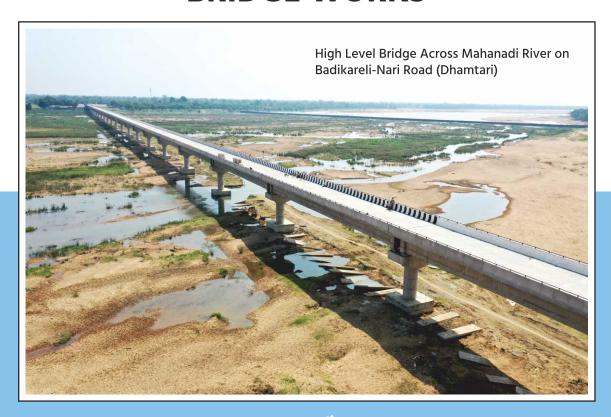


# GOVERNMENT OF CHHATTISGARH PUBLIC WORKS DEPARTMENT

# **SCHEDULE OF RATES**

FOR

# **BRIDGE WORKS**



With Effect From 1st January, 2025

Issued By:

ENGINEER-IN-CHIEF

PUBLIC WORKS DEPARTMENT

NIRMAN BHAWAN, NAVA RAIPUR (C.G.)

**Price: Rs. 200/-** (Excluding Postage Charges etc.)



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# OFFICE OF THE ENGINEER-IN-CHIEF PUBLIC WORKS DEPARTMENT, NIRMAN BHAWAN, ATAL NAGAR, NAVA RAIPUR (CG)

#### SCHEDULE OF RATES FOR BRIDGE WORKS OF PWD

No.65010/540/SOR/2024

Nava Raipur, Dated 26/12/2024

### **PREAMBLE**

The Schedule of Rates (SOR) published by the Public Works Department (PWD) is a vital document. It serves not only as a useful tool for the estimation, evaluation, and execution of government projects by PWD personnel but is also recognized as an authoritative reference by various government, semi-government, and private entities, including builders, architects, and consultants.

The last SOR for Bridge works was released on January 1, 2015. Since then, the department has observed significant changes in the prices of labor, materials, POL (petroleum, oil, and lubricants), and machinery. Additionally, the Indian Roads Congress (IRC) has revised several codes,. In light of these changes, the prevailing SOR for Bridge works required revision.

It is a matter of great satisfaction that the updated SOR for Bridge works will come into effect from January 1<sup>st</sup>, 2025.

The new tax system GST was enforced from July 1<sup>st</sup>, 2017 and all existing taxes were merged in GST. The rates in the SOR exclude GST. Since the Government of India periodically updates GST rates, an 18% GST shall be added over estimated costs to provide a realistic evaluation of project expenses. All amendments to the previous SOR have been incorporated into the new document. New items, such as Higher Grade of Concrete for RCC in foundation Work, M-40 Grade of RCC pile is added along with pile dia size of 1500 mm, Pre-stressing in sub-structure, Dynamic Pile Load Test, Noise Barrier and Item nomenclature and descriptions have also been updated to align with the latest relevant codes.

All efforts have been made to make this document error free. However, effective suggestion, addition and alterations are always welcome for any further betterment of the document.

Despite diligent care in its preparation, typographical or other errors may still occur. Such discrepancies, if identified, would be appreciated, if brought to our attention.

I extend my heartfelt gratitude to Shri M.L. Uraon, Chief Engineer PWD (NH), Shri S.K. Kori, Chief Engineer PWD Bridge, Shri C.K. Pandey, Executive Engineer, Shri Roshan Kumar Sahu, Assistant Engineer, Shri K.K. Yadav, Assistant Engineer, Shri Sabir Khan, Sub-Engineer and Shri Rajiv Mishra, Sub-Engineer for their dedication, guidance, and significant efforts in ensuring this document is both comprehensive and unique.

The development of this SOR has been possible through the sincere efforts of numerous individuals and institutions. While it is not feasible to name everyone, we sincerely acknowledge and thank them for their invaluable contributions.

This SOR is also available on the department's website: www.pwd.cq.nic.in.

(Er. K.K. Pípri) Engineer-in-Chief Public Works Department Nava Raipur (CG)

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### **GENERAL NOTES**

1)	SOR-2025 has been prepared on the basis of the "Standard Data Book for Analysis of Rates" of MoRT&H, published by Indian Roads Congress. Some items, which do not find place in the Standard Data Book for Analysis of Rates, have also been included in the new SOR, as these are required and had been provided in the previous SOR, looking to the necessity of execution.					
2)	<b>DEFINITIONS</b>					
a)		Having a total length of above 60 M. measured along the center line of the bridge between inner faces of the dirt walls.				
b)		Having a total length more 6 M. and upto 60 M. measured along the center line of the bridge between inner faces of the dirt walls.				
c)		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.				
3)	<b>SPECIFICATIO</b>	<u>NS</u>				
i)	"Specifications for & Highway) - sub of the items and n considerations and Road/Bridges issue	s of works shall be carried out as per 5th revision of r Road and Bridge works" (Ministry of Road Transport ject to such changes as are incorporated in the wording lotes below. The work will be governed by the design I specifications contained in I.R.C. codes of practice for ed upto the date of receipt of tender.				
ii)	The materials of co	onstruction shall be governed as per relevant I.S. Codes.				
iii)		nterpretation in respect of any provision contained in the d in para (i) to (ii) the decision of the Engineer-in-Chief, nal & binding.				
4)	<b>FOUNDATION</b>					
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)	doing the foundat should be recorded particular foundat foundation work,	shall be the average water level met with at the time of tion work. The maximum and minimum water levels ed by the Assistant Engineer, just before starting the ion and within a reasonable time at the close of that the average of these two levels will be the L.W.L. for ork. In case of major bridges such records will be taken Engineer.				

#### 5) 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.

#### 6) **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.

#### 7) **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 200 m. 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 200 m. 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<sup>th</sup> 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.

#### 8) STEEL

- 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) 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).

#### 9) <u>CEMENT</u>

i) 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

#### 10) MASONRY WORK

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:
  - a) 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.
- 11) Cost of Transportation of all materials from the place of delivery up to site of work is included in the rates of the item of this Schedule of Rates.

#### 12) LEAD AND LIFTS

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.

#### 13) **DISMANTLING**

The rates include the complete cost of dismantling & 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.

- **STORAGE OF MATERIALS:** Storage of construction materials at site shall be as per clause 1014 & 1604 of the specifications.
- **MODE OF MEASUREMENTS:** The mode of measurements shall be as per provisions contained in the relevant clauses of the specifications unless specified otherwise.
- 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.
- 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.

- 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.
- In the absence of any stipulation to the contrary, unit rates for different items of works are for completing the works to the specifications i/c full compensation for all operations detailed in the relevant sections of the specifications under "Rates". The rates are to be considered as the full inclusive rate for the finished work covering all labour, material, royalties, lease, rent, wastage, temporary work, plant, equipment, overhead charges and profit, excluding GST, unless specified otherwise.
- The rates in SOR are exclusive of GST charges. GST shall be as per prevailing laws of GOI. However at present, GST shall be added @ 18% over estimated cost for the purpose of realistic cost of project. GST shall not be payable to the Contractor. Contractor has to include GST in his quotation / bid.
- **24)** The basic rates for important materials considered in this S.O.R. are as follows:-

(a) Cement :- Rs. 5150.00 per M.T.

(b) Steel (HSD bar) :- Rs. 51000.00per M.T.

(c) Structural Steel :- Rs. 56000.00 per M.T.

