearing coat including its disposal complete as per Technical specification without causing any detrimental effect to any part of the bridge structure and removal of dismantled material with all lifts and lead upto 1000m as per section 2811.	**sqm**	**84**
6.2	**Removal of existing asphaltic wearing coat** comprising of 50 mm thick asphaltic concrete laid over 12 mm thick mastic asphalt including disposal with all lift and lead upto 1000m as per specifications.	**sqm**	**63**
6.3	**Guniting concrete surface with cement mortar** applied with compressor after cleaning surface and spraying with epoxy complete as per Technical specification. (Thickness 25mm)	**sqm**	**1148**
6.4	**Providing and inserting nipples with approved** fixing compound after drilling holes for grouting as per Technical specifications including subsequent cutting/removal and sealing of the hole as necessary of nipples after completion of grouting with Cement/Epoxy	**each**	**139**
6.5	**Sealing of cracks/porous concrete** by injection process through nipples/Grouting complete as per Technical specification.		
A	Cement Grout	**kg**	**79**
B	Cement mortar (1:1) Grouting	**kg**	**146**
6.6	**Patching of damaged concrete surface** with polymer concrete and curing compounds, initiator and promoter, available in present formulations, to be applied as per instructions of manufacturer and as approved by the Engineer. (Av. thickness 25mm)	**sqm**	**2062**
6.7	**Sealing of crack / porous** concrete with Epoxy Grout by injection through nipples complete as per specifications..	**kg**	**1370**
6.8	**Applying epoxy mortar over leached**, honey combed and spalled concrete surface and exposed steel reinforcement complete as per Technical specification section 2804 (10mm thick epoxy mortar)	**sqm**	**677**

Item No.	Descriptions	Unit	Rate (Rs)
6.9	**Removal of defective concrete, cleaning** the surface thoroughly, applying the shotcrete mixture mechanically with compressed air under pressure, comprising of cement, sand, coarse aggregates, water and quick setting compound in the proportion as per clause 2807.1., sand and coarse aggregates conforming to IS: 383 and table 1 of IS: 9012 respectively, water cement ratio ranging from 0.35 to 0.50, density of gunite not less than 2000 kg/cum, strength not less than 25 Mpa (40mm average thickness).	**sqm**	**1132**
6.10	**Applying pre-packed cement** based polymer mortar of strength 45 Mpa at 28 days for replacement of spalled concrete(thickness 10mm)	**sqm**	**170**
6.11	**Epoxy bonding of new concrete to old concrete**	**sqm**	**1035**
6.12	**Providing external prestressing** with high tensile steel wires/strands including drilling for passage of prestessing steel, all accessories for stressing and stressing operation and grouting complete as per drawing and Technical specification section 2812.		
A	For span = 25 m (4 no. of cables and 8 no anchorage)	**tonne**	**311028**
B	For span = 50 m (4 no.of cables and 8 no anchorage)	**tonne**	**297017**
C	For span = 100 m (6 no of cables and 12 no anchorage)	**tonne**	**270635**
6.13	**Replacement of bearings** complete as per Technical specification section 2810 (the work entails replacement of all the bearings on one site of span)	**each**	**38955**
6.14	**Replacement of Expansion Joints** complete as per drawings (Removal of old expansion joint)	**meter**	**3017**
6.15	**Replacement of damaged concrete railing** (Dismantling the old railing and disposal of dismantled material)	**meter**	**1730**
6.16	**Replacement of damaged mild steel railing** (Dismantling of old railing and disposal of dismantled material)	**meter**	**2673**
6.17	**Repair of concrete crash barrier** with cement concrete of M-30 grade by cutting and trimming the damaged portion to a regular shape, cleaning the area to be repaired thoroughly, applying cement concrete after erection of proper form work	**meter**	**165**
6.18	**Repair of R.C.C. railing :** Carrying out repair of RCC M-30 railing to bring it to the original shape	**meter**	**110**
6.19	**Repair of steel railing:** Repair of steel railing to bring it to the original shape (It is assumed that damage to the steel railing is to the extent of 10 percent.)	**meter**	**240**

