

WATER RESOURCES DEPARTMENT
GOVERNMENT OF MADHYA PRADESH
UNIFIED SCHEDULE OF RATES

FOR

WORKS OF WATER RESOURCES DEPARTMENT MADHYA PRADESH

In Force From

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Engineer-in-Chief

Water Resources Department Madhya Pradesh Bhopal

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PREFACE

Madhya Pradesh Water Resources Department started enforcement of Unified Schedule of Rates (USR) since 1st February 1977. A standard –data-unit –analysis based on execution of works by manual labour, in general, was prepared in 1984. Later on based on these analysis of rates of various items the revision in USR were effected on 1st August 1984, 1st April 1991, 1st April 1998, 1st September 2003, 1st July 2007 and 1st July 2009. To keep pace with modern construction technology, day to day use of machines and equipment, it has been felt necessary to revise the “standard-data-unit-analysis” based on use of plant & equipment in rate analysis. Accordingly, U.S.R. was prepared and enforced from 01.11.2015. The same is now modified in view to make it more precise and comprehensive. This emended U.S.R. will be in force from 1st April 2016. A policy has been adopted to restrict the chapters of this USR to water retaining and water conveyance structures only and to follow the USR of other departments for other allied items of works not contained in U.S.R. Main features of this revision are as under:-

1. Items are provided for the work with modern construction technology.
2. The Chapters related to building, roads, laying of closed pipe conduits, electrification etc. are not provided in this USR and the rates for items of such allied works shall be adopted from current SOR of PWD/MPRRDA/PHED/ UADD/MP State Electricity Companies Central Govt., other states and PSUs.
3. Most of the items are now framed in such a way that clubbing is not required and items can be directly used in bill of quantities.

Revision has been carried out under the guidance of Shri Nand Kumarum, PD World Bank Aided Projects, Shri M.K. Acharya, Chief Engineer BODHI. I would like to thank Shri T.R. Kapoor, Secretary, Shri Rajiv Sukalika, C.E. Shri Narayan Warwade, C.E., E&M., Shri R.K. Khandelwal C.E., Shri Y.C. Sharma, Directors, Shri Salilendra Shrivastava, Shri B.C. Purndare, Shri R.C. Saxena, S.E., Shri G.P.Soni, Shri P.C. Gwalvanshi D.D., who provided valuable contribution in preparation of various chapters. I am also thankful to Shri Bharat Gosavi, Director R&C, BODHI, along with his team, consisting of Shri Gandhi D.D. Shri S.K.Jain. Shri A.K.Chatterji, and Ku. Rajni Yadav, Ku. Richa Upadhay, Assistant Directors, who worked with dedication and compiled this edition of amended U.S.R. Although efforts have been made to make this USR comprehensive & precise, improvements are always possible. Therefore, suggestions for improvements will be highly appreciated.

Bhopal
Date: / /2016

(M.G. Choubey)
Engineer-in-Chief
M.P. Water Resources Department

GENERAL INSTRUCTIONS

1. These general instructions apply to all chapters of Schedule of Rates to the extent they are relevant.

2. All materials to be used on work shall conform to relevant specifications of Bureau of Indian Standards and specifications, circulars issued by MP Water Resources Department from time to time.

3.

(a) The rates in all items of this USR are inclusive of all lead, lift and transportation of material except otherwise specified in the item. No extra on this account is payable unless otherwise specifically mentioned in any particular item.

(b) The rates for completed items also include the cost of material, labour, workmanship, quality assurance measures, field/ laboratory test, mix design, finishing, wastage, enabling work, loss on stocks, machinery, templates, tools and plants and other appliances etc. required for proper execution of work. It also covers provision for erection and removal of shuttering, scaffolding and ladders, protection of work during construction such as erosion and falling materials and other causes.

(c) The **Annexure-I** showing the quantity of materials for various items of work and **Annexure-II** showing transportation charges are for general guidance only and for working out lead charge for specific requirement if any.

4. Measurements:

Unless otherwise stated, hereafter all works shall be measured net in decimal system, as fixed in position as given below:

a. Each dimension shall be generally measured to the nearest 0.01 m, or any other lesser units if specified.

b. Area shall be generally worked out to the nearest 0.01 sqm or any other lesser units if specified.

c. Cubical contents shall be generally worked out to the nearest 0.01 cum or any other lesser units if specified.

5. The rates for completed items are inclusive of

a. royalty charges of materials as per notification of Govt. of MP, Mining Department F-19-75-2000-12-1, date 06/09/14, and

b. Octroi duty and all other taxes are included in the rates. No extra on this account shall be payable.

6. The rates for completed items also include following :-

a. Contractor's profit & overheads 10%

b. Sundries 1%

c. Labour cess 1%

Total 12%

7.

a. In general the use of Muster Rolls is prohibited. In special conditions the Government orders for use of N.M.R. be followed strictly. For execution of works on NMR the rates will be reduced by the element of contractor's profit (10%). Hence works executed on NMR should be $10 \times 100 / 112 = 8.9$ say 9% below schedule of rates. For awarding contracts on piecework the deduction will be only 7% because there will be element of profit restricted to 3%. Hence work executed on piecework shall be $7 \times 100 / 112 = 6.25\%$ say 6% below schedule of rates. Prior sanction of competent authority as assigned by the Government shall be necessary for execution of works on NMR or piecework.

b. The NMR/ piecework rates arrived in accordance with (a) above shall be rounded off to next Rupee.

8. The rates of completed items are inclusive of site clearance, haul roads, working under watery situation, de-silting but exclude dewatering and river diversion arrangement, wherever applicable.

9. Useful rubble, boulder and stone chips obtained from excavation shall be issued to the contractor for use on works (including enabling works and aggregate crushing) at the issue rates specified for those materials.

10. For rates of items not provided in the related chapter, the rates as provided in another chapter shall be adopted.

11.

a. The rates as provided in the schedule of rates of PWD/MPRRDA/PHED/UADD/ MP State Electricity Companies be adopted for the items not found in this Schedule of Rates & the general instructions of respective SOR with specifications shall be followed. The guidelines / instructions for adoption of SOR item of other departments are enclosed as **Annexure-III**.

b. The sequence of preference of SOR of other departments will be

- i. Departments Govt. of MP,
- ii. Public sector organisations of Govt. of MP.
- iii. Central Govt. Departments
- iv. Public sector organisations of Central Govt.
- v. Departments of other State Govt.
- vi. Public sector organisations of other State Govt.

12. All steel shall be procured from an authorised dealer of original producers who manufacture billets directly from iron ores and roll the billets to produce steel conforming to IS: 1786. No re-rolled steel shall be used on the works.

13. The nomenclature of items given in the schedule of rates shall not be deviated and shall be followed as they are. It is important that the deviation can be done only for items, which do not find place in the schedule of rates with due permission from Engineer in Chief, MP Water Resources Department.

14.

a. Work shall be executed strictly in accordance with relevant IS Codes, IRC, MORTH, Technical circulars & specifications issued by M.P. Water Resources Department from time to time or specifications of relevant departments whose SOR items are used.

b. Wherever any reference is made to any specified code in the schedule, it shall be taken as reference to the latest edition with all amendments issued.

15. In the interpretation of description of items or rates of the schedule and specifications, the decision of the Engineer in Chief, W.R. Department shall be final.

16. The estimates for works shall be prepared on the basis of unified schedule of rates (USR) for comparison of tendered rates with common datum throughout the department, without adding or subtracting anticipated tender rates.

17. The labour rates adopted for preparation of USR are inclusive of provision for weekend holiday.

18. Antiquities.-Any ancient carvings, relics of antiquity, coins or other curiosities which may be discovered or excavated are the property of Government and are to be delivered to the Engineer-in-Charge.

19. Any vegetation, earth, moorum, sand, gravel, stone, debris, bricks, brickwork, concrete, masonry etc. obtained from excavation shall form the property of the government.

20. The rates given in the schedule of rates are in Indian Rupees and Paisa.

21. The sequence of construction of irrigation channel (s) shall be so planned that the work are completed from head to tail, including construction of all structures.

22. The horizontal (depth-wise or height-wise) splitting of work shall not be done. The sanction for longitudinal (length wise) splitting of work shall be accorded when considered desirable with due regard to junction with other group(s).

23. The items of work to be adopted for execution of works shall be based on designed requirements and type of works, however for small works; nominal mix for concrete can be used, with prior written permission of Engineer in charge.

24. Rates of labour and material as adopted in analysis of items are enclosed in **Annexure-IV**, however no claim will be entertained during execution of works for variation with market rates.

25. The analysis of rates of completed items of works, having cement component has been worked out with use of Portland Pozzolana Cement conforming to IS 1489 part 1 & 2. 26. During execution of work all regulations, notifications, bye laws of Central, State Government and Local bodies shall be followed.

27. Option for masonry, concrete, plum concrete be decided by the Superintending Engineer considering availability of material, skilled workers, cost implications etc. for all projects having "C" masonry sub-head of Rs. One Crore or more in all new projects/ordinary repair/special repair works.

CHAPTER-1

SURVEY AND INVESTIGATION

Instructions

1. General instructions on Schedule of Rates shall be applicable to the extent they are relevant.
2. Rates include Cost of
 - a. labour
 - b. all material required for execution of item of work
 - c. All lead and lifts
3. Rate for drilling work include:
 - a. All lead and lifts of materials, machines and labourers.
 - b. Cost of taking out cores, logging labeling and preservation of cores, maintaining in serial order and painting depths on cores & core box and protection of drill holes till final measurements.
 - c. Water and air charges.
4. A. For chain and compass survey, the length of the survey will be measured along the lines on which particular type of survey is to be done. For example, for chain and compass survey, it would be the length along which the chaining and compassing is to be done. For leveling, it would be the total length of the lines along which levels are to be taken.
B. For topographical and cadastral survey by total station the area will be measured in hectares.
5. (a) The rates are based on the following average daily progress that can be normally achieved under average conditions by one survey party:-

Item	Head works	Canals
Chain and Compass Survey	2km	3 km
Levelling	2 km	2.5km
Total Station Survey	35 ha	45 ha

- b). The labour strength of one survey party for chain and compass survey considered in (a) above is 11 mazdoors (3 for ranging, 1 for preparing pegs, 1 peg man, 2 chainman, 1 compass man, 2 axe men for removing obstacles, 1 waterman). For levelling (above 15m interval) the labour strength considered is 8 mazdoors (2 chain and tape man, 1 staff man, 1 instrument man, 1 umbrella man, 1 waterman and 2 axe men for removing obstacles).
 - c) For total station survey party includes 9 persons (2 diploma holder surveyor, 2 prism holder (unskilled), 1 data composer, 2 instrument carrier/helper (unskilled), 1 umbrella & water man, 1 axe-man for clearing obstacles)
6. a). For setting out curves for irrigation channels carrying discharge above 1 cumec and layout of important structures etc., preferably theodolite shall be used.
b) The chaining of final alignment shall be done with due precision preferably after setting out curves.
c) The final alignments shall invariably be marked on village maps.
d) The survey party for double levelling shall be headed by the A.E.
7. For total station, it shall be mandatory to obtain a soft copy of field work raw data from the survey agency so that the results can be checked at any time.
 8. For execution of item 1.16, one Sub Engineer unit may engage a maximum of one Amin (Qualified) or Survey Attendant (ITI certificate holder), one field Assistant, Abhiyana (Matric) or Time-keeper (Matric). Item 1.16 shall be executed on prior written sanction of the Superintending Engineer/ Chief Engineer, specifying the number of Sub-Engineer units in each Sub Division and the period for which they are to be engaged.
 9. Item no 1.35 to 1.40 RTDAS/ SCADA system shall be used for estimation purpose only.

CHAPTER-1
SURVEY AND INVESTIGATION
Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
1.01	Dag-belling in all types of soil			
1.01.1	Single spade stroke (minimum 75 mm deep)	m	5.00	
1.01.2	Double spade "V" shaped stroke (100 mm deep)	m	7.00	
1.02	Excavation for trial pit or trial trench or other investigation work including dressing etc. complete.			
1.02.1	In all kind of soil Soft/loose/hard /dense soils, moorum & moorum mixed with boulders and mud.	cum	48.00	
1.02.2	In Soft/ disintegrated/ weathered rock.	cum	104.00	
1.02.3	In hard rock.	cum	336.00	
1.03	Extra rate for excavation for trial pit or trial trench or other investigation work including dressing etc. complete. When depth is more than 1.5 times the specified top width.			
1.03.1	In all kind of soil Soft/loose/hard /dense soils, moorum & moorum mixed with boulders and mud.	cum	5.00	
1.03.2	In Soft/ disintegrated/ weathered rock.	cum	10.00	
1.03.3	In hard rock.	cum	34.00	
1.04	Extra rate for wet excavation for trial pit or trial trench or other investigation work including dressing etc. complete. Below sub- soil water level.			
1.04.1	In all kind of soil Soft/loose/hard /dense soils, moorum & moorum mixed with boulders and mud.	cum	4.00	
1.04.2	In Soft/ disintegrated/ weathered rock.	cum	8.00	
1.04.3	In hard rock.	cum	27.00	
1.05	Boring holes with auger in all types of soil up to 5 m depth below ground level including collecting samples etc. complete.			
1.05.1	For 200 mm dia.	m	332.00	
1.05.2	For 250 mm dia.	m	434.00	
1.05.3	For 300 mm dia.	m	511.00	
1.06	Chain and compass survey			
1.06.1	For headworks	km	1,124.00	
1.06.2	For canal works	km	749.00	
1.07	Theodolite work involving fixing of stones at every tenth chain, tangent, apex or vertex points of final alignment etc. complete.	km	2,247.00	
1.08	Fly levelling for fixing temporary bench marks	km	533.00	
1.09	Levelling for head works			
1.09.1	Below 15 m interval for basin survey and dam seat survey.	km	1,226.00	
1.09.2	Above 15 m interval for basin survey and dam seat survey.	km	817.00	

1.10		Levelling for canal works			
	1.10.1	Below 15 m interval for command survey and canal survey, including survey for C.D. work	km	981.00	
	1.10.2	Above 15 m interval for command survey and canal survey, including survey for C.D. work.	km	654.00	
1.11		Double levelling for transfer of bench marks.	km	2,451.00	
1.12		Providing and fixing of standard bench marks, as per type design 8 of Water Resources Dept. including fixing of MS plate size 12x12x0.60 cm and 2 Nos. anchor bolts of 10 mm dia. and 30 cm length including shaping and welding etc., including cost of cement, metal and sand (for 0.13 cum M-15 nominal mix concrete with 20 mm graded metal) including labour for excavation in all type of strata, mixing, laying and curing of concrete including form work and fixing of MS plate including cost of water for mixing and curing of concrete including all lead and all lifts etc complete.	each	1,502.00	
		White washing and figuring of bench marks as per type design 7 of Water Resources Department including cost of material complete.	each	181.00	
1.14		Providing and fixing benchmark as per type design 6 of Water Resources Department including embedding of 45 cm depth with 15 cm concrete all around and in bottom, with cost of cement, metal and sand (for 0.11 cum M-10 nominal mix concrete with 20 mm graded metal) including labour for excavation in all type of soil, handling and fixing of benchmark, including mixing, laying & curing of concrete with cost of water for mixing and curing of concrete including all lead and lifts etc. complete.			
	1.14.1	With chisel dressed cut stone of size 15x15x75cm	each	632.00	
	1.14.2	With M-15 nominal mix RCC including cost of steel	each	638.00	
1.15	1.15.1	Providing chainage cum boundary, stone (as per type design no 4 of WRD)	each	77.00	
	1.15.2	Fixing chainage cum boundary stone, as per type design no 4 of WRD in M-7.5 cement concrete with 40 mm graded aggregate including excavation (any strata), handling and fixing of stone, curing etc. complete.	each	341.00	
	1.15.3	Painting chainage cum boundary stone as per (type design no 4 of WRD) with enamel paint and figuring and labelling with black paint including cost of paint brushes etc complete	each	49.00	
1.16		Labour only for survey for all types of building/ houses/wells including taking detailed measurements thereof, measuring components like fencing etc., and entering in register, sketching, if required, noting specifications for foundation plinth, superstructure, roofing, flooring, doors and windows etc directly at site.	per day	766.00	

1.17		Drilling approximately 75 mm dia. holes by calyx or any other rotary process (except diamond drilling) through over burden providing black steel or suitable casing pipe, using casing shoe bit, vertical or inclined up to 10 degrees to vertical as directed including cost of all materials, machinery, labour, water charges, reaming, collection of wash samples at suitable intervals, logging and labelling, supplying wooden core box, fixing casing pipes etc. complete.			
	1.17.1	For depth up to 30m from surface	m	1,892.00	
	1.17.2	For depth beyond 30 m from surface.	m	2,081.00	
1.18		Drilling by diamond drilling, holes of minimum 75 mm dia. vertical or at specified inclination using diamond core drilling bit, double barrel tube in masonry, concrete or rock including cost of all materials, machinery, labour, water, collection of core samples, logging & labelling samples, supplying wooden core box and re-drilling in case of collapse of sides etc. complete.			
	1.18.1	For depth upto 30 m from surface.			
	1.18.1.1	0° to 10° vertically downwards	m	5,830.00	
	1.18.1.2	Exceeding 10° but not exceeding 45° vertically downwards	m	6,413.00	
	1.18.1.3	0° to 45° vertically upwards	m	8,162.00	
	1.18.1.4	Up to but not including 45° to the horizontal (downward)	m	6,705.00	
	1.18.1.5	Up to but not including 45° to the horizontal (upward)	m	6,996.00	
	1.18.2	For depth beyond 30 m from surface			
	1.18.2.1	0° to 10° vertically downwards	m	6,996.00	
	1.18.2.2	Exceeding 10° but not exceeding 45° vertically downwards	m	7,696.00	
	1.18.2.3	0° to 45° vertically upwards	m	9,794.00	
	1.18.2.4	Up to but not including 45° to the horizontal (downward)	m	8,046.00	
	1.18.2.5	Up to but not including 45° to the horizontal (upward)	m	8,395.00	
1.19		Total station survey			
	1.19.1	Topographic and cadastral survey for head works of irrigation projects by using Total station GPS, etc. with minimum 30 number of point reading per ha, to generate 15mx15m grid and 0.5 m interval contours including transfer of entire data to computer system in different geo-referenced layers / themes using features of standard software, compatible with design software packages, including supply of soft and hard copies of point readings, including digitizing village maps and super imposing the contours on village map (scale 1in 4000) including marking all permanent features like roads, cart tracks, existing canals, temples, tanks, forest boundary and electric poles, etc. including marking of ridges and valleys on survey sheet including supply of 4 soft copies and 4 hard copies after approval of competent authority, preparation & submission of grid and L-section nalla etc. complete.	ha	235.00	

	1.19.2	Topographic and cadastral survey for command area including canal alignment works of irrigation projects by using Total station GPS, etc. with minimum 20 number of point reading per ha, to generate 30mx30m grid and 0.5 m interval contours including transfer of entire data to computer system in different geo-referenced layers / themes using features of standard software, compatible with design software packages, including supply of soft and hard copies of point readings, including digitizing village maps and super imposing the contours on village map (scale 1in 4000) including marking all permanent features like roads, cart tracks, existing canals, temples, tanks, forest boundary and electric poles, etc., including marking of ridges and valleys on survey sheet including supply of 4 soft copies and 4 hard copies after approval of competent authority, preparation & submission of 10m x10m grid for all structures of canal etc. complete.	ha	176.00	
1.20		Data interpretation of Satellite Remote Sensing Data / imaginaries procured from Indian Remote Sensing Satellite IRS-LISS III, Resource sesat-II Cartosat-I from National Remote Sensing Centre/ ISRO for creating layers for mapping of different uses, for one toposheet (1:50,000) and one layer excluding cost of imaginaries etc. complete.	each	5,000.00	
1.21		Digitization of features, such as road, canal, water bodies, monuments, river/ nalla, boundaries, landmarks etc. complete of one toposheet (1:50000)	each	2,000.00	
1.22		Geo-rectification of carto-sat data of one toposheet (1:50000) using appropriate software.	each	2,000.00	
1.23		Reconnaissance survey			
		Labour only for general reconnaissance survey of the geographical area for tracing out the forest area, hillock and area suitable for detailed study of strata of wells and also selection of representative wells of the area for ground water survey purpose only etc. complete.	Sqkm	46.00	
1.24		Geological Investigation			
		Labour only for systematic geological investigation for ground water survey purpose Including carrying instrument at site breaking and collection of rock sample etc. complete.	Sqkm	182.00	
1.25		Well Inventory			
		Labour only for monitoring of water level of POW/Piezometer.	per well	55.00	
1.26		Interference study			
	1.26.1	Labour only for interference study of wells complete for ground water survey purpose only.	job	1,008.00	
	1.26.2	Labour only for collection of water samples for chemical analysis for well in 10 Sq.km area, per day 2 No. samples	per sample	114.00	
1.27		Pumping test of well departmentally with 5 HP pumps, only for ground water draw down observation including cost of P.O.L i.e. diesel, M.oil, Lubricants and cost of labour crew charges and all material etc. complete.	hour	172.00	

1.28		Resistivity Survey			
	1.28.1	Resistivity Survey for selection of site for Dug well/Tube well/ Dug cum borewell for one site three soundings including all required material, equipment, labour and transportation of all materials etc. complete.	per site	2,238.00	
	1.28.2	Labour only for resistivity survey work for selection of site for Dug well/Tube well/Dug cum bore well for one site three soundings.	per site	1,048.00	
1.29	1.29.1	Geophysical & Hydrological investigation by geotechnical expert of, on and around dam upto 20 m below ground level to ascertain the cause and path of percolation(streaming potential) by non-destructive methods like, Electrical imaging or Vertical electrical sounding or seismic refraction or Refraction micro tremor (ReMi) Streaming potential etc. by any one, or any combination methods including processing of data by computer software including submission of detail report showing methodology in brief, procedure analysis & conclusion. The rates are inclusive of lead of all man, material & machines up to the site and back.	m	862.00	
	1.29.2	Suggesting method of treatment based on conclusion of report as per item no 1.29 (a) by Geotechnical expert	Each Job	50,000.00	
		Hydrological Investigation			
1.30		Fabrication and installation of reinforcement cement concrete gauge post of size 15 cm x 10 cm (one side tapered in 5 cm length) made with M-15	each	3,400.00	
		concrete mix (with aggregate 20 mm nominal size) – 1.80 m long. At river banks including cost of civil works in foundation embedded in M-15 reinforced cement concrete pedestal block of size 60 cm x 60cm x 60 cm including the of steel reinforcement, centring, shuttering, finishing, reinforcement over the M-7.5 (with aggregate 40 mm nominal size) cement concrete base of size 80 cm x 80 cm x 15 cm with 12 mm thick plastering complete and marking the gauge with synthetic enamel with standard metric gradation of 5 mm thickness in black & white alternately & red synthetic enamel of 5 mm width at every 100 mm etc complete.			

1.31		Providing, fixing and installation of bank operated cableway system for discharge observation with current meter with sinker weight maximum up to 125 kg including double drum hydro-metric winch machine with manual operation suitable for horizontal and vertical movements of current meter and with the arrangement to operate silt sampler complete with automatic load break system and slip ring system including the cost of civil works, pre-fabricated pole size 2.25m long for machine side fitted with triple pulley block, and on the other side fitted with single pulley block, instruments carriage, foundation bolts with nut and washers, master plate and other fixing bolts, nuts, D shackles, U-clamps, anchor bolt, track cable, towing cable, conduction cable {co-axial) with snap hooks thimble etc. complete.			
	1.31.1	Up to 100 m span	each	11,50,000.00	
	1.31.2	From 101 to 150 m span	each	15,50,000.00	
	1.31.3	From 151 to 200 m span	each	18,50,000.00	
1.32		Providing, fixing and installation of bank operated cable way system with cradle of capacity 1000 kg weight to take the discharge observation by using current meter sensor with sinker weight max up to 125 kg including double drum hydro-metric winch machine with manual operation suitable for horizontal and vertical movements of current meter and with the arrangement to operate silt sampler complete with automatic load break system, slip ring system including all civil works, prefabricated pole size 2.25 m long for machine side fitted with triple pulley block,			
		prefabricated pole size 2.25 m long on the other side fitted with single pulley block, instruments carriage, foundation bolts with nut and washers, master plate and other fixing bolts nuts, D shackles, U -clamps etc. anchor bolt, track cable, towing cable, conduction cable (co-axial) with snap hooks thimble etc. complete.			
	1.32.1	Up to 100 m span	each	17,25,000.00	
	1.32.2	From 101 to 150 m span	each	23,25,000.00	
	1.32.3	From 151 to 200 m span	each	27,50,000.00	
1.33		Providing and fixing of 25 mm diameter steel guide ropes across the river for discharge observation	m	1,200.00	
1.34		Painting of gauge post 1.8 m long with synthetic enamel of approved brand & manufacture to give an even shade by two or more coats and marking the gauge with Japan paint Red, Black and White with standard metric gradation marking of 5 mm thickness in black & white alternately & red synthetic enamel of width 5 mm at every 50 mm etc. complete.	each	750.00	

1.35		Supply, installation, testing and commissioning of automatic Rainfall station with GSM/GPRS Telemetry communication system.			
	1.35.1	Supply of automatic rainfall station (tipping bucket type) complete with all accessories including supply of real time (GSM/GPRS) Telemetry data communication system with data logger, display unit with all equipment and accessories such as solar power supply system including solar panel, charge regulator, battery and station grounding system, GSM/GPRS modem, System enclosure with gasketing and maintenance free rechargeable batteries as per technical specification etc. complete.	each	3,28,000.00	
	1.35.2	Cost of related services for installation and commissioning of entire RTDAS, training for operation and maintenance, site preparation and civil works, integration of RTDAS and backup acquisition system with SMS, provision of manuals, documents and reports, inspection and testing and initial maintenance upto final acceptance of the entire system as per technical specifications etc. complete.	each	1,48,000.00	
1.36		Supply, installation, testing and commissioning of automatic water level Radar			
		sensor with GSM/GPRS telemetry communication system.			
	1.36.1	Supply of Automatic Water level radar sensor complete with all accessories including supply of real time (GSM/GPRS) Telemetry data communication system with data logger, display unit with all equipment and accessories such as, solar power supply system including solar panel, charge regulator, battery and station grounding system, GSM/GPRS modem, system enclosure with gasketing and maintenance free rechargeable batteries as per technical specification etc. complete.	each	3,25,000.00	
	1.36.2	Cost of related services for installation and commissioning of entire RTDAS, training for operation and maintenance, site preparation and civil works, integration of RTDAS and backup acquisition system with SMS, provision of manuals, documents and reports, inspection and testing and initial maintenance upto final acceptance of the entire system as per technical specifications etc. complete.	each	1,47,000.00	
1.37		Supply, installation, testing and commissioning of automatic weather station with GSM/GPRS telemetry communication system.			
	1.37.1	Supply of automatic Weather station complete with all accessories including supply of real time (GSM/GPRS) Telemetry data communication system with data logger, display unit with all equipment and accessories such as solar power supply system including solar panel, charge regulator, battery and station grounding system, GSM/GPRS modem, system enclosure with gasketing and maintenance free rechargeable batteries as per technical specification etc. complete.	each	5,54,000.00	

	1.37.2	Cost of related services for installation and commissioning of entire RTDAS, training for operation and maintenance, site preparation and civil works, integration of RTDAS and backup acquisition system with SMS, provision of manuals, documents and reports, inspection and testing and initial maintenance upto final acceptance of the entire system as per technical specifications etc. complete.	each	1,92,000.00	
1.38		Supply, installation, testing and commissioning of automated Gate Sensor with GSM/GPRS telemetry communication system.			
	1.38.1	Supply of automated Gate sensor complete with all accessories including supply of real time (GSM/GPRS) Telemetry data communication system with data logger, display unit with all equipment and accessories such as solar power	each	5,98,000.00	
		supply system including solar panel, charge regulator, battery and station grounding system, GSM/GPRS modem, System enclosure with gasketing and maintenance free rechargeable batteries as per technical specification etc. complete.			
	1.38.2	Cost of related services for installation and commissioning of entire RTDAS, training for operation and maintenance site preparation and civil works, integration of RTDAS and backup acquisition system with SMS, provision of manuals, documents and reports, inspection and testing and initial maintenance upto final acceptance of the entire system as per technical specifications etc. complete.	each	2,00,000.00	
		Establishment of Data Centre			
1.39		Establishment of Data Centre with earth receiving station and GSM/GPRS ground station including quality control function, design, manufacture, testing, delivery along with the server and software solution, associated interface wiring, termination, commissioning, site acceptance testing and supply of mandatory spares etc. as per technical specifications complete.	per set	7,00,000.00	
1.40		Providing ancillary equipment's to the data centre such as one laser colour printer, one black & white laser printer, modems and routers, backup resources along with one display system (42" LED) at the office of Chief Engineer and one display system (42" LED) at Data Centre including work stations etc. complete.	per set	1,50,000.00	
1.41	1.41.1	Socio economic survey for preparation of social impact assessment study of proposed irrigation project	Per family	315.00	
	1.41.2	Monitoring and evaluation of post status of project effected families after completion of the project.	Per family	315.00	

1.42		Environment impact assessment management plan including required data collection, necessary studies for environmental impact assessment, preparation of resettlement and rehabilitation plan, dam break analysis etc., submission of draft environmental impact assessment/environment management plan with executive summary in Hindi and English to State Pollution Control Board in required copies for conducting public hearing, preparation of final environmental impact assessment/environment management plan including public hearing report as per proposed TOR and submission to expert appraisal committee /state expert appraisal committee and obtaining environment clearance from competent authority including			
		preparation and submission of six monthly monitoring report to regional office, ministry of forest and climate change and other compliances in accordance with condition stipulated in environment clearance.			
	1.42.1	For Major Project	per ha of CCA	60.00	
	1.42.2	For Medium Project	per ha of CCA	200.00	
1.43		Survey for determining environmental impact on the submergence area and adjoining area, command area of a newly constructed or old reservoirs.	per ha of CCA	30.00	

CHAPTER-2
EXCAVATION AND EARTHWORK
Instructions

1. General instructions on Schedule of Rates shall be applicable to the extent they are relevant.
2. Rates include cost of :
 - a. Labour.
 - b. Running charges of machinery including fuel and lubricants.
 - c. All material required for execution of item of work
 - d. All lead and lift.
 - e. Removing all slips or falls in excavations.
 - f. Precautionary measures to be adopted in blasting as per I.S. 4081-1967 "Safety code of blasting" (as amended from time to time) and storing explosives as per "Explosives Rules 1940" corrected up to date.
 - g. Site clearance, layout and setting out of work.
3. Unless otherwise specified the basic rates are inclusive of loading & unloading, site clearance, haul roads, working under watery situation, de-silting but exclude dewatering and river diversion arrangement.
4. Measurements
 - a. Measurements of earthwork will be taken by cross sectional measurements. Only when such measurements are not possible, pit measurements may be taken, but full measurements will be checked by E.E.
 - b. In case of cross sectional measurements of embankment/ filling the following deductions shall be made:

Sno	Description	% deduction to be made in completed sectional measurement	% addition to designed height for shrinkage allowance
1	Earth work rolled, watered and compacted at optimum moisture content to maximum dry density.		
i	For embankment founded on unyielding (rock) foundations.	0.99	1
ii	For embankment founded on compressible (soil) foundations.	1.96	2
2	Earthwork rolled and watered (light rolling, i.e. by non- powered rollers/ hand ramming).	10	11
3	Earthwork rolled and not watered (light rolling i.e. by non- powered rollers/hand ramming).	15	18
4	Earthwork neither rolled nor watered.	20	25
5	Earthwork neither rolled nor watered in case of clayey soils like Kankar soil or black cotton soil.	25	33

- c. The above percentages shall be reduced to the following extent if measurements have been taken after:
 - i. One rainy season has passed 50%
 - ii. Two rainy seasons have passed 30%
 - iii. More than two rainy seasons have passed 12.50%
- d. The length, breadth and depth (or height) shall be measured correct to the nearest cm. If the measurements are taken with level and staff, the levels shall be recorded correct to nearest 5 mm. The area shall be calculated in sqm correct to two places of decimal and cubical contents in cum correct to two places of decimal.
- e. From the cross sectional area of embankment, the area occupied by seepage drain, boulder toe, pitching, filters, sluice barrel, and parapet walls embedded in the earthwork or any other opening having area 0.1 sqm shall be deducted.
- f. No separate payment shall be admissible for housing.
- g. No deduction is admissible from the sectional measurements for voids of seepage drain, boulder toe, pitching, and filters.

5. Classification of strata:

Effort required for excavation shall be the criteria for classification of strata. Power for classification of strata during excavation shall remain with the Executive Engineer. For excavated hard rock which is not likely to be useful for civil engineering works, verification of Superintending Engineer/ Chief Engineer before payment will be necessary.

- a. Soft/loose/hard/dense soils/ moorum with boulders and mud: Generally any soil which yields to the ordinary application of pick and shovel, or to spade, rake or other digging equipment, such as vegetable or organic soil, turf, gravel, sand, silt, loam, clay, peat, cobble stones, moorum with boulders, mud etc. It shall include embedded rock boulders of size less than 1 meter in any dimension & not more than 200 mm in any of the other two dimensions, total cubic content up to 0.04 cum.
- b. Soft/ disintegrated/ weathered rock (not requiring blasting): Rock or boulder which may be quarried or split with crow bar. This will also include laterite and hard conglomerate. For this type of rocks the core sample recovery is less than or equal to 0.50. This will also include boulders of size up to 1 meter in any dimension and more than 200 mm but less than 500 mm in any one of the other two dimensions having total cubic content of more than 0.04 cum. This will also include any rock which in dry state may be hard requiring blasting, having core recovery more than 0.50 during excavation, but when wet or moist becomes soft and manageable by means other than blasting.
- c. Hard rock (requiring blasting): The type of strata which can-not be excavated with pick axes, crow bars etc., any rock or boulder, for excavation of which blasting is required for this type of rock, the core sample recovery shall be more than 0.50.
- d. Hard rock (requiring controlled blasting): Due to any reason if general blasting is prohibited for rock excavation, controlled blasting shall be used with prior approval of Engineer in Charge. The core sample recovery for such rock shall be more than 0.50.
- e. Hard rock (blasting prohibited): Hard rock requiring blasting as described in 5 (c) above but where blasting is prohibited for any reason (s), breaking of rock shall be done by chiseling, wedging & barring mechanical rock breaker or by using hydraulic splitter and chemical substances mixed in an appropriate proportion or any other agreed method or any combination of above. The core sample recovery for such rock shall be more than 0.50.

6. Authority for classification:-

The classification shall be decided by the Executive Engineer and his decision shall be final.

7. All excavated and embankment section shall be neatly dressed to the profile shown in drawing or as directed by Engineer in Charge.

8. Dressing:-

(a) Dressing is normally required at one place i.e. at the place of excavation or at the place of filling, hence

the rates provided in the schedule include dressing only once, either at the place of cut or at the place of fill. In case of canal excavation, where earth is reused at or near the same place and for the same work, in such case only one dressing which is already included in the basic rates is admissible, even though the dressing is actually needed at both the places i.e. at the place of cut and at the place of fill, while additional rate for trimming in cutting only will be payable.

(b) In case, dressing is not done either in cut or in fill or both, full rate for dressing will be reduced.

(c) No separate payment for dressing or trimming of spoil bank(s) and borrow area(s) shall be made.

9. Earth for embankment:

a. In canal excavation the earth excavated from surplus reaches should be utilized in same & in adjoining deficit reaches so that the land acquisition for disposal of surplus earth and borrow areas in deficit reaches is reduced to a minimum. Accordingly the surplus earth should be shifted to deficit reaches such that the surplus earth from excavation is utilized in the nearest reach first. For this purpose on the basis of starting levels a shifting statement for the canal network should be prepared which will form the basis for shifting of earth and computation of net payable quantity of earthwork and lead charges. When there are no deficit reaches where the surplus earth can be shifted, the surplus earth shall be disposed-off in a planned manner with due regard to drainage arrangement.

b. The lead for earthwork shall be measured from the center of borrow area(s) to the centre line of the dam/ embankment and shall be measured as crow flies, the crawly distance being measured from the geometrical centre of borrow area(s) to the centre of the dam/ embankment. While calculating the lead for payment and additional 5% over the distance calculated above shall be used to cover circuitous path.

c. Where canal embankment are proposed to be constructed with dam specifications, excavated moorum, soft rock, disintegrated rock may be utilized and duly compacted up to 2 m below bed level and the earthwork over this prepared surface shall be done with suitable soil. For such utilization additional payment for watering and compaction shall be payable.

10. Forming (or leaving) 'dead men' or 'tell-tales' in borrow pits and their removal after measurements.

11. Where stacking of the material is done under specific orders of the Engineer in charge with a view to utilize, the entire materials on other items of works, rate for stacking shall be payable separately.