(d) High Tensile Steel wires/strands :- Rs. 81000.00 per M.T

## CHAPTER –I SITE CLEARANCE AND DISMANTLING

tem No.	Descriptions	Unit	Rate excluding GST(in Rs)
1.1	Cutting of trees, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all leads & lifts and filling in depression/pit with suitable soil including compaction in layers at OMC as directed by Engineer-in-charge and as per relevant clauses of section-200 for:-		
i)	Girth from 300 mm to 600 mm	Each	325
ii)	Girth beyond 600 mm to 900 mm	Each	499
iii)	Girth beyond 900 mm to 1800 mm	Each	882
iv)	Girth above 1800 mm	Each	1694
1.2	Removal of leftover portion of trunk and removal of rootes after cutting of tree by the forest department or any other agency, including required excavation and all necessary activities for uprooting, stacking of serviceable material and disposal of unserviceable material with all leads & lifts and filling the depression/pit with suitable soil including compaction in layers at OMC as directed by Engineer-in-Charge and as per relevant clauses of section-200 for:-		
i)	Girth from 300 mm to 600 mm	Each	254
ii)	Girth beyond 600 mm to 900 mm	Each	345
iii)	Girth beyond 900 mm to 1800 mm	Each	748
iv)	Girth above 1800 mm	Each	1515
1.3	Clearing Grass and Removal of Rubbish (clearing grass and removal of rubbish including all leads and lifts)	Hectare	19436
1.4	Clearing and grubbing road land including uprooting rank vegetation, grass, bushes, shrubs, saplings and trees girth up to 300 mm, removal of stumps of trees cut earlier and disposal of unserviceable materials and stacking of serviceable material to be used or auctioned including all leads and lifts removal and disposal of top organic soil not exceeding 150 mm in thickness if required and as per relevant clauses of section-200.		
A	In area of light jungle	Hectare	61253
В	In area of thorny jungle	Hectare	73785
1.5	Dismantling of existing structures like culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with including all leads and lifts and as per relevant clauses of section-200 in		
(i)	Lime / Cement Concrete		
( <del>*</del> /	Lime Concrete, cement concrete grade M-10 and below		ļ

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
В	Cement Concrete Grade M-15 & M-20	Cum.	563
С	Prestressed / Reinforced cement concrete grade M-20 &		1040
(!!\	above Brick / Tile work	Cum.	1342
(ii)			
<u>A</u>	In lime mortar	Cum.	271
В	In cement mortar	Cum.	368
C	In mud mortar	Cum.	232
D	Dry brick pitching or brick soling	Cum.	212
(iii) #	Stone Masonry		
<u>A</u>	Rubble stone masonry in lime mortar	Cum.	239
В	Rubble stone masonry in cement mortar.	Cum.	297
C	Rubble Stone Masonry in mud mortar.	Cum.	200
D	Dry rubble masonry	Cum.	180
E	Stone pitching/ dry stone spalls.	Cum.	161
F	Boulders laid in wire crates including opening of crates	<b>C</b>	200
(*)	and stacking dismantled materials.	Cum.	200
(iv)	Wood work wrought framed and fixed in frames of trusses upto a height of 5 m above plinth level.	Cum.	550
(v)	Steel work in all types of sections upto a height of 5 m		
	above plinth level excluding cutting of rivet.		
A	Including dismembering	Tonne	1872
В	Excluding dismembering.	Tonne	1405
С	Extra over item No. (v) A and (v) B for cutting rivets.	Each	13
(vi)	Scraping of bricks dismantled from brick work including stacking.		
A	In lime/Cement mortar	1000 No.	1451
<u>В</u>	In mud mortar	1000 No.	
		1000 No.	487
(vii)	Scraping of Stone from dismantled stone masonry	<b>C</b>	520
<u>A</u>	In cement and lime mortar	Cum.	539
<u>B</u>	In Mud mortar	Cum.	98
(viii)	Scraping plaster in lime or cement mortar from brick/ stone masonry	Sqm.	16
(ix)	Removing all type of Hume Pipes in serviceable		
	condition without damaging the pipe and Stacking with		
	all lifts and lead excluding Earthwork and Dismantling		
	of Masonry Works.		
A	Up to 1000 mm dia	Meter	609
В	Above 1000 mm dia	Meter	731
	Note: Pipe removed in damaged/unserviceable condition shall be paid in dismentling of concrete on volume basis in respective items.		
1.6	<b>Dismantling of flexible pavements</b> and disposal of dismantled materials including all leads, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200.		
A	Bituminous courses	Cum.	864
B	Granular courses		603
ט	Orangiai Courses	Cum.	003

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
1.7	Milling of bituminous pavement upto depth of 50 mm by cold milling machine including all levelling and slope sensors, self-loading of milled material by discharge conveyor onto transport vehicle including lead charges of 10 km as directed by Engineer in Charge	Sqm.	71
1.8	Milling of bituminous pavement upto depth of 50 to 75 mm by cold milling machine including all levelling and slope sensors, self-loading of milled material by discharge conveyor onto transport vehicle including lead 10 km as directed by Engineer in Charge	Sqm.	75
1.9	Milling of bituminous pavement depth of 75 to 100 mm by cold milling machine including all levelling and slope sensors, self-loading of milled material by discharge conveyor onto transport vehicle including lead 10 km as directed by Engineer in Charge	Sqm.	82
1.10	Dismantling of cement concrete pavement i/c breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials with all leads, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200.	Cum.	1321
1.11	<b>Dismantling guard rails</b> by manual means and disposal of dismantled material with all leads and lifts, stacking serviceable materials and unserviceable materials separately and as per relevant clauses of section-200.	Meter	91
1.12	<b>Dismantling kerb stone</b> by manual means and disposal of dismantled material with all leads & lifts and as per relevant clauses of section-200.	Meter	15
1.13	<b>Dismantling kerb stone channel</b> by manual means and disposal of dismantled material with all leads & lifts and as per relevant clauses of section-200	Meter	22
1.14	<b>Dismantling of kilometer stone</b> including cutting of earth, foundation and disposal of dismantled material with all leads & lifts and back filling of pit with suitable soil including compatinc in layers at OMC as directed by Engineer-in-Charge.		
A	5th KM stone	Each	471
В	Ordinary KM Stone	Each	279
C 1 15	Hectometer Stone  Diamentling of borbed wire fenging/ wire mosh	Each	56
1.15	<b>Dismantling of barbed wire fencing/ wire mesh fencing</b> including posts, foundation concrete, back filling of pit by manual means including disposal of dismantled material with all lead & lifts, stacking serviceable material and unserviceable material separately.	Meter	49
1.16	Dismantling of CI water pipe line 600 mm dia including disposal with all leads & lifts and stacking of serviceable material and unserviceable material separately under supervision of concerned department.	Meter	138

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

# 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.
- 3. 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.
- 4. 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.
- 5. Back filling up to original bed level shall be done as per clause 304.3.7 of "Specification for Road and Bridges" of MoRTH (5<sup>th</sup> Revision) no extra shall be payable on this account.
- 6. 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%.
- 7. A levelling coarse of 150mm thickness (Av.) in M-15 shall be provided before laying open foundations.
- 8. 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 latest IRC-78. 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.

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

# CHAPTER -II FOUNDATION

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
2.1	<b>Excavation for Structures</b> (Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom and backfilling with approved material.) as per section 304.		
I	Ordinary soil		
(i)	Upto 3 m depth	Cum.	161
(ii)	3 m to 6 m depth	Cum.	184
(iii)	Above 6 m depth	Cum.	233
	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		
II	@ 1 percent on cost of excavation for open foundation.	Cum.	260
11	Ordinary rock (not requiring blasting)  Add extra 20% in the rates of above items for dewatering	Cum.	200
	(Assessment of dewatering shall be made as per site condition)		
III	Hard rock (requiring blasting)	Cum.	957
	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.	1061
	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.	791
	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.	Cum.	77
VI	Back Filling in Marshy Foundation Pits	Cum.	420
2.2	Providing & Filling Annular Space Around Footing in Rock upto top of rock with Lean cement concrete M-15 nominal mix in foundation 1.50 M in soft rock & 0.60 M in hard rock with crushed stone aggregate 40 mm nominal size & as per relevant clauses of section 1500,1700 & 2100.  NOTE:- Only footing size with 30 cm offset all around to be consider for payment.	Cum.	4791
2.3	Sand Filling in Foundation Trenches as per Drawing & Technical Specification as per section 304.	Cum.	1278
2.4	Brick masonry work in cement mortar 1:3 in foundation complete excluding pointing and plastering, as per drawing and technical specifications as per section 1300.	Cum.	5759