PUBLIC WORKS DEPARTMENT,
CHHATTISGARH

SOR (Bridge Works) 01-01-2015

w.e.f. 10.06.2026

STANDARD TABLE AND USEFUL DATA

FIELD LABORATORY EQUIPMENT

Clause 120.4

Table 100-2 List of Laboratory Equipment

A)	GENERAL		
1)	Weigh Balances		
	a)	5 – 20 kg capacity Electronic type – Accuracy 1 gm	1 No.
	b)	500 gm capacity-Electronic Type Accuracy 0.01 gm	1 No.
	c)	Electronic 5 kg capacity Accuracy 0.5 gm	1 No.
	d)	Platform Balance scale-300 kg capacity	1 No.
	e)	Chemical Balance 100 gm capacity-accuracy 0.001 gm	--
2)	Oven-electrically operated, thermostatically controlled (including thermometer), stainless steel interior		
	From 0^oC to 220^oC Sensitivity 1^oC		1 No.
3)	Sieves : as per IS:460-1962		
	a)	I.S. sieves 450 mm internal dia of sieve sets as per BIS of required sieve sizes complete with lid and pan	1 set
	b)	IS sieve 200 mm internal dia (brass frame and steel/or brass wire cloth mesh) consisting of sieve sets of required sieve sizes complete with lid	2 sets
4)	Sieve shaker capable of asking 200 mm and 450 mm dia sieves-electrically operated with time switch		1 No.
5)	200 tonnes compression testing machine		1 No.
6)	Stop watches 1/5 sec. accuracy		1 No.
7)	glassware comprising beakers, pipettes, dishes, measuring cylinders (100 to 1000 cc Capacity)glass rods and funnels, glass thermometers range 0^oC to 100^oC and metallic thermometers range up to 300^oC.		2No. each
8)	Hot plates 200 mm dia (1500 watt.)		1 No.
9)	Enamel trays		
	a)	600 mm x 450 mm x 50 mm	2 Nos
	b)	450 mm x 300 mm x 40 mm	2 Nos
	c)	300 mm x 250 mm x 40 mm	2 Nos
	d)	Circular plates of 250 mm dia	2 Nos
10)	Water Testing Kit		1 No
B)	**FOR SOILS**		
1)	Water still		
2)	Liquid limit device with ASTM grooving tools as per IS:2720		1 No.
3)	Sampling pipettes fitted with pressure and suction inlets, 10 ml. Capacity		1 set
4)	Compaction apparatus (Proctor) as per IS:2720 (Part 7) complete with collar, base plate and hammer and all other accessories		1 No.