12. Benching - Benching should be provided where the works are to be done on highly undulating / steeply sloping ground.

Note:

1. Where FSL of the channel is below the ground level neither stripping nor ploughing and furrowing shall be done.

2. Neither stripping nor benching shall be done for seat under spoil banks.

3. The item of striping shall be payable for depth up to 15 cm only. If greater depths are to be removed, total depths are to be paid as per rates of general excavation of earthwork.

CHAPTER-2 EXCAVATION AND EARTHWORK

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
2.01	Excavation in all kind of soft/loose/hard/dense soils, moorum & moorum mixed with boulders and mud including dressing, placing the excavated soil neatly in specified dump area or disposing off the same as directed, including cost of site clearance, all materials, machinery, labour and dressing etc. Complete.	cum	40.00	
2.02	Excavation in soft/disintegrated/weathered rock including wet excavation, dressing, placing the excavated material neatly in specified dump area or disposing off the same as directed, including cost of site clearance, all materials, machinery, labour and dressing etc. Complete.	cum	87.00	
2.03	Excavation in hard rock of all toughness requiring blasting, minimising damage to rock beyond excavation line and placing the excavated rock neatly in specified dump area or disposing off the same as directed, including wet excavation, cost of site clearance, all materials, machinery, labour etc. Complete.	cum	280.00	
2.04	Excavation in hard rock of all toughness (requiring controlled blasting), including control of vibration by use of delay detonators and control of fly-rock by muffling arrangements etc. and placing the excavated rock neatly in specified dump area or disposing off the same as directed, including wet excavation, cost of site clearance, all materials, machinery, labour etc. Complete.	cum	440.00	
2.05	Excavation in hard rock of all toughness (blasting prohibited), placing the excavated rock neatly in specified dump area or disposing off the same as directed, including wet excavation, cost of site clearance, all materials, machinery, labour etc. Complete.	cum	484.00	
2.06	Deduction for Govt. excavated rock if used for construction.	cum	100.00	
2.07	Earthwork for embankment (hearting/ casing) using selected soil from approved borrow areas in layers of 250 to 300 mm (before compaction) including cost of all materials, machinery, labour and dressing, all other operations such as collection of soil, spreading soil in layer of specified thickness, sorting out, breaking clods, levelling, sectioning edges / sides, watering, compacting to achieve maximum dry density using sheep foot roller/vibratory compactors etc. Complete.	cum	74.00	

		Earthwork for cut off trench filling using selected impervious soil from approved borrow areas in layers of 250 to 300 mm (before compaction) including cost of site clearance, all materials, machinery, labour, dressing, all other operations such as collection of soil, spreading soil in layer of specified thickness, sorting out, breaking clods, levelling, watering, compacting to achieve maximum dry density using sheep foot roller/vibratory compactors etc. Complete.	cum		
2.09		Compaction of earthwork at optimum moisture content to achieve maximum dry density by mechanical sheep foot roller/vibratory compactors etc. (excluding watering)	cum		
2.10		Watering earthwork for compaction at optimum moisture content.	cum		
2.11		Collection of boulders or rubble from excavated materials including stacking at suitable place.	cum		
2.12		Dressing of Earthwork in			
	2.12.1	All type of soil	cum		
	2.12.2	All type of Rocks (other than hard rock)	cum		

**CHAPTER-3
DAM AND ALLIED WORKS**

Instructions

1. General instructions on Schedule of Rates shall be applicable to the extent they are relevant.
2. Rates include Cost of :
 - a. Labour
 - b. Running charges of machinery including crew, fuel and lubricants.
 - c. All material required for execution of item of work.
 - d. All lead and lift of materials, machines and labours.
 - e. Wastage of Cement, Sand, Course Aggregate, Admixture, Concrete, Mortar etc.
 - f. Shuttering, Scaffolding, Formwork, Vibration, and curing
 - g. Testing of materials and quality assurance measures including mix design.
 - h. Standard safety measures.
 - i. Site clearance, layout and setting out of work.
3. The rates of completed items are inclusive of loading and un-loading, standard finish required for concrete work, cleaning/ preparation of cold and hot joints.
4. All the construction materials, workmanship and quality shall conform to the standards prescribed in IS-Codes and Specification/Guidelines/ Circulars of MP Water Resources Department.
5. For all nominal mixes, mix proportions shall be as per IS 456.
6. The rates of completed items are exclusive of cost of river diversion works.
7. Measurements:- No deductions shall be made for the following
 - a. Volume occupied by reinforcement.
 - b. Opening up to 0.1 sqm in area
 - c. Ends of dissimilar material for example beams, posts, girders, rafters, purlins, trusses, corbels and steps up to 0.5 sqm in cross section.
 - d. Opening up to 0.1 sqm in area (in calculating area of an opening, the thickness of separate lintel or sill shall be included in height).
 - e. Volume occupied by pipes, conduits sheathing, etc., not exceeding 0.1 sqm each in cross sectional area.
 - f. Moulds drip molding, chamfers, splayed rounded or curved angles, bed grooves and rebates up to 10 cm in width or 15 cm in girth.
8. The table as per IS: 11155 show minimum concrete mix strength and maximum size of aggregate to be used in various components of dam. The type of concrete mix may be selected accordingly.

S.No.	Structure	Maximum Size of Aggregate in mm	Desirable Minimum
1	Spillway mass concrete	150	M 15
(i)	Around opening with reinforcement	40	M 20
(ii)	1.5 to 2.5 m thick upstream face excluding crest of spillway	150	M 20
(iii)	Spillway crest (minimum 1.5 m thick on surface).	80	M 20
(iv)	Downstream Spillway bucket, stilling basin		
	a) All concrete in the top 0.6m including baffle walls, end sills, chute blocks, etc	40	M 25
	b) All concrete below 0.6 m from top surface.	80	M 20
(v)	Retaining walls of spillway		
	a) Minimum 1.5 m on face	150	M 20
	b) Interior	150	M 15
	c) Reinforced retaining walls	80	M 20
(vi)	Irregularities of foundation (uneven surface)	40	M 20
(vii)	Spillway piers and breast walls	80	M 20
(viii)	Spillway bridge deck		
	a) Beams	40	M 20
	b) Deck	20	M 20
(ix)	Trash rack structure	40	M 20
(x)	Block outs	20	M 20

Note: Maximum size of aggregate as shown in table may be changed by competent technical authority with due consideration of structural parameters.

9. Mass concrete: Any volume of concrete cast in place (generally as a monolithic structure usually incorporating a high proportion of large coarse aggregate and a low cement content) and intended to resist applied load by virtue of its mass; it is distinct from other types of concrete because its dimensions are of such magnitude as to require that measures be taken to cope with the generation of heat and attain volume changes.

10. Plain cement concrete: Concrete containing no steel reinforcement or less amount of reinforcement than specified for reinforcement concrete in the code, the co-operation of such steel being ignored in resisting stress resultant.

11. Reinforced cement concrete: Concrete containing steel reinforcement (non– prestressed) conforming to IS Code and of not less than the minimum amount required by the code and is a composite material in which both material act in cooperation to resist the stress resultant.

I.S. No./IRC No	Title
SP 55: 1993	Design aid for anchorages for spillway piers, training walls and divide walls.(Reaffirmed 2010)
IS 6512:1984	Criteria for design of solid gravity dams(first revision)(reaffirmed 2013)
IS 8826:1978	Guidelines for design of large earth and rock fill dams(Reaffirmed 2013) (Amendment no. 1)
IS 9429:1999	Code of practice for drainage system of earth and rock fill dams (first revision)(Reaffirmed 2013)
IS 10135:1985	Code of practice for drainage system for gravity dams, their foundations
IS 11155:1994	Construction of spillways and similar overflow structures- Code of practice (first
IS 11216:1985	Code of practice for permeability test for masonry(during and after construction)
IS 12169:1987	Criteria for design of small embankment dams. (Reaffirmed 2013) (Amendment no. 1)
IS 12200:2001	Provision for water stops at transverse contraction joints in masonry and concrete dams-
IS 13645:1993	Guidelines for guniting the upstream face of masonry dams. (Reaffirmed 2013) (Amendment
IS 14591:1999	Temperature control of mass concrete for dams-guidelines (Reaffirmed 2010)
IS 14690:1999	Quality control during construction of earth and rock fill dams- Recommendations(Reaffirmed
IS 14954:2001	Distress and remedial measures in earth and rock fill dams- Guidelines(Reaffirmed 2013)
IS 15058:2002	Specification for PVC water stops at transverse contraction joints in masonry and concrete
IS 455:1989	Specification for port land slag cement(fourth revision)(amendment No.1,2,3,4,5,6&7)
IS 456:2000	Code of practice for plain and reinforced concrete (third revision) (Reaffirmed2011) (with
IS 457:1957	Code of practice for general construction of plain and reinforced concrete for Dam and other
IS 1489-1991	Specification for port land pozzolana cement (second revision)(amendment No.1,2,3,4,5)
IS 2505-1998	General requirements for concrete- vibrators, immersion type (second revision).

IS 2506-1985	General requirement for screed board concrete vibrators. (Reaffirmed2005)
IS 4925-2004	Specification for concrete batching and mixing plant. (Reaffirmed2005)
IS 7861-(Pt-1)- 1975	Code of practice for extreme weather concreting part-1 hot weather.
IS 9103-1999	Specification for admixture for concrete. (first revision)(Reaffirmed2013)(Amendment No. 2)
IRC-21-2000	Standard Specification & code of practice for road bridges.
IS.8237-1985	Code of practice for protection of slope of reservoir embankments (Reaffirmed2012).
IS.9759-1981	Guide lines for dewatering during construction. (Reaffirmed2003)
IS 6066-1994	Recommendations for pressure grouting of rock foundations in river valley projects.
I.S.1489-1991-	Portland pozzolana cement (third revision)(Reaffirmed 2014)
I.S.1542-1992-	Sand for plaster (first revision) (Reaffirmed 2003)
I.S.2116-1980-	Sand for masonry mortars (first revision)(reaffirmed 2012)
I.S.2250-1981-	Preparation and use of masonry mortar (first revision) (Reaffirmed 2010)
I.S.4082-1996-	Stacking and storage of construction material at site (first revision) (Reaffirmed 2003)
IS9103:1999	Admixtures for concrete(Reaffirmed 2013)
IS 516-1959	Method of test for strength of concrete (Amdt.No.1) (Reaffirmed 2013)
IS 1199-1959	Method of sampling and analysis of concrete(Reaffirmed 2013)
IS2430-1986	Method for sampling of aggregates for concrete. (Reaffirmed 2014)
IS8605-1977	Code of practice for construction for masonry in dams. (Reaffirmed 2013)
IS11216-1985	Permeability test for masonry during and after construction.(Reaffirmed 2013)
IS2402-1963	Code of practice for external rendered finishes(Reaffirmed 2006)

IS2750-1964	Steel scaffoldings (with amendments No 1 to 3) (Reaffirmed 2006)
IS3696 (Pt. I)- 1987	Safety code for scaffolds and ladders: Part-1 Scaffolds. (Reaffirmed 2007)
IS: 383:	Specification for Coarse and Fine Aggregates From Natural Sources For Concrete.
IS 10262:	code of practice for concrete mix design.(Reaffirmed 2009)
SP-23:	Hand book on concrete mixes

CHAPTER-3 DAM AND ALLIED WORKS

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
3.01	Preparing foundation bed for masonry or concrete by removing all loose material by wedging / chiselling upto 150 mm and disposing off the same as directed and cleaning the surface with air and water jet including cost of all materials, machinery, labour etc. Complete.	sqm	39.00	
3.02	Preparing foundation bed for cut-off trench filling in rock portion by removing all loose materials by wedging / chiselling upto 150 mm and disposing off the same as directed etc. Complete.	sqm	23.00	
3.03	3.03.1 Drilling 50 to 75 mm dia. holes vertical or inclined upto 10 degrees to vertical in rock / masonry / concrete by percussion drilling method using waggon drill or any other suitable equipment including cost of all materials, machinery, labour, re-drilling through partially set grout wherever required etc. complete.			
	3.03.1.1 Beyond 0 m to 06 m from surface :	m	419.00	
	3.03.1.2 Beyond 6 m depth from surface add extra for every 6 m. additional depth :	m	42.00	
	3.03.2 Re-drilling (percussion) set or partially set grout holes for item no. 3.03.1	m	50.00	
	3.03.3 Wet percussion drilling 50 to 75 mm dia. holes in drainage gallery, for grouting, drainage holes or anchor etc., vertical or at specified inclination, in masonry concrete or rock up to 10 m depth			
	3.03.3.1 0° to 10° vertically downwards	m	1,318.00	
	3.03.3.2 Exceeding 10° but not exceeding 45° vertically downwards.	m	1,450.00	
	3.03.3.3 0° to 45° vertically upwards	m	1,845.00	
	3.03.3.4 Up to but not including 45° to the horizontal.	m	1,582.00	
	3.03.4 from 10 to 20 m depth			
	3.03.4.1 0° to 10° vertically downwards	m	1,450.00	
	3.03.4.2 Exceeding 10° but not exceeding 45° vertically downwards.	m	1,595.00	
	3.03.4.3 0° to 45° vertically upwards	m	2,030.00	
	3.03.4.4 Up to but not including 45° to the horizontal.	m	1,740.00	
	3.03.5 More than 20 m depth			
	3.03.5.1 0° to 10° vertically downwards	m	1,516.00	
	3.03.5.2 Exceeding 10° but not exceeding 45° vertically downwards.	m	1,668.00	
	3.03.5.3 0° to 45° vertically upwards	m	2,122.00	
	3.03.5.4 Up to but not including 45° to the horizontal.	m	1,819.00	

3.04		Conducting percolation test in the drill holes at the desired pressure including water supply arrangements and necessary accessories etc. complete.			
	3.04.1	Up to 10 m depth	each	264.00	
	3.04.2	Add extra beyond 10 m depth for every addition of 10m depth or part thereof.	each	53.00	
3.05		Conducting standard penetration test in the bore holes at every 1.5 m interval from the desired elevation including cost of all accessories and arranging of cores from depths as obtained			
	3.05.1	Up to 10 m depth	each	330.00	
	3.05.2	Add extra beyond 10 m depth for every addition of 10 m depth or part thereof.	each	66.00	
3.06		Re-drilling (wet percussion) set or partially set grout holes for Items no.3.03.3	m	264.00	
3.07		Flushing grout holes of all sizes with water and air jets alternatively for an average period of 30 minutes and observing water intake after flushing including cost of all materials, machinery, labour etc. complete.	m	76.00	
3.08		Consolidation grouting with neat cement grout mix of suitable consistency under specified grout pressure as directed in drilled holes by stage grouting method including cost of all materials, machinery, labour, re-drilling if necessary, required admixtures etc. Complete.	tonne	8,419.00	
3.09		Curtain grouting with neat cement grout mix of suitable consistency under specified grout pressure as directed in drilled holes by stage grouting method including cost of all materials, machinery, labour, re-drilling if necessary, required admixtures etc. Complete.	tonne	9,275.00	
3.10		Providing and fixing up-heaval gauge with all accessories as per specifications excluding cost of drilling holes including cost of all other materials, machinery, labour, equipment's etc. complete.	each	1,960.00	
3.11		Providing and fixing 25 mm dia. 3 m long cold twisted deformed steel dowel bars with one end driven into 38 mm diameter 1.50 m deep hole drilled in bed rock and other end provided with L-bend for embedding in concrete / masonry of over flow / non-over flow blocks and other appurtenant works including cost of all materials, machinery, labour, drilling and cleaning hole, filling hole with specified cement mortar, driving anchor rod etc. Complete.	each	869.00	
3.12		Providing and fixing 25 mm dia. 2.75 m long ribbed steel anchor rods with one end split and driven firmly using steel wedge into 1.25 m deep 38 mm dia. hole drilled in bed rock and other end provided with L-bend for embedding in concrete / masonry for spillway and appurtenant works including cost of all materials, machinery, labour, steel wedge, drilling and cleaning hole, filling hole with thick cement slurry, driving anchor rod etc. complete.	each	833.00	

3.13		Providing, fabricating and placing in position steel reinforcement bars for Reinforced cement concrete / Plain Cement Concrete structures including cost of all materials, machinery, labour, cleaning, straightening, cutting, bending, hooking, lapping / welding joints wherever required, tying with 1.25 mm diameter soft annealed steel wire etc. Complete.	tonne	46,510.00	
3.14		Providing and laying M-10 grade Mass Concrete design mix using 40 mm graded aggregates, clean, hard including cost of all materials, machinery, labour, formwork, centring, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, packing joints of shuttering etc. Complete.	cum	2,712.00	
3.15		Providing and laying M-15 grade Mass Concrete design mix using graded aggregates, clean, hard, including cost of all materials, machinery, labour, formwork, cantering, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, packing joints of shuttering			
		etc. Complete. Using aggregate of maximum size.			
	3.15.1	150 mm	cum	2,917.00	
	3.15.2	80 mm	cum	3,211.00	
	3.15.3	40 mm	cum	3,334.00	
3.16		Providing and laying M-20 grade Mass Concrete design mix using graded aggregate, clean, hard including cost of all materials, machinery, labour, formwork, centring, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, packing joints of shuttering etc. Complete. Using aggregate of maximum size.			
	3.16.1	150 mm	cum	3,089.00	
	3.16.2	80 mm	cum	3,371.00	
	3.16.3	40 mm	cum	3,501.00	
3.17		Providing and laying M-20 grade Plain Cement Concrete design mix using graded aggregate, clean, hard including cost of all materials, machinery, labour, formwork, centring, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, packing joints of shuttering etc. Complete. Using aggregate of maximum size.			
	3.17.1	40 mm	cum	4,126.00	
	3.17.2	20 mm	cum	4,425.00	
3.18		Providing and laying M-20 grade Reinforced Cement Concrete design mix using graded aggregate, clean, hard including cost of all materials, machinery, labour, formwork, centring, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, packing joints of shuttering etc. Complete. Using aggregate of maximum size.			
	3.18.1	40 mm	cum	4,277.00	

	3.18.2	20 mm	cum	4,576.00	
3.19		Providing and laying M-25 grade Plain Cement Concrete design mix using clean, hard and graded aggregates, including cost of all materials, machinery, labour, formwork, cantering, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, packing joints of shuttering etc. Complete, using aggregate of maximum size.			
	3.19.1	40 mm	cum	4,447.00	
	3.19.2	20 mm	cum	4,746.00	
3.20		Providing and laying M-20 grade RCC design mix using 20 mm graded aggregates, clean, hard for solid parapet (as per Annexure-XII) consisting of 350 x 200 mm kerb, 350 x 350 x 1000 mm pillars spaced approximately at 3.35 m c / c, 125 mm thick wall 800 mm height with 125 mm thick and 350 mm wide coping slab for wall and 125 mm thick 400 x 400 mm coping for pillars with top edges of kerb and coping chamfered / rounded as directed including cost of all materials, machinery, labour, formwork, centring, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing etc. complete (excluding cost of providing and placing reinforcement steel and gate) .	m	2,105.00	
3.21		Providing and laying M-20 grade RCC design mix using 20 mm graded aggregates , clean, hard for ornamental parapet (as per Annexure-XII) consisting of 350 x 200 mm kerb, 350 x 350 x 1000 mm pillars spaced approximately at 3.5 m apart, 200 x 150 mm posts 800 mm height approximately 300 mm c/c with 125 mm thick and 350 mm wide coping slab for posts 400 x 400 x 125 mm coping slab for pillars with top edges of kerb and coping chamfered or rounded as directed including cost of all materials, machinery, labour, formwork, cantering, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing etc. complete (excluding cost of providing and placing reinforcement steel and gate).	m	2,657.00	
3.22		Pre-cooling to control placement temperature of cement concrete in the range of 12 to 18°C at the concrete placement point by inundation of coarse aggregates by circulating normal water and using flaked ice and water chilled up to 4° C for mixing	cum	91.00	
		concrete including cost of all materials, machinery, labour etc. Complete.			
3.23		Providing and forming porous (without sand) concrete precast body drain of size 400 x 400 x 200 mm with 200 mm diameter central hole using cement and 20 mm down approved, clean, hard, graded coarse aggregates in 1 : 5 proportion by weight including cost of all materials, machinery, labour, formwork, batching, mixing, placing in position, tamping, curing etc. Complete.	cum	4,689.00	

3.24		Providing and constructing un-coursed rubble stone masonry using approved stones in cement mortar including cost of all materials, machinery, labour, scaffolding, cleaning, packing mortar and wedging stone chips into joints, curing etc. Complete.			
	3.24.1	(Strength 14 N/sqmm)	cum	2,549.00	
	3.24.2	(Strength 10.5 N/sqmm).	cum	2,309.00	
3.25		Providing and constructing coursed rubble face stone masonry using approved stones in cement mortar including cost of all materials, machinery, labour, scaffolding, cleaning, packing mortar and wedging stone chips into joints, curing etc. complete.			
	3.25.1	(Strength 14 N/sqmm)	cum	2,717.00	
	3.25.2	(Strength 10.5 N/sqmm)	cum	2,530.00	
3.26		Providing and constructing chisel and hammer dressed face stone masonry with approved stones in cement mortar including cost of all materials, machinery, labour, scaffolding, ramps, cleaning, packing mortar and wedging stone chips into joints, curing etc. complete.			
	3.26.1	(Strength 14 N/sqmm)	cum	2,854.00	
	3.26.2	(Strength 10.5 N/sqmm)	cum	2,715.00	
3.27		Providing average 50 mm deep cement mortar flush pointing to face stone masonry in Cement mortar including cost of all materials, labour, raking-out and cleaning joints, pressing mortar into joints, scaffolding, finishing, curing etc. Complete.			
	3.27.1	Cement Mortar 1:2	sqm	76.00	
	3.27.2	Cement mortar 1: 3	sqm	67.00	
3.28		Providing average 20 mm thick cement mortar plastering to stone masonry block joint in CM 1 : 3 proportion by volume including cost of all materials, machinery, labour, raking-out and cleaning joints for 50 mm depth, pressing mortar into joints, finishing surface, curing etc. Complete.	sqm	186.00	
3.29		Providing and constructing contraction joints by fixing 300 mm wide central bulb type approved quality PVC water stop as per I.S. 15058 in three lines as per I.S. 12200 and forming 200 mm dia. formed drain behind water seals including cost of all materials, machinery, labour etc. Complete.	m	901.00	
3.30		Providing and fixing in position 1mm thick and 355 mm wide annealed copper sealing strips In contraction joints, including bending to specified shape and providing butt joints with overlap of 50 mm and 10 mm dia. M. S. anchor rods of 600 mm length at 900 mm centre to centre alternately on both sides, Including welding and brazing of anchor bars and joints, etc. complete in all respect.	m	3,216.00	

3.31		Providing in contraction joints by fixing 225 mm wide central bulb type PVC water stop transparent or white in colour in single line supported by 10 mm dia. steel dowel rods on either side at 1 metre interval including cost of all materials, machinery, labour, vulcanizing water seal joints etc. Complete.	m	411.00	
3.32		Earthwork for embankment adjacent to masonry / concrete structures key wall, sluice barrel etc. and filling trial pits using selected soil from approved borrow area in layers of 100 to 150 mm (before compaction) including cost of all materials, machinery, labour, all other operations such as collection of soil, picking previous layer, spreading soil in layer of specified thickness, sorting out, breaking clods, levelling, sectioning edges / sides, watering, compacting to maximum dry density using pneumatic tampers/vibrating earth rammers etc., complete.	cum	81.00	
3.33		Providing and constructing rock fill embankment using 300 mm downgraded stones and quarry spalls from approved source including cost of all materials, machinery, labour, spreading stones and spalls in layers, hand packing, wedging, compaction by pneumatic/temper/vibratory earth rammer, finishing the surface to required slopes as per approved drawings etc. Complete.	cum	488.00	
3.34		Providing and constructing longitudinal/cross drains trapezoidal in shape with 1 m bottom width and depth of 0.9 m having side slope of 1:1 with graded filter having 150 mm thick			
		sand & metal layer, and 300 mm thick rubble layer from approved source satisfying specified filter criteria in layers of specified thickness including cost of all materials, machinery, labour, laying to required slopes, compaction etc. complete as per specification and approved drawings. Note:- Excavation will be paid separately same as per excavation rate.			
	3.34.1	Sand	cum	779.00	
	3.34.2	Aggregate 40mm nominal size	cum	795.00	
	3.34.3	Rubble	cum	415.00	
3.35		Providing filter blanket horizontally, Including laying, spreading, packing etc. Complete in layers of required thickness but excluding excavation of foundation.			
	3.35.1	Aggregate 80 mm nominal size.	cum	618.00	
	3.35.2	Aggregate 60 mm nominal size.	cum	702.00	
	3.35.3	Aggregate 40 mm nominal size.	cum	786.00	
	3.35.4	Aggregate 20 mm nominal size.	cum	1,028.00	
	3.35.5	Aggregate 10 mm nominal size.	cum	1,249.00	
	3.35.6	Shingle 80 mm or 60 mm nominal Size.	cum	449.00	
	3.35.7	Shingle 40 mm nominal size.	cum	567.00	
	3.35.8	Shingle 20 mm nominal size.	cum	739.00	
	3.35.9	Shingle 10 mm nominal size.	cum	891.00	
	3.35.10	Sand passing through 4.75 mm screen.	cum	762.00	

3.36		Add extra over item 3.35 for laying specified filter layers			
	3.36.1	On inclined surfaces steeper than 1 in 5			
	3.36.1.1	Aggregate 80 mm nominal size.	cum	680.00	
	3.36.1.2	Aggregate 60 mm nominal size.	cum	772.00	
	3.36.1.3	Aggregate 40 mm nominal size.	cum	865.00	
	3.36.1.4	Aggregate 20 mm nominal size.	cum	1,131.00	
	3.36.1.5	Aggregate 10 mm nominal size.	cum	1,374.00	
	3.36.1.6	Shingle 80 mm or 60 mm nominal Size.	cum	494.00	
	3.36.1.7	Shingle 40 mm nominal size.	cum	624.00	
	3.36.1.8	Shingle 20 mm nominal size.	cum	813.00	
	3.36.1.9	Shingle 10 mm nominal size.	cum	980.00	
	3.36.1.10	Sand passing through 4.75 mm screen.	cum	838.00	
	3.36.2	For chimney filter			
	3.36.2.1	Aggregate 80 mm nominal size.	cum	742.00	
	3.36.2.2	Aggregate 60 mm nominal size.	cum	842.00	
	3.36.2.3	Aggregate 40 mm nominal size.	cum	943.00	
	3.36.2.4	Aggregate 20 mm nominal size.	cum	1,234.00	
	3.36.2.5	Aggregate 10 mm nominal size.	cum	1,499.00	
	3.36.2.6	Shingle 80 mm or 60 mm nominal Size.	cum	539.00	
	3.36.2.7	Shingle 40 mm nominal size.	cum	680.00	
	3.36.2.8	Shingle 20 mm nominal size.	cum	887.00	
	3.36.2.9	Shingle 10 mm nominal size.	cum	1,069.00	
	3.36.2.10	Sand passing through 4.75 mm screen.	cum	914.00	
3.37		Construction of rock toe in earthen embankments Including laying and hand packing, dressing, wedging and finishing over surface etc. complete.			
	3.37.1	Boulders	cum	495.00	
	3.37.2	Quarried stone			
	3.37.2.1	Other than black trap, basalt or granite	cum	588.00	
	3.37.2.2	Black trap, basalt or granite	cum	701.00	
3.38		Filling foundations around masonry works with soil obtained from spoil banks including watering and ramming etc. complete.	cum	67.00	
3.39		22 cm thick dry stone pitching without quarry spall with individual stone of 22 cm depth and minimum size 0.014 cum complete.	cum	750.00	
3.40		30 cm thick dry stone pitching without quarry spall with individual stone of 30 cm depth and minimum size 0.021 cum complete.	cum	822.00	
3.41		22 cm thick dry picked up boulder pitching with individual boulders of 22 cm depth and at least the dimension of boulders in any direction should not be less than 10 cm complete.	cum	436.00	
3.42		Providing stone chips under stone pitching complete.	cum	537.00	
3.43		Providing picked up boulder spalls under pitching complete.	cum	385.00	
3.44		Puddle filling of good clay including mixing watering and kneading by tamping, ramming and laying etc. complete.	cum	196.00	

3.45		Providing and constructing Dry rubble wall (toe wall) with stone of minimum size 0.021 cum at the base of stone pitching or rip-rap excluding excavation etc. complete.	cum	588.00	
3.46		Providing and constructing dump riprap as per IS-8237 over 400mm thick graded filter media backing consisting of sand, clean, hard, and graded (Metal/shingle) aggregates laid in layers of 200 mm thick each including cost of all materials for riprap filter media, machinery, labour, laying to required slopes as per approved drawings, packing and wedging with stone chips etc. Complete.			
	3.46.1	600 mm thick	sqm	685.00	
	3.46.2	750 mm thick	sqm	760.00	
	3.46.3	1000 mm thick	sqm	886.00	
3.47		Providing and constructing hand packed riprap as per IS-8237 over 300 mm thick graded filter media backing consisting of sand, clean, hard, and 40mm graded (Metal/shingle) aggregates laid in layers of 150 mm thick each including cost of all materials, labour, hand packing/wedging stone chips finishing etc. Complete.			
	3.47.1	300 mm thick	sqm	473.00	
	3.47.2	450 mm thick	sqm	546.00	
	3.47.3	600 mm thick	sqm	619.00	
3.48		Stripping the seat of embankment of all foreign materials, vegetation and other growth like grass roots etc. and removing the rubbish up to a suitable distance including dressing and jungle clearance etc. complete.	cum	44.00	
3.49		Benching the seat of embankment to an average depth of 15 cm and cross slope of 1 in 12 including cleaning of all foreign material, vegetation and other growth like grass and plant roots and removing the rubbish up to a suitable distance with dressing etc. complete.	cum	48.00	
3.50		Preparing surface for turfing, including laying 15 cm of good soil on top in 7.5 cm layers, surface watering and light ramming etc. Completes.	sqm	29.00	
3.51		Turfing on prepared surface, including seed or sods.	sqm	16.00	
3.52		22 cm thick grouted stone pitching (without quarry-spalls) with individual stone of 22 cm depth and minimum size 0.014 cum in cement mortar 1:6 etc. complete.	cum	1,205.00	
3.53		Deduction for using shingle in place of metal			
	3.53.1	For using shingle 80 mm in place of coarse aggregate (metal) 80 mm	cum	278.00	
	3.53.2	For using shingle 40 mm in place of coarse aggregate (metal) 40 mm	cum	355.00	
	3.53.3	For using shingle 20 mm in place of coarse aggregate (metal) 20 mm	cum	508.00	
	3.53.4	For using shingle 10 mm in place of coarse aggregate (metal) 10 mm	cum	634.00	
3.54		Labour only for curing			

	3.54.1	Concrete	cum	181.00	
	3.54.2	Masonry	cum	90.00	
3.55		Dewatering and pumping the working area including all connecting operation required etc. complete. for cleanliness of working area by			
	3.55.1	Measured in terms of electric energy consumed	kwh	22.00	
	3.55.2	5hp to 10 hp diesel pump	hour	144.00	
	3.55.3	10 hp to 20 hp diesel pump	hour	219.00	
3.56		Stacking without boxing			
	3.56.1	Puddle earth, moorum, sand or kankar	cum	13.00	
	3.56.2	Metal, Shingle, stone chips, quarry spalls or boulder	cum	26.00	

CHAPTER-4
CANAL AND ALLIED WORKS
(Excluding canal structures)

Instructions

1. General instructions on Schedule of Rates shall be applicable to this chapter to the extent they are relevant.
2. Rates include cost of :
 - a. Labour
 - b. Running charges of machinery including fuel and lubricants.
 - c. All material required for execution of item of work.
 - d. All lead and lift of materials, machines and labours.
 - e. Wastage of Cement, Sand, Coarse Aggregate, Admixture, Concrete and Mortar.
 - f. Shuttering, Scaffolding, Formwork, Vibration, and curing
 - g. Testing of materials and quality assurance measures including Mix design.
 - h. Standard safety measures.
 - i. Site clearance, layout and setting out of work.
3. The rates of completed items of concrete works are inclusive of loading and unloading, standard finish and preparation of cold and hot joints.
4. All the construction materials, workmanship and quality shall conform to the standards prescribed in IS-Codes and Specification/Guidelines/Circulars of MP Water Resources Department.
5. For all nominal mixes, mix proportions shall be as per IS: 456.
6. The precast slabs shall be cast at suitable centralized places using table/suitable vibrator and ensuring quality control of concrete and proper curing arrangement.
7. Provision of design mix concrete M-10, MSA-20 mm for cast-in- situ cement concrete lining shall be done for canals having discharges 1 cumec & less or depth of water less than 1 m.
8. A. Provision of design mix concrete M-15 for cast- in- situ cement concrete lining shall be done for canals having discharge more than 1 cumec and depth of water more than 1 m.
B. Provision of design mix concrete M-15 MSA 20 mm for cast- in- situ cement concrete lining in canal side slopes in canal with manual paver/ winch operated slip form shall be done for canals having discharge less than 5 cumecs and width of canal bed shall be less than 1.5m.
9. The PVC strip is to be provided as per guidelines for cast in situ cement concrete lining work in canal issued vide C.E. BODHI, Water Resources Department Bhopal letter No. 1975/canal/BODHI/Bhopal Dated 08/07/2014
10. Flag stone lining/stone pitched lining may be done on canals carrying discharge below 3 cumecs if economically feasible.
11. Measurements:- No deductions shall be made for the following
 - a. Volume occupied by reinforcement.
 - b. Opening upto 0.1 sqm in area
 - c. Ends of dissimilar material for example beams, posts, girders, rafters, per lines, trusses, corbels and steps up to 0.5 sqm in cross section.

- d. Opening up to 0.1 sqm in area (in calculating area of an opening, the thickness of separate lintel or sill shall be included in height.).
- e. Volume occupied by pipes, conduits sheathing, etc., not exceeding 0.1 sqm each in cross sectional area.
- f. Moulds drip molding, chamfers, splayed rounded or curved angles, bed grooves and rebates up to 10 cm in width or 15 cm in girth.