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
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.		<b>5150</b>
(i)	Square Rubble Coursed rubble masonry (first sort)	Cum.	5158
(ii) 2.6	Random Rubble Masonry Coursed / uncoursed  Plain/Reinforced cement concrete in open foundation	Cum.	4844
2.0	complete as per drawing and technical specifications as per section 1500,1700 & 2100.		
A	Using batch type concrete mixer with integrated weigher.		
(i)	PCC Grade M15	Cum.	4791
(ii)	PCC Grade M20	Cum.	5135
(iii)	PCC Grade M25	Cum.	5710
(iv)	PCC Grade M30	Cum.	5741
(v)	RCC Grade M20	Cum.	5223
(vi)	RCC Grade M25	Cum.	5729
(vii)	RCC Grade M30	Cum.	5740
(viii)	RCC Grade M35	Cum.	5827
(ix)	RCC Grade M40	Cum.	5892
(x)	RCC Grade M45	Cum.	6156
(xi)	RCC Grade M50	Cum.	6341
В	With Batching Plant, Transit Mixer and Concrete Pump		
(i)	PCC Grade M20	Cum.	5144
(ii)	PCC Grade M25	Cum.	5714
(iii)	PCC Grade M30	Cum.	5751
(iv)	RCC Grade M20	Cum.	5298
(v)	RCC Grade M25	Cum.	5740
(vi)	RCC Grade M30	Cum.	5752
(vii)	RCC Grade M35	Cum.	5830
(viii)	RCC Grade M40	Cum.	5914
(ix)	RCC Grade M45	Cum.	6176
(x)	RCC Grade M50	Cum.	6364
2.7	<b>Well Foundation</b> (Providing and constructing temporary island for construction of well foundation for 8m dia. Well.)		
(i)	Depth of water 1.0 m and height of island to be 1.25m.	Each	39076
(ii)	Depth of water 4.0 m and height of island 4.5 m.	Each	296856
(iii)	Providing and constructing one span service road to reach island location from one pier location to another pier location	Meter	2125
2.8	<b>Providing and laying cutting edge of mild steel</b> weighing 40 kg per meter for well foundation complete as per drawing and technical specifications per relevant clause of section 1200 and 1900.	MT	107832
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		

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
(a)	Using batch type concrete mixer with integrated weigher.		
(ii)	RCC Grade M25	Cum.	6715
(iii)	RCC Grade M35	Cum.	6876
(b)	With Batching Plant, Transit Mixer and Concrete Pump		
(ii)	RCC Grade M25	Cum.	6802
(iii)	RCC Grade M35	Cum.	6965
В	Well steining		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	PCC Grade M15	Cum.	5067
(ii)	PCC Grade M20	Cum.	5512
(iii)	PCC Grade M25	Cum.	6135
(iv)	PCC Grade M30	Cum.	6206
(v)	RCC Grade M20	Cum.	5525
(vi)	RCC Grade M25	Cum.	6155
(vii)	RCC Grade M30	Cum.	6181
(b)	With Batching Plant, Transit Mixer and Concrete Pump		
(i)	PCC Grade M25	Cum.	6180
(ii)	PCC Grade M30	Cum.	6247
(iii)	RCC Grade M20	Cum.	5605
(iv)	RCC Grade M25	Cum.	6235
(v)	RCC Grade M30	Cum.	6262
C	Bottom Plug		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	PCC Grade M20	Cum.	5594
(ii)	PCC Grade M25	Cum.	6003
(iii)	PCC Grade M30	Cum.	6049
(b)	Using Batching Plant, Transit Mixer and		
	Crane/concrete pump		
(i)	PCC Grade M20	Cum.	5727
(ii)	PCC Grade M25	Cum.	6133
(iii)	PCC Grade M30	Cum.	6182
D	Intermediate plug		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	PCC Grade M20	Cum.	5526
(ii)	PCC Grade M25	Cum.	5739
(b)	Using Batching Plant, Transit Mixer and Crane/concrete pump	Cum.	
(i)	PCC Grade M20	Cum.	5676
(ii)	PCC Grade M25	Cum.	5887
E	Top plug		
(a)	Using batch type concrete mixer with integrated weigher.		

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
(i)	PCC Grade M15	Cum.	4607
(ii)	PCC Grade M20	Cum.	5011
(iii)	PCC Grade M25	Cum.	5577
(b)	Using Batching Plant, Transit Mixer and Crane/concrete pump		
(i)	PCC Grade M25	Cum.	5618
F	Well cap		
(a)	Using batch type concrete mixer with integrated weigher.		
(ii)	RCC Grade M25	Cum.	5804
(iii)	RCC Grade M30	Cum.	5815
(iv)	RCC Grade M35	Cum.	5902
(b)	Using Batching Plant, Transit Mixer and Concrete Pump		
(ii)	RCC Grade M25	Cum.	5881
(iii)	RCC Grade M30	Cum.	5891
(iv)	RCC Grade M35	Cum.	5978
(v) 2.10	RCC Grade M40  Sinking of 6 m external diameter well (other than	Cum.	6075
	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 includes removal of all type of obstructions).		
A	Sandy / Clayey Soil		
(i)	Depth below bed level upto 3.0 M	Cum.	468
(ii)	Beyond 3m upto 10m depth	Cum.	923
(iii)	Beyond 10 m upto 20 m		
	Notes		
a)	Add 5% for every additional meter depth of sinking over the		
(iv)	rate of sinking for the previous meter		
a)	Beyond 20m upto 30 m  Add 7.5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
В	Soft rock (6m dia well)	Cum.	1157
C	Hard rock (6m dia well)	Cum.	1289
2.11 A	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).  Sandy / Clayey Soil		
(i)	Depth below bed level upto 3.0 M	Cum.	498
(ii)	Beyond 3m upto 10m depth	Cum.	673
		Cum.	0/3
(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		

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
(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		
В	Soft rock (7m dia well)	Cum.	773
C	Hard rock (7m dia well)	Cum.	1100
2.12	<b>Sinking of 8 m external diameter well</b> (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.	466
(ii)	Beyond 3m upto 10m depth	Cum.	532
(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		
В	Soft rock (8m dia well)	Cum.	660
C	Hard rock (8m dia well)	Cum.	862
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 includes removal of all type of obstructions).		
<u>A</u>	Sandy / Clayey Soil		207
(i)	Depth below bed level upto 3.0 M	Cum.	387
(ii)	Beyond 3m upto 10m depth	Cum.	454
(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		
В	Soft rock (9m dia well)	Cum.	638
<u>C</u>	Hard rock (9m dia well)	Cum.	784
2.14	<b>Sinking of 10 m external diameter well</b> (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).		
<u>A</u>	Clayey soil (10m dia. Well)		
(i)	Depth below bed level upto 3.0 M	Cum.	340
(ii)	Beyond 3m upto 10m depth	Cum.	354
(iii)	Beyond 10 m upto 20 m		

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
	Notes		
A	Add 5% for every additional meter depth of sinking over the rate of sinking for the previous meter		
В	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		
В	Soft rock (10m dia well)	Cum.	553
C	Hard rock (10m dia well)	Cum.	715
2.15	<b>Sand filling in wells</b> complete as per drawing and technical specifications as per section 1207.	Cum.	1234
2.16	<b>Providing steel liner</b> 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	97091
2.17	<b>Bored cast-in-situ M35 grade R.C.C. pile</b> excluding reinforcement complete as per drawing and technical specifications and removal of excavated earth with all lifts and <b>all lead</b> as per section 1100 and 1700.		
(i)	Pile diameter-750 mm	Meter	8362
(ii)	Pile diameter-1000 mm	Meter	13394
(iii)	Pile diameter-1200 mm	Meter	16566
(iV)	Pile diameter-1500 mm	Meter	20709
2.18	<b>Bored cast-in-situ M40 grade R.C.C. pile</b> excluding reinforcement complete as per drawing and technical specifications and removal of excavated earth with all lifts and <b>all lead</b> as per section 1100 and 1700.		
(i)	Pile diameter-750 mm	Meter	8396
(ii)	Pile diameter-1000 mm	Meter	13453
(iii)	Pile diameter-1200 mm	Meter	16652
(iv)	Pile diameter-1500 mm	Meter	20843
2.19	<b>Driven cast-in-place vertical M35 grade R.C.C. pile</b> excluding reinforcement complete as per drawing and & Technical Specification as per section 1100 and 1700.		
(i)	Pile diameter-750 mm	Meter	5938
(ii)	Pile diameter-1000 mm	Meter	9163
(iii)	Pile diameter-1200 mm	Meter	13456
2.20	Driven precast vertical M35 grade R.C.C. piles excluding reinforcement complete as per drawing and & Technical Specification as per section 1100 and 1700		
(i)	Specification as per section 1100 and 1700.  Pile diameter-500 mm	Meter	2857
(ii)	Pile diameter-750 mm	Meter	4323
(iii)	Pile diameter-1000 mm	Meter	6897
2.21	Driven precast vertical M35 grade R.C.C. piles excluding	1,10001	0077
<b>4.41</b>	reinforcement complete as per drawing and & Technical Specification as per section 1100 and 1700.		