5)	Modified AASHTO Compaction apparatus as per IS:2720 (Part 8) 1974 or Heavy Compaction Apparatus as per IS complete with collar, base plate hammer and all other accessories		1 No
6)	Sand pouring cylinder with conical funnel and tap and complete as per IS:2720 (Part 28) 1974 including modern equipment.		2 Nos.
7)	Ignore Standard Sand		As required
8)	Sampling tins with lids 100 mm dia x 75 mm ht. ½ kg capacity and miscellaneous items like moisture tins with lid 50 grams etc.		4 Nos.
9)	Lab CBR testing equipment for conducting CBR testing, load frame with 5 Tonne capacity, electrically operated with speed control as per IS:2720 (Part 16) and consisting of following:		1 set
	a)	CBR moulds 150 mm dia – 175 mm ht.	6 No.
	b)	Tripod stands for holding dial gauge holder	4 Nos.
	c)	CBR plunger with settlement dial gauge holder	1 No.
	d)	Surcharge weight 147 mm dia 2.5 kg. wt.	2 Nos.
	e)	Spacers disc 148 mm dia 47.7 mm ht. With handle	6 Nos.
	f)	Perforated plate (Brass)	2 Nos.
	g)	Soaking tank for accommodating 6 CBR moulds	2 Nos.
	h)	Proving rings of 1000 kg, 2500 kg capacity	1 No each
	i)	Dial gauges 25 mm travel – 0.01 mm/division	2 Nos.
10)	Standard penetration test equipment		1 No.
11)	Nuclear moisture Density meter or equivalent		-
12)	Speedy moisture meter complete with chemicals		1 No.
13)	Unconfined Compression Test Apparatus		1 No.
C)	**FOR BITUMEN AND BITUMINOUS MIXES**		
1)	Constant temperature bath for accommodating bitumen test specimen, electrically operated, and thermostatically controlled (to accommodate minimum six Specimens)		1 No.
2)	Penetrometer automatic type, including adjustable weight arrangement and needles as per IS:1203-1958		1 No.
3)	Soxhlet extraction or centrifuge type apparatus complete with extraction thimbles with solvent and filter paper		1 No.
4)	Bitumen laboratory mixer including required accessories (20 ltrs.)		1 No.
5)	Marshall compaction apparatus automatically operated as per ASTM 1559-62 T complete with accessories (with 180 N Marshall Moulds)		1 set
6)	Furol viscometer		1 No.
7)	Ductility meter		1 No.
8)	Softening point (Ring and ball app)		1 No.

9)	Distant reading thermometer	-
10)	Rifle box	1 No.
11)	Automatic Asphlat content Meter	1 No.
12)	Thin film over test apparatus for modified binder either with PMB or CRMB	-
13)	Mastic Asphalt Hardness testing equipment	-
14)	Sand Equivalent test apparatus	1 set
15)	Core cutting machine suitable for upto 150 mm dia core	1 set
16)	Thermometers	4 Nos.
D)	**FOR CEMENT, CEMENT CONCRETE AND MATERIALS**	
1)	Water still	
2)	Vicat needle apparatus for setting time with plungers as per IS:269-1967	1 No.
3)	Moulds	
	a) 150 mm x 300 mm ht. Cylinder with capping component along with the capping set and compound as per IS	As req.
	b) Cube 150 mm, and 100 mm (each size)	As req.
4)	Concrete permeability apparatus	
5)	High frequency mortar cube vibrator for cement testing	
6)	Concrete mixer power driven, 1 cu.ft. capacity	
7)	Variable frequency and amplitude vibrating table size 1 m x 1 m as per the relevant British Standard	
8)	Flakiness index test apparatus	1 No.
9)	Aggregate impact test apparatus as per IS:2386 (Part 4) 1963	1 No.
10)	Los-angeles abrasion test apparatus as per IS:2386 (Part 4) 1963	1 No.
11)	Flow table as per IS:712-1973	-
12)	Equipment for slump test	1 No.
13)	Equipment for determination of specific gravity or fine and coarse aggregate as per IS:2386 (Part 3) 1963	1 No.
14)	Compression and Flexural strength testing achine of 200 T capacity with additional dial for flexural testing	1 No.
15)	Core cutting machine with 10 cm dia diamond cutting edge	1 No.
16)	Needle vibrator	2 Nos.
17)	Air entrainment meter	-
18)	0.5 Cft, 1 Cft cylinder for checking bulk density of aggregate with tamping rod.	As req.
19)	Soundness testing apparatus for cement (Lee chattlier)	1 set
E)	**FOR CONTROL OF PROFILE AND SURFACE EVENNESS**	
1)	Total Statoin	1 No.
2)	Precision automatic level with micrometer attachment	1 set
3)	Distomat or equivalent	1 set
4)	Theodolite – Electronically operated with computerized output attachment	1 set
5)	Precision staff	2 sets
6)	3 meter straight edge and measuring wedge	1 set

7)	Camber template 2 Lane	
	a) Crown type cross-section	1 set
	b) Straight run cross-section	2 sets
8)	Steel tape	
	a) 5 m long	2 Nos.
	b) 10 m long	2 Nos.
	c) 20 m long	2 Nos.
	d) 30 m long	2 Nos.
	e) 50 m long	1 No.
9)	Roughometer (Bump Integrator)	1 No. (when required)

Note: The items and their number listed above in this Section are indicative and shall be decided by the Engineer as per requirements of the Project and modified accordingly.