12. The LDPE film, sealing compound and primer shall bear ISI Mark in accordance with Indian Standards Institution (Certification Marks) Act 1952. The following Indian Standards may be referred to:-

I.S. Code No.	Title
1398-1982	Packing paper, water proof, bitumen laminated (first revision) (with amendments 1 to 3) (Reaffirmed 1994).
2506-1985	Screed board vibrators.(Reaffirmed 2005)
2508-1984	Low-density polyethylene films (second revision).(Reaffirmed 2003)
2514-1963	Concrete vibrating tables.(Reaffirmed 2001)
3873-1993	Code of Practice for laying in-situ cement concrete lining on canals(second revision)(Reaffirmed 2004)
4031-1991	Methods for physical tests for hydraulic cement (first revision)(Reaffirmed 2005) (Part I to XV)
4558-1995	Code of Practice for under-drainage of lined canals.(Reaffirmed 2006)
4575-1983	Code of Practice for design of cross-section of lined canals (with amendments 1 & 2).(Reaffirmed 2005)
5256-1992	Code of practice for sealing joints in concrete lining on canals.(Reaffirmed 2003)
5690-1982	Guide for laying combination lining for existing unlined canals (with amendment No.1).(Reaffirmed 2004)
5889-1994	Vibratory plate compactor (with amendment No.1)(Reaffirmed 2005)
7245-1974	Specification for concrete pavers (Reaffirmed 2001).
7246-1974	Recommendations for use of table vibrators for consolidating concrete.(Reaffirmed 2004)
9013-1978	Methods for making, curing & determining compressive strength of accelerated cured concrete test
9451-1994	Guide lines for lining of canals in expansive soils. (Reaffirmed 2004)
9698-1995	Code of practice for lining of canals with low-density polyethylene film. (Reaffirmed 2001)
10430-2000	Criteria for Design of Lined Canals and Guidance for Selection of Type of Lining (Reaffirmed 2004)

10646:1991	Method of test for determining flexural strength of pre-cast cement concrete slabs for canal lining (Reaffirmed 2004)
12379:1988	Code of practice for lining in water courses and field channels. (Reaffirmed 2003)
13143:1991	Specification on joints in concrete lining of canals-sealing compound. Reaffirmed 2004

CHAPTER-4 CANAL AND ALLIED WORKS

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
4.01	Excavation in different types of soil in canal bed and sides slopes for lining, sleepers, steps, coping and under- drainage-arrangement including dressing to the profile and disposal of excavated materials etc. Complete.			
	4.01.1 In all kind of soft/loose/hard/dense soils, moorum & moorum mixed with boulders and mud	cum	48.00	
	4.01.2 In soft/disintegrated/weathered rock including wet excavation,	cum	104.00	
	4.01.3 In hard rock of all toughness requiring blasting	cum	336.00	
4.02	Providing and fixing fine chisel dressed canal bed grade stone (Type design 5) embedding 45 cm depth of stone with 15 cm concrete all around & in bottom in cement concrete M-7.5 (Nominal Mix), grade including excavation (all type of soil) orientation of stone along centre line and top of concrete is flushed with design bed level, curing etc. Complete. Using graded aggregate of maximum size 40 mm.			
	4.02.1 Size 60 x15 x15 cm	each	340.00	
	4.02.2 Size 55x15x15 cm	each	311.00	
	4.02.3 Size 50x15x15 cm	each	283.00	
4.03	Providing and placing approved cohesive non- swelling soils, below lining in canal bed and side slopes including serration in soil, breaking of clods, laying in layers of 15 cm. thickness, cutting and finishing in required bed grade & side slopes including dressing, watering, compaction (at optimum moisture content to obtained dry density not below 90%) etc. Complete.	cum	128.00	
4.04	Tamping in canal bed and sides including saturation up to 30 cm depth for preparation of earthen sub-grade before laying in-situ cement concrete lining.	sqm	11.00	
4.05	Providing and laying free draining sand below lining in canal bed and sides slopes including compaction cost of all materials, labour, spreading to specified thickness etc. complete as per specification.	cum	883.00	
	Providing and fixing in position LDPE film of 150 micron (0.15 mm) IS mark of grade 231 for bed and sides of canal including cost of all materials, labour, laying, joining as per specifications etc. Complete.	sqm	28.00	

4.07		Providing and applying primer, conforming IS 3384, on sleepers of in-situ cement concrete lining panels in canal as per IS 3873 and 5256 with layer @ 1 lit per 2 sqm including cost of all materials, labour, as per specifications etc. Complete.			
	4.07.1	On top of sleepers	sqm	74.00	
	4.07.2	On vertical face of panel	sqm	37.00	
4.08		Providing and placing in position cement concrete with graded aggregate in canals, including cost of all material, vibration, finishing, curing for 28days, cleaning etc. Complete.			
	4.08.1	For sleepers, safety ladders & lining of field channel & water courses using graded aggregate of maximum size 20 mm with.			
	4.08.1.1	Cement concrete M10. (Nominal Mix)	cum	3,296.00	
	4.08.2	For in-situ lining in canal (in bed and slopes & coping) with design mix Concrete)			
	4.08.2.1	M-10, 20mm graded aggregate	cum	3,353.00	
	4.08.2.2	M-15, 20mm graded aggregate	cum	3,525.00	
	4.08.2.3	M-15, 40mm graded aggregate	cum	3,227.00	
4.09		Providing and placing in position M-15 grade Design Mix concrete using graded aggregate of maximum size 20 mm.for in-situ lining in canal side slopes including form work for laying in panels, screeding the surface of side slopes with manual paver/winch operated slip form, vibration, making grooves as per IS 3873, curing for 28days by constructing brick masonry drains with weep holes of perforated pipes on the coping at the top of lining or by sprinklers cleaning etc. complete including cost of all materials.	cum	3,936.00	
4.10		Filling contraction joints (grooves) as per IS: 5256 with hot applied sealing compound IS:13143 including cleaning and washing grooves, painting its inner surfaces with primer IS:3384 at the rate of 1 litre per 4 sqm			
		inclusive of cost of all materials for in-situ concrete lining etc. complete.			
	4.10.1	grooves of 17 mm depth	m	17.00	
	4.10.2	grooves of 20 mm depth	m	21.00	
	4.10.3	grooves of 27 mm depth	m	27.00	
	4.10.4	grooves of 30 mm depth	m	30.00	
	4.10.5	grooves of 33 mm depth	m	33.00	
4.11		Providing and placing in position M-15 grade Design Mix concrete having air entraining agent by paver machine in bed, side slopes and curvature including cost of all material trimming, batching, mixing, transporting, placing, vibrating, inserting PVC strips at joints, smooth finishing, curing etc. complete. Using graded aggregate of maximum size.			
	4.11.1	40 mm	cum	3,863.00	
	4.11.2	20 mm	cum	4,139.00	

4.12		Providing & fixing in position Precast Cement Concrete slabs of M-15 grades design mix concrete of various sizes in CM 1:3 proportion by volume for lining of canal over 12 mm thick bed of CM 1:3 including cost of all materials, labour, preparing surface, packing mortar into joints and flush pointing in CM 1:3 joints neatly, curing etc complete. Using graded aggregate of maximum size 20 mm.			
	4.12.1	Pre cast Slab of 60 mm thickness	sqm	338.00	
	4.12.2	Pre cast Slab of 50 mm thickness	sqm	304.00	
	4.12.3	Pre cast Slab of 40 mm thickness	sqm	284.00	
4.13		Providing and laying stone slab lining for canals on average 12 mm thick bedding of cement mortar 1:3 with raking, refilling & pointing in cement mortar 1:3 striking joints, curing and cleaning etc. complete including cutting slab to required size and cost of all materials.			
		40 to 50 mm thick flag stone	sqm	228.00	
4.14		Providing and constructing stone pitched lined in canal in compartment made of stone masonry in cement mortar 1:3 with pin headers at 2 per sqm using stones and stone chips from approved source including cost of all materials, labour, hand packing/wedging stone chips, finishing etc. Complete.			
	4.14.1	150 mm thickness	sqm	142.00	
	4.14.2	225 mm thickness	sqm	197.00	
	4.14.3	300 mm thickness	sqm	274.00	
4.15		Providing and constructing stone masonry in CM 1:3 with pointing in similar mortar proportion by volume for canal lining over a bed of minimum 12 mm thick similar cement mortar using stones from approved quarry including cost of all materials, machinery, labour, batching and mixing mortar, raking & pointing, mortar joints, finishing, curing etc. Complete.	cum	2,157.00	
4.16		Providing and laying of 150 mm dia. PVC corrugated perforated pipes in longitudinal & transverse drains including joints etc. complete as per specifications.	m	340.00	
4.17		Providing and forming 610x610x975 mm deep filter drain pocket around pressure relief pipe consisting of 75 mm thick each layer with 20 - 40 mm graded gravel layer & 5-20 mm graded gravel and sand layer including cost of all materials, labour etc. Complete.	each	375.00	

4.18		Providing and construction of longitudinal & transverse graded filter drains around of 150 mm perforated PVC pressure release pipe having gradually decreasing thickness layer using 40 mm graded metal 150 mm thickness and 75mm thick layer of coarse sand of minimum FM 1.5 approved clean, hard, gravels satisfying specified filter criteria in layers of specified thickness including cost of all materials, labour, laying to required slops compaction etc. complete as per specification and approved drawings. Note:- Excavation will be paid separately same as per excavation rate.			
	4.18.1	Sand	cum	906.00	
	4.18.2	Metal 40 mm nominal size	cum	942.00	
	4.18.3	150 mm perforated PVC pressure release pipe	m	336.00	
4.19		Providing and laying bitumen laminated water proof paper IS:1398(Type 1) over top of drains and sand surface before laying in-situ cement concrete lining.	sqm	14.00	
4.20		Providing and fixing flap valves in drains.	each	413.00	
4.21		Providing and fixing in position pressure relief valves of size 150 mm. IS:4985 for outlets in longitudinal drains in canal bed as per specifications including of cost of all materials.	each	507.00	
4.22		Providing and fixing in position R.C.C cylindrical boxes and covers at outlet in longitudinal drains IS : 4558 pre-cast cement concrete M-15 nominal mix with 12.5 mm graded aggregate excluding cost of reinforcement but including form work, vibration, finishing, curing etc. complete.	cum	4,912.00	
4.23		Construction of Dowels (Dowla)			
	4.23.1	Construction of Dowels, 30 cm wide on top and 30 cm in height (1.5:1 side slopes) on the canal banks including excavation, dressing etc. Complete.	m	15.00	
	4.23.2	Construction of Dowels, 30 cm wide on top and 30 cm in height (2:1 side slopes) on the canal banks including excavation, dressing etc. Complete.	m	18.00	

CHAPTER-5

CANAL STRUCTURE

Instructions

1. General instructions on Schedule of Rates shall be applicable to the extent they are relevant.
2. Rates include cost of :
 - a. Labour
 - b. Running charges of machinery including fuel and lubricants.
 - c. All material required for execution of item of work.
 - d. All lead and lift of materials, machines and labours.
 - e. Wastage of Cement, Sand, Course Aggregate, Admixture, Concrete, Mortar etc.
 - f. Shuttering, Scaffolding, Formwork, Vibration, and curing
 - g. Testing of materials and quality assurance measures. Including Mix design
 - h. Standard safety measures.
 - i. Site clearance, layout and setting out of work.
3. The rates of completed items of concrete works are inclusive of loading and unloading, standard finish required for concrete work, cleaning/ preparation of cold and hot joint.
4. All the construction materials, workmanship and quality shall conform to the standards prescribed in IS-Codes and Specification/Guidelines/ Circulars of MP Water Resources Department.
5. For all nominal mixes, mix proportions shall be as per IS 456.
6. For purpose of measurement of concrete/ masonry work in piers and retaining walls in canal structures and similar work the following shall apply: -
 - A. Foundation and sub structure - work up to 1.5 m above top of foundation concretes.
 - B. Super structure- for all works above the level specified in 6 (A).
7. In case of canal structures with well sinking or pile foundations the following definitions shall apply: -
 - (a) Foundations-All works below ground level or below water level, whichever is higher, but not above soffit level of deck slab/ beam shall be termed as foundation.
 - (b) Sub-structure- The part of the bridge (or canal structure) below soffit level of the deck slab/beam but above the foundation level as defined in (a) above, shall be taken as sub-structure of the bridge (or canal structure) part.
 - (c) Superstructure:-The work above soffit level for deck slabs/beams including centring and shuttering (formwork) required for the superstructure, kerbs, railings, expansion joints, beams, slabs, etc., shall be termed as superstructure of the bridge (or canal structure) part.
8. The bearings shall conform to section No.2000 of "Specifications for road and bridge works (first revision) of Ministry of shipping and Transport (Roads wing).
9. Measurement:-

Reinforced Cement Concrete

 - (a) Dimensions shall be measured to nearest 0.01 m. except for the thickness of slab which shall be measured to nearest 0.005 m. The areas shall be worked out to nearest 0.01 sq. m. The cubical contents shall be worked out to nearest 0.01 cum.
 - (b) The filling in the well shall be measured on the cross- sectional area of the dredge hole multiplied by the height of the fill.

(c) Concrete in well steining shall be measured by multiplying the cross-sectional area of the steining by the height of the steining as actually casted.

(d) No deduction shall be made for the following:-

i. Ends of dissimilar materials for example beam, posts, girders, rafters, purlins, trusses, corbels and step up to 0.5sq. m in cross section;

ii. Opening up to 0.1 sq. m in area (in calculating area of an opening, the thickness of any separate lintel or sill shall be included in height).

iii. Volume occupied by reinforcement;

iv. Volume occupied by pipes, conduits, sheathing, etc. not exceeding 0.1 sq.

m. each in cross sectional area; and

v. Moulds, drip moulding, chamfers, splays, rounded or curved angles, beds, grooves and rebates up to 10 cm in width or 15 cm in girth.

vi. Columns shall be measured from top of column base to underside of floor slab.

vii. In case of columns for flat slabs, flare of column shall be included with column for measurement.

viii. Beams shall be measured from face to face of columns and shall include haunches, if any, between columns and beams. The depth of beams shall be measured from bottom of slab to bottom of the beam except in case of inverted beams where it shall be measured from top of slab to top of beam.

10. Masonry – Classification of masonry

(A) Masonry - For masonry works up to 15 m height –

i. Hammer dressed coursed rubble masonry- Face stone shall be hammer dressed on all beds and joints, so as to give them approximately rectangular shape. The bed and side joints shall be hammer dressed for 75 mm from the face. The bushing on the face shall not be more than 4 cm on an exposed face.

ii. Random rubble or un-coursed masonry- Stones used for un-coursed or random rubble masonry work shall be hammer dressed on the sides and bed in such a way as to close up with the adjacent stone in masonry work as strongly as possible. The face of stones shall be so dressed that bushing on the exposed face shall not project by more than 4 cm from the general wall surface.

(a) Bond stones:- Through bond stones shall be provided in walls up to 60 cm thick and in case of walls above 60 cm thickness, a set of two or more bond stones overlapping each other by at least 15 cm shall be provided in line from face to back. Each bond stone or a set of bond stones shall be provided at 1.5 m to 1.8 m apart clear in each course. The bond stones shall be staggered in successive courses and marked for identification.

(b) Plum stones (Pin-header): Pin header or plum stones shall be provided in hearting at about 1.8 m interval (both across and along). They shall run through the height of at least two courses. Their position shall be staggered in successive courses.

(c) Joints:- The maximum thickness of joints shall be 6 mm for various types of ashlar masonry, 10 mm for squared rubble masonry coursed (first sort), 15 mm for squared rubble masonry (second sort), 20 mm for hammer dressed coursed rubble masonry and 35 mm for random rubble un-coursed masonry.

(B) Masonry- For masonry works having height above 15 m (height means structural height above lowest foundation level and is applicable for entire length of dam and other massive structures):-

i. Face masonry:- Face stones shall be hammer dressed on face and one line chisel dressed (finishing given to the stone face with no portion of it projecting more than 10 mm from the straight edge laid along the face of the stone) on bed, top and sides for 75 mm from the face batter. The bushing on the faces of the stones shall not project more than 4 cm

ii. Coursed rubble masonry:- Face stones shall be hammer dressed on face, sides and bed for 75 mm with the course normal to the face batter. The bushing on the faces of the stones shall not project more than 4 cm.

iii. Random rubble masonry:- The hearting is of random rubble work.

11. Measurements-

(i) Dimensions shall be measured correct to the nearest cm. The area shall be calculated in sqm correct to two places of decimal and cubical contents in cum correct to two places of decimal.

(ii) No deduction or addition shall be made for the following-

- (a) Ends of dissimilar materials (that is joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps, etc.) up to 0.1 sq. m in section.
- (b) Opening up to 0.1 sqm in area.
- (c) Cement concrete blocks for holding down bolts and the like.
- (d) Iron fixtures such as wall tie, pipes upto 300 mm dia.

12. (a) Where specifications of face masonry differ from those of hearting, rate of face masonry will be payable as per actual width limited up to 60 cm from the face.

(b) Double face masonry shall be payable for actual width or up to 60 cm, whichever is less, for each side.

13. (a) The stones for masonry shall be hard, durable tough, sound and clean. They should be free from decay, weathered faces, soft seams, adhering coating, sand holes, veins, flaws, cracks, stains and other defects and shall have, as far as possible, uniform colour and texture. Stones not uniform in colour, texture and/or with stains may be permitted after proper tests.

(b) Stones For Random Rubble Masonry - The size of the stone shall be normally varied from 0.05 to 0.01 cum. No stone larger than the maximum specified size of 0.05 cum. should be used (in general). The stones shall be taken from quarries approved from the geological and engineer in charge consideration. The stone shall weigh less than 25 Kg. The stones used in hearting shall be roughly cubical in shape. No stones weighing between 75Kg. and 150 Kg. shall be less than 225 mm in any direction and no stone weighing between 25Kg. and 75 Kg. shall be less than 150 mm in any direction.

(c) Spalls with minimum dimension of 200 mm to 100mm shall be used to wedge in to thick mortar spaces. They shall not normally exceed 10% of the volume of stone masonry.

15. The following Indian Standards and Indian Road Congress publications may be referred: -

I.S. No.	Title
458-2003	Concrete pipes (with or without reinforcements) (fourth revision) (Reaffirmed 2013).
783-1985	Code of practice for laying of concrete pipes (Reaffirmed 2012)
1322-1993	Bitumen felts for water proofing and damp proofing (second revision) (with amendment Nos. 1 and 2)
1838-1961 part II	Preformed fillers for expansion joints in concrete non-extruding and resilient type (bitumen impregnated fibre).
2911- 1979	Code of practice for design and construction of pile foundations-
2911 (part I/ sec.1) - 2010	Concrete piles, section 1, Driven cast in-situ concrete piles (first revision). (Reaffirmed 2002)
2911 (part I/Sec. 2)-2010	Concrete piles, section 2, Bored cast- in situ piles (first revision). (Reaffirmed 2002)
2911 (part IV)-2013	Load test on piles. (Reaffirmed 2002)
3955-1967	Code of practice for design and construction of well foundations (with amendment No.1).

5121-1969	Safety code for piling and other deep foundations (Reaffirmed2005)
6426-1972	Pile driving hammer. (Reaffirmed 2005)
6427 -1972	Glossary of terms relating to pile driving equipment. (Reaffirmed2005)
6428-1972	Pile frame (Reaffirmed 2005)
6751-1972	Aluminium alloy casting and strips for bearing (Reaffirmed1999)
6531:1994	Canal head regulators - Criteria for design (first revision) (Reaffirmed 2010)
6936:1992	Guide for location, selection and hydraulic design of canal escapes (first revision) (Reaffirmed 2012)
7114:1973	Criteria for hydraulic design of cross regulators for canals (Reaffirmed 2013)
7331:1981	Code of practice for inspection and maintenance of cross-drainage works (first revision) (Reaffirmed 2012)
7495:1974	Criteria for hydraulic design of silt selective head regulator for sediment control in off taking canals
7784(Part 1):2013	Design of cross drainage works - Code of practice: Part 1 General features (first revision)
7784(Part 2/Sec 1):1995	Design of cross drainage works - Code of practice: Part 2 Specific requirement Section 1 Aqueducts (Reaffirmed 2010)
7784(Part 2/Sec 2):2000	Code of practice for design of cross drainage works: Part 2 Specific requirement Section 2. Super passages (first revision)
7784(Part 2/Sec 3):1996	Code of practice for design of cross drainage works - : Part 2 Specific requirement Section 3 Canal syphon (first revision)
7784(Part 2/Sec 4):1999	Design of cross drainage works - Code of practice : Part 2 Specific requirement Section 4 Level crossings (first
7784(Part 2/Sec 5):2000	Code of practice for design of cross drainage works: Part 2 Specific requirement Section 5 Syphon aqueducts (first revision)
7871:1975	Criteria for hydraulic design of groyne walls (curved wing) for sediment distribution at off take points in a canal
7880:1975	Criteria for hydraulic design of skimming platform for Sediment control in off taking canal (Reaffirmed 2013)
7986:1976	Code of practice for canal outlets (Reaffirmed 2013)
9913:2000	Code of practice for construction of cross drainage works (first revision) (Reaffirmed 2013)

IRC: 5	Code of practice for Road BridgesPart-1
IRC: 6	Code of practice for Road BridgesPart-2 Loads and Stresses
IRC: 18	Code of practice for Pre-stressed Concrete Road Bridges
IRC-21-2000	Standard specification and code of practice for Road Bridges (section-(iii) cement concrete (Plain and reinforced).
IRC: 43	Recommended practice for Tools, Equipment & Appliances for Concrete Pavement Construction
IRC-45-1972	Recommendations for estimating the resistance of soil below the maximum scour level in the design of well foundation of bridges.
IRC: 78	Standard specification & code of practice for Road Bridges, Section VII Foundation and Substructures
IRC: 83	Standard specification & code of practice for Road Bridges
SP: 23	Hand book on Concrete Mixes

CHAPTER-5 CANAL STRUCTURE

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
5.01	Providing and fixing 25 mm dia. 2.50 m long cold twisted deformed steel anchor rod with 1.25 m length driven into 38 mm dia. hole drilled in bed rock and remaining length embedded in concrete / masonry including cost of all materials, machinery, labour, drilling and cleaning hole, filling hole with thick cement slurry, driving anchor rod etc. Complete.	each	682.00	
5.02	Providing and laying M-10 grade Plain Cement Concrete design mix using 40 mm graded aggregate, clean, hard for foundation filling including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing ,packing joints of shuttering etc. Complete.	cum	2,712.00	
5.03	Providing and laying M-15 grade Plain Cement Concrete Design Mix using graded aggregate clean, hard for foundation filling and sub structure including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing ,packing joints of shuttering etc. complete. Using graded aggregates of maximum size.			
	5.03.1 150 mm	cum	3,378.00	
	5.03.2 80 mm	cum	3,480.00	
	5.03.3 40 mm	cum	3,606.00	
	5.03.4 20 mm	cum	3,912.00	
5.04	Providing and laying M-20 grade Plain Cement Concrete Design Mix using graded aggregate clean, hard for foundation filling and sub structure including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, packing joints of shuttering etc. complete. Using graded aggregates of maximum size.			
	5.04.1 80 mm	cum	3,832.00	
	5.04.2 40 mm	cum	4,142.00	
	5.04.3 20 mm	cum	4,469.00	
5.05	Providing and laying M-20 grade Reinforced Cement Concrete Design Mix using graded aggregate clean, hard for foundation filling and sub structure including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing ,packing joints of shuttering etc. complete. Using graded aggregates of maximum size.			
	5.05.1 40 mm	cum	4,293.00	
	5.05.2 20 mm	cum	4,620.00	

5.06		Providing and laying M- 25 grade Plain Cement Concrete Design Mix for filling foundation & Sub Structure using graded aggregates clean, hard including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position in alternate panels as directed, levelling, compacting, finishing, curing, packing joints of Shuttering etc. complete.Using graded aggregate of maximum size.			
	5.06.1	40 mm	cum	4,979.00	
	5.06.2	20 mm	cum	5,130.00	
5.07		Providing and laying M- 25 grade Reinforced Cement Concrete Design Mix for filling foundation & Sub Structure using graded aggregates clean, hard including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position in alternate panels as directed, levelling, compacting, finishing, curing, packing joints of shuttering etc. complete. Using graded aggregate of maximum size.			
	5.07.1	40 mm	cum	5,130.00	
	5.07.2	20 mm	cum	5,281.00	
5.08		Providing and laying M-15 grade Plain Cement Concrete Design Mix using graded aggregate clean, hard for super structure			
		including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing ,packing joints of shuttering etc. complete. Using graded aggregates of maximum size.			
	5.08.1	80 mm	cum	4,030.00	
	5.08.2	40 mm	cum	4,232.00	
	5.08.3	20 mm	cum	4,431.00	
5.09		Providing and laying M-20 grade Plain Cement Concrete Design Mix using graded aggregate clean, hard for super structure including cost of all materials, machinery, labour, formwork, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, packing joints of shuttering etc. complete. Using graded aggregates of maximum size.			
	5.09.1	80 mm	cum	4,526.00	
	5.09.2	40 mm	cum	4,772.00	
	5.09.3	20 mm	cum	4,930.00	
5.10		Providing and laying M-20 grade Reinforced Cement Concrete Design Mix using graded aggregate clean, hard super structure including cost of all materials, machinery, labour, formwork, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing ,packing joints of shuttering etc. complete. Using graded aggregates of maximum size.			
	5.10.1	40 mm	cum	5,676.00	
	5.10.2	20 mm	cum	5,834.00	

5.11		Providing and laying M-25 grade Plain Cement Concrete Design Mix for super Structure using graded aggregates, clean, hard including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position as directed, levelling, compacting, finishing, curing, packing joints			
		of shuttering etc. complete. Using graded aggregate of maximum size.			
	5.11.1	40 mm	cum	5,961.00	
	5.11.2	20 mm	cum	6,112.00	
5.12		Providing and laying M-25 grade Reinforced Cement Concrete Design Mix using graded aggregates, clean, hard super structure including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position as directed, levelling, compacting, finishing, curing, packing joints of shuttering etc. complete. Using graded aggregate of maximum size.			
	5.12.1	40 mm	cum	6,565.00	
	5.12.2	20 mm	cum	7,016.00	
5.13		Providing and laying Plain Cement Concrete Design Mix for super Structure , using clean, hard, and graded aggregates including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position in alternate panels as directed, levelling, compacting, finishing, curing, packing joints of shuttering etc. complete. Using graded aggregate of maximum size 20 mm.			
	5.13.1	M-30 Concrete	cum	6,263.00	
	5.13.2	M-35 Concrete	cum	6,414.00	
	5.13.3	M-40 Concrete	cum	6,566.00	
	5.13.4	M-45 Concrete	cum	6,717.00	
5.14		Providing and laying Reinforced Cement Concrete Design Mix, using clean, hard, and graded aggregates for foundation filling and substructure including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position in alternate panels as directed, levelling, compacting, finishing, curing, packing joints of shuttering etc. complete. Using graded aggregate of maximum size 20 mm.			
	5.14.1	M-30 Concrete	cum	6,414.00	
	5.14.2	M-35 Concrete	cum	6,565.00	
	5.14.3	M-40 Concrete	cum	6,717.00	
	5.14.4	M-45 Concrete	cum	6,868.00	
5.15		Providing and laying Reinforced Cement Concrete Design Mix, using clean, hard, and graded aggregates for super structure including cost of all materials, machinery, labour, formwork, cleaning, batching, mixing, placing in position in alternate panels as directed, levelling, compacting, finishing, curing, packing joints of shuttering etc. complete. Using graded aggregate of maximum size 20 mm.			

	5.15.1	M-30 Concrete	cum	7,167.00	
	5.15.2	M-35 Concrete	cum	7,318.00	
	5.15.3	M-40 Concrete	cum	7,470.00	
	5.15.4	M-45 Concrete	cum	7,621.00	
5.16		Providing and laying in position design mix concrete with temperature reinforcement for 75 mm thick (average) wearing coat over bridge slabs, laid in alternate panels to the required camber, including formwork, tamping, vibration, finishing, curing ,packing joints of shuttering etc. Complete, including cleaning RCC surface and applying cement slurry (2kg per sqm) before laying concrete (excluding cost of reinforcement) using graded aggregate of maximum size 20 mm.			
	5.16.1	M-15 Concrete	cum	4,304.00	
	5.16.2	M-20 Concrete	cum	4,861.00	
5.17		Providing and laying in position design/nominal mix concrete with graded metal of maximum size 20 mm for coping over walls, laid in alternate panels of 1.5 m, including formwork, tamping, vibration,			
		finishing, curing, cleaning, packing joints of shuttering etc. complete.			
	5.17.1	Design/Nominal Mix M-15	cum	4,206.00	
	5.17.2	Design/Nominal Mix M-20	cum	4,763.00	
5.18		Providing, fabricating, launching and grounding in position, floating steel curbs wells and staining for wells including necessary branching, cutting, edges including all necessary plants etc. Complete.	tonne	1,01,606.00	
5.19		Providing, fabricating, and setting out steel well cutting edge of RCC well curb including timber planking, levelling etc. Complete.	tonne	87,091.00	
5.20	5.20.1	Sinking of wells for foundation to levels as per drawing including dredging as may be necessary including sinking by loading with necessary, Kent ledges and other usual means for the type of work including all the plant and machinery etc. complete in all kinds of soil and removal of boulders or tree trunks up to 0.03 cum average volume except sinking in rock and removal of boulders more than 0.03 cum volume etc. complete up to 3m depth.	cum	853.00	
	5.20.2	Add for each 3m extra depth beyond initial 3m	cum	377.00	
5.21		Filling foundation wells with sand in layers of 250 to 300 mm and compacting by watering, ramming as directed including cost of all materials, machinery, labour etc. complete.	cum	792.00	
5.22		Driving or boring R.C.C. piles of the specified design as per detailed drawings for foundations to required levels, including all necessary plants and machinery for the type of work involved cutting and load testing as per specifications and any other protection work for bores if required etc. complete (excluding cost of reinforcement)			
	5.22.1	Up to 6 m depth per cum volume of pile.	cum	9,309.00	

	5.22.2	Add for each meter extra depth below 6 m sub structure.	cum	931.00	
5.23		Providing and laying in-situ pumped concrete Design Mix, using graded aggregates clean, hard for piers and abutments deploying batching plant, transit mixer and concrete pump including cost of all materials, machinery, labour, formwork, scaffolding, cleaning, batching, mixing, placing in position levelling, vibrating, finishing, curing etc.			
		complete. Using aggregate of maximum size 20 mm.			
	5.23.1	M-20 Concrete	cum	5,200.00	
	5.23.2	M-25 Concrete	cum	5,351.00	
	5.23.3	M-30 Concrete	cum	5,502.00	
	5.23.4	M-35 Concrete	cum	5,653.00	
	5.23.5	M-40 Concrete	cum	5,805.00	
	5.23.6	M-45 Concrete	cum	5,956.00	
5.24		Providing and filling in foundation M-15 grade cement concrete design mix with graded aggregate of maximum size 40 mm laid under water in foundation pits by skip boxes or tremie pipes including ramming, levelling etc. complete	cum	4,284.00	
5.25		Providing elastomeric bearings such as restrained neoprene bearings or any other type with mild steel plates or shims, manufactured as per specifications given in the approved design of the bearings, including- packing, fixing with adhesives as specified in the design etc. complete.	cubic cm	2.40	
5.26		Providing and constructing PVC pipe weep holes for concrete / masonry walls including cost of all materials, machinery, labour, providing 200 x 200 x 200 mm size porous concrete block made of cement and 20 mm down coarse aggregate in 1 : 4 proportion by volume with 100 mm thick sand backing at the junction of wall and soil back fill, etc., complete.			
	5.26.1	100mm dia.	m	318.00	
	5.26.2	150 mm dia	m	408.00	
5.27		Providing and forming expansion joint for bridge consisting of 75 x 75 x 6 mm angles 2 numbers provided with 250 mm long 12 mm dia. anchors fixed to both flanges at 150 mm c /c and 140 x 6 mm plate welded on top of one of the angle including cost of all materials, labour, machinery, providing and fixing 38 mm thick joint filler board matching the thickness of wearing coat, painting etc. complete.	m	1,719.00	
5.28		Providing and fixing in position, 12 mm thick pre- moulded fillers non-extruding and resilient type (bitumen-impregnated fibre), IS: 1838, on the pier cap including cleaning of surface etc. complete.	sqm	1,558.00	
5.29		Providing and fixing in position, to exact profile and pre-stressing high tensile steel of specified ultimate strength, including bending, cutting, tying and providing anchorage, sheathing materials, cable ducts etc. complete as per detailed drawings.	tonne	79,611.00	

5.30		Providing and constructing un-coursed rubble stone masonry with approved stones in CM 1 : 4 proportion by volume for super structure portions of return walls / abutments including cost of all materials, machinery, labour, formwork, scaffolding, ramp, cleaning, batching, mixing, mortar, packing mortar and wedging, stone chips into joints, finishing, curing etc. complete.	cum	2,189.00	
5.31		Providing and constructing coursed rubble (size stone) face stone masonry in CM 1 : 4 proportion by volume with stones from approved source including cost of all materials, machinery, labour, formwork, scaffolding, ramps, cleaning, batching, mixing, mortar, packing mortar and wedging stone chips into joints, finishing, curing etc., complete.	cum	2,438.00	
5.32		Providing cement flush mortar pointing to coursed rubble (size stone) face stone masonry in CM 1 : 2 proportion by volume including cost of all materials, labour, scaffolding, raking and cleaning, joints for 50 mm depth, batching and mixing mortar pressing cement mortar into joints finishing, curing etc. complete.	sqm	75.00	
5.33		Providing cement mortar flush pointing to coursed rubble (size stone) face stone masonry in CM 1 : 3 proportion by volume including cost of all materials, labour, scaffolding, raking and cleaning, joints for 50 mm depth, batching and mixing mortar pressing cement mortar into joints finishing, curing etc. complete.	sqm	71.00	
5.34		Providing 20 mm thick cement mortar plastering in CM 1 : 3 proportion by volume in two layers including cost of all materials, labour, scaffolding, raking and cleaning, joints / surface, batching and mixing mortar, smooth finishing, curing etc. complete.	sqm	161.00	
5.35		Providing 20 mm thick cement mortar plastering in CM 1 : 4 proportion by volume in two layers including cost of all materials, labour, scaffolding, cleaning, joints / surface, batching and mixing mortar, smooth finishing, curing etc. complete.	sqm	151.00	
5.36		Providing Km Stone as per type design 2 of WRD, precast in M-15 RCC with 20 mm metal including form work, cost of reinforcement, finishing, curing etc. complete.	each	474.00	
5.37		Fixing Km stone (type design 2) in M-7.5 cement concrete with 40 mm graded metal including excavation (any strata) handling and fixing of stone, curing etc. complete.	each	498.00	
5.38		Painting km stone as per type design no 2 with canary yellow background of enamel paint and figuring and labelling with black pain including cost of paint brushes etc. complete	each	130.00	
5.39		Providing 0.2 km stone made of fine chisel dressed cut stone as per type design 3 of WRD	each	154.00	
5.40		Fixing Km stone (type design 3) in M-7.5 cement concrete with 40 mm graded aggregate including excavation (any strata) handling and fixing of stone, curing etc. complete.	each	341.00	
5.41		Painting km stone as per type design no 3 with canary yellow background of enamel paint and figuring and labelling with black paint including cost of paint brushes etc. complete	each	65.00	

5.42		Providing, Laying and jointing non-pressure (NP2) RCC pipes with collar joint including testing of joints (Conforming to IS ; 458-1988, IS 783:1985) etc. complete.			
	5.42.1	600 mm dia. (NP2) R.C.C. pipes	m	1,368.00	
	5.42.2	700 mm dia. (NP2) R.C.C. pipes	m	1,747.00	
	5.42.3	800 mm dia. (NP2) R.C.C. pipes	m	2,405.00	
	5.42.4	900 mm dia. (NP2) R.C.C. pipes	m	2,953.00	
	5.42.5	1000 mm dia. (NP2) R.C.C. pipes	m	3,378.00	
5.43		Providing, Laying and Jointing non- pressure(NP3) RCC socket & spigot pipes with rubber gasket joint/joint caulked with cement mortar 1:2 including testing of joints.(Conforming to IS ; 458-1988, IS 783:1985) etc. complete			
	5.43.1	600 mm dia. (NP3) R.C.C. Pipes	m	3,040.00	
	5.43.2	700 mm dia. (NP3) R.C.C. pipes	m	3,573.00	
	5.43.3	800 mm dia. (NP3) R.C.C. pipes	m	4,922.00	
	5.43.4	900 mm dia. (NP3) R.C.C. pipes	m	6,045.00	
	5.43.5	1000 mm dia. (NP3) R.C.C. pipes	m	6,409.00	
	5.43.6	1100 mm dia. (NP3) R.C.C. pipes	m	7,671.00	
	5.43.7	1200 mm dia. (NP3) R.C.C. pipes	m	9,041.00	
	5.43.8	1400 mm dia. (NP3) R.C.C. pipes	m	10,849.00	
	5.43.9	1600 mm dia. (NP3) R.C.C. pipes	m	12,975.00	
	5.43.10	1800 mm dia. (NP3) R.C.C. pipes	m	15,267.00	
5.44		Providing, Laying and Jointing non- pressure(NP4) RCC socket & spigot pipes with rubber gasket joint/ joint caulked with cement mortar 1:2 including testing of joints. [Conforming to IS ; 458-1988, IS 783:1985) etc. complete			
	5.44.1	600 mm dia. (NP4) R.C.C. pipes	m	3,561.00	
	5.44.2	700 mm dia. (NP4) R.C.C. pipes	m	4,269.00	
	5.44.3	800 mm dia. (NP4) R.C.C. pipes	m	5,507.00	
	5.44.4	900 mm dia. (NP4) R.C.C. pipes	m	6,683.00	
	5.44.5	1000 mm dia. (NP4) R.C.C. pipes	m	7,328.00	
	5.44.6	1100 mm dia. (NP4) R.C.C. pipes	m	8,400.00	
	5.44.7	1200 mm dia. (NP4) R.C.C. pipes	m	9,624.00	
	5.44.8	1400 mm dia. (NP4) R.C.C. pipes	m	12,678.00	
	5.44.9	1600 mm dia. (NP4) R.C.C. pipes	m	14,470.00	
	5.44.10	1800 mm dia. (NP4) R.C.C. pipes	m	16,986.00	
5.45		Providing, laying, Jointing & field testing of High Density Polyethylene pipes, (HDPE) confirming to IS 4984/ 14151/ 12786/ 13488 with necessary jointing material like mechanical connector or jointing pipes by heating to the ends of pipes with the help of teflon coated electric mirror/ heater to the required temperature and then pressing the ends together against each other, to form a monolithic & leak proof joint by thermosetting process. It may be required to be done with Jacks/Hydraulic Jacks/ But fusion machine. (50mm & above fusion jointed & below 50mm mechanical jointed) etc. complete			