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
(i)	Size of pile - 300 mm x 300 mm	Meter	2210
(ii)	Size of pile - 500 mm x 500 mm	Meter	3106
(iii)	Size of pile - 750 mm x 750 mm	Meter	5367
2.22	Pile Load Test on single Vertical Pile in accordance with IS:2911(Part-IV)  Note:  (1) Initial pile load test shall be conducted only by static pile load test as per IRC:78 (Part-1) 2024 Appendix-7.		
(3)	(2) Routine pile load test may be conducted by dynamic pile load test method.	Tonno	1800
(i)	Initial static pile load test	Tonne	<u> </u>
(ii)	Lateral load test	Each	75000
(iii)	Dynamic Pile Load test	test Each	75000
(111)	Dynamic The Load test	test	/ 3000
2.23	Cement concrete for reinforced concrete in pile cap complete as per drawing and Technical Specifications per clause 1100,1500 and 1700.		
A	Using batch type concrete mixer with integrated weigher.		
(i)	RCC Grade M25	Cum.	5626
(ii)	RCC Grade M30	Cum.	5677
(iii)	RCC Grade M35	Cum.	5786
(iv)	RCC Grade M40	Cum.	5842
(v)	RCC Grade M45	Cum.	6092
(vi)	RCC Grade M50	Cum.	6267
В	Using Batching Plant, Transit Mixer and Concrete Pump	<b>O</b>	
(i)	RCC Grade M25	Cum.	5727
(ii)	RCC Grade M30 RCC Grade M35	Cum.	5778 5887
(iii)		Cum.	ļ
(iv)	RCC Grade M40	Cum.	5944
(v)	RCC Grade M45	Cum.	6193
(vi)	RCC Grade M50	Cum.	6368
2.24	<b>Levelling course for Pile cap</b> (Providing and laying of P.C.C.M-15 levelling course 100mm thick below the pile cap.) as per section 1100 &1700.	Cum.	4545
2.25	Supplying, fitting and placing HSD (High Strength Deformed steel) bar reinforcement in foundation complete as per drawing and technical specifications as per section 1600.	МТ	79298
2.26	Taking exploratory boring 100 mm dia at the location of piers and abutments or for high embankments in approaches in all types of strata like soil, soft rock, hard rock etc. including all materials such as casing pipes, accessories, grease and other such materials and or as required including converving such materials and machinery to site of work preserving the loose/undisturbed soil sample and rock core sample serially numbered at the site of work, performing		

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
	other tests at site such as SPT etc. as per direction of Engineer In charge and conveying the same to the head quarters of concerned office as directed and submission of detailed bore log sheet along with required test reports as per I.R.C.78 and section 2400 including testing and preserving soil/rock core sample in core boxes as per Technical specifications and direction of Engineer In charge.		
(i)	Upto 1.0 m below bed level	Each	7141
(ii)	Beyond 1.0 m upto 5.0 m depth	Meter	1690
(iii)	Beyond 5.0 m depth	Meter	1918
2.27	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	1089

#### 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. Testing of Bearing shall be performed in accordance with clauses of latest relevant IRC and MoRT&H specifications.
- 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 etc.
- 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 of MoRT&H clause 2504 and table No. 300-3.

## CHAPTER – III SUB-STRUCTURE

Item No.	Descriptions	Unit	Rate excluding GST(in 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.	5568
3.2	Add extra to item above if fly ash brick work are used	Cum.	557
3.3	Pointing with cement mortar (1:3) on brick work in substructure as per Technical specifications section 1300 and 2200	Sqm.	75
3.4	Plastering with cement mortar (1:3) on brick work in substructure as per Technical specifications section 1300 and 2200	Sqm.	133
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.	4718
(ii)	Coursed rubble masonry (first sort )	Cum.	5054
(iii)	Ashlar masonry ( first sort )	Cum.	6675
3.6	Providing and laying Plain/Reinforced cement concrete in sub-structure complete as per drawing and technical specifications section 1500, 1700 and 2200		
A	Height upto 5m		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	P.C.C. Grade M-15	Cum.	5067
(ii)	P.C.C. Grade M-20	Cum.	5512
(iii)	P.C.C. Grade M-25	Cum.	6135
(iv)	P.C.C. Grade M-30	Cum.	6206
(b)	With Batching Plant, Transit Mixer and Concrete Pump		
(i)	P.C.C. Grade M-25	Cum.	6180
(ii)	P.C.C. Grade M-30	Cum.	6247
В	Height 5m to 10m		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	P.C.C. Grade M-25	Cum.	6358
(ii)	P.C.C. Grade M-30	Cum.	6432
(b)	With Batching Plant, Transit Mixer and Concrete Pump		C404
(i)	P.C.C. Grade M-25	Cum.	6404
(ii)	P.C.C. Grade M-30	Cum.	6474
(a)	Height above 10m Using batch type concrete mixer with integrated weigher.		
(a) (i)	P.C.C. Grade M-25	Cum.	6637
(ii)	P.C.C. Grade M-30	Cum.	6714
(h) (b)	With Batching Plant, Transit Mixer and Concrete Pump	Cuill.	0/14
ļ	P.C.C. Grade M-25	Crm	6605
(i)		Cum.	6685
(ii)	P.C.C. Grade M-30	Cum.	6758
D	Height upto 5m		
(a)	Using batch type concrete mixer with integrated weigher.	C	
(i)	R.C.C. Grade M-20	Cum.	5525

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
(ii)	R.C.C. Grade M-25	Cum.	6155
(iii)	R.C.C. Grade M-30	Cum.	6181
(iv)	R.C.C. Grade M-35	Cum.	6303
(v)	R.C.C. Grade M-40	Cum.	6368
(vi)	R.C.C. Grade M-45	Cum.	6650
(vii)	R.C.C. Grade M-50	Cum.	6848
(viii)	R.C.C. Grade M-55	Cum.	7163
(b)	With Batching Plant, Transit Mixer and Concrete Pump		
(i)	R.C.C. Grade M-20	Cum.	5605
(ii)	R.C.C. Grade M-25	Cum.	6235
(iii)	R.C.C. Grade M-30	Cum.	6262
(iv)	R.C.C. Grade M-35	Cum.	6384
(v)	R.C.C./P.S.C Grade M-40	Cum.	6448
(vi)	R.C.C./P.S.C Grade M-45	Cum.	6729
(vii)	R.C.C./P.S.C Grade M-50	Cum.	6929
(viii)	R.C.C./P.S.C Grade M-55	Cum.	7243
E	Height 5m to 10m		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	R.C.C. Grade M-20	Cum.	5726
(ii)	R.C.C. Grade M-25	Cum.	6356
(iii)	R.C.C. Grade M-30	Cum.	6372
(iv)	R.C.C. Grade M-35	Cum.	6441
(v)	R.C.C. Grade M-40	Cum.	6507
(vi)	R.C.C. Grade M-45	Cum.	6795
(vii)	R.C.C. Grade M-50	Cum.	6997
(viii)	R.C.C. Grade M-55	Cum.	7319
(b)	With Batching Plant, Transit Mixer and Concrete Pump		
(i)	R.C.C. Grade M-20	Cum.	5809
(ii)	R.C.C. Grade M-25	Cum.	6439
(iii)	R.C.C. Grade M-30	Cum.	6456
(iv)	R.C.C. Grade M-35	Cum.	6524
(v)	R.C.C./P.S.C Grade M-40	Cum.	6589
(vi)	R.C.C./P.S.C Grade M-45	Cum.	6875
(vii)	R.C.C./P.S.C Grade M-50	Cum.	7080
(viii)	R.C.C./P.S.C Grade M-55	Cum.	7401
F	Height above 10m		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	R.C.C. Grade M-25	Cum.	5977
(ii)	R.C.C. Grade M-25 R.C.C. Grade M-30	Cum.	6659 6687
(iii) (iv)	R.C.C. Grade M-35	Cum. Cum.	6647
(v)	R.C.C./P.S.C Grade M-40	Cum.	6800
(vi)	R.C.C./P.S.C Grade M-45	Cum.	7013
(vii)	R.C.C./P.S.C Grade M-50	Cum.	7221
(viii)	R.C.C./P.S.C Grade M-55	Cum.	7553