MATERIAL 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	Per cent by Weight Passing the Sieve		
	Zone I	**Zone II**	**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

GRADES OF REINFORCING BARS

MATERIAL FOR STRUCTURE

TABLE 1000-3

STEEL

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

Additional requirements for the use of such reinforcement bars are given below:

(a) Patch Up materials shall be procured in sealed containers with certificates from the agency who has supplied the fusion bonded epoxy bars.

(b) PVC coated G.I. binding wires of 18G shall only be used in conjunction with fusion bonded epoxy bars.

(c) Chairs for supporting the reinforcement shall also be of fusion bonded epoxy coated bars.

(d) The cut ends and damaged portions shall be touched up with repair patch up material.

(e) The bars shall be cut by saw-cutting rather than flame cutting.

(f) While bending the bars, the pins of work benches shall be provided with PVC of plastic sleeves.

(g) The coated steel shall not be directly exposed to sun rays or rains and shall be protected with opaque polyethylene sheets or such other approved materials.

(h) While concreting, the workmen or trolleys shall not move directly on coated bars but shall move only on wooden planks placed on the bars.

1010 WATER

(a) To neutralize 100 ml sample of water, using phenolphthalein as an indicator, it should not require more than 5 ml of 0.02 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 limit's for solids shall be as follows:

	Tested as per	**Permissible Limits (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.

(d) The pH value shall not be les than 6.

1012.3 CHEMICAL ADMIXTURES

1012.3.1 General

a) Normal dosage and detrimental effects, if any, of under dosage and over dosage.
b) The chemical names of the main ingredients in the admixtures.
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 entertainments 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 in the in risk of corrosion of the reinforcement or other embedments.
h) Whether it affects the durability of concrete adversely.

1012.3.2 Physical and Chemical Requirements

(a) " Plasticisers " and "Super-Plasticisers" 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 then 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 specification 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:
- Dry Material Content : Within 3 percent and 5 percent of liquid and solid.
- Ash content : Within 1 per cent of the value stated by the manufacturer.
- Relative Density (for liquid admixtures): Within 2 per cent of the value stated by the manufacturer.

(e) All tests relating to the concretes admixtures shall be conducted periodically at an independent laboratory and the results compared with the data given by the manufacturer.

PILE FOUNDATIONS

1104.2 Concrete in Piles

Table 1100-1 : Requirements for Concrete in Piles

	Cast-in-situ Concrete by Tremie	**Precast Concrete**
Grade of concrete	M 35	M 35
Minimum cement content	400 kg/m^3	400 kg/ m^3
Minimum water cement ratio	0.4	0.40
Slump (mm) as measured at the time of placement	150-200	50 - 75

TABLE 1100-2

TIME FOR CURING PRECAST PILES

Type of Cement Used in Casting the Pile	Minimum Periods from Time of Casting			
	Strike Side-Shutters (Hours)	End of Wet Curing (Days)	Lift from Bed (Days)	Casting Drive (days)
Ordinary Portland	24	7	10	28
Rapid hardening Portland	12	7	7	10