	5.45.1	110 mm dia. pipes	m	334.00	
	5.45.2	125 mm dia. pipes	m	430.00	
	5.45.3	140 mm dia. pipes	m	536.00	
	5.45.4	160 mm dia. pipes	m	698.00	
	5.45.5	180 mm dia. pipes	m	874.00	
	5.45.6	200 mm dia. pipes	m	1,081.00	
	5.45.7	225 mm dia. pipes	m	1,365.00	
	5.45.8	250 mm dia. pipes	m	1,669.00	
	5.45.9	280 mm dia. pipes	m	2,086.00	
	5.45.10	315 mm dia. pipes	m	2,634.00	
	5.45.11	355 mm dia. pipes	m	3,361.00	
	5.45.12	400 mm dia. pipes	m	4,340.00	
	5.45.13	450 mm dia. pipes	m	5,485.00	
	5.45.14	500 mm dia. pipes	m	6,778.00	
	5.45.15	560 mm dia. pipes	m	8,475.00	
	5.45.16	630 mm dia. pipes	m	10,720.00	
	5.45.17	710 mm dia. pipes	m	11,003.00	
5.46		Supplying, laying, jointing, field testing, commissioning, complete at site of GRP pipes PN-6.0(6.0kg/sqcm) conforming to IS 12709 for water application/ IS 14402 for sewerage application, including cost of coupling, pipe material, transportation, loading, unloading, stacking and labour work complete stiffness class 124kpa (2500N/m²) etc. complete.			
	5.46.1	300 mm dia. pipes (6mtr length)	m	2,295.00	
	5.46.2	350 mm dia. pipes (6mtr length)	m	2,677.00	
	5.46.3	400 mm dia. pipes (6mtr length)	m	2,968.00	
	5.46.4	450 mm dia. pipes (6mtr length)	m	3,425.00	
	5.46.5	500 mm dia. pipes (6mtr length)	m	3,914.00	
	5.46.6	600 mm dia. pipes (6mtr length)	m	5,040.00	
	5.46.7	700 mm dia. pipes (6mtr length)	m	6,335.00	
	5.46.8	800 mm dia. pipes (6mtr length)	m	7,937.00	
	5.46.9	900 mm dia. pipes (6mtr length)	m	9,316.00	
	5.46.10	1000 mm dia. pipes (6 mtr length)	m	11,982.00	
	5.46.11	1100 mm dia. pipes (6mtr length)	m	13,893.00	
	5.46.12	1200 mm dia. pipes (6mtr length)	m	15,572.00	

CHAPTER-6
LIFT IRRIGATION WORKS
Instructions

- 1 General instructions on Schedule of Rates shall be applicable to the extent they are relevant.
- 2 Rates include cost of :
 - a Labour
 - b Running charges of machinery including fuel and lubricants.
 - c All material required for execution of item of work
 - d All lead and lift of materials, machines and labourers.
 - e Wastage of Cement, Sand, Coarse Aggregate.
 - f Shuttering, Scaffolding, Form work, Vibration and Curing
 - g Testing of materials and quality assurance measures including Mix Design.
 - h Standard Safety measures.
 - i Site clearance, Layout and Setting out of work.
- 3 The rates of completed items are inclusive of loading and unloading, standard finish required for Works, Cleaning/Preparation of cold and hot joint.
- 4 All the construction material, workmanship and quality shall conform to the standard prescribed in IS-Codes and Specification/ Guidelines/ Circulars of MP Water Resources Department
- 5 For all nominal mixes, mix proportion shall be as per IS 456
- 6 The rates of completed items are inclusive of site clearance, haul roads, working under watery situation, de-silting but excluding dewatering and river diversion arrangements wherever applicable
- 7 Items related to excavation and earthwork shall be taken from chapter of "Excavation and Earthwork"
- 8 Items related to Concrete Work not given in this chapter shall be taken from chapter of "Dam and Allied Works, Canal Allied Work and Canal Structures"
- 9 Rates for Electric Sub Station items, Lighting inside and outside Pump House, Earthing for Pump House installation may be adopted as per MPSEB/MP PWD Schedule of rates.
- 10 The rates of Ductile Iron Pipes (D.I.Pipes) may be taken from Schedule of Rates of Public Health Engineering Department. The Following Indian Standards may be referred to :-

I.S. Code No.	Title
1710 -1989	Pumps - Vertical Turbine Mixed and Axial Flow, for Clear Cold Water (Reaffirmed 2009)
4457 - 2007	Ceramic unglazed vitreous acid resisting tile - [Flooring, Wall Finishing and Roofing (Reaffirmed 2012)
IS 5491 - 1969	Code of practice for laying of in-situ granolithic concrete floor topping [CED 5: Flooring, Wall Finishing and Roofing] (Reaffirmed 2001)
784 - 2001	Prestressed Concrete Pipes (Including Specials) — Specifications

14845 - 2000	Resilient Seated Cast Iron Air Relief Valves for Water Works Purposes (Reaffirmed 2010)
14846 - 2000	Sluice Valve for Water Works Purposes (50 to 1200 mm Size) (Reaffirmed 2010)
3589 - 2001	Steel Pipes for Water and Sewage

CHAPTER-6

LIFT IRRIGATION WORKS

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
6.01	Providing and placing sand bags consisting of empty cement bags filled with 35 to 40 kg locally available sand for forming ring bund including cost of all materials, labour, plugging joints with selected earth, etc., complete.	each	28.00	
6.02	Filling clayey soil between two rows of sand bags placed for forming ring bund including cost of all materials, labour, tamping, plugging leakage points etc. complete.	cum	48.00	
6.03	Supplying, fabricating, erecting structural steel members fabricated from rolled steel sections like channels, angles, beams, rails, plates etc., as per specifications and drawings including cost of all materials, machinery, labour, scaffolding, cutting, welding, grinding, cleaning, applying two coats of approved synthetic enamel paint over a coat of zinc chromate red oxide primer paint etc. complete.	tonne	77,215.00	
6.04	Providing and fixing acid resistant tiles of approved quality for battery room flooring / dadoing set over a bed of 20 mm thick CM 1 : 3 proportion by volume including cost of all materials, machinery, labour, cleaning surface, batching and mixing mortar, grouting joints with acid resistant mortar mix, finishing, curing etc. complete.	sqm	1,056.00	
6.05	Providing and laying 40 mm thick granolithic flooring for pump floor in cement concrete M-25 proportion by volume using 10 mm graded approved clean, hard, aggregates including cost of all materials, machinery, labour, formwork, cleaning surface, batching and mixing concrete, laying concrete in alternate panels of specified size as directed, levelling, tamping, finishing, curing etc. complete.	sqm	229.00	
6.06	Additional rate for adding Ironite compound or floor hardener to concrete. For floors subjected to heavy loads ironite compound is added to concrete at 2 kg / sqm at the time of mixing concrete to impart more hardness to finished floor.	sqm	50.00	
6.07	Supplying and laying Pre-stressed concrete pipes (safe for 18 kg / sqcm test pressure) true to line and level with perfect linking at joint including cost of all materials, machinery, labour, loading, unloading, rolling, lifting and lowering into trench, cleaning socket and spigot ends with soap solution, applying soft soap to spigot and spigot with soap solution,			

		applying soft soap to socket and spigot ends, fixing rubber sealing ring into correct position, jointing pipes perfectly by jacking or other approved method, arranging water for testing, giving necessary hydraulic test at specified test pressure etc. complete.			
	6.07.1	800 mm dia. Pre-stressed concrete pipes.	m	6,123.00	
	6.07.2	1000 mm dia. Pre-stressed concrete pipes.	m	8,411.00	
	6.07.3	1200 mm dia. Pre-stressed concrete pipes.	m	10,690.00	
6.08		Manufacturing, supplying, laying in position, aligning, jointing, testing and commissioning of electric resistance welded / submerged arc welded mild steel (Fe-410 grade) delivery pipes of specified diameter and plate thickness with flanged ends wherever required and provided with 1 coat of 40 micron thick zinc rich epoxy primer paint and 3 coats of 100 micron thick each coat coal tar epoxy paint for inner surface and 1 coat of 40 micron thick zinc rich epoxy primer paint and 2 coats of 100 micron thick each coat coal tar epoxy paint for outer surface including cost of all materials, machinery, labour, cutting, bending, welding, finishing, painting, conveying to spot, lowering, aligning, jointing, arranging water for testing, hydraulic testing at fabrication site and after laying and jointing at specified test pressure etc. complete as per specifications and approved drawings. Diameter of delivery pipe : 1200 mm Thickness of plate : 12 mm.	tonne	76,217.00	
		Note: Rate per running metre for specified diameter in mm and thickness of plate in mm =0.373(Rate per tonne)x(diameter in mm)x(plate thickness in mm) /14400			
6.09		Manufacturing, supplying, laying in position, aligning, jointing, testing and commissioning of electric resistance welded / submerged arc welded mild steel (Fe-500 grade) manifold pipe system of specified diameter and plate thickness with flanged inlets / outlets at specified locations for connecting pump delivery pipes and raising mains and provided with 1 coat of 40 micron thick zinc rich epoxy primer paint and 3 coats of 100 micron thick each coat coal tar epoxy paint for inner surface and exposed outer surface including cost of all materials, machinery, labour, cutting, bending, welding, finishing, painting, conveying to spot, lowering, aligning, jointing, arranging water for testing, hydraulic testing at fabrication site and after laying and jointing at specified test	tonne	66,915.00	
		pressure etc. complete as per specifications and approved drawings (excluding cost of thrust block for anchoring / encasing manifold pipe). Diameter of manifold pipe : 2500 mm Thickness of plate 12 mm.			
		Note: Rate per running metre for specified diameter in mm and thickness of plate in mm =0.976(Rate per tonne)x(diameter in mm)x(plate thickness in mm) /30000			

6.10		Manufacturing, supplying, laying in position, aligning, jointing, testing and commissioning of electric resistance welded / submerged arc welded mild steel (Fe-410 grade) raising main pipe of specified diameter and plate thickness provided with flanges / outlets wherever required for connecting to manifold system / for fixing valves and provided with 15 mm thick inner lining of CM 1:1.5 proportion by volume and 25 mm thick outer lining of CM 1:3 proportion by volume (aggregate for outer lining shall be mixture of 80 percent natural sand and 20 percent 6 mm down crushed stone chips) over 13 gauge 50 x 50 mm opening size weld mesh including cost of all materials, machinery, labour, cutting, bending, welding, cement mortar lining, finishing, curing, conveying to spot, lowering, aligning, jointing, arranging water for testing, hydraulic testing at manufacturing site and after laying and jointing at specified test pressure etc., complete as per specifications and approved drawings. Diameter of rising main pipe : 2000 mm Thickness of plate : 12 mm.	tonne	69,878.00	
		Note: Rate per running metre for specified diameter in mm and thickness of plate in mm =0.597(Rate per tonne)x(diameter in mm)x(plate thickness in mm)/24000			
6.11		Design, manufacture, supply, erection, trial running, performance testing and commissioning of vertical turbine pump of approved make conforming to IS: 1710 having specified pump output under specified operating head coupled to HT motor of adequate HP rating operating at 6.6 KV with flexible coupling, self-water lubricated thrust bearings, discharge Tee with flanged end for connecting delivery pipe with all other standard accessories and safety devices etc., complete as per specifications, terms and conditions of contract.			
	6.11.1	V T pump with more than 1000 hp upto 1500 hp motor	per set/hp	11,200.00	
	6.11.2	V T pump with more than 1500 hp upto 2000 hp motor	per set/hp	11,819.00	
	6.11.3	V T pump with more than 2000 hp upto 2500 hp motor	per set/hp	12,432.00	
	6.11.4	V T pump with more than 2500 hp upto 3000 hp motor	per set/hp	13,039.00	
	6.11.5	V T pump with more than 3000 hp upto 3500 hp motor	per set/hp	13,640.00	

6.12		Design, fabrication, supply, assembling, testing and commissioning of HT pump panel board made of sheet metal duly painted with recess for cable entries at the bottom suitable for 6.6 KV equipped with vacuum circuit breaker of suitable capacity for 1 number incoming 1600A and 2 numbers 630A outgoing of suitable capacity with aluminium bus bars of 1600Amp metering panel, protection relays and all other accessories complete with wiring as per specifications and approved drawings.			
	6.12.1	Panel board with fittings common to all pumps	per Set	13,20,000.00	
	6.12.2	Additional VCB including sheet metal enclosure, extension bus bars, metering and relays complete for each additional pump mounted on common panel board.	per Set / Pump	4,66,400.00	
		Note: Rate for complete set of pump panel board= (Rate for common VCB and fittings + Rate for additional VCB per pump)x(Number of additional pumps)			
6.13		Design, fabrication, supply, assembling, testing and commissioning of Remote control panel made of sheet metal in desk type configuration duly painted with recess for cable entries at the bottom equipped with operating consoles, indicators, enumeration windows, hooters and all other accessories assembled and ready to receive control wires and other connections etc. complete as per specifications and approved drawings.	per Pump	39,600.00	
		Note: Rate per complete set of Remote control panel =(Rate for Remote control panel for each pump)x(Number of pumps)			
6.14		Supply, installation and commissioning of High tension Power factor capacitor bank of specified KVAR rating operating at 6.6 KV with all accessories etc. complete as per specifications, terms and conditions of contract.	per KVAR	704.00	
		Note: Rate for PF capacitor bank set / pump =(Specified KVAR rating)x(Rate per 50 KVAR) / 50			
6.15		Supply, installation and commissioning of Load Break Switch with HRO fuses, CBCT and ELR in sheet metal enclosure with operating console etc. complete for use along with Power factor	per Set	3,33,300.00	
		Capacitor Bank as per specifications, terms and conditions of contract.			
6.16		Supply and installation of Auxiliary DC supply system of approved make with battery charger cum DCDB with batteries for 110 A hour etc. complete with all accessories.	per Set	6,02,800.00	

6.17		Supplying and installing Temperature scanner suitable for operating at 110 V DC or 230 V AC mounted in a duly painted sheet metal enclosure provided with NO / NC relays for transmitting signal to VCBS for tripping with audible alarm for both windings and bearing RTDs with all other accessories for satisfactory functioning of the system etc. complete.	per Set	68,200.00	
6.18		Supplying, installing and commissioning electrode actuated water level transmitter of approved make with all accessories to protect against dry running of pump etc. complete.	per Set	1,38,600.00	
6.19		Supplying, installing and commissioning electro- magnetic type flow meter of approved make with all accessories including display panel in the pump house.	per Set	10,56,000.00	
6.20		Supply and installation of floor mounting type LTAC panel of approved make fabricated from sheet metal and painted with provision for suitable incoming and specified number of outgoing feeder inlets with metering panel and all other accessories complete for auxiliary supply as per specifications, terms and conditions of contract etc. complete.	each	3,34,400.00	
6.21		Supply and installation of Auxiliary transformer 6.6 KV/433 Volts 160 KVA copper wound, insulating oil filled with all accessories etc. complete as per specifications.	each	2,86,000.00	
6.22		Fabricating, supplying, erecting, testing and commissioning 6.6 KV 2500A capacity wall entry type bus duct with flexible end connectors to connect transformer and HT motor panel inside pump house with all accessories, supports etc., complete as per specifications and drawings.	m	35,200.00	
6.23		Supplying, laying and connecting XLPE 6.6 KV(E) 3 core cable suitable for 28 KA short circuit rating with end connectors from HT panel to motor, starters, capacitor panels etc. complete as per directions.			
	6.23.1	3 core 95 sq mm cable	m	539.00	
	6.23.2	3 core 120 sq mm cable	m	836.00	
	6.23.3	3 core 240 sq mm cable	m	968.00	
	6.23.4	3 core 400 sq mm cable	m	1,496.00	
6.24		Supply, installation and commissioning of soft starter for specified KW load operating at 6.6 KV with load break switch, metering, protection by- pass vacuum contactor with all accessories etc. complete housed in painted sheet metal enclosure.	per kw load	1,320.00	
		Note: Rate for Soft starter set per pump = (Specified kW load)x(Rate per 500 kW) / 500			

6.25		Supplying, installing, testing and commissioning(SITC) electrically actuated Wafer type flanged Butterfly valve PN (Pressure numbers) 1.0 Class conforming to BS : 5155 of specified diameter and approved make with gear box, electric motor and extension stem and all other accessories for perfect linking with pipes on either side including loading, unloading, lifting and placing in correct position, cleaning ends, inserting gaskets into correct position, jointing pipes and valve to form water tight joints, cost of all jointing materials, machinery, labour, etc. complete.			
	6.25.1	400 mm diameter butterfly valve with accessories	per Set	41,040.00	
	6.25.2	500 mm diameter butterfly valve with accessories	per Set	70,620.00	
	6.25.3	600 mm diameter butterfly valve with accessories	per Set	1,01,760.00	
6.26		Supplying, installing, testing and commissioning(SITC) electrically actuated Wafer type flanged Butterfly valve PN (Pressure numbers) 1.6 Class conforming to BS : 5155 of specified diameter and approved make with gear box, electric motor and extension stem and all other accessories for perfect linking with pipes on either side including loading, unloading, lifting and placing in correct position, cleaning ends, inserting gaskets into correct position, jointing pipes and valve to form water tight joints, cost of all jointing materials, machinery, labour etc. complete.			
	6.26.1	400 mm diameter butterfly valve with accessories	rate Per Set	45,360.00	
	6.26.2	500 mm diameter butterfly valve with accessories	rate Per Set	74,900.00	
	6.26.3	600 mm diameter butterfly valve with accessories	rate Per Set	1,06,000.00	
		Supplying, installing, testing and commissioning(SITC) electrically actuated Double flanged Butterfly valve PN (Pressure numbers) 1.0 Class conforming to IS : 13905 of specified diameter and approved make with gear box, electric motor and extension stem and all other accessories for perfect linking with pipes on either side including loading, unloading, lifting and placing in correct position, cleaning ends, inserting gaskets into correct position, jointing pipes and valve to form water tight joints, cost of all jointing materials, machinery, labour etc. complete.			
	6.27.1	700 mm diameter butterfly valve with accessories	per Set	3,34,560.00	
	6.27.2	800 mm diameter butterfly valve with accessories	per Set	4,17,380.00	
	6.27.3	900 mm diameter butterfly valve with accessories	per Set	4,99,872.00	
	6.27.4	1000 mm diameter butterfly valve with accessories	per Set	5,98,260.00	
	6.27.5	1100 mm diameter butterfly valve with accessories	per Set	7,46,856.00	
	6.27.6	1200 mm diameter butterfly valve with accessories	per Set	9,43,340.00	

6.28		Supplying, installing, testing and commissioning(SITC) electrically actuated Double flanged Butterfly valve PN (Pressure numbers) 1.6 Class conforming to IS : 13905 of specified diameter and approved make with gear box, electric motor and extension stem and all other accessories for perfect linking with pipes on either side including loading, unloading, lifting and placing in correct position, cleaning ends, inserting gaskets into correct position, jointing pipes and valve to form water tight joints, cost of all jointing materials, machinery, labour etc. complete.			
	6.28.1	700 mm diameter butterfly valve with accessories	per Set	3,75,360.00	
	6.28.2	800 mm diameter butterfly valve with accessories	per Set	4,60,136.00	
	6.28.3	900 mm diameter butterfly valve with accessories	per Set	5,68,960.00	
	6.28.4	1000 mm diameter butterfly valve with accessories	per Set	6,93,576.00	
	6.28.5	1100 mm diameter butterfly valve with accessories	per Set	8,50,080.00	
	6.28.6	1200 mm diameter butterfly valve with accessories	per Set	10,44,340.00	
6.29		Supplying and fixing Butterfly valve actuator DOL panel board with push button starter and all other accessories including wiring for specified number of valves etc. complete.	per Set	3,34,400.00	
6.30		Supplying, installing, testing and commissioning (SITC) Cast steel double flanged dual plate Check valve Class 150 conforming to API 594 of approved make of specified diameter and to withstand specified pressure with all accessories true to line and perfect linking with pipes on either side including loading, unloading, lifting and placing in correct position, cleaning ends, inserting gaskets into correct position, jointing pipes and valve to form water tight joints, cost of all jointing materials, machinery, labour etc. complete.			
	6.30.1	400 mm diameter check valve with accessories	per Set	97,920.00	
	6.30.2	500 mm diameter check valve with accessories	per Set	1,22,160.00	
	6.30.3	600 mm diameter check valve with accessories	per Set	1,52,400.00	
	6.30.4	700 mm diameter check valve with accessories	per Set	2,04,828.00	
	6.30.5	800 mm diameter check valve with accessories	per Set	2,77,288.00	
	6.30.6	900 mm diameter check valve with accessories	per Set	3,72,690.00	
	6.30.7	1000 mm diameter check valve with accessories	per Set	5,01,984.00	
	6.30.8	1100 mm diameter check valve with accessories	per Set	6,76,368.00	
	6.30.9	1200 mm diameter check valve with accessories	per Set	9,12,994.00	
6.31		Supplying, installing, testing and commissioning (SITC) Cast steel double flanged dual plate Check valve Class 300 conforming to API 594 of approved make of specified diameter and to withstand specified pressure with all accessories true to line and			

		perfect linking with pipes on either side including loading, unloading, lifting and placing in correct position, cleaning ends, inserting gaskets into correct position, jointing pipes and valve to form water tight joints, cost of all jointing materials, machinery, labour etc. complete.			
	6.31.1	400 mm diameter check valve with accessories	per Set	1,08,120.00	
	6.31.2	500 mm diameter check valve with accessories	per Set	1,34,376.00	
	6.31.3	600 mm diameter check valve with accessories	per Set	1,68,656.00	
	6.31.4	700 mm diameter check valve with accessories	per Set	2,27,136.00	
	6.31.5	800 mm diameter check valve with accessories	per Set	3,05,624.00	
	6.31.6	900 mm diameter check valve with accessories	per Set	4,12,080.00	
	6.31.7	1000 mm diameter check valve with accessories	per Set	5,54,400.00	
	6.31.8	1100 mm diameter check valve with accessories	per Set	7,47,830.00	
	6.31.9	1200 mm diameter check valve with accessories	per Set	10,07,511.00	
6.32		Supplying, fixing and commissioning C.I Scour valve (sluice valve) of approved make body and seat ring of bronze PN (Pressure numbers) 1.0 conforming to IS: 14846 of specified diameter and to withstand specified pressure with all accessories true to line and perfect linking with pipes on either side including loading, unloading, lifting and placing in position, cleaning ends, inserting gaskets into correct position, jointing pipes and valve to form water tight joint, cost of all jointing materials, machinery, labour etc. complete.			
	6.32.1	100 mm diameter scour valve with accessories	per Set	8,607.00	
	6.32.2	150 mm diameter scour valve with accessories	per Set	13,195.00	
	6.32.3	200 mm diameter scour valve with accessories	per Set	23,548.00	
	6.32.4	250 mm diameter scour valve with accessories	per Set	33,495.00	
6.33		Supplying, fixing and commissioning C.I Tamper proof Air valve of approved make body and seat ring of bronze PN (Pressure numbers) 1.0 conforming to IS: 14845 of specified diameter with all fixtures including cost of all materials, machinery, labour etc. complete.			
	6.33.1	80 mm diameter Air valve with accessories	Per Set	19,610.00	
	6.33.2	100 mm diameter Air valve with accessories	Per Set	22,939.00	
	6.33.3	150 mm diameter Air valve with accessories	Per Set	42,224.00	
	6.33.4	200 mm diameter Air valve with accessories	Per Set	45,472.00	
6.34		Supplying, fixing and commissioning C.I Tamper proof Air valve of approved make body and seat ring of bronze PN (Pressure numbers) 1.6 conforming to IS: 14845 of specified diameter with all fixtures including cost of all materials, machinery, labour etc. complete.			
	6.34.1	80 mm diameter Air valve with accessories	per Set	20,706.00	
	6.34.2	100 mm diameter Air valve with accessories	per Set	25,578.00	
	6.34.3	150 mm diameter Air valve with accessories	per Set	42,833.00	
	6.34.4	200 mm diameter Air valve with accessories	per Set	46,284.00	
6.35		Design, manufacture, supply, erection, trial running, testing and commissioning of vertical turbine pumps of approved make conforming to IS 1710 having specified	per hp/set	9,500.00	

		pump output specified operating head coupled to LT motor of adequate hp rating operating at 400 to 440 volts+5%, 3 phase with flexible coupling, self-water lubricated thrust bearing, discharge tee with flange end or connecting delivery pipe with all other standard accessories and safety device etc. complete as per specification and condition of contract Rate rounded for VT pumps with motor- per hp per set up to 500 HP			
6.36		Design, manufacture, supply, erection, trail running and commissioning of Auto transformer starter or equivalent for specified KW/HP load operating at LT 400 to 440 volts \pm 5%, 3 phase with Load break switch metering, protection etc. with all accessories etc. complete housed in painted sheet metal enclosure. LT system up to 500 hp /375 kw ,the rates per 100kw rounded	per 100 kw per set	3,00,000.00	
6.37		Design, manufacture, supply, erection, trail running, testing and commissioning of LT control panel for specified KW/HP load operating at LT 400 to 440 volts+5%, 3 phase equipped with circuit breaker of suitable capacity with aluminium bus bars of required load amp metering panel ,protection relays switch ,metering ,protection etc. with all accessories complete with wiring ,made of sheet metal duly painted with recess for cable entries at the bottom housed in painted sheet metal enclosure as per specification and approved drawing. rate of LT panel up to 500 hp set etc. complete.	Per Set	9,50,000.00	
6.38		Centrifugal Coupled Pump set-Erection charges:- Erecting and giving test of centrifugal coupled pump set with foot mounted motor excluding base plate coupling and foundation bolts etc. complete on provided concrete foundation/RSJ with accurate levelling with shims and proper alignment			
	6.38.1	15 to 30 HP	each	3,573.00	
	6.38.2	31 TO 50 HP	each	4,276.00	
	6.38.3	51 TO 100 HP	each	5,097.00	
	6.38.4	101 TO 150 HP	each	6,107.00	
	6.38.5	151 to 200 HP	each	7,117.00	
	6.38.6	201 TO 250 HP	each	8,142.00	
	6.38.7	251 TO 300 HP	each	9,767.00	
	6.38.8	More than 300HP (Add extra for each HP)	per hp	44.00	
6.39	6.39.1	Supplying and fixing Mild Steel (M.S.) fabricated expansion joint conforming to IS 2062E250BR etc. complete.			
	6.39.1.1	300 mm dia PN 10 to PN 16	each	48,639.00	
	6.39.1.2	350 mm dia PN 10 to PN 16	each	52,114.00	
	6.39.1.3	400 mm dia PN 10 to PN 16	each	65,142.00	
	6.39.1.4	450 mm dia PN 10 to PN 16	each	73,828.00	
	6.39.1.5	500 mm dia PN 10 to PN 16	each	83,382.00	
	6.39.1.6	600 mm dia PN 10 to PN 16	each	97,279.00	

6.39.1.7	700 mm dia PN 10 to PN 16	each	1,12,913.00
6.39.1.8	750 mm dia PN 10 to PN 16	each	1,38,970.00
6.39.1.9	800 mm dia PN 10 to PN 16	each	1,66,474.00
6.39.1.1	900 mm dia PN 10 to PN 16	each	1,88,188.00
6.39.1.1	1000 mm dia PN 10 to PN 16	each	2,24,378.00
6.39.1.1	1100 mm dia PN 10 to PN 16	each	2,53,330.00
6.39.1.1	1200 mm dia PN 10 to PN 16	each	2,75,044.00
6.39.2	Supplying and fixing Mild Steel (M.S.) fabricated expansion joint confirming to IS 2062E250BR etc. complete.		
6.39.2.1	300 mm dia PN 20 to PN 25	each	60,799.00
6.39.2.2	350 mm dia PN 20 to PN 25	each	65,142.00
6.39.2.3	400 mm dia PN 20 to PN 25	each	81,428.00
6.39.2.3	450 mm dia PN 20 to PN 25	each	92,284.00
6.39.2.4	500 mm dia PN 20 to PN 25	each	1,04,227.00
6.39.2.5	600 mm dia PN 20 to PN 25	each	1,21,598.00
6.39.2.6	700 mm dia PN 20 to PN 25	each	1,41,140.00
6.39.2.7	750 mm dia PN 20 to PN 25	each	1,73,712.00
6.39.2.8	800 mm dia PN 20 to PN 25	each	2,08,092.00
6.39.2.9	900 mm dia PN 20 to PN 25	each	2,35,236.00
6.39.2.1	1000 mm dia PN 20 to PN 25	each	2,80,472.00
6.39.2.1	1100 mm dia PN 20 to PN 25	each	3,16,662.00
6.39.2.1	1200 mm dia PN 20 to PN 25	each	3,43,806.00

CHAPTER-7
TUNNEL AND ALLIED WORKS
Instructions

1. All General Notes are applicable to Tunnel and Allied Works to the extent they are relevant.
2. The basic rates are inclusive of additional costs for working inside tunnel, shaft and adit.
3. The basic rates are inclusive of scaling loose material, removal of under-cuts, cleaning bed including lighting & ventilation inside tunnel.
4. Excavation- (a) All the open cut excavation shall be measured and paid as per Canal and allied work.
(b) Sectional measurements shall normally be taken. Only in exceptional cases, where sectional measurements are not possible, the payment of rock excavation may be done by stack measurements in which case 40% deduction shall be made from the gross quantities to make allowance for voids.
(c) The rates include dressing to the extent necessary for a particular item of work.
(d) The payment for excavation shall be done as per pay-line indicated in the drawing.
(e) The payment for over-break beyond pay-line if beyond human control shall be-
(i) 50% for excavation items; and
(ii) 80% for concrete items.
5. Basic rates are inclusive of all lead and lifts.
6. Unless otherwise specified the basic rates are inclusive of standard finish required for concrete surface.
7. For excavation and concrete lining works of approach / exit channels the basic rates as provided under "Canal and allied works" and "Canal cross drainage works" shall be adopted.
8. Rates for any other item, if required under Tunnel and allied works, may be adopted from other relevant chapters.
9. For intake structure, tunnel portals, retaining walls, pitching etc, the rates as provided under Dam and allied works' shall be adopted.
10. Measurements.-
(a) Linear dimensions shall be measured to the nearest 0.01 m, the area shall be worked out to the nearest 0.01 sq m and cubical contents to the nearest 0.01 cum.
(b) The measurement of permanent supports shall be done by weight, in kg which shall include the total weight of steel sections including the logging, if any butt plates, feather plates, bolts and nuts and tie rods.
(c) No deduction shall be made for the volume of the reinforcement, but the volume of permanent steel supports where provided shall be deducted from the total volume of concrete lining.
13. The following Indian Standards may be referred to:-

S.NO.	Title
4756-1978 (Reaffirmed2007)	Safety Code for Tunnelling work (first revision)
4880	Code of practice for design of tunnels conveying water-
4880 (Pt I)-1987	General design(Reaffirmed1999)
4880 (Pt II)-1976	Geometric design (first revision) (Reaffirmed 2000)
4880 (Pt III)-1976	Hydraulic design (first revision) (Reaffirmed 2000)
4880 (Pt IV)-1971	Structural design of concrete lining in rock(Reaffirmed 2000)
4880 (Pt V)-1972	Structural design of concrete lining in soft strata and soils (Reaffirmed 2000).
4880 (Pt VI)-1971	Tunnel supports(Reaffirmed 2000)
4880 (Pt VII)-1975	Structural design of steel lining(Reaffirmed 2000)
5878	Code of practice for construction of tunnels-
5878 (Pt I)-1971	Precision survey and setting out(Reaffirmed 2000)
5878 (Pt II/Sec 1)- 1970	Underground excavation in rock, section 1-Drilling and Blasting. (Reaffirmed 2000)
5878 (Pt II/Sec 2)- 1971	Underground excavation in rock, section 2-Ventilation, lighting, Mucking and dewatering. (Reaffirmed 2000)
5878 (Pt II/Sec 3)- 1971	Underground excavation in rock, section 3- Tunnelling method for steeply inclined tunnels, shafts and underground power houses. (Reaffirmed 2000)
5878 (Pt III)-1972	Underground excavation in soft strata(Reaffirmed 2000)
5878 (Pt IV)-1971	Tunnel supports(Reaffirmed 2000)
5878 (Pt V)-1976	Concrete lining (first revision) (Reaffirmed 2000)
5878 (Pt VI)-1975	Steel lining(Reaffirmed 2000)
5878 (Pt VII)-1972	Grouting(Reaffirmed 2000)
6433-1972	Guniting equipment(Reaffirmed 2005)

CHAPTER-7 TUNNEL AND ALLIED WORKS

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
7.01	Driving tunnel up to pay line, vertical/ inclined shaft, adit, recess, enlargement by tunnelling methods in rock not requiring permanent supports including cost of blasting, all materials, machinery, labour, ventilation, lighting, drainage, dewatering, scaling excavated surface, removing under cuts, removing and hauling excavated muck outside tunnel upto specified dump area and all other ancillary operations etc, complete with all underground and ground leads and lifts.	cum	996.00	
7.02	Driving of tunnel, up to pay line vertical/inclined shaft, adit, recess, enlargement by tunnelling methods including excavation with supports in all types of soil/ rock strata requiring supports (excluding cost of providing supports) including cost of blasting, all materials, machinery, labour, ventilation, lighting, drainage, dewatering scaling excavated surface, removing and hauling excavated muck outside tunnel upto specified dump area and all other ancillary operations etc, complete with all underground and ground leads and lifts.	cum	1,829.00	
7.03	Dewatering and pumping of the working area in the tunnel including all connected operations of laying of pipeline, removal all seepage and other operations required for maintaining cleanliness for construction work. etc. complete.	kwh	25.00	
7.04	Providing 25 mm thick guniting /shotcreting to sides and arch of tunnel in M-25 proportion by weight including cost of all materials, machinery, labour, ventilation, lighting, drainage and all other ancillary operations etc. complete.	sqm	302.00	
7.05	Providing and fixing 25 mm dia. steel rock bolts with one end provided with mechanical/ wedge type anchorage and other end provided with threads for fixing washers and nuts including cost of all materials, machinery, labour, ventilation, lighting, drainage, drilling 35-40 mm dia. holes, providing 150 mm long 20 mm thick steel tapered wedge, providing 10 mm thick and 200x200 mm size plate washer and nuts, driving bolt, fixing washers and nuts, tightening bolt by torque wrench after hardness of the cement grout and all other ancillary operations etc. complete.	m	604.00	
7.06	Providing and fixing 25 mm diameter steel rock bolts with resin bond cement capsule anchorage including cost of all materials, machinery, labour, ventilation, lighting, drainage, drilling 35-40 mm dia. holes, threading one end of bolt for fixing	m	612.00	

		nuts, inserting grout capsule, driving bolt, fixing 10 mm thick and 200x200 mm size plate washer and nuts, tightening the nuts by torque wrench after hardening of cement grout and all other ancillary operations etc. complete.			
7.07		Providing fabrication and fixing in position permanent structural steel supports as per details including cost of all materials, machinery, labour, ventilation, lighting, drainage, drainage cutting, bending, welding, grinding and all other ancillary operations etc. complete.	tonne	48,673.00	
7.08		Providing and constructing un-coursed rubble stone masonry with approved stones from tunnel excavated muck in CM 1:6 proportion by volume for backfilling over cuts/ slips on tunnel sides due to geological faults etc., including cost of all materials, machinery, labour, ventilation, lighting, drainage, cleaning, scaffolding, batching and mixing mortar, packing mortar and wedging stone chips in joints, curing etc. complete.	cum	2,408.00	
7.09		Providing and laying M-10 grade Design Mix cement concrete using 40 mm graded aggregate, clean, hard, crushed from tunnel excavated rock for filling and levelling over-cuts in bed due to geological faults etc., including cost of all materials, machinery, labour, ventilation, lighting, drainage, cleaning bed, batching and mixing concrete, conveying upto placing point in agitator cars, placing in position, vibrating, levelling compacting, finishing, curing and all other ancillary operations etc. complete.	cum	2,983.00	
7.10	7.10.1	Providing and laying M-20 grade design mix cement concrete using 40 mm graded aggregate, clean, hard, crushed from tunnel excavated rock for kerb and bed lining including cost of all materials, machinery, labour, ventilation, lighting, drainage, form work, batching and mixing concrete, conveying upto placing point in agitator cars, placing in position, levelling, vibrating, finishing, curing and all other ancillary operations etc. complete.	cum	5,164.00	
	7.10.2	Providing and laying M-20 grade design mix cement concrete using 40 mm graded aggregate, clean, hard, crushed from tunnel excavated rock for sides and arch lining including cost of all materials, machinery, labour, ventilation, lighting, drainage, form work, rail mounted shuttering gantry, batching and mixing concrete, conveying upto placing point in agitator cars, placing in position using placer pump, levelling, vibrating, finishing, curing and all other ancillary operations etc. complete.	cum	5,785.00	
7.11		Drilling 35 to 40 mm diameter grout holes in concrete / rock by percussion drilling using jack	m	350.00	
		hammer or stopper drills as directed to specified depth for consolidation/ contact grouting including cost of all materials, machinery, labour, ventilation, lighting, drainage, dewatering cleaning holes and all other ancillary operations etc. complete.			