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
(b)	With Batching Plant, Transit Mixer and Concrete Pump		
(i)	R.C.C. Grade M-20	Cum.	6063
(ii)	R.C.C. Grade M-25	Cum.	6745
(iii)	R.C.C. Grade M-30	Cum.	6775
(iv)	R.C.C. Grade M-35	Cum.	6935
(v)	R.C.C./P.S.C Grade M-40	Cum.	6800
(vi)	R.C.C./P.S.C Grade M-45	Cum.	7096
(vii)	R.C.C./P.S.C Grade M-50	Cum.	7307
(viii)	R.C.C./P.S.C Grade M-55	Cum.	7638
3.7	Supplying, fitting and placing HSD bar reinforcement in sub-structure complete as per drawing and technical specifications section 1600 and 2200	MT	79704
3.8	High tensile steel wires/strands including all accessories for stressing, stressing operations and grouting complete as per drawing and Technical Specifications as per section 1600	MT	189169
3.9	Providing weep holes in Brick masonry/ Plain/ Reinforced concrete abutment, wing wall/return wall with 100 mm dia AC pipe, extending through the full width of the structure with slope of 1V:20H towards drawing foce. Complete as per drawing & Technical specifications section 2706 & 2200	Meter	438
3.10	<b>Back filling behind abutment</b> , 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.	1011
3.11	Providing and laying of Filter media with granular materials/stone crushed aggregates satisfying the requirements laid down in clause 2504.2.2. of MoRTH specifications to a thickness of not less than 600 mm with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind abutment, wing wall and return wall to the full height compacted to a firm condition complete as per drawing and technical specifications 710.1.4 of I.R.C. 78 and 2200	Cum.	1968
3.12	Supplying, fitting and fixing in position true to line and level cast steel rocker bearing conforming to IRC: 83(Pt1) section IX and clause 2003 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications section 2000, 1000 and 2200	Per tonne capacity	560
3.13	Supplying, fitting and fixing in position true to line and level forged steel roller bearing conforming to IRC: 83(Pt1) section IX and clause 2003 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications section 2000, 1000 and 2200	Per tonne capacity	737
3.14	Supplying, fitting and fixing in position true to line and level sliding plate bearing with PTFE surface sliding on stainless steel complete including all accessories as per drawing and Technical Specifications and BS: 5400, section 9.1 & 9.2 (for PTFE) and clause 2004 of MoRTH Specifications section 2000 and 2200	Per tonne capacity	611

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
3.15	Supplying, fitting and fixing in position true to line and level elastomeric bearing conforming to IRC: 83 (Part-II) section IX and clause 2005 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications section 2000 and 2200	Per cubic centimet er	1.1
3.16	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	608
3.17	<b>Supplying, fitting &amp; fixing in position true to line &amp; level POT-PTFE bearing</b> 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 & other parts conforming to BS: 5400, section 9.1 & 9.2 & clause 2006 of MoRTH Specifications complete asper drawing & approved technical specifications.	Per tonne capacity	338
3.18	<b>Providing and fixing in position tar paper bearing</b> for slab as per approved drawings and specification	Sqm.	66
3.19 (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 concrete 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. Covering of Joints of Box (top slab & side walls) is to be done with V-shaped Aluminium Prismatic sheets (minimum 600mm width & 2mm thick) to cater seepage water (if any) from joints of boxes to drain in box.	Cum.	21440
3.19 (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	Cum.	1543

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
	taken by Engineer-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		
3.19 (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.	50
3.20	Painting on bridge over concrete surface with epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications i/c priming coat with epoxy primer, preparation of surface, etc. complete.	Sqm.	257

#### 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. Precast RCC/PSC "I" Beam Girder including Launching have been added in this chapter & if this item is taken then Compulsory provisions for "Precast Girder including launching" have to be made in NIT. The rate is inclusive of casting precast Girder, transportation of Girders from yard to Site location, providing Crane of adequate capacity including all lead, lifts, safety provisions and other charges complete
- 6. 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.
- 7. 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.
- 8. 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.
- 9. 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 excluding GST(in Rs)
4.1	Furnishing and Placing Reinforced/Prestressed cement concrete in super-structure as per drawing and Technical Specification sections 1500, 1600 and 1700		
<b>A</b>	RCC Grade M25		
I	For Solid Slab Super Structure		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	Height upto 5m	Cum.	6678
(ii)	Height 5m to 10m	Cum.	6957
(iii)	Height above 10m	Cum.	7235
(b)	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	Cum.	6652
(ii)	Height 5m to 10m	Cum.	6929
(iii)	Height above 10m	Cum.	7206
II	For T-beam & slab		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	Height upto 5m	Cum.	6957
(ii)	Height 5m to 10m	Cum.	7235
(iii)	Height above 10m	Cum.	7513
<b>(b)</b>	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	Cum.	6929
(ii)	Height 5m to 10m	Cum.	7206
(iii)	Height above 10m	Cum.	7484
В	RCC Grade M 30		
I	For Solid Slab Super Structure		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	Height upto 5m	Cum.	6788
(ii)	Height 5m to 10m	Cum.	7070
(iii)	Height above 10m	Cum.	7353
(b)	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	Cum.	6842
(ii)	Height 5m to 10m	Cum.	7127
(iii)	Height above 10m	Cum.	7412
II	For T-beam & slab		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	Height upto 5m	Cum.	7070
(ii)	Height 5m to 10m	Cum.	7353

Item No.	Descriptions	Unit	Rate excluding GST(in R
(iii)	Height above 10m	Cum.	7636
(b)	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	Cum.	7127
(ii)	Height 5m to 10m	Cum.	7412
(iii)	Height above 10m	Cum.	7697
С	RCC/PSC Grade M35		
Ι	For Solid Slab Super Structure		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	Height upto 5m	Cum.	6806
(ii)	Height 5m to 10m	Cum.	7094
(iii)	Height above 10m	Cum.	7383
(b)	Using Batching Plant, Transit Mixer and Concrete		
	Pump		
(i)	Height upto 5m	Cum.	6854
(ii)	Height 5m to 10m	Cum.	7144
(iii)	Height above 10m	Cum.	7435
II	For T-beam & slab		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	Height upto 5m	Cum.	7094
(ii)	Height 5m to 10m	Cum.	7383
(iii)	Height above 10m	Cum.	7671
(b)	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	Cum.	7144
(ii)	Height 5m to 10m	Cum.	7435
(iii)	Height above 10m	Cum.	7725
Ш	For Box Girder and Balanced Cantilever		
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	Height upto 5m	Cum.	7960
(ii)	Height 5m to 10m	Cum.	8536
(iii)	Height above 10m	Cum.	9113
(b)	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	Cum.	8016
(ii)	Height 5m to 10m	Cum.	8597
(iii)	Height above 10m	Cum.	9177
IV#	RCC/PSC Grade M-35 "I" beam including	Cum.	10421
	Launching of Precast Girder and transportation of		
	Girders from yard to Site location, providing Crane		
	of adequate capacity including all lead, lifts, safety		
	provisions and other charges complete		
D	RCC/PSC Grade M-40		
I	For Solid Slab Super Structure		