1116 TOLERANCES

1116.1. Permissible Tolerances for Piles

i) Precast Concrete Piles :

a) Variation in cross-sectional dimensions : $\pm$ 5 mm
b) Variation in length : $\pm$ 25 mm
c) Surface irregularities measured with 3 m straight edge : 5 mm
d) Bow for total length of pile in mm : 1 mm/m length of pile limited to 20 mm

ii) Driven Piles

a) Variation in cross-sectional dimensions : + 50 mm, - 10 mm
b) Variation from vertical for vertical piles : 1 in 150
c) For vertical piles deviation at pilling platform level : 75 mm
d) Variation of level of top of piles : $\pm$ 25 mm

iii) Bored Piles

a) Variation in cross-sectional dimensions : + 50 mm, - 10 mm
b) Variation from vertical for vertical piles : 1 in 150
c) For vertical piles deviation at pilling platform level : 75 mm
d) Variation of level of top of piles : $\pm$ 25 mm

iv) For raker piles from specified rake : 1 in 25

1116.2. Permissible Tolerances for Pile Caps

a)	Variation in dimensions	: + 50mm, -10 mm
b)	Misplacement from specified position in plan	: 15 mm
c)	Surface irregularities measured	: 5 mm with 3 m straight edge
d)	Variation of level of top of piles	: ± 25 mm

1508. REMOVAL OF FORMWORK

The scheme for removal of form work (i.e. de-shuttering and de-centering) 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 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)	Soffits of Girders (with props left under)	:	7 days
e)	Props (left under girders)	:	21 days

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
1703. GRADES OF CONCRETE
TABLE 1700-1.

Type of concrete/Grade Designation			Characteristic Strength in MPa
Nominal Mix Concrete	Standard Concrete	High Performance Concrete	
M 15	M 15		15
M 20	M 20		20
	M 25		25
	M 30	M 30	30
	M 40	M 35	35
	M 45	M 40	40
	M 50	M 45	45
		M 50	50
		M 55	55
		M 60	60
		M 65	65
		M 70	70
		M 75	75
		M 80	80
		M 85	85
		M 90	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/m^3**	**Minimum Grade of Conrete**
Moderate	0.45	340	M 25
Severe	0.45	360	M 30
Very Severe	0.40	380	M 40

Note:

i) All three provisions given in the above table for a particular exposure condition, shall be satisfied.

ii) The term cement for maximum w/c ratio and minimum cement content shown in Table includes all cementitious materials mentioned granulated blast furnace slag in the blended cement shall be as specified in IS:1489 (Part 1) and IS:455 respectively.

iii) 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/m^3 for use of 12.50 mm nominal size aggregates and decreased by 30 kg/m^3 for use of 40 mm nominal size aggregates.

TABLE 1700-3
Requirement of Concrete Exposed to Sulphate Attack

Class	Concentration of Sulphates as SO_3			Type of Cement (Note II)	Minimum Cement Content, kg/m^3	Maximum Water/ Cement Ratio	Minimum Grade of Concrete
	In Soils		In Ground Water, g/l				
	Total SO_3 %	SO_3 in 2:1 Water: Soil Extract, g/l					
1)	Traces	< 1.0	< 0.3	-OPC, PPC or PSC	280	0.5	M25
2)	2.0 to 0.5	1.0 to 1.9	0.3 to 1.2	-OPC, PPC or PSC -SRPC	330	0.5	M25
3)	0.5 to 1.0	1.9 to 3.1	1.2 to 2.5	-SRPC, -PPC or PSC	330 350	0.5 0.45	M25 M30
4)	1.0 to 2.0	3.1 to 5.0	2.5 to 5.0	-SRPC	370	0.45	M35
5)	>2.0	>5.0	>5.0	-SRPC with protective coatings	400	0.4	M40

Note:

If the requirements of maximum water/cement ratio, minimum grade of concrete and minimum cement content from other durability considerations as given in Table 1700-2 are more stringent than those given in this table, then the former will govern.

OPC: Ordinary Portland Cement, PPC: Portland Pozzolona Cement. PSC: Portland Slag Cement, SRPC: Sulphate Resisting Portland Cement.

The minimum cement content shall be as low as possible but not less than the quantities specified in Table 1700-2 and 1700-3.