7.12		Grouting cement slurry in grout holes under specified pressure for consolidation / contact grouting including cost of all materials, machinery, labour, ventilation, lighting, drainage, re-drilling wherever necessary, and all other ancillary operations etc. complete.	tonne	9,261.00	
7.13		Drilling 50 to 75 mm diameter drainage holes vertical or inclined in rock / concrete in tunnel by percussion drilling method using wagon drill or other suitable drilling equipment including cost of all materials, machinery, labour, ventilation, lighting, drainage etc. complete.	m	761.00	

CHAPTER-8
GATE AND ALLIED WORKS
(HIRING OF MACHINES)
Instructions

General instruction on schedule of rates shall be applicable to the extent they are relevant.

1. Rates include cost of :-

a Labour.

b Running charges for machineries including fuel, lubricants and electricity charges etc. complete.

c All materials, machineries and scaffoldings required for execution of items of work

d Packing and forwarding charges for structural steel components and other items including all lead and lifts.

e Wastage of all raw materials such as steel, structural steel, nut bolts, paints etc.

f All scaffoldings, form works, temporary electric arrangements etc.

g Testing of materials, equipment's etc. in order to assure quality and safety measures.

h Site clearance after all erection, test and trial etc.

i Taxes, duties, levies and all other incidental charges.

j Re-handling at fabrication and erection sites.

k Preparation of designs / drawings / material schedules etc., as per specifications and other technical data including revisions.

l Preparatory works such as rectification of damages, repairing, workshop/factory painting, cleaning, positioning and anchoring first stage embedment's, cleaning surface for field painting etc.

m Zinc rich epoxy primer paint and coal tar epoxy paint, 40 microns per coat and 100 microns dry film thickness per coat respectively.

n Design drawing @0.5% of item subject to maximum of Rs. 50000.

2. The gates are classified on the basis of Total head above sill level as follows:-

(a) High head gate- A gate which operates under a head of 30 m and above.

(b) Medium head gate- A gate which operates under a head from 15m to 30 m .

(c) Low head gate - A gate which operates under a head of less than 15 m.

The gates shall be designed, taking into consideration the recommended design criteria and the materials used for different components shall conform to the relevant I.S.

Generally electromechanical hoist should be provided for spillway gates .However if the condition of frequent opening /shutting and urgent operation occurs, hydraulic hoist with prior written permission of Chief Engineer E&M WRD/Chief Engineer BODHI WRD & E-in-C WRD may be obtained.

Canal gates of small size:-

(a) The small gates shall be square or rectangular in shape. The size of square opening shall be 300, 450, 600, 750, 900, 1000 and 1200 mm and that for rectangular gate, recommended width to depth ratio is 1:0.75.

(b) The hoisting capacity and the diameter of the lifting rod shall be determined by taking into consideration the operating head under which the gate is to be closed. The type and capacity of the headstock and dia. of hand wheel should be sufficient to enable operation of gate under the maximum operating head. The manual operation arrangement shall be so designed that the continuous effect per person does not exceed

a crank force of 100 N at 400 mm crank radius at a continuous rating of 24 revolution per minute, as per IS:11228.

(c) The exact length of lifting rod shall be determined considering distance from the bottom sill of gate to the top of operating platform, number of rods and guide- brackets.

(d) The number of rods, guide- brackets and number of rod couplings required shall be determined considering horizontal distance of water way opening.

(e) The materials used for different components is as specified below:-

S.NO.	Component part	Material	Specification
1	Head stock body, wedge, blocks guide brackets, thrust nut, stem coupling	Grey cast iron Grade 20.	IS:210
2	Stem (spindle), Gate, frame shutter	Structural Steel	IS:2062
3	Stem nut	Cast brass	IS:28
4	Seating face (seat facings)	Stainless Steel	IS:410
5	Assembly bolts & nuts, wedge, clamping, adjustment bolts and nut	Electro galvanized Mild steel	IS:1570-1961, IS:1367-1967
6	Anchor bolt	Mild steel	IS:1367
7	Paint gate	Epoxy paint	IS:14177
8	Paint for head-stock	Enamel paint	IS:14177

(f) The gates shall be workshop/factory tested. The leakage, if any, shall not exceed 1.5 litres per minute per meter length of sealing perimeter while testing under design hydraulic head conditions.

(g) All the vertical gates of dams, canals, barrages, diversion schemes etc. shall be obtain from Central Mechanical Unit Bhopal, In case of deviation prior permission of the Engineer -In-Chief, be obtained.

Approximate weight of canal and Tank Gates as per standard size, rod size and rod length shall be taken as below:

(A) Canal Gates (3 Meter Rod Length)

Size of Gate (in mm)	Rod Size (Spindle Dia.)	Approximate weight (in Kg.)
300 x 300 mm	36 mm	150 Kg.
450 x 600 mm	45 mm	240 Kg.
600 x 600 mm	56 mm	320 Kg.
900 x 900 mm	63mm	500 Kg.

(B) Tank Gate (10 Meter Rod length) (Up to 15 meter water head)

Size of Gate (in mm)	Rod Size (Spindle Dia.)	Approximate weight (in Kg.)
300 x 300	36 mm	180 Kg.
450 x 450	45 mm	275 Kg.
600 x 600	56mm	400 Kg.
750 x 750	63mm	410 Kg.
900 x 900	63 mm	550 Kg.

Note:-Approximate weights are shown for estimate purpose only. For payment actual weight shall be considered.

3. Painting work Paints, oils etc. of approved brand and manufacturer shall be used. Ready mixed paints as received from the manufacturer without any admixture shall be used. If for any reason, thinning is required in case of ready mixed paint, the brand of thinner recommended by the manufacturer or as decided by the Engineer-in-Charge shall be used. Approved paints, oils shall be brought to the site of work by the contractor in their original container in sealed condition. The materials shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work.

4. Measurements. -

(a) Dimensions shall be measured correctly to the nearest unit. The area shall be calculated in sq. m. correct to two places of decimal.

(b) No deduction shall be made for openings not exceeding 0.5 sq. m each, and no addition shall be made for painting to beading, moulding, edges, jambs, soffits, sills etc., of such openings.

(a) The surface preparation and painting of spillway, sluice, canal gates, stop logs and other components/ assemblies/ machinery /structures etc. exposed to water and exposed embedded parts should be done strictly in accordance to IS Code 14177-1994.

Item 29 to 33 shall not be executed without prior approval of the concerned Chief Engineer.

The time interval for painting of dams and Canals Gates etc., shall be normally five to seven years but if the condition of painting deteriorates on account of frequent operations of the opening and closing of gates in every season, the painting work can be taken up earlier also to save the gate and ancillary steel structure with the prior approval of concerned Chief Engineer.

For gates, structures, machinery etc. separate rates are worked out for works.

(i) Upto 1.5 m height

(ii) Beyond 1.5m height for items 8.29, 8.30, 8.31, 8.32 & 8.33 etc. It is intended that the rates upto 1.5m height shall be payable where work is executed without the use of scaffolding etc. and the rates beyond 1.5 m height shall be payable where scaffolding etc., are used for the execution of the work. The measurement of height shall be taken from the sill level of gates, the place where component or job is executed e.g. ground level, deck, bridge etc.

5. The Calculation procedure of gate's weight for estimation purpose the following formulas may be used.

Weight of 1 vertical lift gate including embedded parts in tonnes

$$= 0.1332 \times (L \times H \times h)^{0.659}$$

(L) is length = clear vent width in m + 0.50m.

(H) is height of gate in m = clear vent height in m + 0.20m.

(h) is head of water above sill of gate in m = FSL – Sill level

Weight of 1 radial gate including embedded parts in tonnes = 0.0887x

$$(L \times H \times h)^{0.673}$$

(L) is length in m = clear distance between piers.

(H) is total height of gate in m = FRL – Sill level + 0.15m.

(h) is head of water above sill of gate in m = FRL – Sill level

Weight of 1 set of vertical lift crest gate including embedded parts in tonnes

$$= 0.0690 \times (L \times H \times h)^{0.716}$$

(L) is length = clear distance between piers in m + 1 m.

(H) is total height of gate in m = FRL – Sill level + 0.20m.

(h) is head of water above sill of gate in m = FRL – Sill level

Weight of 1 set of Stoplog elements including embedded parts in tonnes

$$= 0.0578 \times (L \times H \times h)^{0.716}$$

(L) is length = clear distance between piers in m + 0.65 m.

(H) is total height of stoplog gate in m = FRL – Sill level + 0.20m.

(h) is head of water above sill of gate in m = FRL – Sill level

Weight of Lifting beam in tones = 0.02212 x (LxHxh)0.716/n

(L) is length = clear distance between piers in m + 0.65 m.

(H) is total height of stoplog gate in m = FRL – Sill level + 0.20m.

(h) is head of water above sill of gate in m = FRL – Sill level

(n) is number of gate elements in 1 set

Capacity of screw hoist in tone including 25% reserve capacity = 2.50 x Wt of gate

(Hoist capacity shall be rounded off to next 1 tonne) Weight of screw hoist with all accessories : 300kg per tonne capacity of hoist

Hoist capacity in tone including 25% reserve capacity = 2.5 x weight of gate (Hoist)

Capacity shall be rounded off to next 5 tonne)

Weight of hoist with all accessories : 250kg per tonne capacity of hoist

weight of hoist bridge:

Columns with bracings/Anchors/Stiffeners : 400kg per meter height

Beams with cross beams/stiffeners : 400kg per meter span

Railing/ Chequered plate/Ladder etc. : 10% of wt. of columns/beams

Weight of trunnion bridge : 300kg per meter length of catwalk

(Approximate weight - Vertical Axis swing gate is 0.50MT per sqm.

The following Indian Standard, may be referred to :-

I.S. Code	Title
104-1979	Ready mixed paint, brushing, zinc chrome, priming (second revision). (With amendment No. 1) (Reaffirmed 2004).
210-1993	Specifications for grey iron casting (Reaffirmed in 1999)
226-1975	Specifications for structural steel (standard quality) (Super-ceded by I. S.2062-1992) 5th revision
306-1983	Specifications for bronze in gates & castings (Reaffirmed in1998),
318-1981	Specifications for loaded Tin Bronze and casting (Reaffirmed in 2001):
290-1961	Coal tar black paint (revised) (reaffirmed 1996)
430-1972	Paint remover, solvent type, non-flammable (second revision) (reaffirmed 1999)
800-1984	Code of practice for General construction in steel in general building construction. (Reaffirmed in 2007)
800-1973 (Pt.III,V& VI)	Specifications for rolled steel beam, channel and angle sections (revised in 1989)
816-1969	Code of practice for use of Metal Arc Welding for general construction in Mild steel. (reaffirmed in 1998)
817-1987	Code of practice for straining and testing of metal arc welders. (Reaffirmed in 2003)
819-1957	Code of practice for resistance spot welding for light assemblies in Mild steel. (reaffirmed in 1998)
822-1970	Code of practice for inspections of welds. (Reaffirmed in 2003)
823-1964	Code of practice of Metal Arc Welding of Mild steel.
1024-1999	Code of practice for use of welding in Bridges and structures, subject to dynamic loading.

1030-1998	Carbon steel castings for general engineering purposes
1068-1993	Electroplated castings of Nickle & Chromium Iron & Steel. (Reaffirmed in 2006)
1181-1967	Qualifying test for Metal Arc Welders. (Superseded by 7318- 1974)
1323-1982	Code of practice for Oxygen-Acetylene welding for structural work in mild steel. (Reaffirmed in 2003)
1393-1961	Code of practice for training and testing of Oxygen-Acetylene welding (Reaffirmed in 2003)
1570-1978	(Part-VII) Schedule for wrought steel for general engineering purposes (Reaffirmed in 1998)
2004-1991	Specifications for steel forgings for general engineering purposes.
2062-1999	Specifications for structural steel. (Fusion Welding quality) (Revised in 2006)
2595-1978	Code of practice for Radiographic Testing. (Reaffirmed in 2000)
2825-1969	Code of practice for stress relieving of welding joints.(Reaffirmed in 2002)
3042-1965	Specifications for single faced sluice gates (200 mm to 1200 mm size) (Reaffirmed in 2003)
4622-2003	Recommendations for structural design of fixed wheel gates(Reaffirmed in 2013)
4623-2000	Recommendations for structural design of radial gates.(IIIrd revision)(Reaffirmed in 2013)
5905-1989	Specifications for sprayed aluminium and zinc coating on iron & steel. (Reaffirmed in 2000)
6527-1995	Specifications for stainless steel wire rod (reaffirmed 2006).
6603-2001	Specifications for Stainless steel bars and flats

6938-2005	Code of practice for design and rope drum and chain hoists for hydraulic gates (with amendment 2) (Reaffirmed in 2010)
7718(Pt 1)-1991	Recommendations for inspection, testing and maintenance of fixed wheel slide gates at manufacturing stage.(Revised in 1991) (Reaffirmed in 2010)
7718 (Pt 11)-1978	-do- at the time of erection. .(Revised in 1991)
7718(Pt 111)-1978	-do- after erection. (Revised in 1991)
8500-1991	Structural steel micro alloyed (medium and high strength qualities). (Reaffirmed in 2000)
9349-2006	Recommendations for structural design of medium and high Head Slide gates. (II nd revision)
10096(Pt.I, Sec.I) 1983 1990)	Recommendations for inspection, testing, maintenance of radial gates and their hoists at manufacturing stage. (Revised in 1983 and Reaffirmed in 1990)
10096 (Part- I, 1983	Inspection, testing and assembly at the manufacturing stage section-I Gates. (Reaffirmed 2000) Section-2- Rope Drum hoists - .2000
10096 Part-II, 1983	Inspection, testing and assembly at the time of erection(Reaffirmed 2000)
10096 (Pt. III) 2002	-do- after erection. British Steel Corpn. Corrosion prevention booklet No. 5.
10210-1993	Criteria for design of hydraulic Hoist for gates (First revision)
14177-1994	Guidelines for painting system for hydraulic gates and hoists.

CHAPTER-8 GATE AND ALLIED WORKS, HIRING OF MACHINES

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
8.01	Design, Drawing, fabrication, supply, erection, testing and commissioning of Embedded parts consisting of sill beam, vertical tracks, vertical seal tracks, sealing frame, Guide tracks/rails, wall plates, seal seats, anchors, anchor girders, yoke girders, tie flats, trunnion supports, rope and pulley supports etc. and any required necessary item , with all accessories as per relevant IS code for all type radial gates/ Vertical lift fix wheel type sluice and Canal gates/Stop log gates including cost of all materials, machinery, labour, cutting, aligning, anchoring, welding, finishing, cleaning, applying two coat of zinc rich epoxy primer to give dry film thickness of 70± 5 microns and finish coat (two coats) of solvent less coal tar epoxy paint as per relevant IS code , using airless spray to provide dry film thickness of 150± 5 microns per coat thus total dry film thickness of all coats, including primer coating, should not be less than 350 microns., including packing & forwarding charges complete, as per specifications and approved drawings complete, including packing & forwarding charges for structural steel components and other materials.	tonne	1,05,000.00	
8.02	Design, Drawing, fabrication, supply, erection, testing and commissioning of Radial gate consisting of skin plate, stiffeners, horizontal girders, sector arms, trunnion assemblies, tie beam, pulley supports, bracings, rubber seals, clamps plates etc., with all accessories as per relevant IS code for radial gates including cost of all materials, machinery, labour, cutting, bending, aligning, anchoring, welding, finishing, cleaning, applying two coat of zinc rich epoxy primer to give dry film thickness of 70± 5 microns and finish coat(two coats)of solvent less coal tar epoxy paint as per relevant IS code, using airless spray to provide dry film thickness of 150± 5 microns per coat thus total dry film thickness of all coats, including primer coating, should not be less than 350 microns., seal fixing etc., complete as per specifications and approved drawings complete, including packing & forwarding charges for structural steel components and other materials.	tonne	1,12,000.00	

8.03		Design, Drawing, fabrication, supply, erection, testing and commissioning of Vertical lift fix wheel type sliding gate/inter changeable Stop log gates consisting of skin plate, stiffeners, horizontal girders, pulley, pully supports, bracings, lifting lug, bracket, rubber seals, clamps plates etc. with all accessories as per relevant IS code for Canal , sluice Vertical gates and spillway gates including cost of all materials, machinery, labour, cutting, bending, aligning, anchoring, welding, seal fixing etc., finishing, cleaning, applying two coat of zinc rich epoxy primer to give dry film thickness of 70± 5 microns and finish coat(two coats)of solvent less coal tar epoxy paint as per relevant IS code, using airless spray to provide dry film thickness of 150± 5 microns per coat thus total dry film thickness of all coats, including primer coating, should not be les than 350 microns., complete as per specifications and approved drawings complete, including packing & forwarding charges for structural steel components and other materials.	tonne	1,10,100.00	
8.04		Design, Drawing, fabrication, supply, erection, testing and commissioning of Vertical lift sliding type gate with frame consisting of skin plate, sealing frame, stiffeners, horizontal and vertical girders, guide, stainless steel flat/Brass flat, revets, wedges, lifting rods etc., with all accessories including frame & gate complete set as per relevant IS code for Canal Cross, Escape, Head regulator /Tank head regulator including cost of all materials, machinery, labour, cutting, aligning, welding, finishing, cleaning, seal fixing etc., applying two coat of zinc rich epoxy primer to give dry film thickness of 70± 5 microns and finish coat(two coats)of solvent less coal tar epoxy paint as per relevant IS code, using airless spray to provide dry film thickness of 150± 5 microns per coat thus total dry film thickness of all coats, including primer coating, should not be less than 350 microns., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.	tonne	1,08,200.00	
8.05		Design, Drawing, fabrication, supply, erection, testing and commissioning of Vertical lift sliding type Shutter gates interchangeable consisting of ,sealing frame(embedded),skin plate of shutters, stiffeners, horizontal and vertical girders, guide, stainless steel flat, lifting hooks, Clits etc., with all accessories including frame & gate complete set as per relevant IS code for Barrage/Stop dam/waste weir /spillway including cost of all materials, machinery, labour, cutting, aligning,	tonne	1,10,200.00	
		welding, finishing, cleaning, applying one coat of zinc rich epoxy primer and three coats of cold applied coal tar epoxy paint as per relevant IS code, seal fixing etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.			

8.06		Design, Drawing, fabrication, supply, erection, testing and commissioning of Adequate capacity electrically operated rope drum hoist consisting of hoist platform, rope drums, connecting shaft, gear system, Reduction unit, electric motor, electro-magnetic brake system, control panel, pulleys, wire rope, gate position indicator, with inbuilt manual operating system, etc., with all accessories as per relevant IS code for operating gates including cost of all materials, machinery, labour, cutting, aligning, anchoring, welding, finishing, cleaning, greasing, oil filling, applying two coats of zinc chromate red oxide primer and three coats of approved synthetic enamel paint etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.	Per tonne capacity	45,600.00	
8.07		Design, Drawing, fabrication, supply, erection, testing and commissioning of Adequate capacity manually operated rope drum hoist consisting of hoist platforms, rope drums, connecting shaft, gear system, pulleys, wire rope, Gate position indicator, manual operation system, etc., with all accessories as per relevant IS code for operating gates including cost of all materials, machinery, labour, cutting, aligning, anchoring, welding, finishing, cleaning, greasing, oil filling, applying two coats of zinc chromate red oxide primer and three coats of approved synthetic enamel paint etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.	Per tonne capacity	39,000.00	
8.08		Design, Drawing, fabrication, supply, erection, testing and commissioning of Adequate capacity screw type hoist consisting of supporting structure, platform, railing, ladder etc., with all accessories as per relevant IS code for operating Head/cross/ escape regulator gate including cost of all materials, machinery, labour, cutting, aligning, anchoring, welding, finishing, cleaning, greasing, oiling, applying two coats of zinc chromate red oxide primer and three coats of approved synthetic enamel paint etc., complete as per specifications and approved drawing, including packing & forwarding charges for structural steel components and other materials.	Per tonne capacity	30,100.00	

8.09		Design, Drawing, fabrication, supply, erection, testing and commissioning of adequate capacity Moving Gantry Crane as per relevant IS code consisting of rail mounted gantry frame top platform with handling long/cross travel arrangements ,rope drums, gear systems, electric motors, electromagnetic brake system, cabin, control panel, wire rope , ladder, motorised cable reeling drum etc. with all accessories for Operating stop log gates elements including cost of all materials, machinery, labour, aligning, anchoring, welding, cleaning, greasing, applying two coats of zinc chromate red oxide primer three coats of approved synthetic enamel paint etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.	Per tonne capacity	2,12,900.00	
8.10		Design, Drawing, fabrication, supply, erection, testing and commissioning of Automatic lifting beam with all accessories as per relevant IS code for handling, lowering and lifting of Stop log/ emergency gates including cost of all materials, machinery, labour, cutting, aligning, welding, finishing, cleaning, applying one coat of zinc rich epoxy primer and two coats of cold applied coal tar epoxy paint etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials. Note:-The rate is applicable to the actual weight of lifting beam.	tonne	1,52,600.00	
8.11		Design, Drawing, fabrication, supply, erection and commissioning of Structural steel hoist bridge/ structural steel hoist supporting structure as per relevant IS code for monorail /Catwalk bridge for connecting spillway piers/Trestle assembly/ Railing decking/Trash rack for all type of sluice with embedded parts consisting of columns, beams, bracings, stiffeners, ties, chequered plate covering, hand railing, ladder etc., with all other accessories for supporting hoist for operating gates including cost of all materials, machinery, labour, cutting, aligning, anchoring, welding, finishing, cleaning, applying two coats of zinc chromate red oxide primer and three coats of approved synthetic enamel paint etc., complete as per specifications and approved drawings , including packing & forwarding charges for structural steel components and other materials.	tonne	83,000.00	
8.12		Design, fabrication, supply, erection and commissioning of adequate capacity Electrically operated mono-rail hoist assembly as per relevant IS code consisting of electric motor, rope drum,	per tonne capacity	46,000.00	

		gear system, wire rope with lifting attachment, festoon cabling etc., with all accessories for operating pump house stop-log gate including cost of all materials (excluding hoisting supporting trestle structure), machinery, labour, cleaning, greasing etc., complete as per specifications and approved drawings ,including packing & forwarding charges for structural steel components and other materials.			
8.13		Design, Drawing, fabrication, supply, erection, testing and commissioning of EOT crane as per relevant IS code consisting of double girder box type construction, rail mounted end carriages with long and cross travel arrangement, main and auxiliary hoists of specified capacity, rails, pendant control, gear boxes, electric motors, brakes, rope drums, wire ropes, sheaves, end buffer stoppers, pendant operated DSL bus bars with all accessories for main and auxiliary hoists for handling pumps and accessories in pump house including cost of all materials, machinery, labour, cutting, aligning, welding, finishing, cleaning, greasing, applying two coats of zinc chromate red oxide primer and three coats of synthetic enamel paint etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.	Per Tonne capacity	1,39,425.00	
8.14		Design, Drawing, fabrication, supply, erection, testing and commissioning of Hydraulic Hoist as per relevant IS code for Spill way, Head Sluice & other Regulating gates, with all accessories like Power Pack, duly filled with oil, Hydraulic cylinder, Hydraulic cylinder pipe line, Limit Switch, Dial indicator panel, Cable, Control panel etc including cost of all materials, machinery, labour, cutting, aligning, welding, finishing, cleaning, greasing, applying two coats of zinc chromate red oxide primer and three coats of synthetic enamel paint etc. with all scope of work, complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.	per tonne capacity	1,22,640.00	
8.15		The bifurcation of cost of work at various stage of construction/work for item no.8.01 to 8.14			
	8.15.1	Fabrication work excluding materials including cost of, machinery, labour, cutting, aligning, anchoring, welding, finishing, cleaning, applying one coat of zinc rich epoxy primer and four coats of cold applied coal tar epoxy paint etc.,		25% cost of item	
		including packing & forwarding charges as per specifications and approved drawings			
	8.15.2	Fabrication work including cost of all materials, machinery, labour, cutting, aligning, anchoring, welding, finishing, cleaning, applying one coat of zinc rich epoxy primer and four coats of cold applied coal tar epoxy paint etc., including packing & forwarding charges as per specifications and approved drawings		70% cost of item	

	8.15.3	Erection work with commissioning, testing for above item of work including cost of all materials, machinery, labour, cutting, aligning, anchoring, welding, finishing, cleaning, etc., including packing & forwarding charges, as per specifications and approved drawings		30% cost of item	
8.16		Design, Drawing, fabrication, supply, erection, testing and commissioning of Rail track using 45 kg / m standard rails on bridge for movement of gantry crane for handling and operating stop log gate elements including cost of all materials, machinery, labour, aligning, anchoring, welding, cleaning, applying one coat of zinc rich epoxy primer and two coats of cold applied coal tar epoxy paint for buffers and rail supporting plates etc., complete as per specifications and approved drawing, including packing & forwarding charges for structural steel components and other materials.	M	6,700.00	
8.17		Providing fabrication and fitting work of Stainless steel flat on Embedded parts (on Departmental section, only MS section Given by department) of gates with testing , including cost of all materials(SS flat and welding rods etc.), machinery, labour, cutting, aligning, welding, finishing, cleaning, applying two coat of cement primer , etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.	kg	665.00	
8.18		Designing. Drawing ,Providing Casting machining and assembling of Cast Steel Rollers assembly complete with testing ,including cost of all materials as Cast steel Rollers, Stainless steel eccentric pin/shaft with square cut shape in one end for adjustment, Lock plate, bronze bush, cover plate ,nut bolts, machinery, labour, cutting, aligning, welding, finishing, cleaning, applying one coat of zinc rich epoxy primer and two coats of cold applied coal tar epoxy paint, etc., complete as per specifications, relevant IS code and approved drawings, including packing & forwarding charges for structural steel components and other materials.	kg	350.00	
8.19		Providing Casting ,dressing and assembling of Cast Iron Ballast weight assembly complete as per drawing with testing ,including cost of all materials as Cast iron Ballast weight , Suitable type tapped threaded hole with nut hook for lifting in all sides, with machinery, labour, cutting, aligning, welding, finishing, cleaning, etc., complete as per specifications, relevant IS code and approved drawings, including packing & forwarding charges for structural steel components and other materials.	kg	57.00	

8.20		Providing Casting machining and assembling of Cast Iron Items for Tank, canal, barrage, stop dam gates as CI wedges, CI couplings, CI guides, assembly complete as per drawing with testing, including cost of all materials, with machinery, labour, cutting, aligning, welding, finishing, cleaning, etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.			
	8.20.1	CI wedges	kg	78.00	
	8.20.2	CI couplings, Guides	kg	87.00	
8.21		Providing Fabrication, machining and assembling of different types of MS Anchors/MS Anchors/MS chuck nut for Gates assembly, complete as per drawing with testing ,including cost of all materials, applying one coat of zinc rich epoxy primer and two coats of cold applied coal tar epoxy paint with machinery, labour, cutting, aligning, welding, finishing, cleaning, etc., complete as per specifications and approved drawings ,including packing & forwarding charges for structural steel components and other materials.			
	8.21.1	MS Chuck Nut	kg	77.00	
	8.21.2	U,J ,H,I type anchors	kg	78.00	
	8.21.3	Anchor bolts with two nut and two washers	kg	89.00	
8.22		Providing Casting machining and assembling of Head stocks assembly with handle complete for operating Tank, canal, barrage, stop dam gates , as per drawing with testing ,including cost of all materials as head stock body, GM			
		Nut, Warm wheel, Gear, Bush ,Pin ,operating handle etc. with machinery, labour, cutting, aligning, welding, finishing, cleaning, etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.			
	8.22.1	Head Stock Worm & wheel type coupled set 63mm dia. threaded Nut (Model WW-90) two tone capacity, approx-322 kg weight	kg	184.00	
	8.22.2	Head Stock Worm & wheel type, single set, 63mm dia. or 56mm dia. (Model WW-90) one tone capacity ----approx-175 kg weight	kg	160.00	
	8.22.3	Head Stock screw jack type 50mm dia. threaded Nut (Model M-75), 0.750 tonne capacity----- approx-45 kg weight	kg	123.00	
	8.22.4	Head Stock screw jack type 45mm dia. threaded Nut(Model M-70), 0.700 tonne capacity ----- approx-42 kg	kg	122.00	
	8.22.5	Head Stock screw jack type 36mm dia. threaded Nut (Model S-36),0.400 tonne capacity----- approx-19.5 kg	kg	170.00	

8.23		Straightening and machining work of structural steel sections (departmental materials) complete job , with all machinery as planner machine etc., labour, cutting, aligning, finishing, cleaning, etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.			
	8.23.1	Straightening work any steel sections	kg	3.00	
	8.23.2	Machining work of structural steel sections like as Guide T, Track etc. with planner machine	sqm	2,000.00	
8.24		Providing ,fabrication, threading (Square and V threading as required) , machining, straightening of MS Round bar complete as per drawing with testing ,including cost of all materials, with machinery, labour, cutting, aligning, welding, finishing, cleaning, etc., complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.			
	8.24.1	Rate for double start square threading for 63mm dia. round bar with materials	kg	104.00	
	8.24.2	Rate for double start square threading for 63mm dia. round bar without materials	m	1,300.00	
	8.24.3	Rate for single start square threading for 63mm dia. round bar with materials	kg	97.00	
	8.24.4	Rate for single start square threading for 63mm dia. round bar without materials	m	1,202.00	
	8.24.5	Rate for double start square threading for 56mm dia. round bar with materials	kg	95.00	
	8.24.6	Rate for double start square threading for 56mm dia. round bar without materials	m	907.00	
	8.24.7	Rate for single start square threading for 56mm dia./50mmdia /45mm dia. round bar with materials	kg	91.00	
	8.24.8	Rate for single start square threading for 56mm dia./50mmdia /45mm dia. round bar without materials	m	641.00	
	8.24.9	Rate for single start square threading for 36mm dia./32mmdia round bar with materials	kg	87.00	
	8.24.10	Rate for single start square threading for 36mm dia./32mmdia round bar without materials	m	312.00	
	8.24.11	Rate for "V " threading for Round bar with materials			
	8.24.11.1	63 mm dia	kg	83.00	
	8.24.11.2	56 mm dia	kg	61.00	
	8.24.11.3	50 mm dia.	kg	76.00	
	8.24.11.4	45 mm dia	kg	73.00	
	8.24.11.5	36 mm dia.	kg	70.00	
	8.24.11.6	32 mm dia.	kg	70.00	
	8.24.12	Rate for "V " threading for Round bar without materials			
	8.24.12.1	63 mm dia	m	1,040.00	

	8.24.12.2	56 mm dia	m	726.00	
	8.24.12.3	50 mm dia.	m	726.00	
	8.24.12.4	45 mm dia	m	513.00	
	8.24.12.5	36 mm dia.	m	250.00	
	8.24.12.6	32 mm dia.	m	250.00	
8.25		Providing, Fabrication, machining with straightening work of Guide Tee, Track, Sealing frame, Leaf frame for gates, complete as per drawing with testing including cost of all materials, machinery, labour, cutting, aligning, welding, finishing, cleaning, etc., applying, one coat of zine rich epoxy primer and two coats of cold applied coal tar epoxy paint etc. complete as per specifications and approved drawings, including packing & forwarding charges for structural steel components and other materials.			
	8.25.1	Rate of work with all materials	kg	62.00	
	8.25.2	Rate of work without materials	kg	20.00	
8.26		Transportation of hydraulic gates/heavy earth moving machineries and other equipment's, plants etc. and their components, materials, loading & unloading work, from F O R to different irrigation project sites of water resources dept. in Madhya Pradesh by Pacca/ Kachcha Road			
	8.26.1	12.00 Tonne minimum capacity open body truck	km	48.00	
	8.26.2	9.00 Tonne minimum capacity normal half body truck	km	39.00	
	8.26.3	9.00 Tonne minimum capacity open body truck	km	40.00	
	8.26.4	6.00 Tonne minimum capacity normal half body truck	km	29.00	
	8.26.5	6.00 Tonne minimum capacity open body truck	km	31.00	
	8.26.6	4.00 Tonne minimum capacity normal body truck	km	27.00	
	8.26.7	Loading & unloading of steel material, weighing at MPLUN/ SAIL/Other outside stores and transportation from MPLUN/ SAIL/ Other stores to CMU campus and unloading of material.	tonne	725.00	
8.27		Preparation, printing work of Engineering Drawing by computer(CAD) as per design of various projects			
	8.27.1	Preparation of Drawing by computer as per design with showing all dimensions & scale	sqm	1,900.00	
	8.27.2	Plotting of Drawing on film by computer & electronic Plotter	sqm	660.00	
	8.27.3	Plotting of Drawing on paper by computer & electronic Plotter	sqm	525.00	
	8.27.4	Ammonia Printing of drawings	sqm	80.00	
8.28		Providing of MS Nut Bolts of required size and type, as per specifications with testing, including all lead and lifts, packing & forwarding charges for all components etc. complete.	kg	67.00	

8.29		Providing of High tensile MS Nut Bolts of required size and type, as per specifications with testing, including all lead and lifts, packing & forwarding charges for all components etc. complete.	kg	90.00	
8.30		Providing of Stainless steel counter shank nut bolts with washer of required size and type, as per specifications with testing, including all lead and lifts, packing & forwarding charges for all components etc. complete.	kg	320.00	
8.31		Providing of Rubber seals as per IS:11855 for Dam sluice, canal, barrage, stop dam etc. gates of required size and type and specifications with testing, including all lead and lifts, packing & forwarding charges for all components etc. complete.			
	8.31.1	Rubber seal musical note type 75mm x33mm x12mm (33mm Bulb) uncladed	m	367.00	
	8.31.2	Rubber seal musical note type 100mm x44mm x14mm (44mm Bulb) uncladed	m	517.00	
	8.31.3	Rubber seal musical note type 100mm x44mm x14mm (44mm Bulb) Teflon cladded	m	1,550.00	
	8.31.4	Rubber seal Z type 150mm x75mm x20mm (L- 75mm/35mm) uncladed	m	620.00	
	8.31.5	Rubber seal Flat type 75mm x12mm uncladed	m	298.00	
	8.31.6	Rubber seal Flat type 100mm x14mm uncladed	m	463.00	
	8.31.7	Rubber seal Flat type 150mm x20mm uncladed	m	555.00	
	8.31.8	Rubber seal Corners musical note type 100mm x44mm x14mm (44mm bulb),Teflon cladded inside bulb or outside bulb 300mm x300mm long ,set of two pieces	set	1,550.00	
8.32		Special Item:- II nd stage concreting M-15 (nominal mix) with graded metal of max size 12.5 mm in gate groove & sill beam, after fixing alignment of second stage parts, sill beam, including cost of material, labour for shuttering, mixing, laying scaffolding consolidating, curing and cleaning & finishing / chipping as required with all leads & lifts etc. complete.	cum	6,900.00	

8.33		<p>Painting of Spillway gates, sluice gates, canal gates (both vertical or radial), stop log gates, exposed embedded parts and all unmachined ferrous surface (hoist cylinders, cylinder heads, hydraulic piping, pipe fittings, bonnet covers), exposed to water as per IS 14177, for which surface preparation by blast cleaning of class "B" primer coat (one coat) of inorganic zinc silicate (preferably airless spray) or alternatively, two coats of zinc rich primer (containing not less than 85% zinc on dry film) to give dry film thickness of 70 ± 5 micron and finish coat (two coats) of solvent less coal tar epoxy paint using airless spray to provide dry film thickness of 150 ± 5 micron per coats. Thus, total dry film thickness of all the coats, including primer coating, should not be less than 350 microns, this will include expenses on mobilisation and demobilisation of equipments. For maintenance painting the surface preparation shall be done by appropriate hand and power tool cleaning, prior to hand power tool cleaning. Any heavy layer of rust should be removed by</p>			
		<p>chipping visible oil, grease, dirt and other foreign material be cleaned using solvents like clean mineral spirits, xylol or white gasoline. After hand and power tool cleaning the surface should be cleaned of loose dust and debris and/or blast cleaned as laid down in para 7.0 of IS code 14177. After the surface preparation the primer and finishing coats shall be carried out as provided above for painting etc. complete.</p>			
	8.33.1	Up to 1.5m height	sqm	505.00	
	8.33.2	Beyond 1.5m height	sqm	531.00	