Item No.	Descriptions	Unit	Rate excluding GST(in R
(a)	Using batch type concrete mixer with integrated weigher.		
(i)	Height upto 5m	Cum.	7062
(ii)	Height 5m to 10m	Cum.	7356
(iii)	Height above 10m	Cum.	7651
(b)	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	Cum.	6931
(ii)	Height 5m to 10m	Cum.	7225
(iii)	Height above 10m	Cum.	7519
II	For T-beam & slab		1
(a)	Using batch type concrete mixer with integrated		
(4)	weigher.		
(i)	Height upto 5m	Cum.	7356
(ii)	Height 5m to 10m	Cum.	7651
(iii)	Height above 10m	Cum.	7945
(b)	Using Batching Plant, Transit Mixer and Concrete	Cum	,,,,
(6)	Pump		
(i)	Height upto 5m	Cum.	7225
(ii)	Height 5m to 10m	Cum.	7519
(iii)	Height above 10m	Cum.	7813
III	For cast in situ Box Girder, Segment Construction	Cum	7010
	and Balanced Cantilever		
	Using Batching Plant, Transit Mixer and Concrete		
	Pump		
(i)	Height upto 5m	Cum.	8106
(ii)	Height 5m to 10m	Cum.	8694
(iii)	Height above 10m	Cum.	9281
IV #	RCC/PSC Grade M-40 "I" beam including	Cum.	10538
	Launching of Precast Girder and transportation of		
	Girders from yard to Site location, providing Crane		
	of adequate capacity including all lead, lifts, safety		
	provisions and other charges complete		
E	PSC Grade M-45		
Ι	For solid slab/voided slab super-structure		
(a)	Using Batching Plant, Transit Mixer and Concrete		
	Pump		
(i)	Height upto 5m	Cum.	7109
(ii)	Height 5m to 10m	Cum.	7416
(iii)	Height above 10m	Cum.	7722
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.	7416
(ii)	Height 5m to 10m	Cum.	7722
(iii)	Height above 10m	Cum.	8029
III	For cast-in-situ box girder, segmental construction		

Item No.	Descriptions	Unit	Rate excluding GST(in Rs
	and balanced cantilever		
(a)	Using Batching Plant, Transit Mixer and Concrete Pump		
(i)	Height upto 5m	Cum.	8335
(ii)	Height 5m to 10m	Cum.	8948
(iii)	Height above 10m	Cum.	9561
IV #	RCC/PSC Grade M-45 "I" beam including Launching of Precast Girder and transportation of Girders from yard to Site location, providing Crane of adequate capacity including all lead, lifts, safety provisions and other charges complete	Cum.	10836
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.	8519
(ii)	Height 5m to 10m	Cum.	9150
(iii)	Height above 10m	Cum.	9781
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.	8904
(ii)	Height 5m to 10m	Cum.	9563
(iii)	Height above 10m	Cum.	10223
4.2	Supplying, fitting and placing HSD bar reinforcement in super-structure complete as per drawing and technical specifications as per section	MT	81366
4.3	High tensile steel wires/strands including all accessories for stressing, stressing operations and grouting complete as per drawing and Technical Specifications as per section 1600	MT	189169
4.4	Providing and laying Cement concrete wearing coat M-35 grade including reinforcement of 8 mm diameter @ 150 mm c/c spacing in both ways for each 75 mm thickness of concrete complete as per drawing and Technical Specifications as per section 2700	Cum.	12684
4.5	Mastic Asphalt		
ì	Providing and laying 12 mm thick mastic asphalt wearing course on top of deck slab excluding prime coat with paving grade bitumen meeting the requirements given in table 500-39, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of	Sqm.	405

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
	9.5 mm nominal size at the rate of 0.005cum per 10 sqm and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces not less than 100 deg. C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 516.		
ii	Providing and laying 25 mm thick mastic asphalt wearing course with paving grade bitumen meeting the requirements given in table 500-39, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 13.2 mm nominal size at the rate of 0.005cum per 10 sqm and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces is not less than 1000C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 516.	Sqm.	816
4.6	Crash Barriers for Bridge Provision of an M-40 grade Reinforced cement concrete crash barrier at the bridge decks & approaches to bridge structures, constructed with Reinforced Cement Concrete with HSD reinforcement conforming MoRT&H Specification and as per details given IRC -5 including dowel bars, expansion joints filled with pre-moulded asphalt filler board etc and approved drawing, technical specifications and at locations directed by the Engineer, all as specified.		
A	Crash Barriers for Bridge (Height 900 mm) as per details given IRC -5 (fig1) (Area-0.254 Sqm. for 1 meter length)	Meter	3761
В	Crash Barriers for Bridge (Height 1100 mm) as per details given IRC -5 (fig2) (Area-0.298 Sqm. for 1 meter length)	meter	4397
C	Crash Barriers for Bridge Height 1550 mm) as per details given IRC -5 (fig3) (Surface Area-0.514 Sqm. for 1 meter length)	meter	7577
4.7	Provision of an M-40 grade Reinforced cement concrete <b>new jersey crash barrier at the medians</b> , constructed with Reinforced Cement Concrete with HYSD reinforcement conforming to conforming MoRT&H Specification and as per details given IRC -119 (Fig26) including dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board etc, as per approved drawing and at locations directed by the Engineer, all as specified. (Area-0.261 Sqm. /Meter, Double Face)	Meter	3789

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
4.8	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 latest IRC-5 & IRC-6, approved drawings and technical specifications as per relevant clauses of section 1500, 1600, 1700 and 2703.	Meter	2072
4.9	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 latest IRC-5 & IRC-6, approved drawings and technical specifications.	Meter	2008
4.10	Providing, fitting and fixing mild steel protective screen on crash barrier (minimum 1.20 M above concrete) with vertical (minimum 0.30M embedded in concrete and 2M C/C) and horizontal member of ISA 40x40x6 mm, inclined bracing of ISA 35x35x6 mm with welded wire mesh of aperture 50x25mm and MS Flat 25x5mm to fix welded wire mesh including all fittings, staples and application of priming coat of red oxide chromate complete as per approved drawing and technical specifications	Meter	2640
4.11	Providing, fitting and fixing mild steel railing with minimum 2 nos ISMC 100 post spaced @ 2 metre c/c with ISMC 100 as horizontal members at top and bottom and 20 mm square bars spaced @ 100 mm c/c between posts complete as per approved drawing and Technical Specification and as per relevant clauses of section 1900 and 2703.2 (All vertical square bars is to be inserted in all horizontal members pierced and welded in horizontal members)	Meter	3893
4.12	Providing and Fixing in position collapsible pipe railing of approved design including 2 coats painting etc. complete with channel post I.C.M.C. 100x50mm (0.95m high) and 48.4mm outer dia lighter type class "A" G.I. pipe excluding cost of end concrete post.	Meter	1531
4.13	Drainage Spouts complete as per approved drawing and Technical specifications of section 2705	Each	2688
4.14	Add extra for G.I. Pipe of 100mm dia from soffit level upto ground level for Drainage Spouts in urban areas to discharge the surface run-off to drains provided at ground level providing all bend with door complete as per drawing and Technical	Meter	627

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
	specification		
4.15	PCC M15 Grade leveling course below approach slab complete as per drawing and Technical specification and as per relevant section 2700	Cum.	4607
4.16	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.	9867
4.17	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	24420
4.18	Filler joint	C	10700
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.	19728
В	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.	1212
С	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.	697
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.	320
4.19	Asphaltic Plug joint (Providing and laying of asphaltic plug joint to provide for horizontal movement of 25 mm and vertical movement of 2 mm, depth of joint varying from 75 mm to 100 mm, width varying from 500 mm to 750 mm (in traffic direction), covered with a closure plate 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	2117
4.20	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	Meter	25715

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
	manufacturer/supplier or their authorized representative ensuring compliance to the manufacturer's instructions for installation and clause 2606 of MoRTH specifications for road & bridge works.		
4.21	Compression Seal Joint	Meter	12225
	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.		
4.22	Strip Seal Expansion Joint (Providing and laying of a strip seal expansion joint catering to maximum horizontal movement upto 70 mm, complete as per approved drawings and standard specifications to be installed by the manufacturer/supplier or their authorized representative ensuring compliance to the manufacturer's instructions for installation.)	Meter	11567
4.23	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	30429
В	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	46286
4.24	<b>Painting on kerbs</b> 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	70
4.25	Painting on concrete surfaces with 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	Sqm.	169

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
4.26	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.	170
4.27	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.	Sqm.	940
4.28	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.	Sqm.	940
4.29	<b>Testing of span of bridge for deflection</b> due to live load with platform for loading arrangements, apparatus for measurement etc. complete as per drawing and specifications (As per I.R.C.S.P.51)	Tonne	912
4.30	Performing detailed survey and investigation and collection of hydraulic datas (essential design data as per I.R.C 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	3124
(ii)	For catchment areas 1.25 to 2.5 sq.Km.	Each	3806
4.31	Providing & fixing in position structural steel expansion joint i/c. cutting riveting bolting welding as per MORTH Std. drawing No. BD/1-69 'B' and specification as per section 1000, 1900 and 2600	Meter	2500
4.32	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	MT	165660