The maximum cement content excluding any mineral admixtures (Portland cement component alone) shall not exceed 450 kg/cu.m.

1704.1. Requirements of Consistency

Table 1700-4.

	Type	Slump(mm) (at the time of placing of concrete
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

1704.2 Requirements for Designed Mixes

1704.2.1 Target mean Strength

(i) The Current margin for a concrete mix shall be determined by the Contractor and shall be taken as 1.64 times the standard deviation of sample test results taken from at least 40 separate batches of concrete of nominally similar proportions produced at site by the same plant under similar supervision, over a period exceeding 5 days, but not exceeding 6 months.

(ii) Where there is insufficient data to satisfy the above, the current margin for the initial design mix shall be taken as given in Table 1700-5 :

Concrete Grade	Current Margin (MPa)	Target Mean Strength (MPa)
M 15	10	25
M 20	10	30
M 25	11	36
M 30	12	41
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

1704.2.3 Control of Strength of design mixes

a) **Adjustment to Mix Proportions.**

Adjustment to mix proportions arrived at in the trial mixes shall be made subject to the Engineer's approval, n order to minimize the variability of strength and to maintain the target mean strength. Such adjustments shall not be taken to imply any change in the current margin.

b) **Change of Current Margin**

When required by the Engineer, the Contractor shall recalculate the current margin in accordance with Clause 1704.2.1 The recalculated value shall be adopted as directed by the Engineer, and it shall become the current margin for concrete produced thereafter.

c) **Additional Trial Mixes**

In case any changes are observed in the properties of fresh concrete and/or strength of hardened concrete on the basis of early age tests, additional mixes and tests shall be carried out during production, so as to control and bring the quality of concrete within acceptable limits. In case of any change in the source or properties of materials, the design of mix shall be established afresh.

TABLE - 1700-6

PROPORTION 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 aggregates (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 1:2, subject to upper limit 1:1:5 and lower limit of 1:2:5	25	
M 20	250		25	22

1706: Size on Coarse Aggregate

Table 1700- 7.

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

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

2400 - SURFACE AND SUB-SURFACE GEOTECHNICAL INVESTIGATION

2405 – DETAILED INVESTIGATION FOR BRIDGE FOUNDATIONS RESTING ON ROCK

2406- BORING

2408 - METHODS OF SAMPLING

There are two types of sample viz. (a) Disturbed sample (b) Undisturbed sample. The usual methods for sampling conforming to IS : 1892 and IS:2132 are given below :-

Nature of Ground	Type of Sample	Method of Sampling
Soil	Disturbed	Hand Samples Auger Samples Shell Samples
	Undisturbed	Hand Samples Tube Samples
Rock	Disturbed	Wash Samples from percussion or rotary drilling
	Undisturbed	Cores

TABLE 2400-2 SIZE OF SOIL SAMPLE REQUIRED

S.NO.	PURPOSE OF SAMPLE	SOIL TYPE	WEIGHT OF SAMPLE REQUIRED Kg.
1.	Soil identification, natural moisture content tests, mechanical analysis and index properties, chemical tests	Cohesive soils Sands and Gravels	1 3
2.	Compression tests	Cohesive soils and sand	12.5
3.	Comprehensive examination of construction material any borrow area soil including soil stabilization	Cohesive soils sands Gravelly soil	25 - 50 50 - 100

2413- TESTING OF MATERIAL FOR FOUNDATION OF GUIDE BUNDS AND HIGH EMBANKMENTS

TABLE 2400-3 SHEAR STRENGTH TESTS FOR STABILITY ANALYSIS

S. No.	Stage in Life of Embankment	Strength Parameters	Shear Test	Type of Analysis
1)	(a) During construction or immediate post-construction	^{c}uu, ¸Φuu	Unconsolidated undrained triaxial shear test on undisturbed samples and on compacted embankment material	Total stress analysis
	(b) -- do -	S_u	Unconfined compression test in laboratory or vane shear test	-- do --
	(c) -- do --	C Φ	Consolidated undrained test with pore-pressure measurement on as compacted soil samples of embankment materials and on undisturbed samples	Effective stress analysis
2)	Long term stability	C Φ	-- do --	-- do –