8.34		<p>Painting of lifting beam/lifting tackles are per IS : 14177, for which surface preparation by blast cleaning, as per class "C" or class "B", primer coat (two coats) of zinc Phosphate primer, to provide dry film thickness of 40 microns per coat and finish coat (two coats) of alkyd based micaceous iron oxide paint, using airless spray, to provide minimum dry film thickness of 65± 5 microns per coat, at an interval of 24 hours. Thus, total dry film thickness of all the coats, including primer coating, should not be less than 200 microns. This will include expenses on mobilisation and demobilisation of equipment's. For maintenance painting, the surface preparation shall be done by appropriate hand and power tool cleaning. Prior to hand and power tool cleaning, any heavy layer of rust should be removed by chipping. Visible oil, grease, dirt and other foreign material be cleaned using solvents like clean mineral spirits, xylol or white gasoline. After hand and power tool cleaning, the surface should be cleaned of loose dust and debris and / or blast cleaned as laid down in para 7.0 of IS Code14177. After the surface preparation, the primer and finishing coats shall be carried out as provided above for painting etc. complete.</p>			
	8.34.1	Upto 1.5 m height	sqm	421.00	
	8.34.2	beyond 1.5m height	sqm	443.00	
8.35		<p>Painting of structural components of Hoist including supporting structures and surfaces of hydraulic hoist sun exposed to water as perIS:14177, for which surface preparation by blast cleaning of class 'B', primer coat (two coats)of Zinc phosphate primer to give dry film thickness of 40 ± 5microns per coat and finish coat(one coat) of alkyd based micaceous iron oxide paint give dry film thickness of 65 ± 5 microns followed by two coats of synthetic enamel paint, using airless spray, to give dry film thickness of 25 ± 5 microns per cost, at an interval of 24 hours. Thus total dry film thickness of all the coats, including primer coating, should not be less than175 microns. This will include expenses on mobilisation and demobilisation of equipment's. For maintenance painting, the surface preparation shall be done by appropriate hand and power tool cleaning. Prior to hand and power tool cleaning, any heavy layer of rust should be</p>			

		removed by chipping. Visible oil, grease, dirt and other foreign material be cleaned using solvents like clean mineral spirits, xylol or white gasoline. After hand and power tool cleaning, the surface should be cleaned of loose dust and debris sand / or blast cleaned as laid down in para 7.0 of IS Code14177. After the surface preparation, the primer and finishing coats shall be carried out as provided above for painting etc. complete.			
	8.35.1	Up to 1.5m height	sqm	412.00	
	8.35.2	Beyond 1.5m height	sqm	433.00	
8.36		Painting of machinery, including gearing, housing, shafting, bearing, pedestals, oil tanks, control cabinets, hoist beams, pipe support, clamps, ladders etc., of hoists and supporting structures, as per IS 14177, for which surface preparation by blast cleaning of class 'B', primer coat (one coat) of Zinc phosphate paint to give a minimum dry film thickness of 50 ± 5 microns and finish coat(three coats) of aluminium paint or synthetic enamel paint, using airless spray, to provide a dry film thickness of 25 ± 5 microns per coat. Thus, total dry film thickness of all the coats, including primer coat, should not be less than 125 microns. This will include expenses on mobilisation and demobilisation of equipment's. For maintenance painting, the surface preparation shall be done by appropriate hand and power tool cleaning. Prior to hand and power tool cleaning, any heavy layer of rust should be removed by chipping. Visible oil, grease, dirt and other foreign material be cleaned using solvents like clean mineral spirits, xylol or white gasoline. After hand and power tool cleaning, the surface should be cleaned of loose dust and debris and / or blast cleaned as laid down in para 7.0 of IS Code14177. After the surface preparation, the primer and finishing coats shall be carried out as provided above for painting etc. complete.			
	8.36.1	Up to 1.5m height	sqm	341.00	
	8.36.2	Beyond 1.5m height	sqm	359.00	
8.37		Painting of unmachined surface, as per IS 14177, for which surface preparation by blast			

		<p>cleaning of class 'B', primer coat(one coat) of chlorinated rubber based zinc phosphate primer, to provide a dry film thickness of 50± 5 microns and finish coat(three coats) of vinyl resin /chlorinated rubber, using airless spray, to provide a dry film thickness of 30 ± 5 microns per coat. Thus, total dry film thickness of all coats including primer coat should not be less than 125 microns. Thus will include expenses on mobilisation and demobilisation of equipment's. ; For maintenance painting, the surface preparation shall be done by appropriate hand and power tool cleaning. Prior to hand and power tool cleaning, any heavy layer of rust should be removed by chipping. Visible oil, grease, dirt and other foreign material be cleaned using solvents like clean mineral spirits, xylol or white gasoline. After hand and power tool cleaning, the surface should be cleaned of loose dust and debris and / or blast cleaned as laid down in Para 7.0 of IS Code14177. After the surface preparation, the primer and finishing coats shall be carried out as provided above for painting etc. complete.</p>			
	8.37.1	Up to 1.5m height	sqm	511.00	
	8.37.2	Beyond 1.5m height	sqm	537.00	
8.38		Hiring of Dumper with 6 Cum capacity including Operator, Helper, Diesel/Oil and maintenance charges.	hour	811.00	
8.39		Hiring of Dumper with 10 Cum capacity including Operator, Helper, Diesel/Oil and maintenance charges.	hour	1,008.00	
8.40		Hiring of Dumper with 14 to 16 Cum capacity including Operator, Helper, Diesel/Oil and maintenance charges.	hour	1,210.00	
8.41		Hiring of Hydraulic Excavator 10 Tonne Operating weight Capacity without rock breaking attachment & 0.6 cum Bucket Capacity including Operator, Helper, Diesel/Oil and maintenance charges.	hour	1,278.00	
8.42		Hiring of Hydraulic Excavator 10 Tonne Operating weight capacity with rock breaking attachment including Operator, Helper, Diesel/Oil and maintenance charges.	hour	1,420.00	
8.43		Hiring of Hydraulic Excavator 20 to 30 Tonne Operating weight capacities with rock breaking attachment including Operator, Helper, Diesel/Oil and maintenance charges.	hour	2,200.00	
8.44		Hiring of Hydraulic Excavator 20 to 30 Tonne Operating weight Capacity without rock breaking attachment & with 0.9 to 1.2 cum Bucket Capacity including Operator, Helper, Diesel/Oil and maintenance charges.	hour	1,866.00	

8.45		Hiring of Backhoe Loader with excavator bucket including Operator, Helper, Diesel/Oil and maintenance charges.	hour	864.00	
8.46		Hiring of Tractor with Hydraulically Operated trolley 45 to 50 H.P. including Operator, Helper, Diesel/Oil and maintenance charges.	hour	572.00	
8.47		Hiring of Vibratory Compactor Pad Foot Type having minimum gross weight 10 to 12 Tonne, 30/36 Hz Frequency and minimum 1.5 mm amplitude and 250 Cum meter per Hour Compaction capacity including Operator, Helper, Diesel/Oil and maintenance charges.	hour	1,398.00	
8.48		Hiring of Truck mounted Water Tanker Capacity 10000 Litters including Operator, Helper, Diesel/Oil and maintenance charges.	hour	887.00	
8.49		Hiring of Touring Vehicle (inspection vehicle) for Local run & visiting sites including Operator, Toll Tax and maintenance charges.			
	8.49.1	Hiring charges Per km with Diesel	km	15.60	
	8.49.2	Hiring charges per month without Diesel	month	18,000.00	
8.50		Hiring of Utility Vehicle including Operator, Toll Tax and maintenance charges			
	8.50.1	Hiring charges Per km with Diesel	km	15.00	
	8.50.2	Hiring charges per month without Diesel	month	17,000.00	

CHAPTER-9
PRELIMINARY AND MAINTENANCE WORKS
(HIRING OF MACHINES)
Instructions

1. General instructions on Schedule of Rates shall be applicable to the extent they are relevant.
2. Rates include cost of :
 - a. Labour
 - b. Running charges of machines including fuel and lubricants.
 - c. Material required for execution of item of work
 - d. All lead and lift of materials, machines and labours.
 - e. Wastage of Cement, Sand, Coarse Aggregate, Admixture, Concrete, Mortar etc.
 - f. Shuttering, Scaffolding, Formwork, Vibration, and curing
 - g. Testing of materials and quality assurance measures.
 - h. Standard safety measures.
 - i. Site clearance, layout and setting out of work.
3. The estimate for annual repair (A.R.) work of Dam & Canals shall be prepared as per guidelines issued by Govt. of M.P. Water Resources Department letter no.206/2013 dated 3/05/2013.
4. The rates of completed items are inclusive of loading and un-loading, standard finish required for concrete work, cleaning/preparation of cold and hot joint.
5. All the construction materials, workmanship and quality shall conform to the standards prescribed in IS-Codes and Specification/Guidelines/ Circulars of MP Water Resources Department.

CHAPTER-9

PRELIMINARY AND MAINTENANCE WORK

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
	A. PRELIMINARY WORK			
9.01	Ordinary shrub jungle (area below 25% covered by shrubs) clearance involving removal of grass, shrubs, bushes and twigs including rooting out & disposal etc. complete.	sqm	0.40	
9.02	Medium shrub jungle (25% to 50% area covered by shrubs) clearance involving removal of grass, shrubs, bushes and twigs including rooting out & disposal etc. complete.	sqm	0.95	
9.03	Thick shrub jungle (area above 50% covered by shrubs) clearance involving removal of grass, shrubs, bushes and twigs including rooting out & disposal etc. complete.	sqm	1.70	
9.04	Removing stumps, tree roots etc., including excavation, stacking materials neatly and levelling surface etc. complete.			
	9.04.1 Girth up to 0.60 m	each	26.00	
	9.04.2 Add for every additional 0.60 m girth	each	26.00	
9.05	Clearance of Jalkumbhi /water Lily from water bodies including removing and rental cost of boat, labour etc. complete and disposal of material by burning including all other charges for materials and machinery etc. complete.	sqm	4.00	
	B. MAINTENANCE WORK			
9.06	Removing and re-constructing 22cm to 45cm thick dry stone pitching, with stones obtained from removal of old pitching, to specified slopes including wedging with stone chips, finishing surface etc. complete.	sqm	45.00	
9.07	Removing and re-constructing 22cm to 45cm thick dry stone pitching, over 300 mm thick graded filter media consisting of sand and gravel satisfying specified filter criteria laid in layers of 150 mm thick each using sand from approved quarry and stones and gravel/metal obtain from removed pitching for re- construction, including cost of sand, labour, laying filter and stones, to specified slopes, wedging with stone chips, finishing surface etc. complete.	sqm	202.00	
9.08	Removing rock-toe/ boulder toe and filter layers below rock-toe/boulder toe including stacking all materials separately as directed etc. complete.	sqm	103.00	

9.09		Re-constructing rock-toe, including filter media, below / behind rock-toe, consisting of 300 mm thick sand layer and 300 mm thick gravel/ metal layer, satisfying specified filter criteria laid in layers, using sand from approved quarry and stones and filter gravel/ metal obtained from rock- toe removed for re-construction including cost of sand, labour, laying filter and stones to specified slopes, wedging with stone chips, finishing surface etc. complete.	sqm	268.00	
9.10		Removing and resetting disturbed flag stone lining in CM 1:3 proportions by volume including cost of all materials, labour, finishing, curing etc. complete.			
	9.10.1	Up to 40 mm thick	sqm	46.00	
	9.10.2	Above 40 mm thick	sqm	52.00	
9.11		Removing and re-fixing disturbed centreline/ chain-age/demarcation stones including excavation, back filling after re-fixing stone etc. complete.	each	49.00	
9.12		Earthwork for embankment for breached/ damaged portion of dam/ canal, using selected impervious soil from approved borrow area/ spoil bank in 100 to 150 mm layers (before compaction), including cost of materials, machinery, labour, all other operations such as collection of soil, spreading soil in layer of specified thickness, sorting out, breaking clods, levelling, sectioning edges / sides, watering, compacting to achieve maximum dry density using sheep foot roller/vibratory compactors etc. complete.	cum	89.00	
9.13		Repairing rain cuts/ re-sectioning canal slopes to required lines and grades as directed, using available canal side soil including dressing, packing soil, breaking clods, watering, tamping etc., complete.	sqm	3.00	
9.14		Maintenance of canals wherever required, having bed width more than 5m or discharge more than 10 cumecs (as applicable) & depth of canal < 3m by deploying a unit of T-210 or T-110, Dumper/Tractor trolley and 10 numbers of labour, to restore the bed levels and side slopes of canal section, including service road to proper condition, including clearance of all vegetation such as grass, shrubs, bushes etc. and disposal of surplus and un-useful earth or barrow of earth, as needed, including cost of all materials, labour and transportation etc. complete.			
	9.14.1	For earthen canal	km	30,106.00	
	9.14.2	For lined canal	km	7,527.00	

9.15		Maintenance of canals wherever required, having bed width more than 5m or discharge more than 10 cumecs (as applicable) & depth of canal > 3m by deploying a unit of T-210 or T-110, Dumper/Tractor trolley and 10 numbers of labour, to restore the bed levels and side slopes of canal section, including service road to proper condition, including clearance of all vegetation such as grass, shrubs, bushes etc. and disposal of surplus and unusefull earth or barrow of earth, as needed, including cost of all materials, labour and transportation etc. complete.			
	9.15.1	For earthen canal	km	34,406.00	
	9.15.2	For lined canal	km	8,602.00	
9.16		Maintenance of canals wherever required, having bed width between 1m to 5m or discharge between 1 cumec to 10 cumecs (as applicable) by deploying a unit of JCB, Dumper/ Tractor trolley and 10 numbers of labour to restore the bed levels and side slopes of canal section including service road to proper condition including clearance of all vegetation such as grass, shrubs, bushes etc. and disposal of surplus earth, as needed, including cost of all materials, labour and transportation etc. complete.			
	9.16.1	For earthen canal	km	8,357.00	
	9.16.2	For lined canal	km	2,089.00	
9.17		Maintenance of canals wherever required, having bed width less than 1m. or discharge less than 1 cumec (as applicable) by deploying a unit of JCB, Dumper/Tractor trolley and 10 numbers of labour to restore the bed and side slopes of canal section including service road to proper condition including clearance of all vegetation such as grass, shrubs, bushes etc. and disposal of surplus earth or borrow of earth, as needed, including cost of all materials, labour and transportation etc. complete.			
	9.17.1	For earthen canal	km	1,929.00	
	9.17.2	For lined canal	km	482.00	
9.18		Clearance of silt and debris and maintenance (wherever needed) of one row hume pipe of dia. up to 2 m syphon or cross drainage or V.R.B. structures including upstream and downstream reaches to restore the structures to original shape, such as repair of cracks in parapet wall and/ repair of pitching & other protection works including cost of all material, labour and transportation etc. complete.	per structure	1,879.00	
9.19		Add for each additional row (in case of structure having more than one row)	row	282.00	

9.20		Clearance of silt and debris and maintenance (wherever needed) of one row hume pipe of dia. more than 2 m syphon or cross drainage or V.R.B. structures including upstream and downstream reaches to restore the structures to original shape, such as repair of cracks in parapet wall and/ repair of pitching & other protection works including cost of all material, labour and transportation etc. complete.	per structure	2,135.00	
9.21		Add for each additional row (in case of structure having more than one row)	row	320.00	
9.22	9.22.1	Clearance of silt and debris and maintenance of R.C.C. trough aqueduct (wherever needed) having span up to 15m including all repair works as needed for upstream and downstream reaches to restore the structures to original shape, such as repair of cracks in parapet wall, repair of pitching & other protection works including cost of all material, labour and transportation etc. complete.	per structure	2,755.00	
	9.22.2	Add extra for each additional 5 m. span in item No. 9.22.1	Additio nal 5 m. span	413.00	
9.23		Repair of structures using M-15 cement concrete (nominal mix) including cost of all material, labour and transportation etc. complete.	per structure	2,704.00	
9.24		Clearance with uprooting of grass shrubs, bushes, debris from canal bed & slopes for maintenance work by labour, wherever required, before start of irrigation through canals, including disposal of uprooted materials at sufficient distance etc. complete.			
	9.24.1	For canal depth up to 3 m.	sqm	1.30	
	9.24.2	For canal depth more than 3 m.	sqm	1.60	
9.25		Repair of Brick/ stone masonry work with plastering or pointing with watering including cost of all materials, labour and transportation etc. complete.	per structure	2,513.00	
9.26		Removing and hauling all kinds of soil/ soft rock including boulders up to 0.6 m. dia. slipped due to natural / geological causes and disposing off the same in specified dump area or as directed, including cost of all materials, machinery, labour, forming steps / ramp ways and all other ancillary operation etc. complete.	cum	101.00	
9.27		Removing carefully plain cement concrete / Stone slabs from the side lining of canal and stacking the same on the road side/ canal bed etc. complete.	sqm	26.00	
9.28		Providing and applying one coat of Zinc rich epoxy primer paint (zinc content 85%) of approved quality 40 micron dry film thickness to gates/ embedded parts/ hoist components including cost of all materials, labour, removing rust cleaning surface, scaffolding etc. complete.	sqm	199.00	

9.29		Providing and applying two coats of anti-corrosive bituminous black paint of approved quality 40 micron dry film thickness each coat to gate components such as horizontal girders/sector and all bracings/ trunion assembly/ yoke girders/ stiffeners/ foot bridge etc. including cost of all materials, labour, removing rust, cleaning surface, scaffolding etc. complete.	sqm	79.00	
9.30		Supplying and fixing bulb type (musical note) uncladded rubber seals and stainless steel counter sunk bolts/ nuts/ washers of approved quality including cost of all materials, labour, removing existing worn-out/damaged bulb type rubber seals from gates, cleaning surface, making holes in new seals, fixing new seals / bolts/ nuts/ washers tightly in position, labour, scaffolding etc. complete.	m	846.00	
9.31		Supplying and fixing bulb type teflon cladded rubber seals and stainless steel counter sunk bolts/ nuts/ washers of approved quality including cost of all materials, removing existing worn-out/damaged bulb type rubber seals from gates, cleaning surface, making holes in new seals, fixing new seals/ bolts/ nuts/ washers tightly in position, labour, scaffolding etc. complete.	m	1,542.00	
9.32		Supplying and fixing flat rubber seals and stainless steel counter sunk bolts/ nuts/ washers of approved quality including cost of all materials, labour, removing existing worn-out/ damaged flat type rubber seals from gates, cleaning surface, making holes in new seals, fixing new seals /	m	772.00	
		bolts/ nuts/ washers tightly in position, scaffolding etc. complete.			
9.33		Supplying and fixing Z-type rubber seals and stainless steel counter sunk bolts/ nuts/ washers of approved quality including cost of all materials, labour, removing existing worn-out/ damaged Z-type rubber seals from gates, cleaning surface, making holes in new seals fixing new seals bolts/ nuts/ washers tightly in position, scaffolding etc. complete.	m	1,106.00	
9.34		Providing and fixing 100 x 50 mm 10 gauge non-galvanized weld mesh to concrete/ masonry surface including cost of all materials, machinery, labour, fixing wire mesh to exposed reinforcement bars or by driving rafter nails, scaffolding etc. complete.	sqm	260.00	
9.35		Providing and filling/ replacing gear oil of approved quality up to the required gauge level for Reduction gear unit of hoists/ gantry cranes including cost of all materials, machinery, labour etc. complete.	litre	283.00	
9.36		Providing and applying grease of approved quality to gate and hoist components requiring greasing as part of annual maintenance using grease gun wherever necessary including cost of all materials, machinery, labour, scaffolding etc. complete.	kg	360.00	

9.37		Providing and applying cardium compound of approved quality to wire ropes of hoists/ gantry cranes as part of annual maintenance including cost of all materials, machinery, labour etc. complete.	kg	163.00	
9.38		Providing and filling/ replacing hydraulic oil of approved quality up to the required gauge level including cost of all materials, machinery, labour etc. complete.	litre	148.00	
9.39		Cleaning gates/ hoists/ embedded parts for re- painting by removing rust, oil, paint, grease etc., by using wire brush, scrubber, rust remover and applying a coat of rust inhibitive compound etc., complete.	sqm	48.00	
		Transportation charges with utility van and with four men (two helper , one welder and one fitter) with welding parts, cutting items and extra tools and tackles required for fitting work gate parts and head etc			
9.40	9.40.1	upto 50 km	Each	4,000.00	
	9.40.2	for above 50km, per Km extra charge	Each	50.00	
9.41		Oiling, Greasing work of gate parts like Headstock, Headstock parts, Roller Assembly, Operating Rod, Sealing Frame, Guide Tee			

CHAPTER-10
MATERIAL TESTING AND MODEL STUDIES
Instructions

1. General instructions on Schedule of Rates shall be applicable to the extent they are relevant
2. Rates includes the following:
 - a. Cost of material used for testing /model studies
 - b. Cost of salvage value of machinery /equipment used for testing
 - c. Cost of water used for model studies
 - d. Cost of labour and supervisory staff engaged for material testing/model studies
3.
 - (a) Each representative sample shall be distinctly marked for identification and securely packed to avoid damage or loss of fine particles during transit. The outside cover should bear proper seal or name of sender as well as that of the receiving officer of research formation. A tin or plastic sheet showing all details of the sample should also be kept inside the sample.
 - (b) Specifications for sampling of undisturbed soil samples should be rigidly followed. Utmost care by way of wax sealing and safe transit must be taken to see that the in-situ conditions are not changed until the samples are received in the laboratory.
 - (c) No freight charges will be borne by the laboratory for the samples supplied to the laboratory.
 - (d) The quantities of samples for testing should be supplied to the laboratory as per table given in para 4.5 of quality control manual volume-I of WRD M.P.
4.
 - (A) SOIL & MATERIAL TESTING:
 - a. A programme for material /soil testing or model testing should be prepared by field authorities showing indenting date and date of test result desired.
 - b. The time period required for different tests are given in table 9 of para 4.7.3 of Quality Control Manual volume-I of WRD M.P.
 - c. A detailed report with drawings showing location of trial pit, borrow, logs of bore hole data, geological details, depth of water table and other relevant information should be submitted to laboratory to understand the properties to be evaluated and accordingly planning the testing methodology.
 - (B) MODEL STUDY:
 - a. The project authorities will send a proposal for model study of their project such as dams, tunnel, canals, river study etc to the director irrigation research.
 - b. After receiving the proposal Research officer will send a list of documents required for model study
 - i. Detailed project report
 - ii. Salient features of the project
 - iii. Grid plan up to 500m u/s and 500m d/s from dam axis
 - iv. L-section, X-section, Plan of structure to be tested
 - v. TWL Curve for 100%,75%,50% and 25% of design flood or any other flood condition, if required
 - vi. Hydraulic design of structure proposed for the study
 - vii. Terms of reference for the study
 - c. After receiving the above data, estimate will be submitted to the field formation for 2D/3D model study as desired by the field authorities
 - d. TS for estimate will be given by the project authorities
 - e. G-schedule will be approved by the Director Irrigation Research
 - f. Then it will be sent for E-Tendering process to CE. e-Procurement

g. After fixing agency for the work, fund will be allotted by the E-in-C from the budget of the concerned project.

h. For the work of other Department/ private agency, fund will be provided by the agency through Demand Draft in favour of Research Officer(H), Bhopal and will be deposited in deposit head 8443/108

i. Time Schedule for 3D Model Study

i. Time Required for Tendering Process = 1 Month

ii. Time for Construction of 3D Model = 45 Days

iii. Time for Study = 20 Days

iv. Time for Reporting = 10 Days

j. Time Schedule for 2D Model study

i. Time Required for Tendering Process = 1 Month

ii. Time for Construction of 2D Model = 30 Days

iii. Time for Study = 20 Days

iv. Time for Reporting = 10 Days

5.

(a) On receipt of programme showing desired tests and consequent indenting dates, priority for testing will be decided on the basis of indenting date/receipt of sample. Then Deputy Director Soil & Material testing will prepare a proforma bill of testing charges as per rates shown in this chapter. The charges shall be paid by the sponsoring authority well before the indenting date. Testing will be started after receipt of testing charges. In case of delay in payment the priority fixed will be lost and it will be arranged after last member of the list. If during testing the sponsor desire to get additional test conducted, then additional amount will be required to be paid.

(b) Testing of cement concrete and cement mortar cubes will be given top priority as per casting date.

(c) If any party desires to have test results on special priority, then they should contact Director, Irrigation Research in advance who will decide the programme for such job with respective Deputy Directors to trace scope for such testing job. The test will be conducted as per the programme approved by DIR. The charges for such testing will be 10% higher.

(d) For items, not included in this schedule of rates, separate rates will be quoted depending on the type of job involved.

6. NOC for any test to be conducted for any organization other than MPWRD will be granted by Director, Irrigation Research on merits of case.

7. Once the results are sent to the party concerned, request for rechecking of these results will be done if the Director, Irrigation Research feels it to be justified. Extra charges, if any fixed by the Director, Irrigation Research, will have to be paid for such retesting.

8. The testing will be carried out by the staff of the directorate alone, and no other party will be permitted to carry out the test. Any interested party can only watch the testing procedure if prior permission is provided by CE, (BODHI), WRD Bhopal (MP)/ Director, Irrigation Research, WRD Bhopal (MP)

9. For all tests, Indian Standard specifications would be followed where applicable. For other specialized tests, specifications finalized by the Directorate Irrigation Research would be followed. Any clarification on the method of testing can be obtained from the Director, Irrigation Research, Tulsi Nagar, Bhopal-462003

10. The staff of the Directorate of Irrigation Research shall not be responsible for giving legal defense or for appearing in a court of law in connection with test carried out by laboratories and no such request shall be entertained.

11. Director reserves the right to publish the result of any test without taking permission of the party concerned.

12. The samples supplied for testing will be stored up to a period of 3 months after their reports are communicated to the party and after this period, they will be finally disposed-off.

13. In matters of dispute and interpretations of any rules and results, the decision of the Engineer-in-Chief will be final.

14. For field tests, rates cover the cost for testing only. The transportation cost for equipments to site of work will be charged extra as per actual or may be arranged by the party for whom the work is undertaken.

15. The preparation of site, including excavation of pits, areas, scaffolding, de-watering, air supply, meter charges for electricity, drilling cost, water supply, fixing of anchor rods, concrete pedestals and foundations, supply of labour, tools and plants and all such other miscellaneous arrangements which are directly or indirectly connected with actual performance of field test will be the responsibility of the party. This should be arranged in advance in consultation with the concerned Deputy Director/Research Officer

16. Normal facilities like residential accommodation conveyance etc. for the staff deputed for conducting the field tests will be provided by the party.

17. WORKS OF OTHER AGENCIES/DEPARTMENTS

A. During the visit of laboratory staff to the field for conducting field test, travelling allowance and dearness allowance will be charged extra.

B. 25 % of sum of (A) and estimate prepared for testing work will be charged additionally.

18. The following IS Codes may be referred for the Soil and Material Testing:

S.No.	I.S. Code	Title
1	460-	Test Sieves
2	460-(Pt.I)-1985	Wire cloth test sieves (Third Revision)(Reaffirmation 2004)
3	460-(Pt.II)-1985	Perforated Plate Test Sieves (Third Revision) (Reaffirmation 2004)
4	460-(Pt.III)-1985	Method of examination of test Sieves (Third Revision) (Reaffirmation 2001)
5	456-2000	Code of Practice for plain and Reinforced Concrete (Third Revision) (Reaffirmation 2005)
6	516-2000	Methods of tests for strength of concrete (with amendment No. 2) (Reaffirmation 2004)
7	650-1991	Standard Sand for testing of cement(First revision with amendment No. 2) (Reaffirmation 2008)
8	1121	Method of test for determination of strength properties of natural building stone
9	1121- (Pt. I)-1974	Compressive strength (first revision with amendment No. 1) (Reaffirmation 2008)
10	1121- (Pt. IV)-1974	Shear Strength (first revision) (Reaffirmation 2003)
11	1122-1974	Methods of test for determination of true specific gravity of natural building stone (first revision.) (Reaffirmation 2003)

12	1124-1974	Method of test for determination of water absorption, apparent specific gravity and porosity of Natural building stone. (first revision) (Reaffirmation 2003)
13	1125-1974	Method of test for determination of weathering of natural building stone (first revision) (Reaffirmation 2003)
14	1126-1974	Method of test for determination of durability of natural building stones(first revision) (Reaffirmation 2008)
15	1199-1959	Method of sampling and analysis of concrete. (Reaffirmation 2004)
16	1498-1970	Classification and Identification of soil for general engineering purpose (first revision) (Reaffirmation 2007)
17	1727-1967	Method of test for pozzolanic material (first revision) (Reaffirmation 2004)
18	1888-1982	Method of load test on soils (first revision) (Reaffirmation 2002)
19	2386-	Method of test for aggregates for concrete
20	2386-(Pt. I)-1963	Particle size and shape (Amendment march 2010) (Reaffirmation 2002)
21	2386-(Pt. II)-1963	Estimate of deleterious material and organic impurities (Reaffirmation 2011)
22	2386-(Pt. III)-1963	Specific gravity, density ,voids, abrasion and bulking (Reaffirmation 2002)
23	2386-(Pt. IV)-1963	Mechanical properties (with amendment no.1) (Reaffirmation 2002)
24	2386-(Pt. V)-1963	Soundness (Reaffirmation 2002)
25	2386-(Pt. VI)-1963	Measuring Mortar making properties for fine aggregate (Reaffirmation 2011)
26	2386-(Pt. VII)-1963	Alkali aggregate reactivity (Reaffirmation 2002)
27	2430-1969	Method of sampling for aggregate for concrete (Reaffirmation 2005)
28	2720-	Method of test for soil-
29	2720 (Pt-I)1983	Preparation of dry soil samples for various test (first revision) (with amendment no. 1) (Reaffirmation 2006)
30	2720 (Pt-II)1973	Determination of water content (second revision) (Reaffirmation 2010)
31	2720 (Pt-III)1980	Determination of Specific gravity (Reaffirmation 2002)

32	2720 (Pt-III/Sec-I)1980	Section- I – Fine grained soil (first revision) (Reaffirmation 2002)
33	2720 (Pt-III/Sec- II)1980	Section-II Fine , medium and coarse grained soils (first revision) (Reaffirmation 2002)
34	2720 (Pt- IV) -1985	Grain size analysis (Second revision) (Reaffirmation 2006)
35	2720 (Pt-V)-1985	Determination of liquid and Plastic limit (first revision) (Reaffirmation 2006)
36	2720 (Pt- VI)-1972	Determination of shrinkage factors (first revision). (Reaffirmation 2001)
37	2720 (Pt-VII)-1980	Determination of water content, dry density elation using light compaction (Reaffirmation 2011)
38	2720 (Pt –VIII)-1983	Determination of water content, dry density relation using heavy compaction (Third revision) (with amendment no. 1). (Reaffirmation 2006)
39	2720 (Pt-IX0-1992	Determination of dry density, moisture content relation by constant weight or soil method (with amendment no. 1) (Reaffirmation 2002)
40	2720 (Pt- X)-1991	Determination of unconfined compressive strength (second revision) (Reaffirmation 2006)
41	2720 (Pt-Xi)-1993	Determination of shear strength parameter of a specimen tested in unconsolidated, un drained triaxial compression without the measurement of pore water pressure (amendment no 1&2) (Reaffirmation 2002)
42	2720 (Pt-XII)-1981	Determination of shear strength parameter of soil from consolidated un drained triaxle compression test with measurement of pore water pressure. (Reaffirmation 2002)
43	2720 (Pt-XIII0-1986	Direct shear test (second revision) (Reaffirmation 2002)
44	2720 (Pt-XV)-1965	Determination of consolidation properties (with amendment no. 1 &2) (Reaffirmation 2002)
45	2720 (Pt- XVI)-1987	Laboratory determination of CBR (first revision) (Reaffirmation 2002)
46	2720 (Pt-XVII)-1986	Laboratory determination of permeability (with amendmentno.1) (second revision) (Reaffirmation 2002)
47	2720 (PtXXI)-1977	Determination of Total soluble solids (first revision) (Reaffirmation 2006)
48	2720 (Pt-XXIII)-1976	Determination of calcium carbonate (first revision) (Reaffirmation 2006)

49	2720 (Pt-XXVI)-1987	Determination of ph values (second revision) (Reaffirmation 2002)
50	2720 (Pt- XXIX)-1975	Determination of dry density of soil in-place by the core cutter method (first revision) (Reaffirmation 2005)
51	2720 (Pt-XL)- 1970	Determination of free-swell index of soils (Reaffirmation 2002)
52	2720 (Pt-XLI)-1977)	Measurement of swelling pressure of soils (Reaffirmation 2002)
53	2809-1972	Glossary of terms and symbols relating to soil engineering (first revision) (Reaffirmation 2006)
54	3025 -(Pt. XIV)-2013	Conductivity for water by conductivity meter
55	3025-(Pt. X)-1984	Turbidity test of water by turbidity meter (Reaffirmation 2002)
57	3025 (Pt. 32) 1988	Chloride test of water by spectrophotometer (Reaffirmation 2007)
58	3025 (Pt. 60) 2009	Fluoride test of water by spectrophotometer
59	3025 (Pt. 4) 1986	Sulphate test of water by spectrophotometer (Reaffirmation 20003)
60	3025 (Pt. 53)	Iron test of water by spectrophotometer
61	ASTMD859-10	Silica test of water by spectrophotometer
62	ASTMD:3867:09	Nitrate- Nitrite test of water by spectrophotometer
63	3495-(Pt I to IV)-1992	Method of test of burnt clay building bricks(third revision)(with amendment no.1) (Reaffirmation 2002)
64	3812- (Pt .I)2013	Loss of ignition Fly Ash /Silica
65	4031- 1996	Methods of Physical test for Hydraulic cement (Reaffirmation 2004)
66	4032-1985	Method of chemical analysis of hydraulic cement (Reaffirmation 2005)
68	4464-1985	Code of practice of presentation of dealing information and core description in foundation, investigation (Reaffirmation 2004)
69	4968-	Method of sub surface sounding for soils
70	4968-(Pt-II)1976	Dynamic methods using core and bentonite slurry (first revision) (with amendment no. 1) (Reaffirmation 2007)

71	4968-(Pt-III)1976	Static cone penetration test (first revision) (Reaffirmation 2002)
72	5513-1996	Vi-cat apparatus (second revision) (Reaffirmation 2005)
73	5514-1996	Apparatus used in Lech atelier test (Reaffirmation 2005)
74	5529-	Code of practice for in-situ permeability tests
75	5529(Pt.I)-Mar-2013	Tests of overburden
76	5529(Pt.II)-2006	Tests in bed rock
77	7320-1974	Concrete slump test apparatus (Reaffirmation 2008)
78	7746-1991	Code of practice for in-situ shear tests of rock (with amendment no. 1) (Reaffirmation 2005)
79	8085-1965	Method of test for permeability of cement mortar and concrete (Reaffirmation 2002)
80	8763-1978	Guide for undisturbed sampling of sands (Reaffirmation 2002)
81	8764-1998	Methods of determination of point load strength index of rocks
82	9013-1978	Method of making curing ,and determining compressive strength of accelerated-cured concrete specimens (Reaffirmation 2008)
83	9143-1979	Method for the determination of unconfined compressive strength of rock materials (Reaffirmation 2001)
84	9179- 1979	Method for preparation of rock specimen for laboratory testing (Reaffirmation 2001)
85	9259-1979	Liquid limit apparatus for soils(with amendment no. 1) (Reaffirmation 2002)
86	9376-1979	Apparatus for measuring aggregate crushing value and 10 % fines value. (Reaffirmation 2004)
87	9377- 1979	Apparatus for aggregate impact value (Reaffirmation 2004)
88	9399- 1979	Apparatus for flexural testing of concrete (Reaffirmation 2004)
89	9399-1980	Apparatus for uses in measurement of length change of Hardened cement paste, mortar and concrete (Reaffirmation 2004)

90	9669-1980	CBR moulds and its accessories (Reaffirmation 2002)
91	10050-1981	Slake durability index rocks, methods for determination (Reaffirmation 2001)
92	10740-1983	Operating requirement or power take off driven implements (Reaffirmation 2004)
93	SP-23-1982	Hand book on concrete mix design. (based on Indian standard) (Reaffirmation Six reprint Nov-2001)
94	SP-36-1987(Pt- I)	Compendium of Indian standards on Soil Engineering(Laboratory Testing) (Reaffirmation First Pub-Mar 1989)
95	SP-36-1988 (Pt. II)	Compendium of Indian standards on Soil Engineering(Part II) Field testing of soil for civil engineering purpose(CED-43: Soil and foundation Engineering)

For model studies

1	10137-1982	Guidelines for selection of spillways and energy dissipaters.(Reaffirmation 2004)
2	7365-2010	Criteria for hydraulics designs of buckets II Revision
3	4997-1968	Criteria for Design of Hydraulics Jump type stilling basin for energy dissipaters.(Reaffirmation 1995)
4	5186 - Apr-1994	Design of Chute and side channel spillways.