Item No.	Descriptions	Unit	Rate excluding
110.			GST(in Rs)
	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.		
	• 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		
	<ul><li>and nothing extra will be paid on this account.</li><li>All layers of painting should be separately got</li></ul>		
	approved as per approved QAP & WPSS nominated		
	representatives.		
	• All Structural steel shall confirm to Grade 'B'		
	specifications except for rolled sections (Angles,		
<u> </u>			<u> </u>

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
	Channels, I-sections). For Rolled sections Grade 'A' steel may be used.		
4.33	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	34320
4.34	Providing and fixing for hand railing top of crash barrier including cost of material complete as per approved drawing.	RM	686
4.35	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 MOST standard drawing No. BD/1-69 'B' and specifications as per section 2600 in:-		
(i)	R.C.C. 75 mm deep wearing coat	Meter	150
(ii)	Asphaltic concrete 56 mm. deep wearing coat.	Meter	120
4.36*	Providing, supplying and fitting minimum 100 mm thick & minimum 3 metre height powder coated absorptive type noise barrier (sandwich panel of mineral wool covered with G.I. corrugated frame minimum Grade B as per IS 2277-2003) as per IS: 13871-1993, EN:1793, En 1794 with universal column 100 mm thick @ minimum 2 metre c/c properly sand blasted & epoxy coated pole fixed with crash barrier using base plate with minimum 4 anchor bolts of grade M25 including all accessories complete as per approved drawing & technical specifications.	Sqm.	443
4.37	DGPS Survey for Flyover/ROB/RUB/Overpass/Grade Separator and providing Autocad & KML files of survey data with details of all existing structures like road, kerbs, trees, drain, temple, buildings, railway tracks etc. along with utilities like electric poles etc. & superimposing on Google map including marking of co-ordinates at site location as per direction of Engineer-In-Charge.	Meter	50

Item No.	Descriptions	Unit	Rate excluding GST(in Rs)
4.38	Providing reinforced earth structure (RE wall) with Geogrid by providing all required materials such as per cast facia panels/facia block, in M-35 (As per specifications and approved design & drawing) steel reinforcement (Fe-500) Friction ties, Polymeric loops, Anchor pin including necessary soling 300mm depth and bed concrete in M-20 grade 250mm depth as directed by Engineer in Charge. Casting leveling pad for fixing facia panels/blocks in line & level as per approved drawing & specifications.	Sqm.	4775
	<b>Note</b> - The compacted earth filling to be retained shall be part of embankment and the same is to be worked out, provided and paid separately as per specifications.		

#### Note:-

- (\*) This item to be executed with prior permission of Chief Engineer.
- (#) If this Item is taken then Compulsory provisions for "Precast Girder including launching" have to be made in NIT.

## CHAPTER- V RIVER TRAINING AND PROTECTION WORKS

No.	Description	Unit	Rate excluding GST(in 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.	2162
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.	3433
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 IRC: 21-2000	Cum.	4887
5.4	Providing and laying Pitching on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment and cement Grouting with C.M. 1:4 in Pitching of gap between stone/block complete as per drawing and Technical specifications as per section 2504		
A	Stone/Boulder	Cum.	2486
В	Cement Concrete blocks of size 0.3x0.3 x0.2 m cast in cement concrete of Grade M15	Cum.	5620
5.5	<b>Providing and laying Filter material</b> 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.	2232
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	Sqm.	408
	creating any uplift head on the pitching as per any relevant section 700 and 2504 of specifications.		
5.7			
5.7	relevant section 700 and 2504 of specifications.  Providing and laying Flooring complete as per drawing and Technical specifications laid over cement	Cum.	5518
	relevant section 700 and 2504 of specifications.  Providing and laying Flooring complete as per drawing and Technical specifications laid over cement concrete bedding as per section 2505	Cum. Cum.	5518 6436
A	relevant section 700 and 2504 of specifications.  Providing and laying Flooring complete as per drawing and Technical specifications laid over cement concrete bedding as per section 2505  Rubble stone laid in cement mortar 1:3		-
A B	relevant section 700 and 2504 of specifications.  Providing and laying Flooring complete as per drawing and Technical specifications laid over cement concrete bedding as per section 2505  Rubble stone laid in cement mortar 1:3  Cement Concrete blocks Grade M15  Construction of Dry rubble Flooring at cross drainage works for relatively less important works as per section	Cum.	6436

Item No.	Description	Unit	Rate excluding GST(in Rs)
В	Cement concrete Grade M15	Cum.	4791
5.10	Construction of flexible apron 1 m thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.	Cum.	2265
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.	3631
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.	5862
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.	285
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.	75
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.	133
5.16	Providing "Antirust Chemical coating" on the work of reinforcement (Providing antirust corrosive treatment to HSD reinforcement with antirust chemical -Zinc rich epoxy resin coating as per section 1600)	MT	975

#### CHAPTER- VI REPAIR AND REHABILITATION

Item No.	Description	Unit	Rate excluding GST(in 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 all leads as per section 2809	Sqm.	126
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 all leads as per section 2809	Sqm.	95
6.3	Guniting concrete surface with cement mortar applied with compressor after cleaning surface and spraying with epoxy complete as per Technical specification section 2807 (Thickness 25mm)	Sqm.	1410
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 as per section 2800	Each	192
6.5	<b>Sealing of cracks/porous concrete</b> by injection process through nipples/Grouting complete as per Technical specification section 2806		
A	Cement Grout	Kg.	120
В	Cement mortar (1:1) Grouting	Kg.	247
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.	2476
6.7	<b>Sealing of crack / porous</b> concrete with Epoxy Grout by injection through nipples complete as per clause 2803.1.	Kg.	1634
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 mortas)	Sqm.	839
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 and workmanship conforming to clause 2807.6. (40mm average thickness)	Sqm.	1414

Item No.	Description	Unit	Rate excluding GST(in Rs)
6.10	<b>Applying pre-packed cement</b> -based polymer mortar of strength 45 Mpa at 28 days for replacement of spalled concrete (thickness 10mm) <b>as per section 2800</b>	Sqm.	216
6.11	Epoxy bonding on old concrete surface for application of new concrete as per section 2805.	Sqm.	1244
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	441563
В	For span = 50 m (4 no. of cables and 8 no anchorage)	Tonne	415529
C	For span = 100 m (6 no of cables and 12 no anchorage)	Tonne	376958
6.13	Replacement of Elastomeric bearings complete as per Technical specification section 2810 (the work entails replacement of all the bearings on one side of span)	Each	47311
6.14	<b>Removal of Expansion Joints</b> complete as per approved drawings (Only Removal of old expansion joint)	Meter	3601
6.15	Replacement of damaged concrete railing (including Dismantling the old railing and disposal of dismantled material)	Meter	2424
6.16	Replacement of damaged mild steel railing (including Dismantling of old railing and disposal of dismantled material)	Meter	3253
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 complete. (It is assumed that damage to the crash barrier is to the extent of 10 percent)	Meter	217
6.18	Repair of R.C.C. railing: Carrying out repair of RCC M-30 railing to bring it to the original shape complete. (It is assumed that damage to the CC railing is to the extent of 10 percent)	Meter	145
6.19	Repair of steel railing: Repair of steel railing to bring it to the original shape complete. (It is assumed that damage to the steel railing is to the extent of 10 percent)	Meter	368

## Public Works Department, Chhattisgarh

SOR (Bridge Works), w.e.f. 1st January, 2025

# STANDARD TABLES & USEFUL DATA

### FIELD LABORATORY EQUIPMENT

#### **Clause 120.4**

#### Table 100-2 List of Laboratory Equipment

A)	GENERAL	
1)	Weigh Balances	
1)	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	
2)	thermometer), stainless steel interior	
	From 0°C to 220°C Sensitivity 1°C	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	1 set
	sizes complete with lid and pan	
	b) IS sieve 200 mm internal dia (brass frame and steel/or brass wire cloth	2 sets
	mesh) consisting of sieve sets of required sieve sizes complete with lid	
4)	Sieve shaker capable of asking 200 mm and 450 mm dia sieves-electrically	1 No.
	operated with time switch	
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	2No. each
	1000 cc Capacity)glass rods and funnels, glass thermometers range 0°C to	
	100°C and metallic thermometers range up to 300°C.	
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	1 No
5)	Heavy Compaction	1 100
	Apparatus as per IS complete with collar, base plate hammer and all other	
	accessories	
6)	Sand pouring cylinder with conical funnel and tap and complete as per	2 Nos.
0)	IS:2720 (Part 28) 1974 including modern equipment.	2 1103.
7)	Ignore Standard Sand	As required
8)	Sampling tins with lids 100 mm dia x 75 mm ht. ½ kg capacity and	4 Nos.
	miscellaneous items like moisture tins with lid 50 grams etc.	
,		
	•	1 set
9)	Lab CBR testing equipment for conducting CBR testing, load frame with 5	1 set
	•	1 set