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
	130 x 130 x 12	23.400
Tee	100 x 100 x 10	15.00
Channel	75 x 40 x 6	5.700

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

g)

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 Stel	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**

4. Quantities of Materials for Finished Items of Works

S.No	Items		Materials	Quantities
a)	**Unit per Cubic meter of finished item**			
1.	Cement Mortar (1:3)		Cement Sand	0.33 Cum. 1.00 Cum.
2.	Cement Mortar (1:4)		Cement Sand	0.25 Cum. 1.00 Cum.
3.	Cement Mortar (1:6)		Cement Sand	0.16 Cum. 1.00 Cum.
4.	Course Rubble Masonry		Stones Mortar	1.00 Cum 0.33 Cum
5.	Cut Stone Masonry		Stone Mortar	1.00 Cum. 0.16 Cum.
6.	Fine Ashlars Stone Masonry		Stone Mortar	1.0 Cum. 0.12 Cum.
b)	**Unit per Sq. Meter of finished item**			
7.	Flush pointing to stone work		Mortar	0.004 Cum.
8.	Truck Pointing of stone work		Mortar	0.008 Cum.

UNITED WEIGHT OF MATERIALS USED AT CONSTRUCTION SITE

Following table shows unit weight of materials used at construction site. Please note this is for reference purpose only and may vary from place and type of material.

S.No	Material	Theoretical Weight in(KG/M³)	Approx Weight at Site in		Remarks
			Kg	Per	
1	Cement	1440	50	Bag	
2	Steel	7850	$d^2/162$		d -dia in mm
3	Sand-				
	Dry	1600	50 to 55	farma	1 farma=1.25cft
	River	1840	57 to 63	farma	1 farma=1.25cft
4	Stone(basalt)	2850 to 2960	48 to 52	farma	metal 12mm to 20mm
5	Water	1000	1	liter	
6	PCC	2240	8.24 to 8.5	Cube mould	cube mould size=15x15x15cm
7	RCC 2% Steel	2420			
8	Bricks	1600 to 1920	1.9 to 2	no	9x4x2 3/4″
			4.8 to 4.9	no	9x6x3 3/4”
9	Brick Masonry	1920			
10	Soil(damp)	1760	50 to 55	cft	Black cotton
11	Cement concrete block(solid)	1800	18 to 20	cft	30x15x20 cm
			10 to 11	no	30x10x20 cm
12	Cement Mortar	2080	57 to 62	cft	
13	Lime Mortar	1760	48 to 52	cft	
14	Lime	640	30	bag	
15	Glass	2530	0.9 to 0.95	sft	4mm tk plain
16	Teak Wood	670 to 830	18 to 20	cft	
17	Sal Wood	990	22 to 24	cft	
18	Marble mosaic tile		2.8 to 3.2	no	25x25x22mm
			4.8 to 5.2	no	30x30x25mm
19	Chequered tile		2.5 to 2.8	no	25x25x22mm
20	Glazed tile15x15cm		0.20 to 0.25	no	5mm tk
21	Marble Stone	2620	5.1	sft	3/4″tk
22	Granite Stone	2460-2800	5.35	sft	3/4″tk
23	Coddappa	2720	6.4	sft	1 1/4″tk
24	A.C.sheet corrugated	16	1.2	sft	
25	Bitumen	1040	220	Drum	200liter drum
26	Window frame (simple design)		1.9 to2.1	sft	
27	Door Frame				
	a)3’00×7’0		25 to 27	no	section 4″x2 1/2″
	b)2’6″x7’0		24 to 26	no	section 4″x2 1/2″