CHAPTER-10

MATERIAL TESTING AND MODEL STUDIES

Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
Part-A Item and Rate for Soil, Material, Chemical & Field testing.				
Soil testing - (I) Laboratory Test				
10.01	Grain size analysis (IS 2720 PT IV)	per sample	1,022.00	
10.02	Apparent specific gravity test (IS:2720 Pt.III and Sec.I and II of Pt. III)	per sample	332.00	
10.03	Liquid, Plastic and Shrinkage limits (IS:2720/Pt.V&VI).	per sample	678.00	
10.04	Standard (light Compaction test/relative density test) (IS 2720 Pt. VII and VIII).	per sample	844.00	
10.05	Laboratory permeability test (IS 2720 Pt XVII).	per sample	1,630.00	
10.06	Effective shear parameters by consolidated un drained test by triaxle machine on 37.5 mm dia. sample.	per sample	3,134.00	
10.07	Determination of in-situ moisture content and density of undisturbed sample (IS 2720 PT. XXIX).	per sample	338.00	
10.08	Shear parameters by quick saturated test (Qsat) by triaxle machine on undisturbed samples (IS:2720 Pt. XI).	per sample	3,189.00	
10.09	Shear parameters by quick test on sample at OMC & MDD or NMC & NDD by triaxle machine on 37.5 mm dia. sample (IS: 2720 Pt. XI).	per sample	2,414.00	
10.10	Box shear test (IS:2720 Pt. XIII)-			
	10.10.1 At OMC & MDD	per sample	947.00	
	10.10.2 On undisturbed sample	per sample	947.00	
10.11	consolidation test on disturbed or undisturbed samples	per sample	1,483.00	
10.12	California bearing ratio (IS:2720 Pt. XVI).	per sample	1,187.00	
10.13	Void ratio	per sample	338.00	
10.14	Chemical tests on soils-			
	10.14.1 Lime content test (IS:2720 Pt. XXIII)	per sample	315.00	
	10.14.2 Soluble salt test (IS:2720 Pt. XXI)	per sample	392.00	

10.15		Chemical test for water suitability for Irrigation use.	per sample	814.00	
10.16		unconfined compression test on 37.5 mm dia. sample	per sample	813.00	
10.17		Swelling pressure test-			
	10.17.1	Free swell (IS:2720 Pt. XL).	per sample	392.00	
	10.17.2	Swelling pressure (IS:2720 Pt. XLI).	per sample	809.00	
10.18		Bearing capacity of soil by triaxle shear test on soil sample.	per sample	3,817.00	
		II-Field Tests-			
10.19		Load bearing test on soil (IS: 1881)	per no.	9,695.00	
10.20		Field permeability test-			
	10.20.1	Pumping in test (IS.5529 Pt. I)	per no.	3,646.00	
	10.20.2	Pumping out test (IS:5529 Pt. II)	per no.	5,755.00	
10.21		Vane shear test on soft fine grained soil (IS:4434).	per no.	2,654.00	
10.22	10.22.1	Static cone penetration test (IS:4968 II & III).	per no.	3,811.00	
	10.22.2	In-situ shear test on rock (IS:7746)	per no.	6,002.00	
		Material Testing			
		(I) Test on Cement			
10.23		Fineness modulus test (IS:4031)			
	10.23.1	By sieving method sample	per sample	343.00	
	10.23.2	By specific surface i.e. air permeability apparatus.	per sample	594.00	
10.24		Consistency test (IS:4031)	per sample	393.00	
10.25		Test for setting time (IS:4031)	per sample	450.00	
10.26		Specific gravity test (IS:4031)	per sample	341.00	
10.27		Heat of Hydration test (IS:4031)	per sample	1,089.00	
10.28		Soundness test (IS:4031)			
	10.28.1	By Le-chat Eller's method	per sample	396.00	
	10.28.2	By Autoclave method	per sample	809.00	
10.29		Tensile strength (IS:4031)			
	10.29.1	Preparing 12 specimen and curing	per job	524.00	
	10.29.2	Testing 12 specimens	per job	152.00	
10.30		Compressive strength of cement (IS:4031)			
	10.30.1	Preparing six specimen and curing	per job	677.00	
	10.30.2	Testing six specimens	per job	172.00	
		(II) Test on Aggregates Including Sand-			
10.31		Sieve analysis (IS:2386 Pt. I)	per sample	393.00	

10.32		Unit weight or bulk density (IS:2386 Pt. III)	per sample	241.00	
10.33		Test for organic Impurities (IS:2386 Pt. II)	per sample	340.00	
10.34		Absorption and specific gravity test (IS: 2386 part III)	per sample	808.00	
10.35		Absorption of aggregate (IS: 2386 part III)	per sample	449.00	
10.36		Test for finding out % of clay,fine silt and fine dust	per sample	528.00	
		(IS: 2386 part II)			
10.37	10.37.1	Soundness test (10 cycles) (IS:2386 part V)	per sample	3,743.00	
	10.37.2	Soundness test (5 cycles)(IS:2386 part V)	per sample	2,276.00	
10.38		Aggregate impact test (IS:2386 part IV)	per sample	393.00	
10.39		Abrasion test by any of the following method			
	10.39.1	Devil abrasion test machine (IS:2386 part IV)	per sample	816.00	
	10.39.2	By Los Angeles machine	per sample	816.00	
	10.39.3	By Derry 's abrasion test machine	per sample	816.00	
10.40		Aggregate crushing value (IS:2386 part IV)	per sample	785.00	
10.41		Compressive strength of stone specimen (IS:2386 part V)			
	10.41.1	Cutting and dressing stone block of size 10x10X10 cm	per sample	240.00	
	10.41.2	Testing the above specimen	per sample	176.00	
10.42		Determination of Coal. lignite and shale in aggregates (IS:2386 Pt. II)	per sample	394.00	
10.43		Alkali aggregate reactivity test as per ASTM (Reduction of Alkali silica release test) (IS:2386 Pt. VII).	per sample	1,588.00	
10.44		Potential alkali aggregate reactivity test (IS:2386 Pt. VII).	per sample	3,124.00	
		(III) Test on Concrete			
10.45		Compressive strength of cube specimen of size 15 cm (IS:516)-			
	10.45.1	Preparing cubes including curing for specified time (minimum for 6 specimens).	per specimen	163.00	
	10.45.2	Testing of one specimen	per no.	165.00	
10.46		Compressive strength of cube specimen of 10 cm (IS:516)			
	10.46.1	Preparing cube specimen of 10 cm size including curing.	per no.	163.00	
	10.46.2	Testing specimen	per no.	155.00	

10.47	10.47.1	Preparing cylindrical specimen of size 15 cm diaX30 cm height including curing (IS:516).	per no.	240.00	
	10.47.2	Testing cylindrical specimen	per no.	239.00	
10.48	10.48.1	Preparing cylindrical specimen of size 10 cm diaX20 cm height including curing (IS:516)	per no.	174.00	
	10.48.2	Testing cylindrical specimen	per no.	173.00	
10.49		Flexural strength-			
	10.49.1	Preparing concrete beam of size 10X10X50 cm.	per no.	164.00	
	10.49.2	Testing specimen	per no.	109.00	
10.50	10.50.1	Non-destructive test of concrete by pulse velocity meter min. no. of specimen three no.	per no.	1,779.00	
	10.50.2	Non-destructive test of concrete by rebound hammer min. no. of specimen three no.	per no.	917.00	
	10.50.3	Compressive strength test for concrete block	per no.	220.00	
10.51		Determination of cement content in hardened concrete-			
	10.51.1	By lime and calcium oxide determination process.	per sample	1,191.00	
	10.51.2	BY silica process SiO ₂ determination (IS: 1199).	per sample	1,191.00	
10.52		Determination of permeability of concrete (IS: 3085)	per sample	508.00	
10.53		Slump test	per sample	393.00	
		(IV) Test on Bricks			
10.54		Water absorption of burnt clay bricks (five specimens).	per job	949.00	
10.55		Compressive strength of bricks (IS:3495)-			
	10.55.1	Five nos.	per job	359.00	
	10.55.2	One no.	per sample	89.00	
10.56		Determination of efflorescence (IS:3495)-			
	10.56.1	Five nos.	per job	357.00	
	10.56.2	One no.	per sample	145.00	
10.57		Flexural strength	per no.	187.00	
10.58		Specific gravity	per sample	240.00	
10.59		Unit weight	per sample	238.00	
		(V) Tests on Natural Building stone-			
10.60		Compressive strength test (IS: 1121 Pt. 1)-			
	10.60.1	Preparing 3 specimen	per job	339.00	
	10.60.2	Testing above 3 specimen	per job	143.00	
10.61		Shear strength test (IS: 1 121 Pt. IV)-			
	10.61.1	Preparing 3 specimen	per job	339.00	
	10.61.2	Testing above 3 specimen	per job	176.00	
10.62		Specific gravity and porosity test (3 specimens) (IS: 1122).	per job	808.00	
10.63		Water absorption test (24 hour immersion and five hour boiling test)-			

	10.63.1	Preparing specimen	per specimen	194.00	
	10.63.2	Testing specimen	per specimen	194.00	
10.64		Durability test (IS: 1 126)-			
	10.64.1	Preparing specimen	per specimen	194.00	
	10.64.2	Testing the specimen	per specimen	1,760.00	
10.65		Weathering test (IS:1125)-			
	10.65.1	Preparing specimen	per specimen	386.00	
	10.65.2	Testing the specimen	per specimen	1,741.00	
10.66		Abrasion test-			
	10.66.1	Preparing specimen	per specimen	385.00	
	10.66.2	Testing specimen	per specimen	443.00	
10.67		Compressive strength on cores (IS:1121Pt.I)-			
	10.67.1	Cores received, cut and polished	per specimen	254.00	
	10.67.2	Cores drilled, cut and polished	per specimen	654.00	
	10.67.3	Testing the specimen	per specimen	186.00	
10.68		Cubes received, Capped and tested specimen	per specimen	220.00	
		(VI) Tests on Tiles			
10.69	10.69.1	Water absorption test	per specimen	218.00	
	10.69.2	Determination of Flexural strength	per specimen	98.00	

	10.69.3	Resistance of wear	per specimen	155.00	
	10.69.4	Impact test	per specimen	254.00	
	10.69.5	Permeability of tiles	per specimen	314.00	
		(VII) Tests on Soil Cement Blocks-			
10.70	10.70.1	Moisture absorption tests group of five.	per job	619.00	
	10.70.2	Compressive strength test	per sample	152.00	
	10.70.3	Weathering test	per sample	1,761.00	
		(VIII) Test on Chemical Admixture(Liquid)			
10.71		Dry material content in liquid admixture	per sample	797.00	
10.72		Ash content of admixture	per sample	929.00	
10.73		Reflective Density of liquid admixture	per sample	181.00	
10.74		Chloride ion concentration of liquid admixture	per sample	238.00	
10.75		pH of liquid admixture	per sample	204.00	
		(IX) Test on Fly Ash/Silica			
10.76		Specific Gravity of fly Ash/Silica Fumes	per sample	371.00	
10.77		Loss of ignition Fly Ash/Silica	per sample	332.00	
10.78		Determination of Fineness by sieving (Fly Ash)	per sample	538.00	
		(X) Test on Water			
10.79		Conductivity test of water by conductivity meter	per sample	116.00	
10.80		Turbidity test of water by Turbidity meter	per sample	116.00	
10.81		Nitrate test of water by Spectrophotometer	per sample	198.00	
10.82		Fluoride test of water by Spectrophotometer	per sample	177.00	
10.83		Sulphate test of water by Spectrophotometer	per sample	191.00	
10.84		Iron test of water by Spectrophotometer	per sample	177.00	
10.85		Silica test of water by Spectrophotometer	per sample	236.00	

10.86		Phosphate test of water by Spectrophotometer	per sample	188.00	
10.87		Nitrite test of water by Spectrophotometer	per sample	196.00	
10.88		Chloride test of water by Spectrophotometer	per sample	225.00	
10.89		Chlorine test of water by Spectrophotometer	per sample	176.00	
		(XI) Test on Aggregate & Rock			
10.90		(Aggregate test) Determination of Flakiness & Elongation index	per sample	440.00	
10.91		(Rock Test) Determination of Slake Durability index of Rock	per sample	657.00	
		Part-B Hydraulic Model Studies			
10.92		Dismantling lime concrete or cement concrete in foundations or under floors, haunches or arches or terrace and also dismantling brick masonry including arches in lime or cement mortar.	cum	447.00	
10.93		Excavation in all kind of soft/loose/ hard/ dense soils, moorum & moorum mixed with boulders and mud including dressing placing the excavated soil neatly in specified dump area or disposing off the same as directed, including cost of site clearance, all materials, machinery ,labour and dressing etc. complete.	cum	48.00	
10.94		Developing basin grid plan as per model scale including wooden pegs with top nails fixing it with mortar at specified levels as given in grid plan of the river or else supplied at different cross sections etc. complete.	sqm	98.00	
10.95		Construction of rigid bed for model excluding walls including placing of muck in grid and profile upto desired levels with top layer 7.5 cm thick M10 cement concrete with graded aggregate of 10 mm size including 15 mm thick cement mortar 1:4 for developing profile for river basin above concrete floor etc. complete.	sqm	362.00	
10.96		Water charges for running model including energy charges, cost of operation and maintenance of pumps, losses and wastage and depreciation cost to pumps, pipe line and electrical system etc. complete.	per cumecs per hour	5,865.00	
10.97		Providing and spreading of 3 to 6 mm metal in downstream of energy dissipation arrangement for measuring scour pattern and scour depth in model for predicting scour depth in prototype of dam etc. complete.	cum	1,537.00	
10.98		Providing and spreading screened sand in downstream of energy dissipation arrangement for measuring scour pattern and scour depth in model for predicting scour depth in prototype of dam etc. complete.	cum	1,116.00	

10.99		Construction of crest profile, bucket/stilling basin providing and fixing all necessary appurtenances like pier, chute block, baffle block, end sill in teak wood, including providing & fixing 4 mm dia. transparent plastic tubes as pressure tips wherever necessary for measuring the pressure at different positions of spillways and all the appurtenances along with piers and apron with neat cement plaster 15mm thick with 1:4 cement mortar including fixing of BM glass on the floor etc. complete.	sqm	1,562.00	
10.10		Providing and fixing frame of steel work in single section including forging and hoisting, fixing in position etc. complete in angles (50x50x5 mm) in appropriate size as per requirement of sectional model flume etc. complete.	kg	94.00	
10.10		Providing and fixing 12 mm thick transparent glass of (1200x900x12 mm) size of approved brand in frame of angles(50x50x5 mm) already fixed in the flume etc. complete.	sqm	1,849.00	
10.10		Construction of Gauge chamber with fixing 5 mm thick transparent glass fixed on side brick walls plastered and BM glass fixed at the bottom and laying PVC Pipe of 5 cm dia. to observe MWL and TWL etc. complete.	per chamber	1,517.00	
10.10	10.103.1	Photograph of running model(taken at site) of size 15cm x10 cm	per copy	50.00	
	10.103.2	Second copy of selected photograph of size 15 cm x10 cm	per copy	25.00	
	10.103.3	Videography of running model at site.	per visit	3,900.00	

CHAPTER-11
SPECIAL ITEMS OF WORKS
Instructions

1. General instructions on Schedule of Rates shall be applicable to the extent they are relevant.
2. Rates include:
 - a. Cost of labour.
 - b. Cost of running charges of machinery including fuel and lubricants.
 - c. Cost of all material required for execution of item of work.
 - d. All lead and lift of materials, machines and labours.
 - e. Wastage of Cement, Sand, Coarse Aggregate, Admixture, Concrete and Mortar.
 - f. Shuttering, Scaffolding, Formwork, Vibration, and Curing.
 - g. Mix design including testing of materials and quality assurance measures.
 - h. Standard safety measures.
 - i. Site clearance, layout and setting out of work.
3. The rates of completed items are inclusive of loading and un-loading, standard finish required for concrete work and preparation of cold and hot joint.
4. All the construction materials, workmanship and quality shall conform to the standards prescribed in IS - Codes, MORTH, ASTM and relevant Specification/ Guidelines/ Circulars of MP Water Resources Department.
5. This chapter covers special items needed during repairs/renovation/new constructions.
6. Measurements :
 - (i) Dimensions shall be measured correct to the nearest centimeter. The area shall be calculated in sqm correct to two places of decimal and cubical contents in cubic meter correct to third places of decimal.
 - (ii) No deductions shall be made for the following:
 - a. Volume occupied by reinforcement.
 - b. Opening up to 0.1 sqm in area.
 - c. Ends of dissimilar material for example beams, posts, girders, rafters, purlins, trusses, corbels and steps up to 0.5 sqm in cross section.
 - d. Opening up to 0.1 sqm in area (in calculating area of an opening, the thickness of separate lintel or sill shall be included in height). Volume occupied by pipes, conduits sheathing, etc., not exceeding 0.1 sqm each in cross sectional area.
7. The item no 11.09 to 11.12 shall be executed with prior written permission of the Engineer in Chief or concerned Chief Engineer and Chief Engineer BODHI.

CHAPTER-11
SPECIAL ITEMS OF WORKS
Schedule of Rates

Item No.	Description of item	Unit	Rate	Remarks
11.01	Repair of spelled joint grooves of contraction joints, longitudinal joints and expansion joints in concrete structure using epoxy mortar or epoxy concrete including cost of raking & cleaning with wire brush or air and water jet, cost of all material, machinery, plant, labour and cost of other incidental charges and testing as per relevant specifications etc. complete.	m	1,670.00	
11.02	Guniting rock or concrete surface with epoxy mortar of average 25mm thickness having compressive strength equivalent to M35 including preparation of surface by sand blasting and cleaning, applying epoxy mortar with specified pressure with wire 3mm G.I. wire mesh, finishing the surface etc. including cost of all material, machinery, T&P, labour and cost of other incidental charges and testing as per relevant specifications etc. complete. - For average 25mm thick layer.	sqm	1,698.00	
11.03	11.03.1 Providing and inserting 12mm- 40mm nipples by drilling holes and fixing nipples with approved (fixing) compound as per standard procedure and specification including subsequent cutting/ removal and sealing of holes after completion of grouting operation, including cost of all material, machinery, T&P, labour and cost of other incidental charges and testing as per relevant specifications etc. complete.	each	87.00	
	11.03.2 Sealing of cracks/ porous concrete by injection process with Cement Grout through nipples complete as per Technical Specification. The rates are inclusive of cost of all material, machinery, T&P,labour and cost of other incidental charges and testing as per relevant specifications etc. complete.	kg	57.00	
	11.03.3 Sealing of cracks/ porous concrete by injection process with Cement Mortar Grout through nipples complete as per Technical Specification. The rates are inclusive of cost of all material, machinery, T&P, labour and cost of other incidental charges and testing as per relevant specifications etc. complete.	kg	60.00	
	11.03.4 Sealing of cracks/ porous concrete by injection process with Epoxy Grout by volume through nipples complete as per relevant Technical Specification. The rates are inclusive of cost of all material, machinery,T&P, labour and cost of other incidental charges and testing etc. complete.	kg	1,617.00	

11.04		Repair of damaged/ deteriorated, leached, honey combed and spalled concrete surface with or without exposed steel reinforcement with epoxy mortar , Grade 3 & class C of ASTM having bond strength of 12 MPA and tensile strength of 16 MPA, average thickness of 10mm and seal coat @ 1 kg per 4m ² including cost of all material, machinery, T&P, labour and cost of other incidental charges and testing as per relevant specifications etc. complete. -For average 10mm thick layer	sqm	982.00	
11.05		Repair of old, damaged exposed concrete/ masonry surface by pre-packed cement based polymer mortar of minimum strength of 45MPA with 10 mm average thickness with application of curing compounds, initiator and promoter. The rates are inclusive of cost of all material, machinery, T&P, labour and cost of other incidental charges and testing as per relevant specifications etc. complete. -For average 10mm thick layer.	sqm	115.00	
11.06		Epoxy bonding of new concrete to old concrete using epoxy resin painting suitable for dry and wet surface of the concrete with having minimum bond strength to concrete 2.5 MPA including preparation of old concrete surface with wire brush and compressed air , sealing of all cracks or spalling by epoxy injection of epoxy mortar or epoxy grouting as per requirement. Applying epoxy resin bond including cost of all material, machinery, T&P, cost of other incidental charges and testing as per relevant specifications etc. complete.	sqm	973.00	
11.07		Repair of old damaged concrete with polymer concrete including removal of damaged concrete upto sound surface, preparation of surface by cleaning with wire brush/ air & water jet, applying polymer concrete, finishing, curing etc. including cost of all material, labours, machinery, T&P, cost of other incidental charges and testing as per relevant specifications etc. complete. For average 25mm thick layer.	sqm	1,544.00	
11.08		Providing shotcrete on old damage concrete /masonry surface or on rock surfaces, comprising of cement, sand, coarse aggregates, water and quick setting compound in designed proportions having minimum density of 2000 kg/cum and strength not less than 25 MPA including preparation of surface by removal of old damaged concrete, cleaning by wire brush/ air water jet, including cost of all material, machinery, labour, T&P, cost of other incidental charges and testing as per relevant specifications etc complete. For average 40mm thick layer.	sqm	328.00	

11.09		<p>Providing UV resistant high strength, non-shrink polymer based repair mortar such as Poly Ironite Ceramic Cementitious (PICC) for joint filling in masonry of dams or hydraulic structures by a special type raised T joint type filling to required depth with part cover on stone to a thickness of 10 to 15 mm and with 20 mm spread on the surface. For surface preparation by removing loose mortar inside the joints and removing loose masonry by breaking using manual and / or mechanical means, removing of existing embedded M.S. bar if any , cleaning the joints surface and inside of joints with special chemical for algae- fungi removal and protection with pressure water jet, applying a bond coat of special type of primer suitable to bond old to new concrete and concrete to rock for required bond strength before application of this mortar and then providing a water repellent top coat after finishing, complete as per specification including materials, machinery, labour, scaffolding (special hanging platform), hire charges of cranes, insurance charges transportation as directed by the Engineer in charge.</p>	sqm	2,942.00	
11.10		<p>Providing UV resistant , nontoxic, high strength, non-shrink, polymer based Cementitious repair mortar such as Poly ironite Ceramic Cementitious (PICC) for resurfacing on damaged surfaces of concrete dams, masonry dams and colgrout faced dams and hydraulic structures to a thickness upto 10 to 15 mm or as per surface conditions and also treatment to the lift joints and honey combed areas, potholes etc. by removing loose material , particles, grout slurry, by breaking using manual and / or mechanical means, removing of existing embedded M.S. bar if any , cleaning the lift joints ,honey combing areas and surface with special chemical for algae- fungi removal and protection with pressure water jet, applying a bond coat of special type of primer suitable to bond old to new concrete and concrete to rock for required bond strength before application of repair mortars and providing a water repellent coat after finishing, complete as per specification including materials, machinery, labour, scaffolding with special hanging platform, hire charges of cranes, insurance charges transportation as directed by the Engineer in charge</p>	sqm	5,668.00	
11.11		<p>Strengthening of structural members like piers, beams, slabs, columns etc. by carbon fibre reinforce polymers (CFRP) including excavation around piers upto the point of projection but not more than one metre below nalla bed level, dewatering, centring, shuttering, chipping, sand blasting, removal of dirt and grime built up wire</p>	sqm	4,000.00	

		mesh support wherever required, epoxy bonding and providing protective cover over CFRP as per standard practice, removing deteriorated mortar, concrete filling of patch spalls, air blasting including surface preparation, priming, putty application, resin application, finishing, painting, including all required operation etc. complete.			
11.12		Grouting with Micro fine cement grout mix of suitable consistency under specified grout pressure as directed in drilled holes by stage grouting method including cost of all materials, machinery, labour, redrilling if necessary etc., complete.	tonne	73,788.00	
11.13		Providing, placing and construction of gabion structure for retaining earth with segments of wire crates of size 7m x 3m x 0.6m each divided into 1.5 m compartments by cross netting, made from 4 mm galvanised steel wire @ 32 kg per 10 sqm having minimum tensile strength of 300 Mpa conforming to IS: 280 and galvanising 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 tied, including cost of all material, machinery, labour, T&P, cost of other incidental charges and testing as per relevant specifications etc. complete.	cum	2,136.00	
11.14		Providing, placing and laying of boulder apron laid in wire crates with 4mm dia. GI wire conforming to IS: 280 and IS : 4826 in 100 mm x 100 mm mesh (woven diagonally)with 10 percent extra for laps and joints laid with stone boulders having least dimension not less than 200 mm & weight 25 kgs each as per drawing and relevant technical specifications including cost of all material, machinery, labour, T&P, cost of other incidental charges and testing etc. complete.	cum	1,823.00	
11.15		Providing and laying M 50 grade design mix concrete with Silica fumes or any other suitable additive using 20 mm graded aggregates clean, hard for RCC works of spillway crest, spillway d/s face, energy dissipating structures, and training walls. piers, abutments and such other locations including cost of all materials, machinery, labour, formwork, centring, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, T&P, cost of other incidental charges and testing as per relevant specifications etc. complete.	cum	6,994.00	
11.16		Providing and laying M 70 grade design mix concrete with Silica fumes or any other suitable additive using 20 mm graded aggregate clean , hard for RCC works of spillway crest, spillway	cum	7,702.00	

		d/s face, energy dissipating structures, training walls. piers, abutments and such other locations including cost of all materials, machinery, labour, formwork, cantering, scaffolding, cleaning, batching, mixing, placing in position, levelling, vibrating, finishing, curing, T&P, cost of other incidental charges and testing as per relevant specifications etc. complete.			
11.17		<i>(This item shall be used for estimation purpose only)</i> Survey, design and construction of underground pipe distribution network for micro irrigation system excluding rising main and sprinkler system but with pressurized irrigation with duty ranging from 0.3 to 0.4 lit/sec/ha and of working/operating pressure not exceeding 6 kg/cm ² with pipes of MS conforming to BIS 3589 mm and DI pipe conforming to BIS 8329 of K7 category (for pipe dia greater than 900) and for pipes of dia 900mm and below, MS/DI (as specified above) & HDPE pipe as per BIS 4984 of category PE 100 PN 6 including all incidental works like excavation, preparation of bedding as per codal requirements, laying, joining, backfilling, applying food grade epoxy coating having dry film thickness of 400 micron for lining of inner surface, three layer polyethylene coating/shotcreting to the external surface for MS pipes i/c testing and commissioning of the system as per specifications complete including all required valves, bends, manifolds, controls etc. conforming to related BIS/European standards including crossing of all rail/ roads, natural drainage, rivers, nallas of any category as per requirement of the owner complete including Supply, Erection and Commissioning of Outlet Management System including filters and control at 20 ha which should be able to control the flow as per desired maximum pressure of 2 kg/cm ² at service outlet after filtration with rotational irrigation facilitating uniform distribution of water to all the users irrespective of its location, elevation and distance from the water supply source including recording, measuring, monitoring and control with suitable power source and alternatively by solar power with three days back up capacity with cumulative quantity of water delivered to the Outlets and with no recurring cost for Communication with GSM/GPRS/RADIO etc, System should be kept in Protective Enclosure capable of giving vandalism alert and shall be SCADA compliant to the main control room operations			
		including cost of temporary acquisition and required permanent acquisition of land including cost of all material, labour, lead, lift and all incidental charges including all taxes. (Adoption of rate are for estimation purpose at DPR level only)			
	11.17.1	From rising main to 500 Ha area	ha. CCA	60,000.00	
	11.17.2	500 Ha to 2.5 Ha chak	ha. CCA	40,000.00	
	11.17.3	2.5 Ha to outlet (0.6 - 1.2Ha)	ha. CCA	7,500.00	

ANNEXURE-1

Quantity of Materials for Additional Lead Charges

Item No	Description of Work	Quantity of materials required			
		Unit	Sand (Cum)	Coarse Aggregate (Metal) (Cum)	Rubble/ Stone (Cum)
(A)	Common Items (Plain/Reinforced Concrete)				
	M-7.5 Using 40 mm max. size of CA	Cum	0.49	0.92	
	M-10 Using 40 mm max. size of CA	Cum	0.42	0.86	
	M-10 Using 20 mm max. size of CA	Cum	0.46	0.75	
	M-15 Using 150 mm max. size of CA	Cum	0.38	0.97	
	M-15 Using 80 mm max. size of CA	Cum	0.377	0.98	
	M-15 Using 40 mm max. size of CA	Cum	0.428	0.877	
	M-15 Using 20 mm max. size of CA	Cum	0.479	0.785	
	M-20 Using 150 mm max. size of CA	Cum	0.38	0.97	
	M-20 Using 80 mm max. size of CA	Cum	0.38	0.88	
	M-20 Using 40 mm max. size of CA	Cum	0.423	0.887	
	M-20 Using 20 mm max. size of CA	Cum	0.418	0.765	
	M-25 Using 40 mm max. size of CA	Cum	0.398	0.918	
	M-25 Using 20 mm max. size of CA	Cum	0.408	0.765	
	M-30 Using 20 mm max. size of CA	Cum	0.41	0.68	
	M-35 Using 20 mm max. size of CA	Cum	0.41	0.68	
	M-40 Using 20 mm max. size of CA	Cum	0.41	0.68	
	M-45 Using 20 mm max. size of CA	Cum	0.41	0.68	
(B)	Stone Masonry				
	Un-coursed and random rubble masonry	Cum	0.42		1.00
	CR Masonry	Cum	0.38		1.00
	Chisel Dressed/ Hammer Dressed Masonry	Cum	1.00		0.36
(C)	Chapter wise Items				
3.20	M-20 CC- 20 mm for solid parapet	Rm	0.101	0.184	
3.21	M-20 CC 20 mm for ornamental parapet	Rm	0.088	0.161	
3.23	Porous Concrete (without Sand) body drain	Cum	-	1.020	
3.27.1	Pointing in CM 1:2	Sqm	0.008		
3.27.2	Pointing in CM 1:3	Sqm	0.007		

3.28	Plastering in CM 1:3	Sqm	0.025		
3.33	Rock fill embankment	Cum			1.00
3.34	Trapezoidal longitudinal/cross drain	Cum			
3.34.2	Sand	Cum	1.00		
3.34.3	Metal	Cum	-	1.00	
3.34.4	Rubble	Cum			1.00
3.35	Filter blanket	Cum			
3.35.1	Metal 80 mm nominal size	Cum		1.00	
3.35.2	Metal 60 mm nominal size	Cum		1.00	
3.35.3	Metal 40 mm nominal size	Cum		1.00	
3.35.4	Metal 20 mm nominal size	Cum		1.00	
3.35.5	Metal 10 mm nominal size	Cum		1.00	
3.35.6	Shingle 80 mm or 60 mm nominal size	Cum		1.00	
3.35.7	Shingle 40 mm nominal size	Cum		1.00	
3.35.8	Shingle 20 mm nominal size	Cum		1.00	
3.35.9	Shingle 10 mm nominal size	Cum		1.00	
3.35.10	Sand Passing through 4.75 mm screen	Cum	1.00		
3.37	Rock toe				
3.37.1	Boulder	Cum			1.00
3.37.2	Quarried Stone				
3.37.2.1	Other than black trap, basalt or granite	Cum			1.00
3.37.2.2	Black trap, basalt or granite	Cum			1.00
3.39	22 cm thick dry stone pitching	Cum			1.00
3.40	30 cm thick dry stone pitching	Cum			1.00
3.41	22 cm thick dry picked up boulder pitching	Cum			1.00
3.42	Stone chips under pitching	Cum			1.00
3.43	Picked up boulder spalls under pitching	Cum			1.00
3.47	Dry rubble wall (Toe wall)	Cum			1.00
3.48	Dump Rip Rap				
3.48.1	600 mm thick	Sqm	0.204	0.204	0.60
3.48.2	750 mm thick	Sqm	0.204	0.204	0.75
3.48.3	1000 mm thick	Sqm	0.204	0.204	1.00
3.49	Hand Packed Rip Rap				
3.49.1	300 mm thick	Sqm	0.153	0.153	0.3
3.49.2	450 mm thick	Sqm	0.153	0.153	0.45
3.49.3	600 mm thick	Sqm	0.153	0.153	0.6
4.02	Fine chisel dressed bed grade stone	each	0.053	0.10	
4.12	PCC Slab M-15 MSA-20				
4.12.1	60 mm Thickness	Sqm	0.0442	0.0489	
4.12.2	50 mm Thickness	Sqm	0.0395	0.0408	

4.12.3	40 mm Thickness	Sqm	0.0350	0.0326	
4.13	Flag Stone Slab lining 40 mm to 50 mm	Sqm	0.0140		Flag Stone (1 Sqm)
4.14	Stone Pitching lining in CM 1:3				
4.14.1	150 mm thickness	Sqm	0.0034		0.150
4.14.2	225 mm thickness	Sqm	0.0077		0.2250
4.14.3	300 mm thickness	Sqm	0.1340		0.3000
4.17	610x610x975 mm deep filter drain pocket	Each	0.16	0.16	
4.18.2	Filter drain (a) Sand	Cum	1.00		
4.18.3	(b) Metal	Cum		1.00	
5.21	Filling Foundation well with sand	Cum	1.00		
5.23.1	Pumped Concrete Design mix M-20	Cum	0.44	0.66	
5.23.2	Pumped Concrete Design mix M-25	Cum	0.44	0.66	
5.23.3	Pumped Concrete Design mix M-30	Cum	0.44	0.66	
5.23.4	Pumped Concrete Design mix M-35	Cum	0.44	0.66	
5.23.5	Pumped Concrete Design mix M-40	Cum	0.44	0.66	
5.23.6	Pumped Concrete Design mix M-45	Cum	0.44	0.66	
5.26	150 mm PVC pipe weep holes	RM	0.0066	0.00267	
5.32	Flush mortar pointing CM 1:2	Sqm.	0.0023		
5.33	Flush mortar pointing CM 1:3	Sqm.	0.0023		
5.34	20 mm thick cement plastering CM 1:3	Sqm.	0.025		
5.35	20 mm thick cement plastering CM 1:4	Sqm	0.025		
5.37	Km Stone Type 2	Each	0.04	0.09	
7.04	25 mm thick guniting M-25	Sqm	0.0178		

Note - Quantity of water for per cum of :-

- (i) Earth work - 90 litre
- (ii) Puddle work -130 litre
- (iii) Concrete/ Masonry work - 180 litre

ANNEXURE-2
Transportation Charges for Materials by Any Mode
(Including Mechanical Means)
(Excluding loading and unloading charges)

S.No.	Distance	Earth/ Sand/ Moorum / in Rs./cum	Rubble/ Size stone/ Cut stone/ Coarse aggregate in Rs. /cum	Cement/ Steel / Pipes/ AC & GI sheets/ RCC pole/CC block/Wood in Rs./tonne	Water in Rs. / 1000 ltr
1	Lead up to 50 m (Covered by item rate)	Initial lead	Initial lead	Initial lead	Initial lead
2	Lead up to 100 m	35.10	57.50	47.70	34.10
3	Lead up to 150 m	35.90	58.30	48.20	34.60
4	Lead up to 200 m	36.90	59.20	48.80	35.20
5	Lead up to 500 m	42.50	64.60	52.30	38.70
6	Lead up to 1 km	51.60	73.90	57.90	44.40
7	Lead more than 1 km but up to 2 km	62.30	84.60	64.60	51.00
8	Lead more than 2 km but up to 3 km	72.60	94.90	71.10	57.50
9	Lead more than 3 km but up to 4 km	82.50	104.80	77.30	63.70
10	Lead more than 4 km but up to 5 km	92.10	114.40	83.20	69.60
11	Add for every additional 1 km beyond 5 km but up to 30 km	8.00	8.00	5.00	5.00
12	Add for every 1 km beyond 30 km	7.10	7.10	4.40	4.40

No loading and un-loading charges shall be added.

S.No.	Description of Items	Earth/ Sand/ Moorum / in Rs./cum	Rubble/ Size stone/ Cut stone/ Coarse aggregate in Rs. /cum	Cement/ Steel / Pipes/ AC & GI sheets/ RCC pole/CC block/Wood in Rs./tonne	Water in Rs. / 1000 ltr
1	Loading	40.50	82.00	75.2	23.80
2	Unloading	11.30	41.00	75.2	Gravity

Notes: 1. Unloading of materials includes stacking wherever applicable.