	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.
<b>C</b> )	FOR BITUMEN AND BITUMINOUS MIXES	
1)	Constant temperature bath for accommodating bitumen test specimen,	1 No.
-)	electrically operated, and thermostatically controlled (to accommodate	1110.
	minimum six Specimens)	
2)	Penetrometer automatic type, including adjustable weight arrangement and	1 No.
2)	needles as per IS:1203-1958	1 110.
3)	Soxhlet extraction or centrifuge type apparatus complete with extraction	1 No.
3)	thimbles with solvent and filter paper	1 110.
4)	Bitumen laboratory mixer including required accessories (20 ltrs.)	1 No.
5)	Marshall compaction apparatus automatically operated as per ASTM 1559-62	1 set
3)	T complete with accessories (with 180 N Marshall Moulds)	1 501
6)	Furol viscometer	1 No.
7)	Ductility meter	1 No.
/) 	Softening point (Ring and ball app)	1 No.
9)	Distant reading thermometer	1 110.
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	-
	Sand Equivalent test apparatus	1 set
14)	<u>;                                    </u>	
15)	Core cutting machine suitable for upto 150 mm dia core	1 set
16)	Thermometers  FOR CEMENT CONCRETE AND MATERIALS	4 Nos.
<u>D)</u>	FOR CEMENT, CEMENT CONCRETE AND MATERIALS	
1)	Water still	1 NT
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	As req.
	capping set and compound as per IS	
	b) Cube 150 mm, and 100 mm (each size)	As req.
4)	Concrete permeability apparatus	
	High traduancy morter cube vibrator for coment testing	
5)	High frequency mortar cube vibrator for cement testing	
5) 6)	Concrete mixer power driven, 1 cu.ft. capacity	
5)	·	
5) 6) 7)	Concrete mixer power driven, 1 cu.ft. capacity  Variable frequency and amplitude vibrating table size 1 m x 1 m as per the relevant British Standard	1 No.
5) 6) 7) 8)	Concrete mixer power driven, 1 cu.ft. capacity  Variable frequency and amplitude vibrating table size 1 m x 1 m as per the relevant British Standard  Flakiness index test apparatus	
5) 6) 7) 8) 9)	Concrete mixer power driven, 1 cu.ft. capacity  Variable frequency and amplitude vibrating table size 1 m x 1 m as per the relevant British Standard  Flakiness index test apparatus  Aggregate impact test apparatus as per IS:2386 (Part 4) 1963	1 No.
5) 6) 7) 8)	Concrete mixer power driven, 1 cu.ft. capacity  Variable frequency and amplitude vibrating table size 1 m x 1 m as per the relevant British Standard  Flakiness index test apparatus	

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

	Per cen	t by Weight Passing th	ie Sieve
IS Sieve Size	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<sub>2</sub>SO<sub>4</sub>. 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 <sub>3</sub> )	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	<b>Precast Concrete</b>
Grade of concrete	M 35	M 35
Minimum cement content	400 kg/m <sup>3</sup>	400 kg/ m <sup>3</sup>
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

Minimum Periods from Time of Casting			
Strike Side-	End of Wet	Lift from	Casting
241114 2144			_
Shutters (Hours)	Curing (Days)	Bed (Days)	Drive
			(days)
24	7	10	28
12	7	7	10
		Strike Side- End of Wet	Strike Side- End of Wet Lift from

#### 1116 TOLERANCES

#### 1116.1. Permissible Tolerances for Piles

iì	Drecast	Concrete	Dilec .	
1)	PIECASI	Concrete	PHES	

a) Variation in cross-sectional dimensions : ± 5 mm
 b) Variation in length : ±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 : ± 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	: 12 to 48 hours as may be
	vertical faces of structural members	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.** 

T	ype of concrete/Grade D	Characteristic Strength in	
Nominal Mix Concrete	Standard Concrete	High Performance Concrete	MPa
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 <sup>3</sup>	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  $40 \text{ kg/m}^3$  for use of 12.50 mm nominal size aggregates and decreased by  $30 \text{ kg/m}^3$  for use of 40 mm nominal size aggregates.

TABLE 1700-3
Requirement of Concrete Exposed to Sulphate Attack

Class	Concent	ration of Sul SO <sub>3</sub>	lphates as	Type of Cement	Minimum Cement	Maximum Water/	Minimum Grade of
	In	Soils	In	(Note II)	Content,	Cement	Concrete
	Total SO <sub>3</sub> %	SO3in 2:1 Water: Soil Extract, g/l	Ground Water, g/l		kg/m <sup>3</sup>	Ratio	
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.

	Туре	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)	Water f	tity of or 50 kg ement
			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 <sup>3</sup>	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 <sup>3</sup> 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:-

Disturbed	Hand Samples
	Tana Sampies
	Auger Samples
	Shell Samples
Undisturbed	Hand Samples
	Tube Samples
Disturbed	Wash Samples from
	percussion or rotary
Undisturbed	drilling
	Cores
	Disturbed

#### 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	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	<sup>с</sup> ии, ¸Фии	Unconsolidated undrained triaxial shear test on undisturbed samples and on compacted embankment material	Total stress analysis
	(b) do -	Su	Unconfined compression test in laboratory or vane shear test	do
	(c) do	СФ	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	СФ	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) <u>High Tensile Steel</u>

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.	Weight Kg/M
	Cm.	
3	2.352	1.848
5	4.620	3.624
8	6.036	4.740

#### d) <u>Structural steel</u> (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)

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

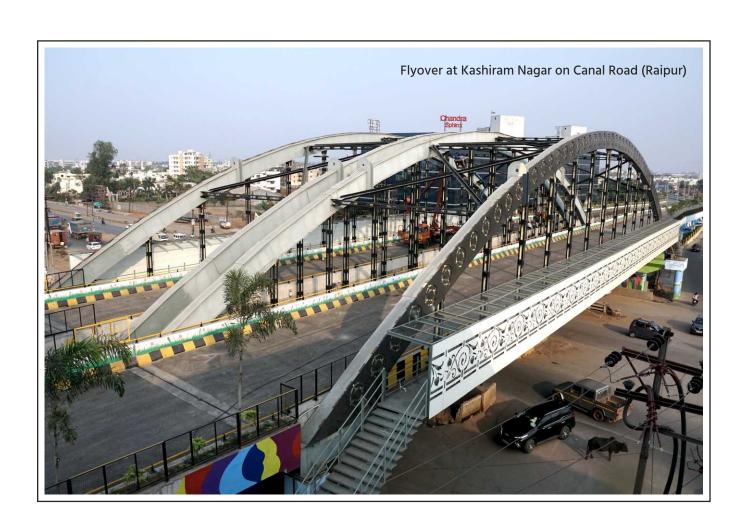
#### 4. Quantities of Materials for Finished Items of Works

S.No	Items	Materials	Quantities
a)	Unit per Cubic meter of finished item		
1.	Cement Mortar (1:3)	Cement	0.33 Cum.
		Sand	1.00 Cum.
2.	Cement Mortar (1:4)	Cement	0.25 Cum.
		Sand	1.00 Cum.
3.	Cement Mortar (1:6)	Cement	0.16 Cum.
		Sand	1.00 Cum.
4.	Course Rubble Masonry	Stones	1.00 Cum
		Mortar	0.33 Cum
5.	Cut Stone Masonry	Stone	1.00 Cum.
		Mortar	0.16 Cum.
6.	Fine Ashlars Stone Masonry	Stone	1.0 Cum.
		Mortar	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.

# UNIT 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	Weight Site in		in	Remarks	
		in(KG/M³)	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	1800	18 to 20	cft	30x15x20 cm
	block(solid)		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"



## **PUBLIC WORKS DEPARTMENT**

**GOVT. OF CHHATTISGARH**