LIFT CHARGES FOR MATERIALS			
S. No	Total lift (Total lift includes initial lift)	Earth /Sand /Gravel Moorum / Size stone / Cut stone /	Cement / Reinforcement steel
1	Total lift up to 1.50 m (covered by item rate)	Initial lift	Initial lift
2	Total lift up to 3.00 m	7.2	5.2
3	Add for every addition 1.5 m. lift beyond 3.00 m.	7.2	5.2

ANNEXURE-3

Items of Work to Be Taken From S.O.R. of other Department

S. No.	Item of Works Related to	S.O.R. to be referred
1	Building Works	P.W.D.
2	Brick masonry	P.W.D.
3	Flooring	P.W.D.
4	Plastering	P.W.D.
5	Wood Work, Joinery, Steel /Rolling/ Collapsible Shutters, Grills etc.	P.W.D.
6	Ceiling and wall Boarding	P.W.D.
7	Roofing	P.W.D.
8	R.C.C. Slab, Beams, for building	P.W.D.
9	White/Colour washing, Distemping	P.W.D.
10	Painting	P.W.D.
11	Road Work	M.P.R.R.D.A.
12	Water Supply	P.H.E.
13	Sewerage & Drainage	P.H.E.
14	Sanitary Fittings	P.H.E.
15	Electrical Works :- Wiring & cable drawing, Accessories, Switches, Distribution, Fuse Boards & Bar Chambers, Fixing of IC switch/Fuses, Maintenance Circuit, Earthing & Lighting, Conductor External electrification- Fans, Fluorescent Tube Fittings, Mercury Vapour Fitting and Miscellaneous.	P.W.D.

ANNEXURE-4

Statement of Rates for Materials - General Construction Materials

GENERAL GUIDE LINES :

- The rates for materials shall be inclusive of all taxes, duties and other local levies.
- The rates for materials shall be inclusive of royalty charges wherever applicable.

S. No.	Description of Material	UNIT	Rate in Rs.
1	Asphalt 80 / 100 Grade	Kg.	47.00
2	Bentonite	tonne	6550.00
3	Binding wire	Kg.	60.00
4	Cement	Kg.	4.50
5	Coal tar epoxy paint	Ltr	230.00
6	Coarse aggregate 10-4.75 mm (Data Rates)	cum	1181.00
7	Coarse aggregate 20-10 mm (Data Rates)	cum	966.00
8	Coarse aggregate 40-20 mm (Data Rates)	cum	723.00
9	Coarse aggregate 80-40 mm (Data Rates)	cum	557.00
10	Copper sheet 16 SWG	Kg.	600.00
11	Coursed rubble stone 300 x 300 x 450 mm	Each	21.00
12	Coursed rubble stone 300 x 300 x 600 mm	Each	27.00
13	Detonating fuse coil	Rm	9.00
14	Detonator delay type	Each	20.00
15	Detonator electric	Each	12.00
16	Detonator ordinary	Each	7.00
17	Empty cement bag	Each	3.00
18	Fine aggregate / sand (unscreened) (Data Rates)	cum	707.00
19	Fine aggregate / sand (screened) (Data Rates)	cum	805.00
20	Hume pipe with collar 150 mm dia	Rm	310.00
21	Hume pipe with collar 300 mm dia	Rm	650.00
22	Ironite compound	Kg.	22.00
23	LDPE sheet 150 micron thick	sqm.	20.00
24	Moorum (Data Rate)	cum	156.00
25	PVC water stopper 310 mm wide (central bulb type)	Rm	220.00
26	Reinforcement steel	Kg.	35.50
27	Rough stone 200 x 200 x 750 mm	Each	18.00
28	Size stone 150 to 200 mm height	Each	8.00
29	Size stone 200 to 250 mm height	Each	10.00
30	Size stone 250 to 300 mm height	Each	13.00
31	Stainless steel plate / flats	Kg.	160.00
32	Stone chips (at dump yard /spoil banks	cum	302.00

33	Stone chips (at quarry) (Data Rates)	cum	431.00
34	Structural steel angle / channel / beam / bars	Kg.	32.80
35	Structural steel plate / flats	Kg.	34.10
36	Through stones 200 x 200 x 300 to 450 mm long	Each	14.00
37	Through stones 250 x 250 x 450 to 600 mm long	Each	20.00
38	Through stones 300 x 300 x 650 to 750 mm long	Each	25.00
39	Un-coursed rubble stones (at dump yard /spoil banks)	cum	205.00
40	Un-coursed rubble stones (at quarry) (Data Rates)	cum	347.00
41	Water proof cement paint	Kg.	50.00
42	Water proofing compound	Kg.	52.00

STATEMENT OF WAGES OF WORKERS

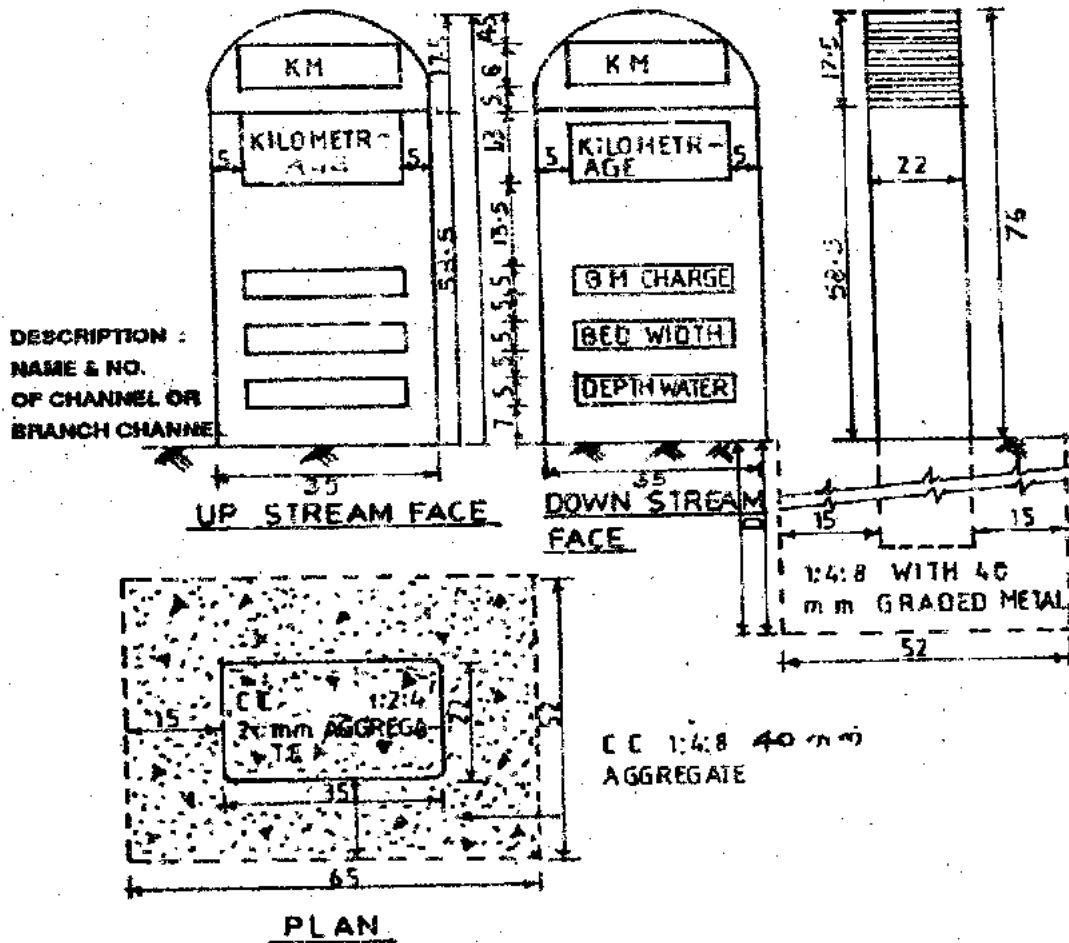
**As per labour Commissioner Indore Order No. ...1/11/5/2014/34725-35124
dated 31/10/2014**

S. No.	Category	Rate Per Day	Rate Per Month
1	Highly Skilled	374	9735
2	Skilled	324	8435
3	Semiskilled	271	7057
4	Unskilled	228	5939

ANNEXURE-5

KILOMETRE STONE TYPE - 2

TYPE DESIGN - 2



SCHEDULE OF REINFORCEMENT					
BAR NO	DIA IN mm	NO OF BARS	SHAPE OF BARS	LENGTH IN mm	
				EACH BAR	TOTAL
1	10	2	U	2571	5142
2	6	6	J	1144	6864

NOTE :-

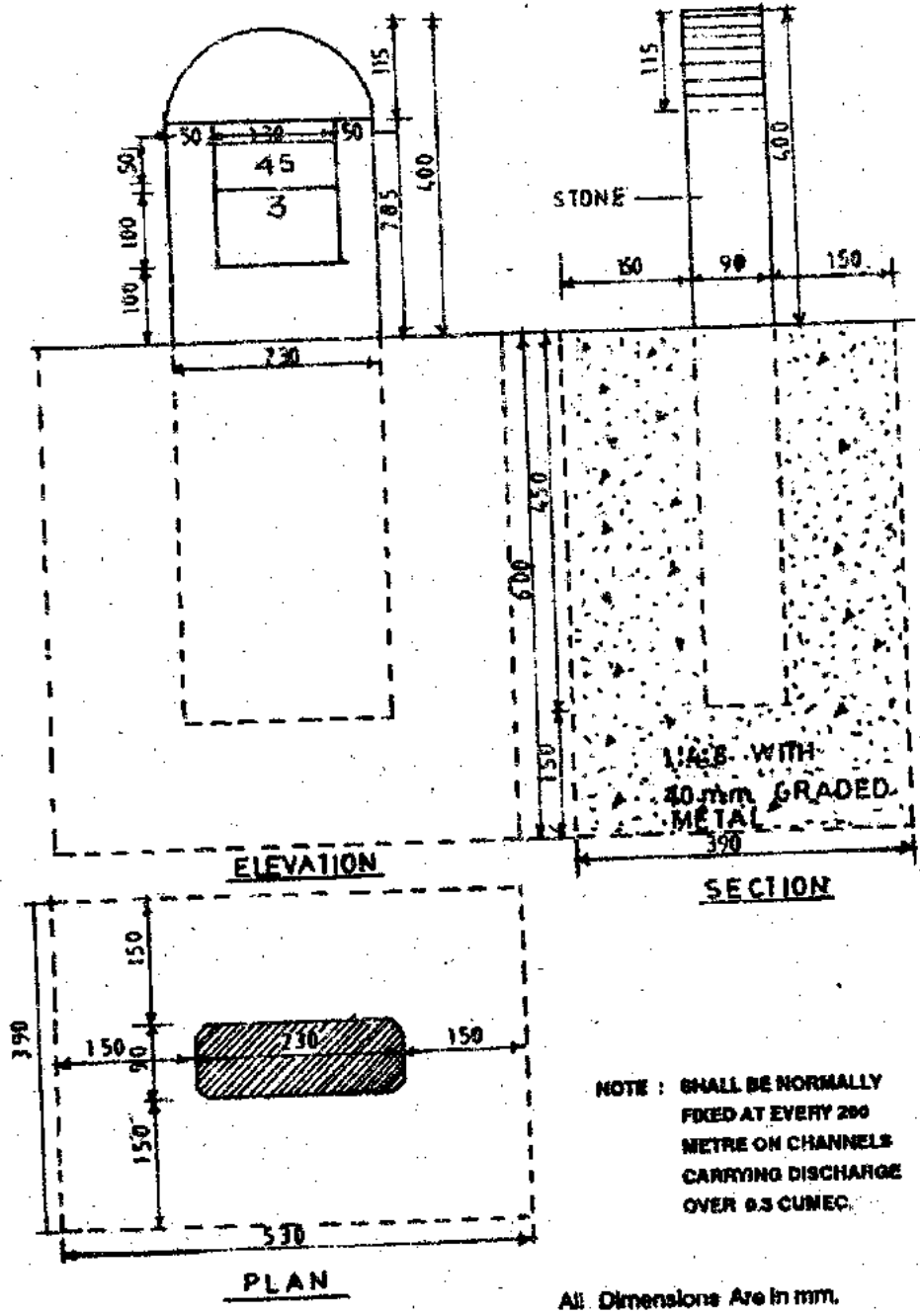
- All Dimensions Are in cm.
- For All Channels Carrying Less Than 3 cumec.

TOTAL Wt. = 6.80 Kg.

SCALE : 1 cm = 10 cm.

ANNEXURE-6 0.2 Kilometre Stone Type Design -3

TYPE DESIGN - 3 - 0.2 KILOMETRE STONE



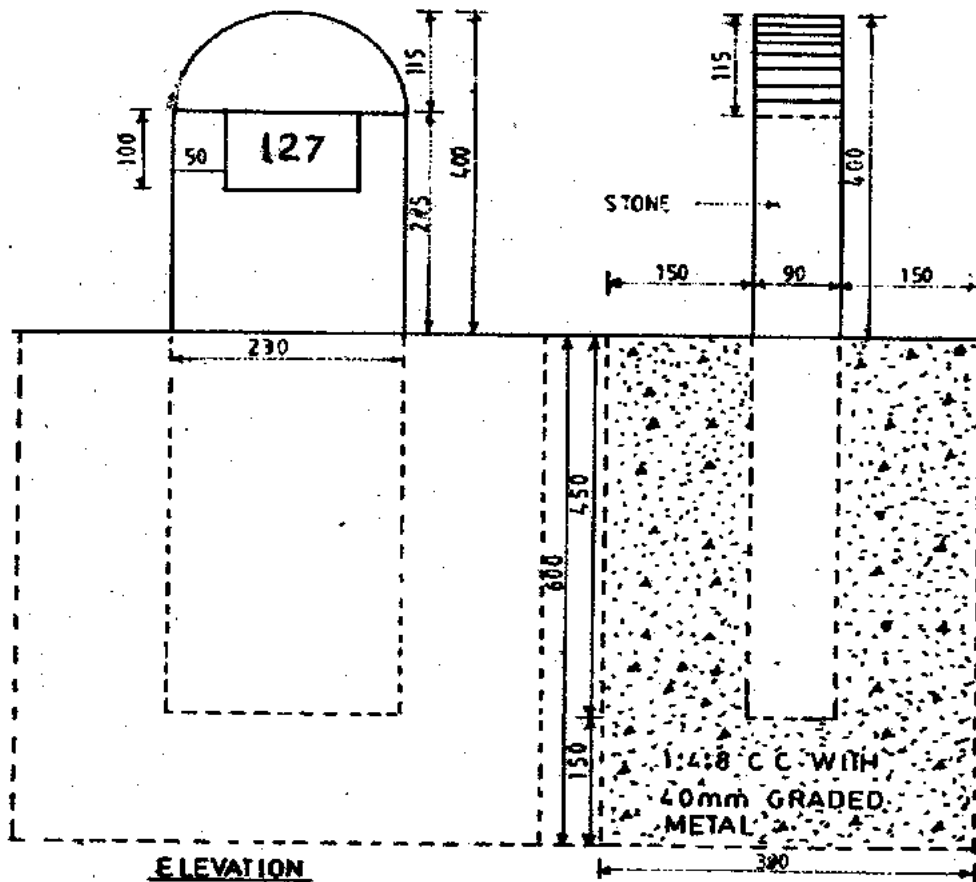
NOTE : SHALL BE NORMALLY
FIXED AT EVERY 200
METRE ON CHANNELS
CARRYING DISCHARGE
OVER 0.3 CUMEC.

All Dimensions Are in mm.

ANNEXURE-7

Chainage cum Boundary Stone Type Design-4

TYPE DESIGN-4 CHAINAGE CUM BOUDARY STONE



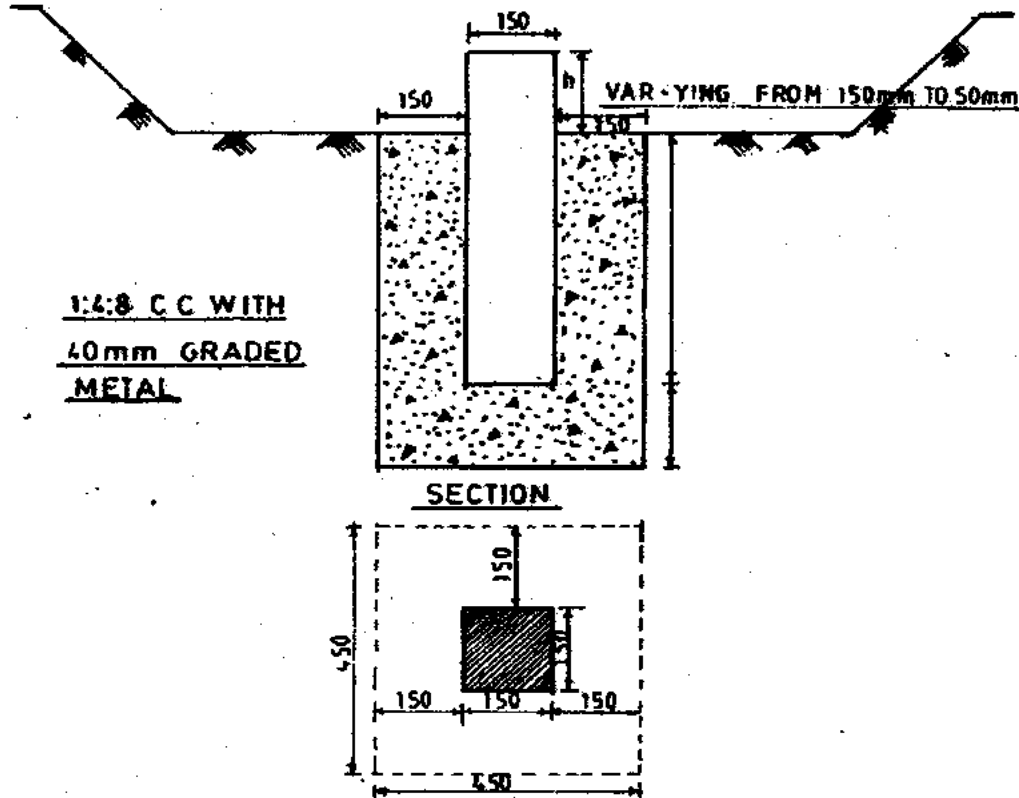
NOTE:-

Shall be used as Chainage Cum Boundary Stone for all Irrigation channels and as Boundary Stone for Demarcating Boundaries of Head work Building, Quarries Etc.

All Dimensions Are In m m

ANNEXURE-8 Bed grade Stone Type Design-5

TYPE DESIGN-5 BED GRADE STONE



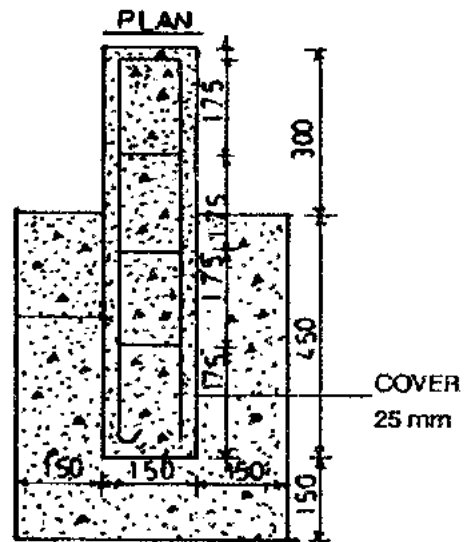
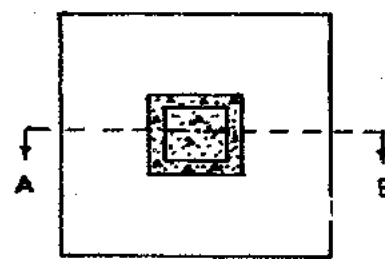
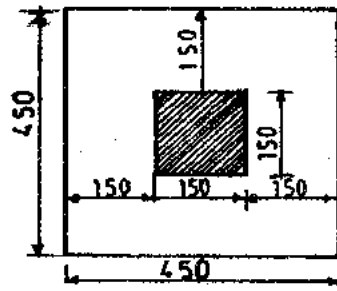
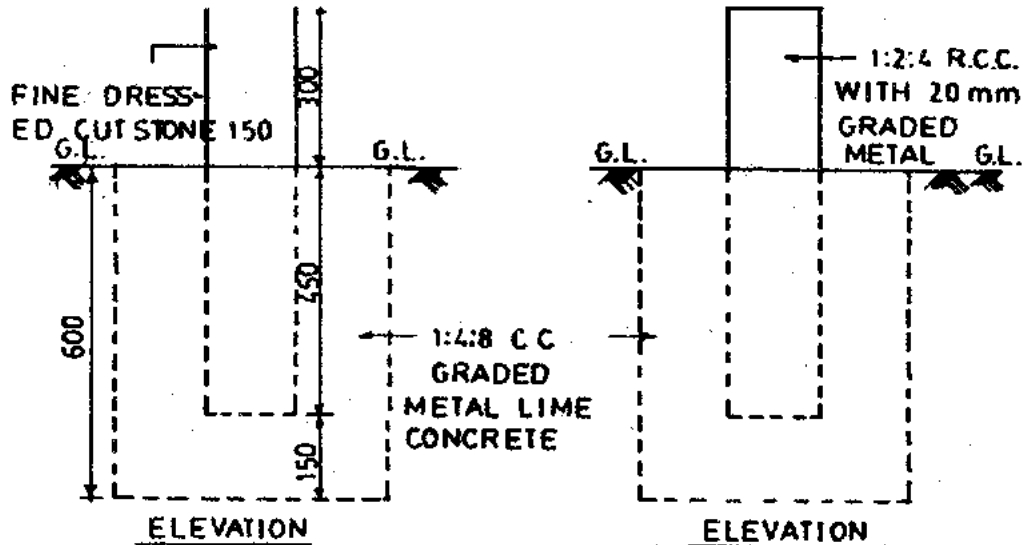
**NOTES:- THE HEIGHT OF BED GRADE STONE ABOVE
DESIGNED BED LEVEL SHALL BE 15cm FOR
DISCHARGE ABOVE 3 cumec 10 cm FOR
DISCHARGE FROM 0.5 TO 3 cumec AND
5cm BELOW 0.5 CUMEC**

All Dimensions Are In mm

ANNEXURE-9

Ordinary Bench Mark Type Design-6

TYPE DESIGN 6 - ORDINARY BENCH MARK



SCHEDULE OF REINFORCEMENT					
BAR NO	DIA IN mm	NO OF BARS	SHAPE OF BARS	LENGTH IN mm	
				EACH BAR	TOTAL
1	6	2		1632	3264
2	6	3		496	1488
TOTAL					4752

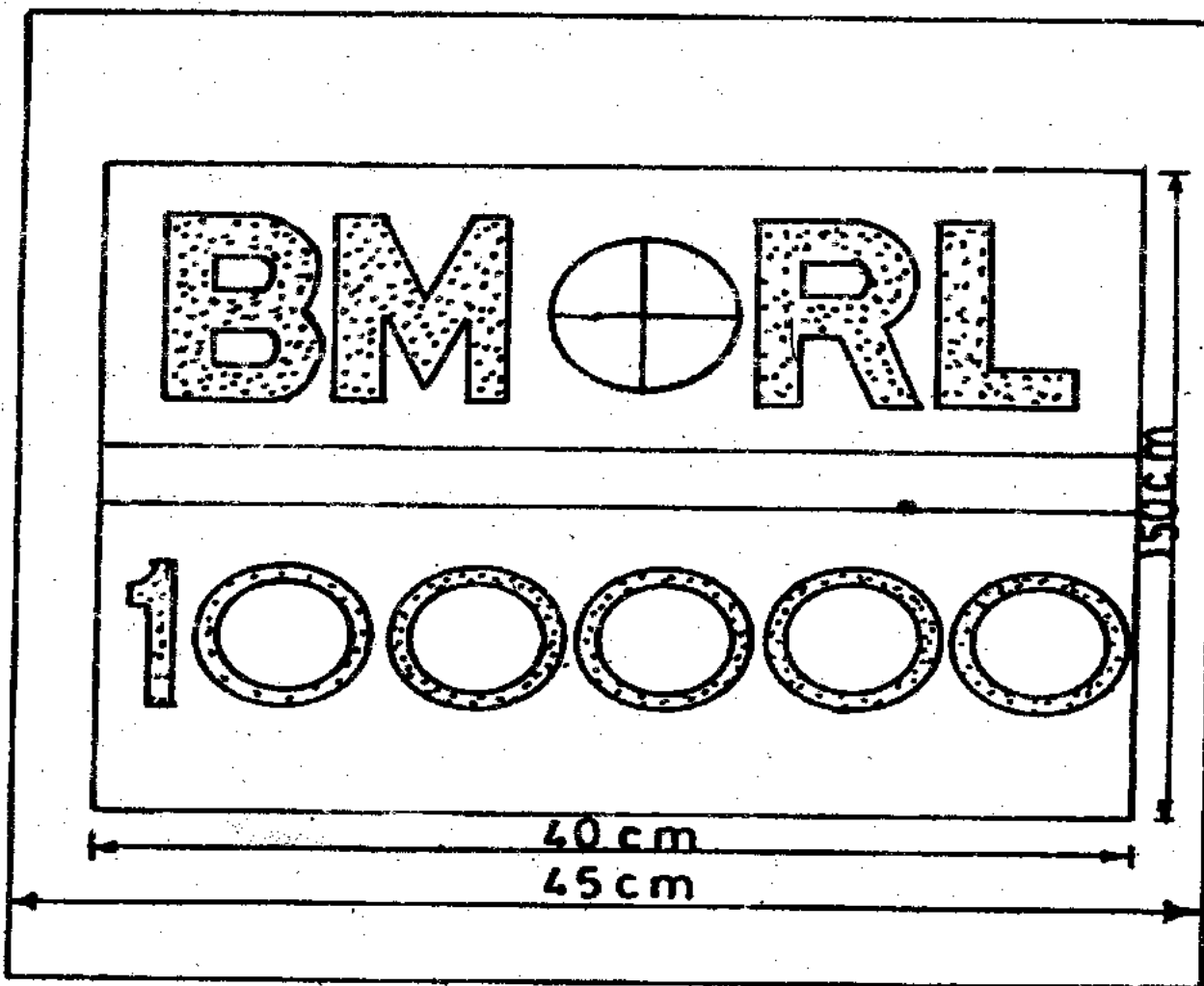
Wt @ .22 Kg/m 1.045 Kg
SAY 1.05 Kg.
All Dimensions Are in mm

SECTION AT 'A-A'

ANNEXURE-10

Bench Mark on Masonry Work Type Design-7

BENCH MARK ON MASONRY WORK TYPE DESIGN - 7

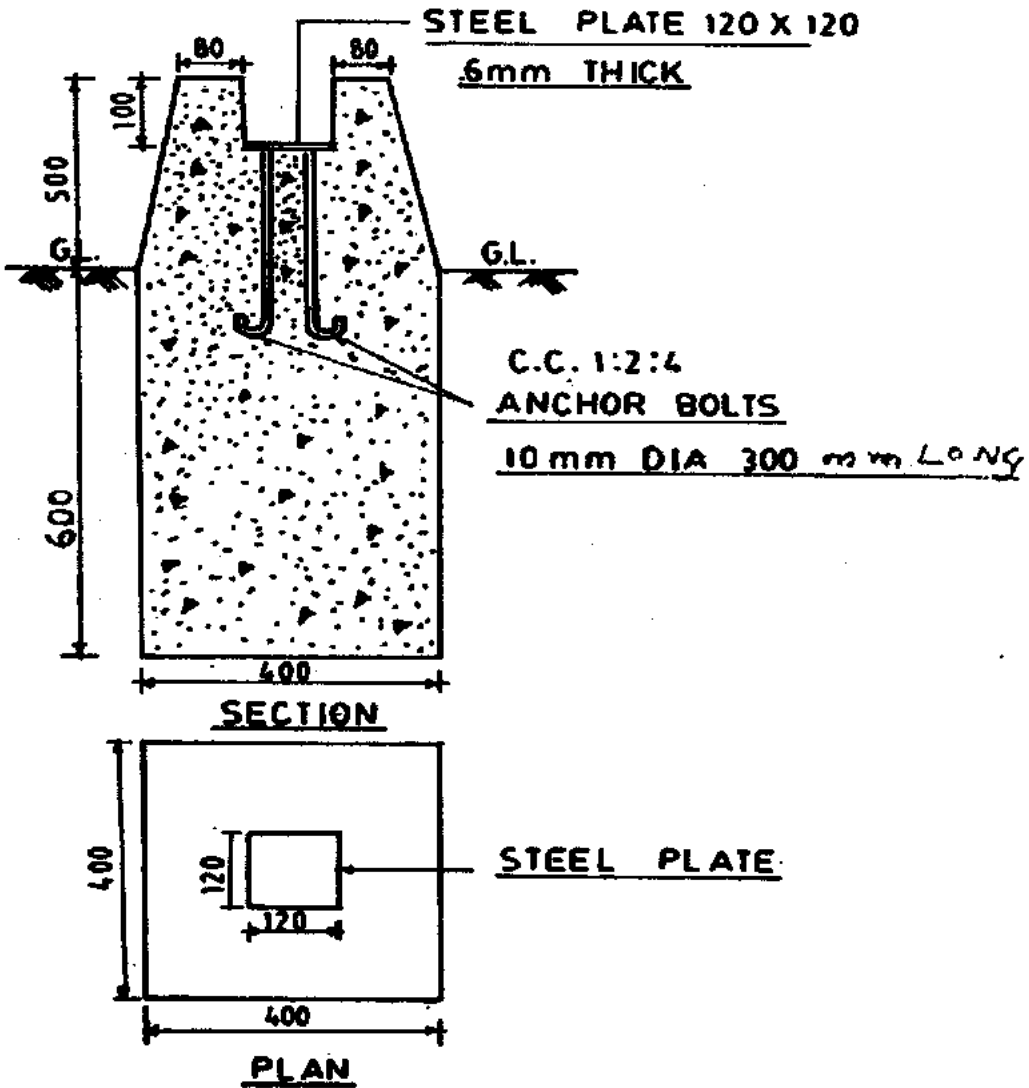


BENCH MARKS ESTABLISHED ON MASONRY WORKS ARE INEXPENSIVE AND SERVE AS PERMANENT BM. THESE MAY BE ESTABLISHED EITHER NEAR THE EDGE OR IN THE CENTRE OR THE PARAPET CONSTRUCTED ON THE OUTER EDGE OF THE SERVICE ROAD. BM'S SHOULD BE ESTABLISHED ON ALL IMPORTANT MASONRY WORKS ON A CANAL. THERE SHALL BE ATLEAST ONE BM AT EVERY KM: DISTANCE.

NOT TO SCALE

ANNEXURE-11
Standard Bench Mark Type Design-8

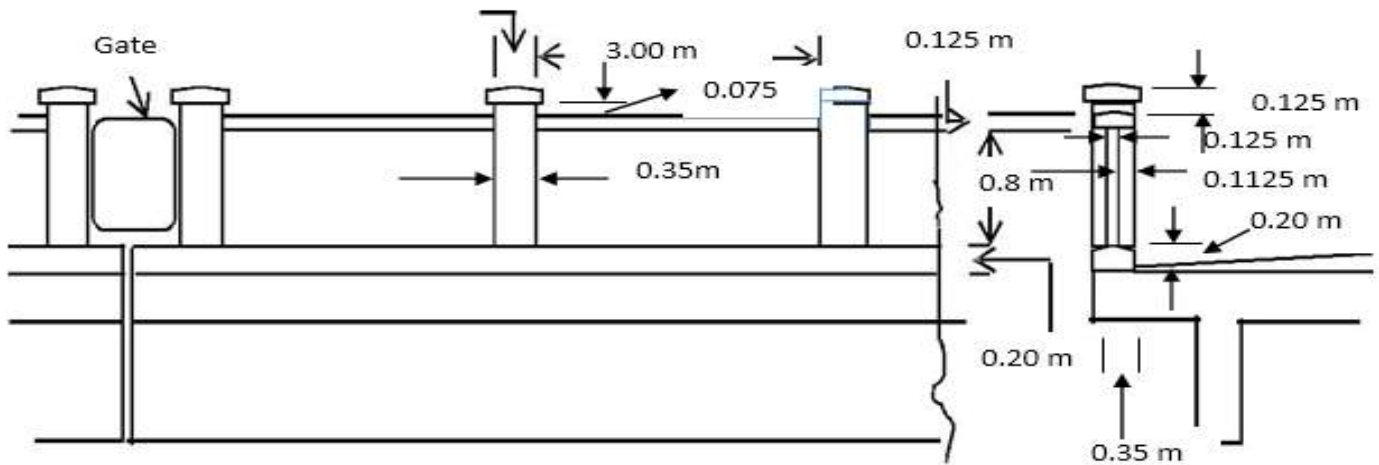
**STANDARD BENCH MARK
TYPE DESIGN - 8**



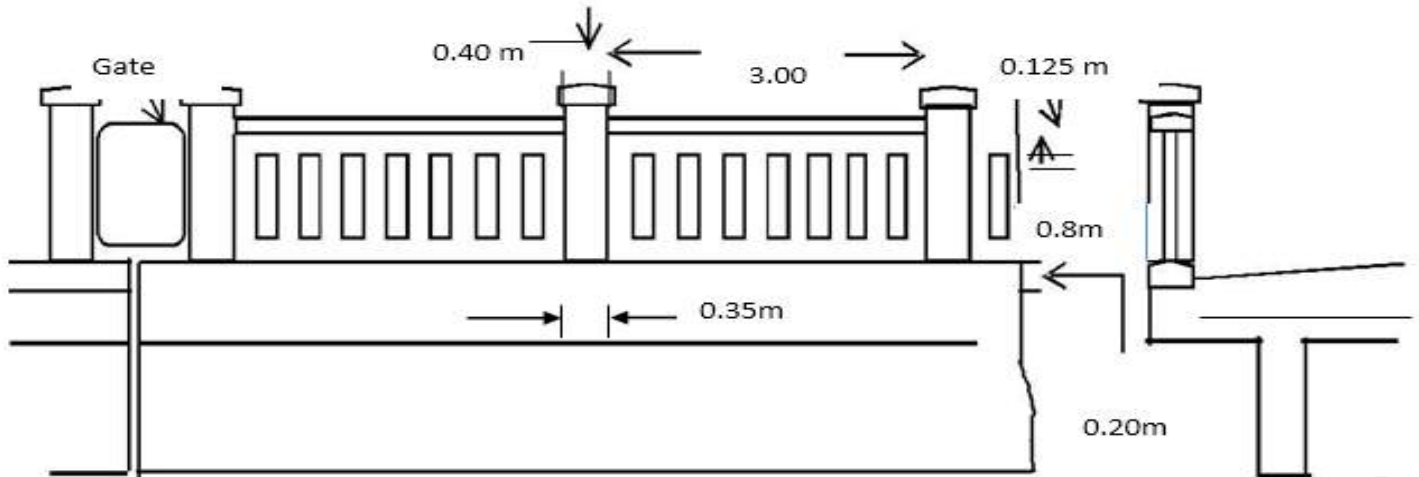
All dimensions are in mm

SCALE :- 10mm = 10 cm

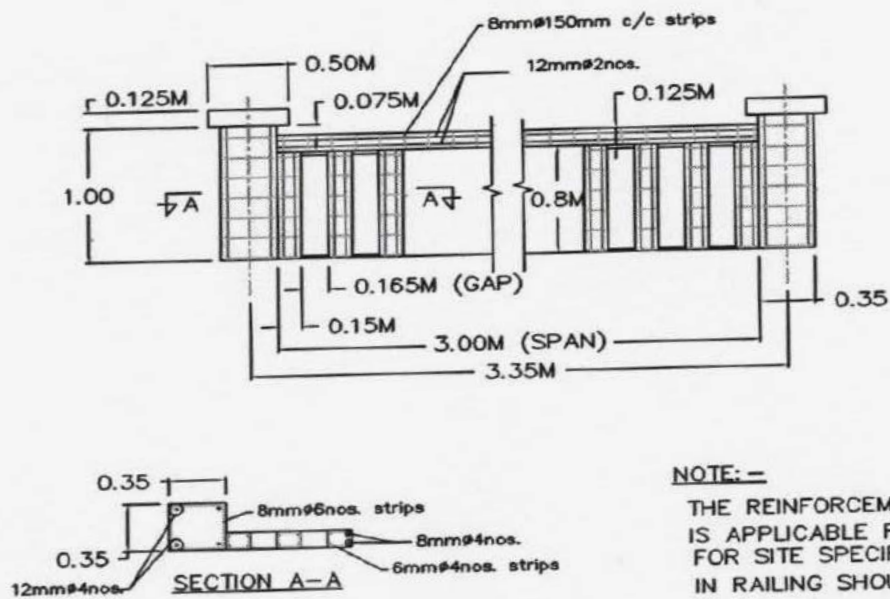
ANNEXURE-12
Drawing of Parapet Wall



SKETCH SHOWING COMPONENTS OF RCC SOLID PARAPET



DETAILS OF REINFORCEMENT OF PARAPET WALL



NOTE: -

THE REINFORCEMENT SHOWN IN DRAWING IS APPLICABLE FOR NORMAL CONDITION. FOR SITE SPECIFIC REQUIREMENT THE REINFORCEMENT IN RAILING SHOULD BE PROVIDED AS PER DESIGN.